

# Lake Nipissing Fisheries Management Plan

## “Valuing a Diverse Fishery”

Ontario Ministry of Natural Resources and Forestry

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## **Titles and Approval**

### **FISHERIES MANAGEMENT PLAN**

**For**

### **Lake Nipissing**

**Encompassing a portion of the Ontario Ministry of Natural Resources and Forestry  
Administrative District of North Bay.**

I certify that this plan has been prepared using the best available science and is consistent with accepted fisheries management principles. I further certify that this plan is consistent with the Ontario Ministry of Natural Resources and Forestry's strategic direction, the Ontario Ministry of Natural Resources and Forestry's Statement of Environmental Values and direction from other sources. Thus, I recommend this fisheries management plan be approved for implementation.

Recommended by:

**Original Signed By**

Mitch Baldwin, District Manager, North Bay District

**August 21, 2014**

(Date)

Approved by:

**Original Signed By**

Corrinne Nelson, Regional Director, Northeast Region

**September 9, 2014**

(Date)

## **Executive Summary**

### **FISHERIES MANAGEMENT PLAN FOR LAKE NIPISSING**

Fisheries management planning is a key component of the Ecological Framework for Fisheries Management (EFFM) in Ontario. The EFFM is an operational framework that provides the building blocks for improving the way recreational fisheries are managed in Ontario. Fisheries Management Planning is consistent with the Ministry of Natural Resources and Forestry's (MNRF) current strategic directions outlined in Our Sustainable Future (OSF) and the goals and objectives of the Ontario Biodiversity Strategy (OBS). It is also aligned with the fisheries policy principles stated in the Strategic Plan for Ontario Fisheries (SPOF II).

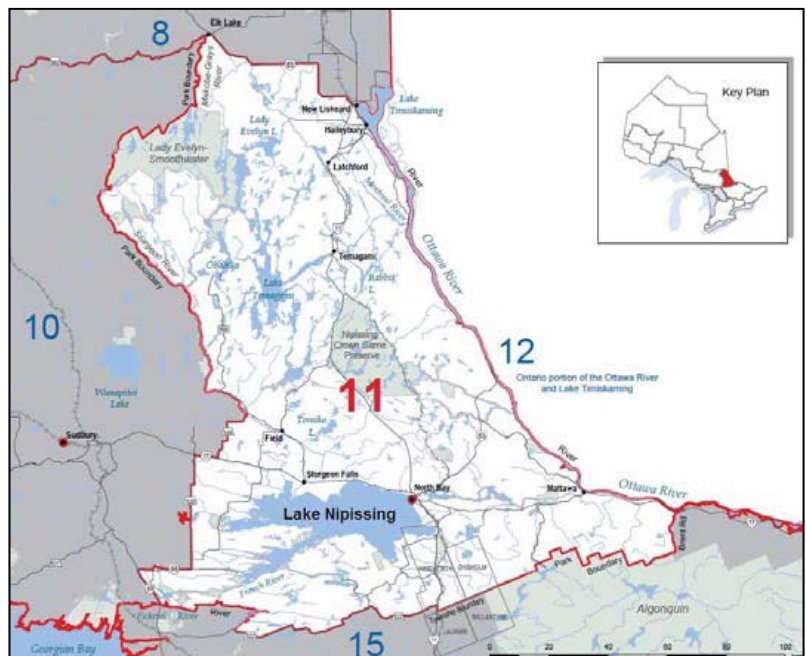
The Fisheries Management Plan (FMP) is designed to highlight the value of the diversity of the lake and to be flexible and adaptable to a wide range of future conditions. The planning process considered the lake in a holistic manner and included a range of management options to ensure a healthy lake environment, conserve the diversity of the fish community and provide opportunities to contribute to the social and economic well-being of the surrounding area.

The final FMP is intended to be a dynamic document that may be amended as circumstances require. An adaptive management approach will be taken with periodic internal review (5 year review periods) to evaluate the progress towards targets and continued appropriateness of plan objectives. Management actions including fishing regulation changes may be required throughout plan implementation to ensure the sustainability of Lake Nipissing's fisheries.

### **Purpose and Scope**

The Lake Nipissing FMP has been developed by the MNRF with input and advice from the Lake Nipissing Fisheries Management Plan Advisory Council (LNFMPAC) along with input received from the broader public at key stages of the plan development process. The planning area lies within the geographic boundaries of Lake Nipissing, a Specially Designated Water (SDW) within the broader Fisheries Management Zone (FMZ 11). The Lake Nipissing FMP will be integrated into the broader FMZ 11 management plan.

Lake Nipissing supports a diverse fish community and offers a wide variety of angling opportunities (e.g. walleye, yellow perch, northern pike, bass, muskellunge, lake herring (cisco) and lake whitefish). The Lake Nipissing recreational fishery is an important economic and social engine within FMZ 11 contributing to a significant local tourism industry. The lake also provides aboriginal subsistence and commercial fisheries that are primarily focused on walleye, but also on whitefish and northern pike.



**Location of Lake Nipissing, a specially designated water body found within Fisheries Management Zone (FMZ) 11.**

### *Fisheries Management Plan for Lake Nipissing*

Goals and objectives are identified herein that address challenges as well as identify opportunities associated with the management of Lake Nipissing's fisheries. The plan identifies actions to assist MNRF in balancing the demands for the use of the resource with the biological capacity of the lake. This balance is based on an analysis of fisheries data and collaborative discussions with members of the public, stakeholders, First Nations and aboriginal communities, and local governments.

The plan focuses on enhancing, promoting and maintaining open communication between government, stakeholders and First Nations by providing a framework for the cooperative management of the fishery. The goals of the plan are to:

- Recognize and understand the natural capacities of Lake Nipissing and to develop and sustain a diverse fishery within those limits within an adaptive management framework.
- Move towards an ecosystem-based approach which recognizes values and manages all components of the lake's fishery and ecosystem.
- Enhance Lake Nipissing as a desirable fishing destination.
- Manage the lake sustainably to provide social, cultural, recreational and economic benefits while respecting Aboriginal and Treaty rights.
- Proactively share all information on the fishery leading to informed use and recognition of its value.
- Increase public understanding of fisheries information to achieve a positive state of stewardship and advocacy for the resource.
- Actively develop/establish partnerships with stakeholders to leverage other resources to achieve plan objectives.

The Lake Nipissing FMP moves towards an ecosystem-based approach that emphasizes the importance of several components of a healthy lake and addresses the significant sustainability issues facing the fishery (i.e., decline in the walleye population) while promoting the diverse angling opportunities the lake has to offer. The MNRF plans to actively develop/establish partnerships with First Nations and stakeholders to leverage other resources to achieve plan objectives via a series of strategies that reflect management priorities within the lake. Each strategy identifies the management challenges or opportunities and associated objectives and management actions. Specifically, these strategies include:

#### Recreational Fishery Management Strategies

- Walleye Management
- Northern Pike Management
- Yellow Perch Management
- Smallmouth and Largemouth Bass Management
- Muskellunge Management
- Lake Herring Management
- Lake Whitefish Management

#### Management Strategies for Ecosystem Health

- Water Quality and Quantity
  - Water Quality
  - Water Levels
  - Fish Habitat

## *Fisheries Management Plan for Lake Nipissing*

- Biological Changes
  - Fish Community
  - Species at Risk
  - Invasive Species
  - Cormorants
  - Fish Disease
- Climate Change

### Other Management Strategies

- Enforcement
- Commercial Ice Huts

## **Recreational Fishery Management Strategies**

### **Walleye Management**

Key highlights include the implementation of a new minimum size limit that allows anglers to harvest fish 46cm in length or greater, while maintaining the current catch limit of two fish for sport licence holders and one fish for conservation licence holders. The regulation is intended to provide increased protection for the remaining strong year classes of juvenile walleye, enabling them to reach spawning age and contribute to restoring the population; to increase the abundance of spawning females, to increase the overall abundance and biomass of walleye, and to promote a low risk and short-term recovery period for walleye in the lake.

The plan identifies opportunities to improve collaboration with First Nations to better understand the demand for walleye by their communities for food, cultural, spiritual and commercial purposes. The plan also identifies opportunities to continue collaborative research efforts and expand the scope of studies to enhance existing information. It will increase public awareness of walleye biology and the limitations of some management tools (e.g. stocking within the current Lake Nipissing context).

The new regulation for walleye was implemented on May 17, 2014.

### **Northern Pike Management**

Recent studies indicate the northern pike population is showing signs of stress with a decline in the overall abundance of northern pike in the lake. A more thorough data review of the pike population dynamics and status in the lake is required in order to properly inform future management actions for the species. The pike regulation for the lake will remain unchanged until this data review is complete.

### **Yellow Perch Management**

Highlights of the yellow perch strategy include doubling the daily catch limit to promote increased harvest. Daily catch and possession limits for sport licence holders have changed from 25 fish per day to 50 fish per day. This is an attempt to decrease abundance of yellow perch to historical levels while taking a cautionary approach. This may also facilitate the recovery of walleye in the lake by reducing potential competition for resources from perch and to re-stabilize the fish community.

The new regulation for yellow perch was implemented on January 1, 2014.



### *Fisheries Management Plan for Lake Nipissing*

#### **Smallmouth and Largemouth Bass Management**

Key highlights include the implementation of a new bass regulation that promotes angling for bass focussing on their sporting qualities and providing additional angling opportunities by opening the season one week earlier than in previous years.

The new regulation for bass was implemented on June 21, 2014.

#### **Muskellunge Management**

The muskellunge fishery on the lake is primarily a trophy fishery that is sustainable at this time. The existing regulations are being carried forward under this plan.

#### **Lake Herring and Whitefish Management**

There is currently very little demand for these species by the recreational fishery. As such, they have both received very limited management effort to date. Although the whitefish population appears to be relatively stable, there is evidence that the herring population is declining in the lake. At this time, the plan maintains existing regulations for both species with the intention of enhancing assessment efforts to acquire a better understanding of the status of these populations.

Fishing regulations for all recreational sportfish species may be adjusted throughout plan implementation based on relevant and updated science and management objectives.

### **Summary of Recent Regulation Changes for Lake Nipissing**

	<b>Current Regulation</b>	<b>New Regulation</b>
<b>Yellow Perch</b> (Implementation Date: Jan 1, 2014)	<b>Season:</b> January 1 to March 15 3 <sup>rd</sup> Saturday in May to October 15  <b>Catch / Possession Limits:</b> Sport - 25 / 50 Conservation 25 / 25	<b>Season:</b> January 1- March 15 3 <sup>rd</sup> Saturday in May to October 15  <b>Catch / Possession Limits:</b> Sport - <b>50</b> / 50 Conservation – 25 / 25
<b>Walleye</b> (Implementation Date: Open Water Season Opener: May 17, 2014)	<b>Season:</b> Jan 1 to March 15 3 <sup>rd</sup> Saturday in May to October 15  <b>Catch Limits:</b> Sport – 2 Conservation – 1  <b>Size Limit:</b> None between 40 to 60 cm (15.7 to 23.6 inches)	<b>Season:</b> January 1 to March 15 3 <sup>rd</sup> Saturday in May to October 15  <b>Catch Limits:</b> Sport – 2 Conservation – 1  <b>Size Limit:</b> <b>None less than 46 cm (18 inches)</b>
<b>Smallmouth and Largemouth Bass</b> (Implementation Date: Season Opener: June 21, 2014)	<b>Season:</b> 4 <sup>th</sup> Saturday in June to November 30  <b>Catch Limits:</b> Sport – 6 Conservation – 2	<b>Season:</b> <b>3<sup>rd</sup> Saturday in June</b> to November 30  <b>Catch Limits:</b> Sport – 6 Conservation – 2

### **Management Strategies for Ecosystem Health**

Ecosystems are naturally complex. Key characteristics of healthy integrated ecosystems include structural elements (e.g., species composition, native biodiversity and a variety of habitats) and functional processes (e.g., energy flow, material transport and hydrological processes). A healthy aquatic ecosystem operates within a range of natural variation providing a benchmark for understanding and measuring ecosystem health. This informs planning decisions by describing the current state of the ecosystem.

Each characteristic was considered along with input on other environmental, social and economic requirements when the management strategies for a healthy Lake Nipissing ecosystem were developed. The plan identifies management strategies within three broad categories of impacts that can affect the Lake Nipissing ecosystem, including water quality and quantity, biological changes, and climate change.

### **Water Quality and Quantity Management**

Water quality and quantity in aquatic ecosystems strongly influence lake productivity, biodiversity and structural elements (e.g. fish habitat). A number of water quality, lake level and fish habitat indicators have been identified to be assessed and monitored over time. Collaborating with key partners on the collection and assessment of these indicators will aid resource managers in determining whether changes in water quality will alter fish populations, whether current water level operations are providing for the needs of fish and whether a variety of habitat types are being maintained.

### **Biological Change Management**

Aquatic ecosystem monitoring generally involves measuring and observing indicators of biological change. These indicators can provide information on changing climates, water quality and quantity and respond to changing patterns of fish resource use. For Lake Nipissing, the biological indicators selected were fish community, including species at risk and invasive species, cormorants and fish disease. Key management actions include assessment and monitoring to improve our understanding of fish community dynamics, anticipate and mitigate impacts from cormorants and prevent the expansion of fish diseases.

### **Climate Change Management**

Ontario's climate is warming and becoming increasingly variable. Projected climate change impacts could include higher water temperatures, fluctuating ice on and off dates, changes in lake productivity and creation of favourable or less favourable conditions for species. A key management action for climate change is to conduct a vulnerability assessment on the watershed to assist in identifying adaptation needs, developing adaptation strategies, developing or expanding on existing monitoring programs and understanding if vulnerabilities have increased, decreased, or been eliminated.

### **Other Management Strategies**

#### **Enforcement**

Enforcement is important to ensure successful implementation of management actions intended to safeguard the public interest. Key highlights include actions to annually review enforcement issues in order to establish annual enforcement priorities for the lake, continuing to collaborate with First Nations to build enforcement capacity and helping to educate users on plan management strategies.

### **Commercial Ice Huts**

Commercial ice huts are now commonplace on the lake with 90 per cent offering overnight accommodation. Growing concern from the public over the impact of overnight ice huts led to the creation of a commercial ice hut licence. A review of winter angler surveys indicates that very few walleye are caught overnight and it has not measurably increased overall angling effort. The plan proposes to continue to implement the commercial ice hut program as per the status quo.

## 1.0 Introduction

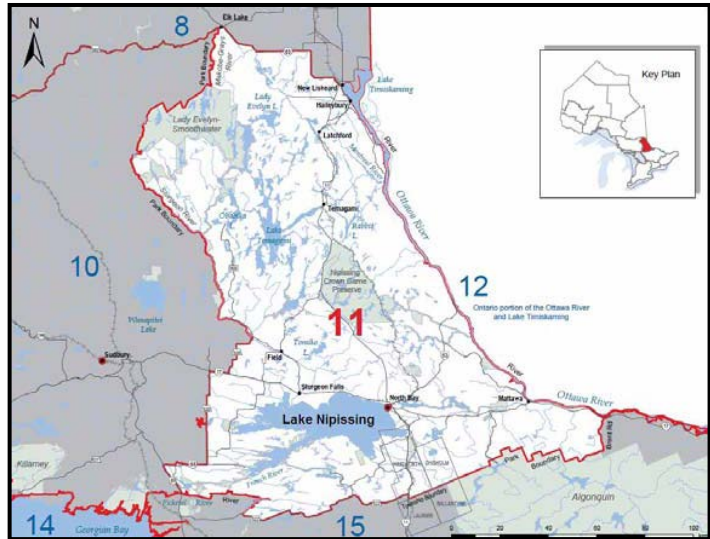
At 87,325 hectares, Lake Nipissing is the largest lake in FMZ 11 (Figure 1) and the fifth largest inland lake wholly within the province of Ontario. Despite its size, Lake Nipissing was referred to by early Natives as 'N'bisiing' or 'little water' because of the size of this lake in comparison to the Great Lakes. In Algonquin, (the linguistic group of the Ojibwe), 'N'bisiing' comes from 'Nbi' meaning 'water' and 'siing' meaning 'little' (Norm Dokis, MNRF, personal communication).

Lake Nipissing is surrounded by a population of approximately 75,000, including the larger municipalities of North Bay, West Nipissing and Callander, in addition to two First Nation communities; Nipissing No. 10 and Dokis No. 9. It is accessed from the south via Highway 69 & 11, from the north via Highway 11, and from the east and west via Hwy 17 (Figure 2). It is currently the seventh most fished lake (including the Great Lakes) in the province with the fisheries being an important economic and social engine within FMZ 11 and the local communities. A detailed economic evaluation associated with the present day fishery is required.

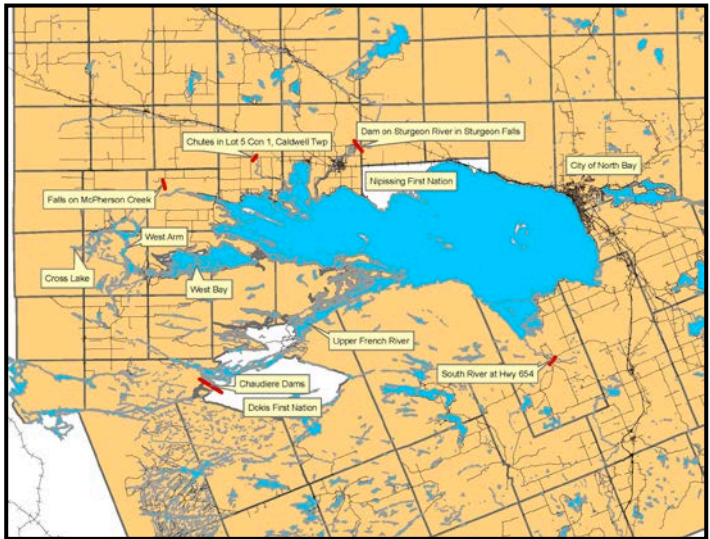
The fisheries also provide cultural, social and economic benefits to both the Nipissing First Nation (NFN) and Dokis First Nation (DFN). Both First Nations rely on the lake for subsistence fishing, while NFN also has a court-recognized treaty right to commercially fish the lake. Currently, NFN undertakes the commercial fisheries on Lake Nipissing (i.e., walleye, whitefish and northern pike) and provides statistical information to MNRF; while MNRF manages the recreational fisheries. The focus of this plan is to address the recreational fisheries management strategies; this plan does not directly address commercial fisheries management strategies. It will, however, incorporate strategies or actions where the two fisheries overlap and it will highlight key areas of collaboration and cooperation between the First Nations and MNRF.

### Background

Lake Nipissing is classified as a Specially Designated Water (SDW) within Fisheries Management Zone 11. SDW's are designated to recognize the importance of specific water bodies to the broader region or Province of Ontario. These waters may have unique challenges requiring more intensive monitoring and planning separate from that of the broader FMZ.



**Figure 1: Location of Lake Nipissing, a specially designated water body found within Fisheries Management Zone (FMZ) 11 (MNRF).**



**Figure 2: Depiction of the Boundaries of Lake Nipissing.**

### *Fisheries Management Plan for Lake Nipissing*

Lake Nipissing's fisheries have a long history of human use, beginning with First Nation's historical use of the lake for subsistence fishing and later for commercial purposes which continues today. In addition to subsistence and commercial fishing use by the local First Nations, the lake has also supported a recreational fishery since at least the early 1900s.

The fish community in the lake is dominated by walleye (*Sander vitreus*), yellow perch (*Perca flavescens*), northern pike (*Esox lucius*), and white sucker (*Catostomus commersoni*), with a significant coregonid component consisting of lake herring (cisco; *Coregonus artedii*) and lake whitefish (*Coregonus clupeaformis*). Other significant species include smallmouth bass (*Micropterus dolomieu*), largemouth bass (*Micropterus salmoides*) and lake sturgeon (*Acipenser fulvescens*). A total of 42 fish species have been documented in Lake Nipissing (Appendix 1). The lake sturgeon (*Acipenser fulvescens*; threatened) and the silver lamprey (*Ichthyomyzon unicuspis*) (special concern) both of Great Lakes-Upper St. Lawrence populations are the two fish species at risk in the lake. Rainbow smelt (*Osmerus mordax*), common carp (*Cyprinus carpio*), and black crappie (*Pomoxis nigromaculatus*) are introduced species. This plan identified specific objectives and strategies regarding the management of walleye, northern pike, yellow perch, bass, muskie, whitefish and herring, however it is expected that non-species specific strategies including those identified for water quality, quantity, habitat and others will be beneficial for the sustainability of the broader aquatic community.

The fisheries management plan for Lake Nipissing considers a broader management approach emphasizing the importance of all components of the fishery and managing them appropriately, rather than focussing solely on walleye. Ecosystem-based fishery management aims to conserve the structure and function of aquatic ecosystems in addition to conserving the fishery resources. It moves away from single species, static population management strategies and recognizes and governs under the principle that **diversity is important to ecosystem function and resilience**.

The purpose of the planning process is to develop management strategies and objectives with specific targets and timelines that will assist with and guide the management of the recreational fisheries for the lake. This was done by compiling and analysing relevant data, reviewing the best available science, referencing provincial policies, management guidelines and direction, as well as gathering input from multiple stakeholders and First Nations with a particular interest or concern with Lake Nipissing (Appendix 2).

## **2.0 Strategic Direction and Guiding Principles**

As stewards of Ontario's fisheries resources MNRF governs the strategic direction and guidance documents that are intended to support the fisheries management planning process. This management plan seeks to incorporate strategic direction and guiding principles specific to the needs of Lake Nipissing's fisheries.

### **2.1 Overview of Fisheries Management in Ontario**

Fisheries Management falls within the direct mandates of Fisheries and Oceans Canada (federal) and the Ontario Ministry of Natural Resources and Forestry (provincial). In some instances other governments or agencies are also involved (e.g., local First Nations and conservation authorities). The mandate for fisheries management prescribed by federal legislation falls under the Fisheries Act (FA) and the Species at Risk Act (SARA), and provincial legislation falls under the Fish and Wildlife Conservation Act (FWCA) and the Endangered Species Act (ESA).

## *Fisheries Management Plan for Lake Nipissing*

The MNRF also has authority for fisheries management under a number of provincial statutes including: the Natural Resources Act (NRA); Crown Forest Sustainability Act (CFSA); Public Lands Act (PLA); Lakes and Rivers Improvement Act (LRIA); and the Environmental Assessment Act (EA Act). All of these contain provisions for the protection and perpetuation of the province's fisheries resources.

The MNRF and all other Ontario Ministries must comply with federal legislation to protect fish and fish habitat in all integrated resource management and planning activities (e.g., forestry, waterpower, renewable energy, municipal planning, resource stewardship and development projects, and transportation facilities).

As the lead planning agency for fisheries management in Ontario, the MNRF is responsible for policy, planning and program development; the allocation of sport, commercial, tourist and baitfish fisheries via regulations and licensing; fish culture and stocking programs; species at risk and invasive species management.

MNRF also considers the potential impacts of climate change on fisheries resources and how fisheries management activities need to adapt to these potential changes when deliberating on the sustainable distribution and use of these resources.

## **2.2 Strategic Direction**

The MNRF's mission (from the Statement of Environmental Values) is to manage Ontario's natural resources in an ecologically sustainable way to ensure that they are available for the enjoyment and use of future generations. The MNRF is committed to the conservation of biodiversity and the use of natural resources in a sustainable manner.

At the provincial level, four documents provide strategic direction for managing fisheries resources in Ontario:

1. *Our Sustainable Future: A Renewed Call to Action*
2. *Government Response to Ontario's Biodiversity Strategy*
3. *The Strategic Plan for Ontario Fisheries (SPOF II)*
4. *MNRF's Statement of Environmental Values*

Historically, District Fisheries Management Plans (DFMPs) were developed by the MNRF to guide fisheries management in the late 1980's, but these have since expired. As part of ***MNRF's Ecological Framework for Fisheries Management (EFFM)*** (OMNR 2005), new Fisheries Management Zones (FMZs) are now the main spatial unit for planning and management of fisheries in Ontario. This framework outlines the process for the MNRF, in consultation with FMZ Advisory Councils, to define objectives and strategies for the management of fisheries in each FMZ.

In Ontario there are currently 22 water bodies or groups of waters, including Lake Nipissing, with significant biological, social and economic local, regional or provincial value that are identified as "Specially Designated Waters". These bodies of water may require a more intensive management approach. Lake Nipissing has a long history of being managed individually, including being managed previously as its own fishing division. The lake has been managed in the past under the direction of two lake-specific management plans (1999 – 2003; 2007 – 2010) and will continue to be managed individually under the direction contained herein.

### *Fisheries Management Plan for Lake Nipissing*

Although Lake Nipissing is being managed as an individual waterbody, the broader landscape scale was considered during the planning process. While management planning decisions were made specifically for Lake Nipissing, the effect of these management actions on adjacent fisheries management zones (FMZ 10, 11 and 15) were also considered, including the implications on adjacent SDW's (French River and Lake Temagami). It is estimated that Lake Nipissing accounts for over a third of all angling effort directed at walleye in FMZ 11 (OMNR 2010a and b). Displacement of effort from Lake Nipissing would likely result in a significant impact to surrounding waters both within and outside of the zone. Management actions, particularly those related to walleye have considered the potential impacts of diverting fishing pressure elsewhere across the landscape.

## **2.3 Provincial Guiding Principles**

The following principles of ecology and conduct will be used to guide fisheries management planning and decision making, and are considered fundamental in achieving the desired future state of the fisheries resource in Lake Nipissing. They are derived from broader MNRF strategic direction such as *Our Sustainable Future: A Renewed Call to Action (OMNR 2011b)*, the *Ontario Biodiversity Strategy (OMNR 2011a)*, and *MNRF's Statement of Environmental Values*.

### ***Ecological Principles***

**Ecosystem Approach** - Fisheries will be managed using a holistic approach where all ecosystem components including humans and their interactions will be considered at appropriate scales.

**Natural Capacity** - There is a limit to the natural capacity of aquatic ecosystems and hence the benefits that can be derived from them.

**Naturally Reproducing Fish Communities** - Self-sustaining fish communities based on naturally occurring fish populations will be the priority for management. Where introduced or invasive fish species have become naturalized, and where consistent with management objectives, they will be managed as part of the fish community.

**Protect, Restore, Rehabilitate** - Fisheries management will place a priority on protecting fish, fisheries and supporting ecosystems and will restore or rehabilitate degraded systems (habitat) when necessary.

**Fish and Aquatic Ecosystems are Valued** - Fisheries, fish communities, and their supporting ecosystems provide important ecological, social, cultural, and economic services that will be considered when making resource management decisions.

### ***Principles of Conduct***

**Aboriginal and Treaty Rights** – Aboriginal rights and interests in fisheries resources will be recognized and considered in MNRF's plans and activities. MNRF is committed to meeting any existing and future legal obligations in respect of Aboriginal peoples.

**Informed Decision Making** – Resource management decisions will be made using the best available science and knowledge. The sharing of scientific, technical, cultural, and traditional knowledge will be fostered to support the management of fish, fisheries and their supporting ecosystems.

**Collaboration** – While the Ministry of Natural Resources and Forestry has a clear mandate for the management of fisheries in Ontario, successful delivery of this mandate requires collaboration with other responsible management agencies and those who have a shared interest in the stewardship of natural resources.

## **2.4 FMZ 11 Guiding Principles**

The following broad objectives were developed by the FMZ 11 Advisory Council and were considered where appropriate during the development of this plan:

**Fish Populations:** Manage for the improvement of fisheries, including **healthy natural fish populations** beyond a minimally sustainable condition, enhance urban angling opportunities and provide a safe food source while employing the precautionary principle.

**Aquatic Ecosystems:** Maintain healthy aquatic ecosystems and restore impacted aquatic ecosystems by affecting positive change to habitat and water quality while minimizing the risk of invasive/invaser species.

**Education:** Improve public knowledge of regulatory principles, respect for the resource and awareness of ethical practices around aquatic ecosystems.

**Socio-economic:** Promote a fair valuation of the fisheries resource to recognize its impact on socio-economic benefits and provide a varied experience for all resource users.

## **2.5 Lake Nipissing Fisheries Management Plan Advisory Council (LNFMPAC) Guiding Principles**

The following broad objectives were developed by the LNFMPAC and were considered where appropriate during the development of this plan:

**Ecological Approach:** An ecological approach to fisheries management will be followed to ensure conservation and use of the resource in a sustainable manner.

**Landscape Level Management:** In general, fisheries are managed at a landscape scale. Lake Nipissing, however, is a major component of the fishery resources within FMZ 11 and it has its own unique use patterns and consequential effects, partly rooted in the history of resource development. It is understood that there may be major differences in the resource or objectives between Lake Nipissing and the broader FMZ which may require different approaches to management within the Zone.

**Balanced Resource Management:** Strategies and actions will consider the ecological, economic, social and cultural benefits and costs to society, both present and future.

**Sustainable Development:** The finite capacity of the resource is recognized in planning strategies and actions for the lake. Only natural resources over and above those essential to long-term sustainability are available for use and development. Only those which exceed the requirements of subsistence fishing are available for other uses such as commercial fishing, recreational fishing or tourism development.



### *Fisheries Management Plan for Lake Nipissing*

**Biodiversity:** Fisheries management will ensure the conservation of biodiversity by committing to healthy ecosystems, protecting and preferring native, natural fish populations and sustaining their genetic diversity. All of the lake's species, including non-sport fish and Species-at-Risk, must be considered.

**Natural Reproduction:** Priority will be placed on native, naturally reproducing fish populations that provide predictable and sustainable benefits with minimal long-term cost to society.

**Habitat Protection:** The natural productive capacity of the habitats of fish and of the organisms upon which fish depend will be protected and habitat will be enhanced where possible.

**Valuing the Resource:** Stakeholders and other users will be invited to understand and appreciate the value of fisheries resources and to participate in decisions to be made by MNRF that may directly or indirectly affect the lake's aquatic ecosystem health.

**Responsibility:** Effective fish management is a cooperative venture with responsibility being shared by local, regional, provincial and federal governments, by First Nations and by citizens generally. Through cooperation and the sharing of knowledge, solutions to challenges will be sought so fisheries can attain and remain at levels from which all parties can derive a sustainable level of benefits.

**Multi-party Involvement:** A wide range of stakeholders, Aboriginal peoples, and interested parties will provide fisheries management advice to ensure an open and transparent process that acknowledges their valuable role in the process.

**Aboriginal Interests:** Ontario is committed to building better relationships with Aboriginal peoples and in involving them in decisions that affect them. It is the responsibility of the government to ensure that the subsistence needs of Aboriginal peoples are met, within the constraints of a sustainable resource base.

**Direct Action:** Before acting upon the resource, the broadest possible constellation of options will be considered and the feasibility of implementing actions will be carefully evaluated. It is expected that our actions may have to evolve as situations change and our knowledge improves.

**Knowledge:** The best available information will be used when objective setting, in strategy development and in implementation. Monitoring and assessment needs and the sufficiency thereof will be re-evaluated as knowledge improves.

**Adaptive Management:** Lake Nipissing will be managed using an adaptive management approach. Objectives will be set, actions implemented and monitoring will occur so that results can be continually compared against objectives. In this way, our management can be adjusted as necessary and as possible to ensure attainment of objectives.

**Precautionary Principle:** When an activity raises threats to human health or the environment, precautionary measures should be taken even if some cause-and-effect relationships are not fully established scientifically. Every effort will be made to ensure our systems are robust and fault-tolerant. We should expect that the future is inherently unpredictable and, thus, be cautious in our manipulations of the natural system.

## **3.0 Plan Development and Consultation Process**

### **3.1 *Plan Development Process***

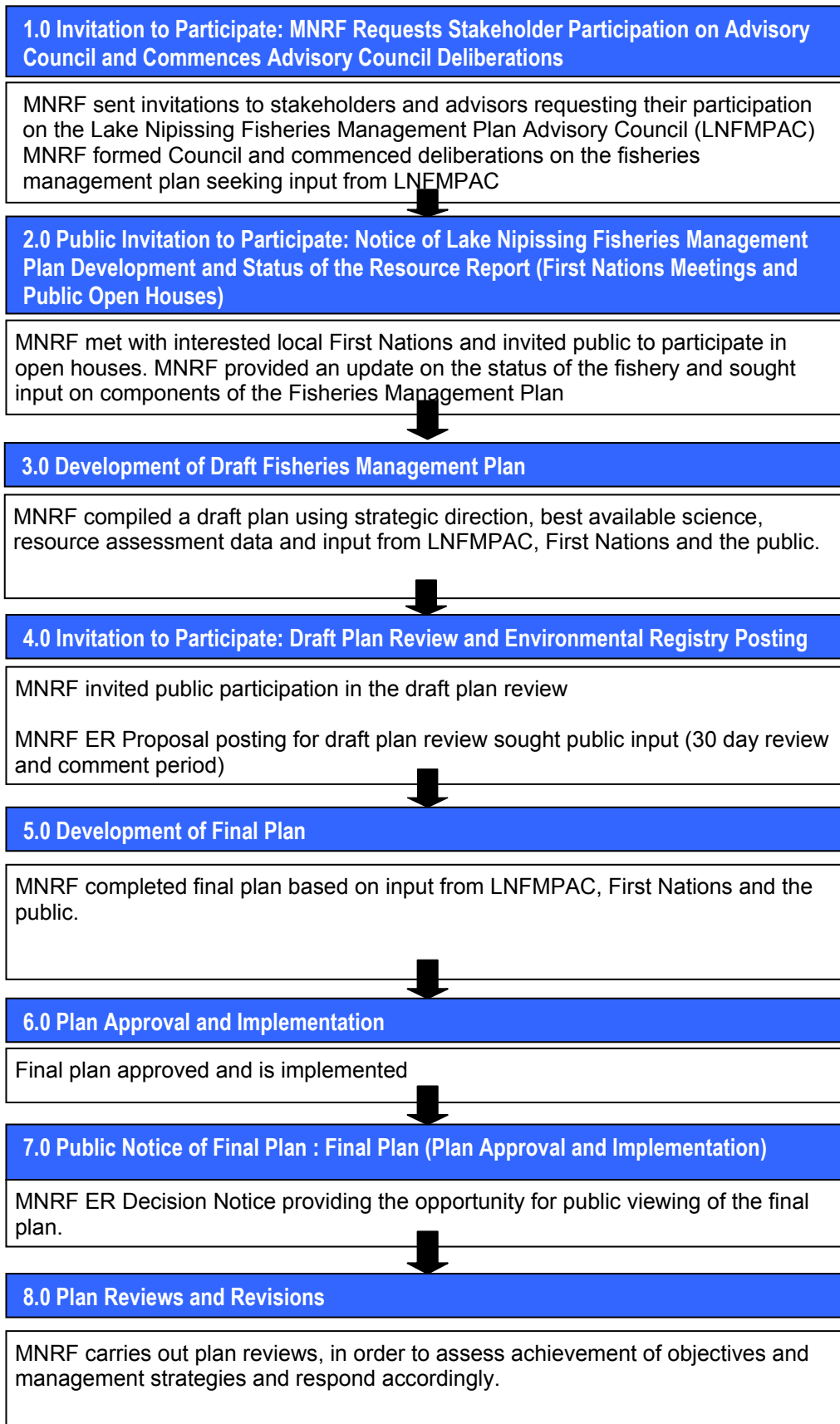
The purpose of the planning process is to gather all relevant pieces of information related to the resource and to develop a document that clearly identifies the management objectives and strategies. These must identify specific targets and timelines that will assist with and guide the management of the recreational fisheries in an open and transparent way that solicits input from the general public and stakeholders. The end result will be a plan that is comprehensive, provides clear direction with measureable and achievable goals that support the long term sustainability of the fisheries in the lake.

Once the plan has been completed and approved, monitoring and reporting as per the management strategies will be completed. The plan will be reviewed periodically (e.g. in 5 year intervals) to track the progress against predicted targets and to allow resource managers to adapt and take action as needed to address emerging management issues on the lake, and to ensure plan objectives are met.

Amendments to the plan can occur when a significant management issue is identified requiring immediate action. This would include any considerable deviation from the strategic direction or management actions outlined in the approved plan. Public consultation may or may not be required for amendments depending on the significance of the change to the original strategic direction or management actions. The nature and scope of consultation efforts will be determined by the MNRF District Manager at that time. Changes to management actions such as fishing regulation changes may be considered and undertaken at any time during plan implementation in the event of threats to the sustainability of Lake Nipissing's fisheries.

**The planning process was comprised of several key stages (Figure 3).**

### *Fisheries Management Plan for Lake Nipissing*



**Figure 3: Fisheries management plan development process.**

### Proposed management objectives and strategies process:

As indicated above, the LNFMPAC, a group of a wide variety of stakeholders, was the initial point of contact for the MNRF to seek stakeholder input into the development of the plan and to commence drafting the objectives and management strategies for the plan. Plan development was based on the current status of the resource, known management issues, challenges and opportunities on the lake.

Once the proposed management objectives were identified, MNRF staff with input from the LNFMPAC developed specific *indicators*, *benchmarks*, *targets*, *timelines*, and *management actions* that supported achievement of the objectives for each species or topic in the plan (Figure 4). These can be found in the summary table for each species or topic in the appendices. Appendix 3 provides the definitions that were used in the development of the indicators, benchmarks, targets, timelines, and management actions.

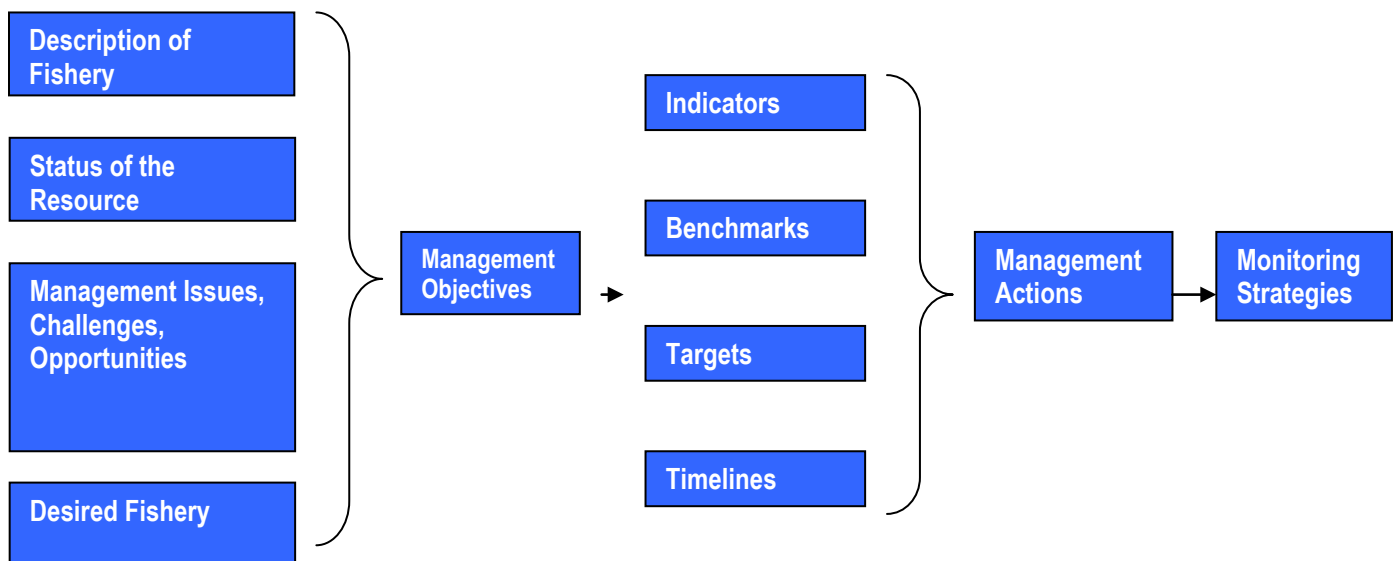


Figure 4: Management Objective and Management Strategy development process.

## 3.2 Public Consultation Process

Under the *Ecological Framework for Fisheries Management*, public input is one of the key pillars of the planning process. Public involvement in fisheries management on Lake Nipissing has had historical significance and grounding in the provincial fisheries management direction utilized today in the province.

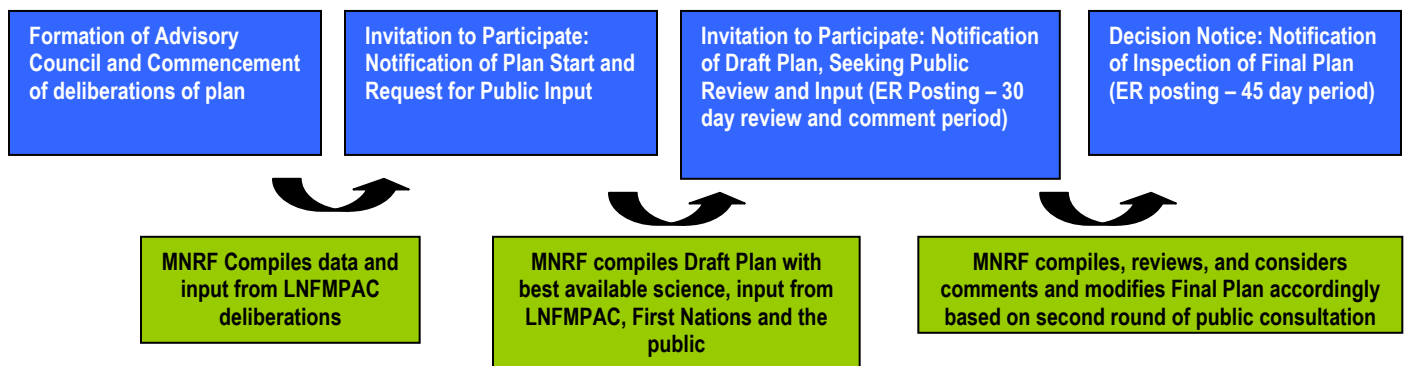
There are various ways in which public consultation is incorporated into the plan. The LNFMPAC was intended to represent the public at large as well as to be the initial point of contact for the MNRF to seek stakeholder input. Stakeholder input is important in the development of the objectives and management strategies for the plan and to be presented to the broader public for review and input.

After each stage of public consultation MNRF compiled and reviewed the comments received and where appropriate, changes were made to the plan (Figure 5).

### *Fisheries Management Plan for Lake Nipissing*

The following section highlights how the LNFMPAC, First Nations, and the public were consulted during the development of the Fisheries Management Plan. Appendices 4 and 5 provide a summary of consultation comments received to date.

**The following illustrates the key stages of the broader public consultation process:**



**Figure 5: Fisheries management planning consultation process.**

### **3.3 Lake Nipissing Fisheries Management Plan Advisory Council (LMFMPAC)**

The core membership of the LNFMPAC is the result of an Advisory Committee established in the summer of 2012, brought together to advise MNRF on the socio-economic impacts of regulation changes being proposed to address concerns with the walleye population. With the decision to proceed towards drafting the fisheries management plan, MNRF enhanced the group's membership to include other relevant stakeholders or organizations that had known or expressed concerns or interests in the lake.

The current advisory council is a standing committee consisting of 10-15 volunteers representing a broad array of stakeholder groups, advisors and representatives from other governmental agencies that have a shared interest in the management of Lake Nipissing including: Nipissing First Nation, Dokis First Nation, FMZ 11 Advisory Council, tourist operators, anglers-at-large, fish and game clubs, Lake Nipissing Partners in Conservation, Greater Nipissing Stewardship Council, Nature and Outdoor Tourism Outfitters (NOTO), North Bay Hunters and Anglers, local municipalities along with the Ministry of Tourism, Culture and Sport, Ministry of Northern Development and Mines, and the North Bay Mattawa Conservation Authority. A complete list of those that chose to participate on the council can be found in Appendix 2.

The purpose of the LNFMPAC is to provide advice to the MNRF to assist with the development of the management objectives and strategies for the lake's fisheries. A *Terms of Reference* (TOR) was developed to describe the purpose, principles, organizational details, roles, responsibilities and operating costs for the Council that can be found in Appendix 2.

### **3.4 Aboriginal Community Involvement**

Within the geographic scope of the FMP, the following Aboriginal communities were identified by MNRF and were consulted as follows:

- **MNRF consulted directly with the Nipissing First Nation community.**
- **MNRF consulted directly with the Dokis First Nation community.**
- **MNRF notified Antoine Algonquins and Mattawa-North Bay through the Algonquin Consultation Coordination Office** (Algonquin Nation of Ontario). **MNRF notified North Bay Métis Council directly** with information copied to the Métis Nation of Ontario (MNO) as per the Ontario interim direction on Métis consultation direction at key stages of plan development and plan implementation.
- **Other Robinson-Huron Treaty First Nations were notified through the Anishinabek Nation (Union of Ontario Indians (UOI))** and not each individual First Nation community for key stages of plan development and plan implementation.

The Lake Nipissing fisheries provide cultural, social and economic benefits to both the NFN and DFN. The MNRF recognizes the Aboriginal and Treaty right of both Dokis and Nipissing First Nation's to fish Lake Nipissing for sustenance. In addition, R. v. Commanda 1990 has recognized Nipissing First Nation's right to commercially fish Lake Nipissing.

Over the duration of the previous management plan, MNRF and NFN have collaborated on a number of assessment projects, including the lake sturgeon tagging program, the 2012 Fall Walleye Index Netting (FWIN), the 2013 Creel survey as well as the development of the *Lake Nipissing Walleye Management Risk Assessment Model*. This model was designed to help fisheries resource managers set safe annual harvest levels for both the commercial and recreational fisheries.

MNRF intends to continue collaborative efforts with First Nations on resource monitoring and allocation planning in a proactive, flexible management framework that balances the subsistence, commercial and recreational demand for fisheries resources on the lake. A collaborative approach will foster an understanding and respect between the fisheries resource managers and their objectives. In addition to this, open, transparent data collection and sharing among parties will contribute to an overall understanding of use patterns and aid in management solutions for the betterment of the fisheries and the lake ecosystem as a whole.

In recognizing the importance of aligning the recreational and commercial fisheries and collaborating with allocation planning, First Nations involvement was strongly encouraged and sought at all stages of development of the plan. Letters requesting participation to local First Nation partners were initially sent inviting their participation on the LNFMPAC which resulted in three members involved on the Advisory Council as council members; two Nipissing First Nation members and one Dokis First Nation member.

Aboriginal perspectives were incorporated into the plan via both Nipissing First Nation and Dokis First Nation involvement on the Advisory Council and through other discussions. Appendix 4 provides a summary of Aboriginal Consultation during the planning process.

### **3.5 Broader Public Involvement**

Reaching a broader public audience is an important part of the planning process. It assures the MNRF that input received from the LNFMPAC reflects that of the broader public opinion; it informs the advice from the LNFMPAC; provides the MNRF the opportunity to communicate the proposed management strategies to the broader public and seek input; and allows MNRF to communicate the rationale for the proposed management strategies which facilitates public understanding and participation.

Comments received on the draft plan were considered and incorporated into the final plan where appropriate (Appendix 5).

There were several stages during the plan development process that sought broader public input into the development of the plan including:

✓ **Public Invitation to Participate: Notice of Lake Nipissing Fisheries Management Plan Development and Status of the Resource Report**

An invitation to participate was released in May 2013 via a series of news releases and open houses that were held to present the background information on the FMP, a status of the resource report for the lake and to seek input from the broader public on the key topics to be included in the plan. These comments were reviewed and considered during the development of the draft plan.

✓ **Public Invitation to Participate: Draft Plan Review and Comment Period (Environmental Registry Posting – 30 day comment period closed April 24, 2014)**

This stage of consultation provided the public with an opportunity to review the proposed plan and provide comments on the proposed direction therein.

The draft plan was made available at the district office, on the MNRF website for Specially Designated Waters - Lake Nipissing, and on the Environmental Registry for public review.

☐ **Public Notice of Final Plan Approval (ER Posting – 45 days)**

The final plan was made available at the North Bay MNRF district office, on the MNRF Fisheries Management Zone website and on the Environmental Registry for public viewing and future reference.

## **4.0 Plan Implementation and Ongoing Commitment to Monitoring**

An important component of Ontario's Ecological Framework for Fisheries Management is the implementation of the commitments outlined in fisheries management plans.

Without a commitment to monitoring there is no way to assess the achievement of objectives or the effectiveness of management strategies (e.g., regulations). In a worst case scenario, lack of monitoring could result in a significant negative impact to the resource.

Many components of the FMP outlined herein acknowledge MNRF's intention to implement effective and meaningful monitoring and adaptive management.

### **4.1 Monitoring Strategy**

The monitoring strategy for the plan is intended to improve fisheries management in two ways. First, trends in the abundance and population structure of currently favoured sport fish species will be assessed and will provide information upon which to manage key fisheries in the short term. In the longer term the program will allow the development of improved yield models which will integrate fish harvest and ecosystem factors to predict changes in the sustainability of the fishery relative to long term environmental change.

Several indicators have been identified in the plan to measure the state of the fishery and ecosystem, and/or show progress toward achieving the objectives for management of the recreational fishery and the lake's ecosystem health. The benchmarks identified for each indicator provide a means to interpret the response of indicators relative to each indicator's benchmark or reference condition where they exist.

To assess progress toward achieving the goals of the plan, indicators may be assessed individually or combined. Fishery responses can then be tracked over time and compared against management actions and ecosystem influences. Sets of indicators may also track the influence of fishing on ecosystem responses; for example, to explain changes in the fish community.

Unfortunately, there is no single tool that can be utilized to assess the entire fishery and lake ecosystem health; however, there are a number of tools that can be used in combination to monitor the state of the lake and its fishery. For each set of plan objectives, individualized monitoring approaches have been described (Appendices 6-24).

Monitoring of Lake Nipissing will be primarily conducted by the MNRF North Bay District Office. Nipissing First Nation is also currently active in collecting information on the fisheries resource. Partner agencies such as the local Conservation Authority, Ministry of the Environment and Climate Change and Nipissing University are also active participants in collecting information on the lake ecosystem.



## **5.0 Recreational Fisheries Management Strategies**

### **5.1 Walleye**

Walleye are the most sought species on Lake Nipissing. Each year more than 70% of recreational angling effort and approximately 90% of commercial angling effort targets walleye. The lake historically experienced over 1 million hours of fishing pressure and harvest levels at or above 100,000 kg of walleye annually. Walleye have been, and remain the most economically and socially important species in the lake, and are considered the most influential top-predator in the Lake Nipissing fish community.

#### **ASSESSING THE LAKE NIPISSING WALLEYE FISHERY**

Fall Walleye Index Netting (FWIN) and Spring Walleye Spawning Assessment are the two assessment tools used to collect fishery independent data for walleye. These provide measures of relative abundance and biomass, as well as information on their growth rates and other life history characteristics.

Creel surveys, conducted during both the open water and winter seasons involve counting and interviewing anglers about their daily catches and provide us with fishery-dependent data used to estimate the recreational fishing harvest (size and number of fish) and effort (hours).

Commercial fishermen complete daily catch reports which provide commercial harvest levels (species and number). Together, these surveys help determine the overall health and sustainability of the population and whether current regulations are directing sustainable harvest levels of the fishery.

#### **STATUS OF WALLEYE FISHERY IN LAKE NIPISSING**

During the 1960s and early 1970s, Lake Nipissing became an important destination for walleye anglers.

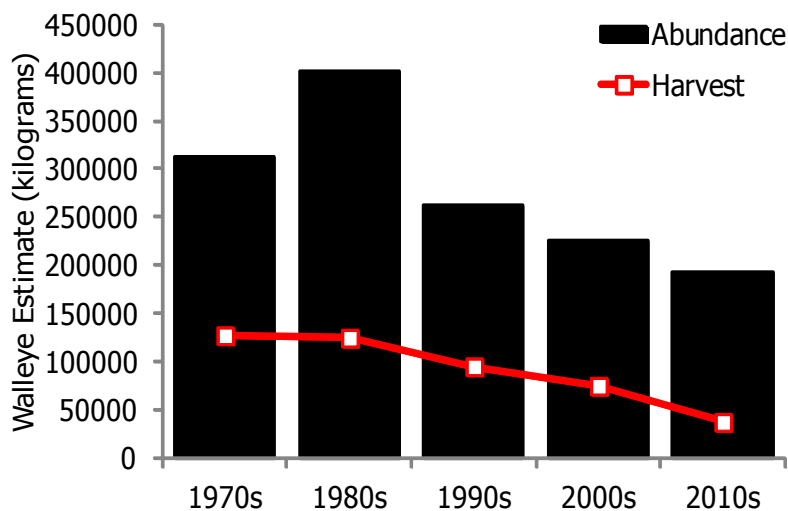
This trend has continued to the present, with ice and open water anglers spending half a million hours each year pursuing walleye on the lake.

#### **Trends in Walleye Harvest and Abundance by Decade**

In the 1970s and 1980s, harvest of walleye was very high, exceeding 100,000 kilograms per year for the recreational fishery.

In the 1990s, management reports identified that annual combined recreational and commercial walleye harvests should not exceed 100,000 kilograms. As such, walleye harvests were reduced slightly through the 1990s to 100,000 kilograms per year on average. Despite the harvest reduction, the population declined in the 1990s, likely due in part to high exploitation in earlier decades. Concerns over this decline led to management actions in the mid-2000s to reduce the harvest to 66,000 kilograms per year.

Despite the more recent reduction in combined harvest, the walleye population is continuing to decline in the lake, with the current biomass at half of what it was in the 1980s (Figure 6).

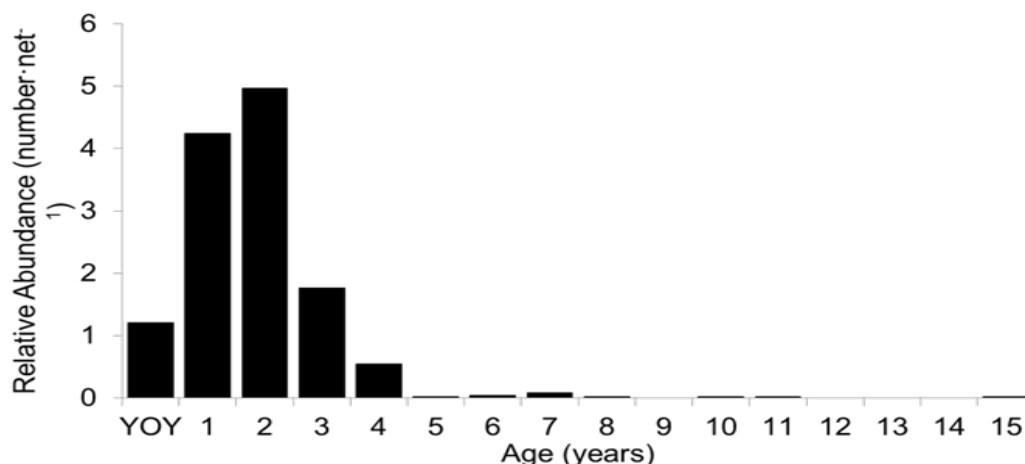


**Figure 6: Walleye harvest and abundance measured in kilograms since the 1970s on Lake Nipissing.**

### Walleye Population Health

The Lake Nipissing walleye population continues to exhibit many signs of a stressed fishery. Current walleye abundance is estimated to be too low to support the previous estimated sustainable harvest of 66,000 kilograms per year. Although there have been other ecosystem changes such as the colonization of Lake Nipissing by double-crested cormorants (*Phalacrocorax auritus*) and the spiny water flea (*Bythotrephes longimanus*), overharvest from fishing has placed the walleye population in a vulnerable state.

FWIN data from 2013 has shown a significant decline in walleye biomass in the lake, and more specifically, abundance and biomass of sexually mature fish (Figure 7). The majority of the population is currently two to three years old and their condition is showing signs of decline.



**Figure 7: Age class distribution of walleye as observed in the 2013 Fall Walleye Index Netting (FWIN) assessment.**

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The 2013 FWIN results indicated that it was a poor year for recruitment and numbers of young of the year were below average when compared to historical averages and the previous four years (2009-12). An overall reduction in the number of spawning females detected in the 2013 Spring Walleye Wasi Falls Spawning Assessment may have been the cause for low observed abundance of young of the year walleye. The spawning assessment data also observed that the average age of spawning females has shifted from 6 years to 10 years. Fewer younger females were observed in the spawning population than previous years; with the majority of the spawning population comprised of older females.

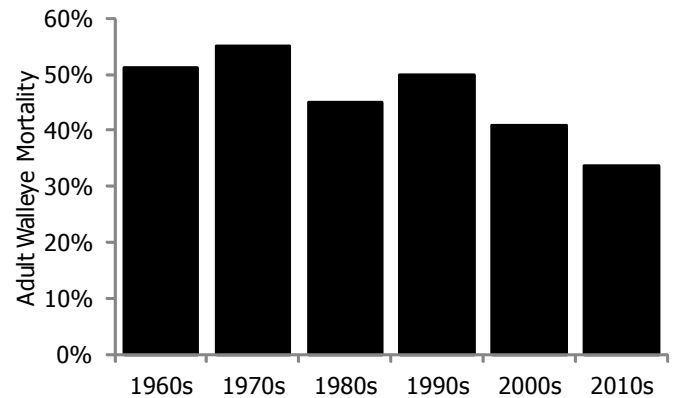
In 2012, an extensive walleye data review clearly identified human exploitation as the cause of the walleye population decline. The review also identified a fish community shift resulting from the decline in the walleye population. This resulted in the yellow perch population increasing dramatically with the relative absence of historically higher densities of walleye as the top predator in the lake.

The loss of adult walleye more than five years old has varied between 30 and 55 per cent over the last five decades (Figure 8). The recent reduction in adult mortality can be attributed to management actions that have been implemented on the lake in recent years. For example, the decrease in adult mortality from the 1970s to the 1980s appears to be related to a delayed spring angling opening, and a similar decline in the 2000s has been attributed to reduced limits and the protected slot size.

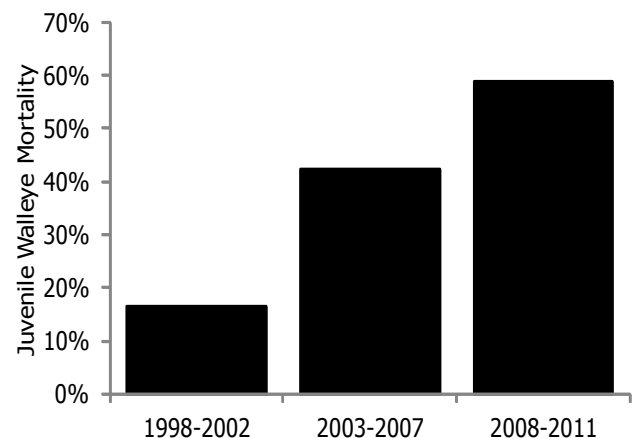
Between 2004 and 2008 marginal improvements in the spawning stock were realized as a result of the implementation of the later season and protected slot. Unfortunately, despite these ameliorations, growth over-fishing had started to occur on the lake (Morgan 2013).

Growth over-fishing occurs when the young fish that become available to the fishery (the “recruits”), typically fish 35cm and larger in length, are caught before they can grow to a reasonable size, or more importantly before they reach spawning status (Figures 9 & 10). This is the result of the fishery (anglers) now keying in on and targeting the most abundant size class in the fishery, the fish less than 40cm.

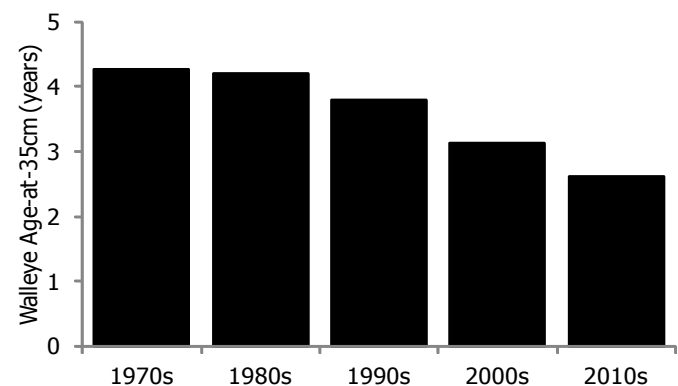
While the recreational harvest was targeting the more abundant juvenile fish, the walleye population was also experiencing increasing growth rates by these immature walleye. Juvenile walleye were found to be growing faster and becoming vulnerable to the fishery (recreational and commercial) earlier (prior to reaching spawning status) than ever before. This is a response to the stressed population condition, with low densities of walleye.



**Figure 8: Adult walleye mortality since the 1960s on Lake Nipissing.**



**Figure 9: Juvenile walleye mortality since 1998 on Lake Nipissing.**



**Figure 10: Walleye age at maturity (35 cm) since the 1970s on Lake Nipissing.**

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This resulted in an increasing proportion of the harvest (recreational and commercial) targeting juvenile fish that had yet to spawn at least once in their lifetime.

Examination of historical data revealed that a 35cm walleye in the 1970's, 80's and most of the 90's was approximately 4 years old. The age of a fish this size had rapidly decreased to approximately 1.5 years old by 2011 (Figure 10). Of more importance, is that the increase in size, occurred without an appropriate shift in the age at first spawning (i.e., 50% maturity remained 4 to 5 years old for females). This early entry to a vulnerable size resulted in juvenile mortality rates that increased beyond 60% per year and was effectively limiting recruitment to the spawning stock.

In 2009, having exhausted its capacity for a growth response, the spawning stock declined suddenly and slipped into a recruitment over-fishing situation. Recruitment over-fishing occurs when the adult spawning stock population is depleted to a level where without appropriate measures being taken it no longer has the reproductive capacity to replenish itself (i.e. there are not enough adults to produce offspring). This is generally addressed by placing moratoriums, quotas and minimum size limits on a fish population that serves to increase the abundance of the adult spawning stock in the fishery. There may be an opportunity to increase the adult spawning population on Lake Nipissing by protecting strong year classes of walleye until they are able to spawn.

With noted increased juvenile mortality and an abundance of exploitable walleye (walleye of the size targeted by either the recreational or commercial fishery) that has declined to its lowest level yet, the MNRF recognized a need to take interim action prior to the completion of the new fisheries management plan. As such, a group of stakeholders was brought together to gather advice on preferred and acceptable immediate and interim actions that could be taken to reduce the fishing mortality of walleye. The 2012 walleye regulation was an interim measure developed by MNRF with input from the Lake Nipissing Fisheries Management Plan Advisory Council (LNFMPAC). On January 1, 2013, the daily angling catch limits for walleye were reduced to 2 fish (from 4) for a sport licence and 1 fish (from 2) for a conservation licence, while maintaining the protected slot size regulation.

Over the fall of 2012 and winter of 2013, MNRF science and field staff worked in collaboration with Nipissing First Nation's fisheries department staff to develop a surplus production model for Lake Nipissing's walleye population (Zhao and Lester 2013). The purpose of the surplus production model was to determine the optimum walleye harvest level the lake could support. This is the harvest level that produces the maximum number of walleye that can be sustained without affecting the long-term productivity of the walleye stock, otherwise known as the maximum sustainable yield (MSY).

As a result of this analysis, it was revealed that the walleye stock has been overfished and unhealthy for the entire duration of the data collection period (since 1976). In turn, the model provided a new set of reference points that suggest that the lake's ability to produce walleye is about 85% of the previous estimate from the 2007 - 2010 Fisheries Management Plan (i.e., maximum sustainable yield = 76,746kg/yr (current) vs. 90,000kg/yr (2007-2010 FMP)). The ability of this model to project into the future and provide estimates of safe annual harvest specific to the Lake Nipissing walleye biomass represents a significant progression in the management of the lake.

This new analysis was used to develop a model that identifies a range of harvest options based on the status (health) of the fishery for resource managers to use to make informed decisions on setting annual harvest levels for Lake Nipissing's fisheries. The *Lake Nipissing Walleye Risk Assessment Model for Joint Adaptive Management* developed by Rowe et al., 2013

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characterizes the risk associated with the status of a given population (based on walleye biomass and harvest levels) relative to their respective reference points (safe levels of fishing mortality), and current levels of fishing mortality. The model identifies the level of risk (high, medium or low) associated with specific management actions (regulations) in addition to providing the risk associated with a range of annual harvest levels for the lake.

Modelling results were presented to the LNFMPAC to seek their input on the preferred option to be implemented to facilitate the recovery of walleye. Results from the model indicate that the current Lake Nipissing walleye population is at a high risk of a large decline. The majority of the advisory council agreed that a **low risk, short-term recovery period was the preferred option** moving forward with the walleye recovery plan.

The model was used to project recommended 2013 combined (recreation and commercial) harvest levels. It suggested that safe harvest levels, those that are low risk and support a shorter recovery period (10yrs) would be  $\leq 29,690\text{kg}$ . Harvest levels that pose a higher risk and are associated with a longer-term (20yrs) recovery period, would be  $\leq 46,562\text{kg}$ .

To support the recommended reduction in harvest and to expedite walleye recovery actions, the 2012 walleye regulation was implemented on January 1, 2013 with a reduced creel limit from 4(2) to 2(1) fish while maintaining the 40-60cm protected slot. However, harvest in the recreational fishery continues to increase due to angler success and increased participation resulting directly from the recruitment and availability of four very strong year classes to the angling fishery. Should the regulation change not have been implemented however, the recreational fishery would have observed much higher harvest levels and more specifically, would have been significantly over the recommended harvest levels versus being only slightly over for the 2013 season.

Thus, moving forward with the refinement of the risk assessment model and current data, MNRF developed new regulations that considered the current status of the fishery, the root causes of the decline, and support the recovery of the walleye population. The risk assessment model will continue to be used to support management decisions to determine real time trajectories for the population towards recovery or collapse.

### **WALLEYE STOCKING**

Supplemental walleye stocking has a long history on Lake Nipissing, with earliest known records dating back to 1920. While periodic in nature for the first 50 years, annual volunteer community based stocking began with the establishment of a community-run hatchery in 1984 which continues operations to this day.

The licensed community hatchery has been permitted to collect and fertilize two million eggs from spawning walleye within Lake Nipissing annually. Assessment of the local spawning site, where collection occurs, determined that this quantity was within safe limits to retain genetic diversity within the natural population based on characteristics of spawning populations at that time and these levels were supported by scientifically accepted genetic principles (Ryman and Laikre 1991). Spawning assessments will continue to inform safe quantities permitted for collection by community hatchery programs.

The 2007–2010 Interim Fisheries Management Plan recommended a study on the effectiveness of the community hatchery stocking program on the lake to determine how the current program should move forward. The study examined the relationship between walleye summer fingerling stocking rates and young-of-the-year catches in the Fall Walleye Index Netting assessment. No relationship was found. Similarly, there was no significant relationship between the number of

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walleyes stocked and the contribution of these fish to the population or adjacent year classes. Finally, there was no relationship between the number of walleye stocked and angler catch rates either 2 or 3 years later when those fish would have been recruited to the angling fishery. The study concluded that this low-intensity stocking program was not providing a measureable benefit to the walleye population or the fishery of Lake Nipissing, (Kaufman 2007) which was to be expected by a small scale stocking program.

Lake Nipissing stocking efforts are a means of collaborating with stakeholders to promote an understanding of the need to manage the Lake Nipissing fishery and to engage partners in the stewardship of the lake. It is understood that stocking will not address the cause of Lake Nipissing's walleye decline (overharvest).

Based on the fact that Lake Nipissing is a large lake with a viable naturally reproducing walleye population and a complex fish community, it does not meet the criteria for supplemental stocking and was determined that it would not be appropriate to enhance the existing stocking efforts beyond the status quo at this time. Assessment of the donor spawning population and rearing success will occur annually to minimize impacts to natural populations and maximize hatchery success. The number of eggs licensed for collection each year may vary as a result of this assessment.

Stocking is currently permitted on Lake Nipissing, primarily as an educational and partnership development tool since the lake contains a walleye population with the capacity to naturally produce young fish. Opportunities exist to expand collaborative efforts with various stakeholders, such as Nipissing University and others to fill information/assessment gaps on stocking effectiveness and alternate techniques. This research could be used to enhance rearing success and survival and pilot alternative non-stocking techniques.

### **MANAGEMENT ISSUES, CHALLENGES AND OPPORTUNITIES**

#### **Issues and Challenges:**

- Expectations about the collective demand for walleye in comparison to past harvests and the productivity of the stock
- Controlling the magnitude of recreational harvest in an open-access fishery
- Current shift in compliance levels on the lake, with perception that non-compliance has increased
- Lack of understanding of unmeasured harvest (e.g., both recreational and commercial non-compliance)
- Expectations around the effectiveness of supplemental stocking to recover the population and maintain high harvest rates by local interest groups
- Continued pressure from local interest groups to increase existing supplemental stocking efforts over a naturally producing population which conflicts with current science, stocking management principles, and general and species-specific stocking guidelines.
- Management of the walleye population in the absence of an agreed upon allocation mechanism between commercial and recreational interests that facilitates the alignment of both fisheries management objectives and management actions
- The disconnect between very high angling catch rates and messages about the walleye population being under stress and reductions in recreational fishing limits
- The unknown level of First Nation subsistence harvest

**Opportunities:**

- The integration of the Risk Assessment Model as the basis for a more adaptive, proactive management system that provides a range of safe annual harvest levels based on the stock status and common reference points for walleye recovery and population health
- Four strong year classes were realized from 2009-2012; 2014 implementation of the regulation change was required to protect the last (2012) of these strong year classes with hopes of rebuilding the population; all four year classes were vulnerable to both fisheries as of Jan 1, 2014.
- Improving the collaboration between MNRF and NFN's commercial and recreational fisheries
- Expanding the collaborative approach to include Dokis First Nation, surrounding municipalities and key stakeholders
- Increase public awareness to the productive capacity of the walleye population and the rationale for various management actions
- Increase the transparency of monitoring results to foster greater public understanding and acceptance of management actions
- Use the existing volunteer efforts to enhance social awareness of issues related to walleye and ecosystem health of Lake Nipissing

**OBJECTIVES FOR WALLEYE MANAGEMENT**

**BIOLOGICAL OBJECTIVES**

1. *Rebuild the walleye biomass in Lake Nipissing to healthy levels (4.6 kg/ha) in 10 years*
2. *Rebuild the age structure of the population to include healthy levels of spawning sized walleye*
3. *Decrease juvenile (30-45 cm) mortality and increase recruitment into the spawning stock*
4. *MNRF, in collaboration with partners to examine previously recommended alternatives to current stocking practices in addition to any new science-based options to traditional stocking of walleye in the lake.*

**SOCIO-ECONOMIC OBJECTIVES**

5. *Reduce total harvest to a low/moderate risk level over 10 years to initiate recovery of the population*
6. *To balance the effects of managing a sustainable fishery with cultural, social and economic interests*
  - *To provide sustenance for local First Nations*
  - *To balance the needs of commercial and recreational fisheries*
  - *Provide opportunities to fish and to harvest fish for consumption*

**ECOSYSTEM OBJECTIVES**

7. *To determine the changes to Lake Nipissing ecosystem and its impacts on walleye recovery rates and endpoints*
8. *To minimize the risk of new environmental stressors such as species introductions*

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9. *To provide input on, and mitigation measures for activities that impact walleye productivity*

### **EDUCATIONAL OBJECTIVES**

10. *To educate all users on walleye biology, status, resulting management actions and the appropriate use of stocking as a management tool on Lake Nipissing.*
11. *To promote awareness about the natural limitations of the walleye population in Lake Nipissing*
12. *To annually report on the state of the walleye population*
13. *To promote safe fish handling techniques to improve post-release survival*

### **MANAGEMENT ACTIONS TO MEET WALLEYE OBJECTIVES**

Appendix 7 provides a more detailed summary of the objectives, indices, targets and timelines associated with each management objective and action for walleye.

**1) Change the previous angling regulation** to facilitate the recovery of walleye and sustain the fishery into the future.

Appendix 6 provides the rationale for the alternate management options that were considered as part of the development of this plan.

**Table 1: Comparison of Previous Regulation to the Current Regulation for Walleye**

<b>Previous Regulation</b>	<b>Current Regulation</b>
<b>Season:</b> Open Jan 1- March 15, 3 <sup>rd</sup> Sat. in May to Oct. 15	<b>Season:</b> Open Jan 1- March 15, 3 <sup>rd</sup> Sat. in May to Oct. 15
<b>Catch Limits:</b> <b>Sport – 2</b> <b>Conservation – 1</b>	<b>Catch Limits:</b> <b>Sport – 2</b> <b>Conservation – 1</b>
<b>Size Limit:</b> none between 40-60 cm	<b>Size Limit:</b> none less than 46 cm

The intent of the new regulation is to:

1. Increase recruitment of juvenile walleye into the spawning stock to ensure at least one reproductive event per fish per lifetime
2. Increase the abundance of spawning females (>400mm, age 4.2)
3. Increase the abundance and biomass of walleye in the lake and remove from stressed population status



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4. Select an option with low risk and a short-term recovery period (10 year versus 20 year)

The detailed data review and subsequent FWIN and creel surveys in 2012 and early 2013 identified juvenile mortality as the factor preventing the entry of juvenile fish into the spawning stock in the lake. This was identified as the greatest barrier to the recovery of the walleye population on the lake today. Given the current state of the walleye population, and MNRF's stated intent of returning the walleye population to a healthy self-sustaining condition, the Advisory Council was nearly unanimous in advocating for a strategy that had the least risk and that fully addressed excessive juvenile mortality rates in the short term (10 year period). The current regulation protects approximately 100% of the male walleye spawning stock and approximately 50% of the female walleye spawning stock with the intention of ensuring that individuals have at least one reproductive event/opportunity in their lifetime prior to being harvested by the recreational fishery. For the walleye recovery strategy to be successful, the harvest of walleye in Lake Nipissing below 46 cm needs to cease.

The minimum size limit set above the size at first maturation for a significant portion of the female population. This helps ensure that each individual has at least one reproductive event during their lifetime.

Public feedback received following the implementation of the recent walleye regulation change (reduction in creel limit from 4 to 2) and during the 2013 open house, indicated that a 2(1) fish limit was not supported by both the recreational anglers and the tourist industry. Despite this, the MNRF has maintained the two fish limit to manage risk to the fishery. This is important to protect a higher proportion of the reproductive potential of the population from recreational harvest, and thereby increasing the chances creating a more robust population for short and long term success.

It should be understood that with the implementation of the new walleye regulation, over the short term, despite potential high catch rates, harvest rates in the recreational fishery will be low until the recruits (2009 on) reach 46cm in length. It is felt that this is a necessary compromise so the fishery can remain sustainable into the future and recover sooner.

**2) Maintain the current fish sanctuaries** associated with Lake Nipissing that are designed to protect spawning adult walleye and ensure continued recruitment into the fishery.

- **Iron Island:** No fishing from March 16 to Fri. before 3<sup>rd</sup> Sat. in May
- **Wasi Falls:** No fishing from March 16 to Fri. before 3<sup>rd</sup> Sat. in May & Oct. 1 to Nov. 30
- **South River (Chapman Chutes):** No fishing from March 16 to Fri. before 3<sup>rd</sup> Sat. in May & Oct. 1 to Nov. 30

**3) Continue the annual monitoring and assessment program** to track walleye recovery through time; to continue to inform sustainable harvest levels for not only the recreational fishery but also the commercial fishery; and continue to monitor and evaluate regulations impacts and harvest levels using the risk assessment model and adaptive management approach.

One of the key components to the success of the recovery of the walleye population, and attaining the objectives of this fisheries management plan, is the MNRF's commitment to carry out our annual monitoring and assessment program on the lake.

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Lake Nipissing will continue to be managed on an individual lake basis due to its significance as a specially designated waterbody. Assessments will continue to be implemented at the lake level as per the frequency outlined herein or the applicable standardized protocol.

The following monitoring activities are key components of the monitoring and assessment program. These will continue to be implemented on an annual basis, or as specified, to assess the status of the resource, the effectiveness of the management objectives and strategies identified herein, and inform any future management actions to be implemented.

- 1) Annual FWIN Surveys
- 2) Annual Creel Surveys
- 3) Annual Walleye Spawning Assessments at major spawning sites (spawning stock assessment and mark recapture program)
- 4) Annual supplemental research to support status of the resource reports, management issues and challenges, and future management actions as they relate to walleye

**4) Continue collaborative efforts with First Nations on resource monitoring** in a proactive, flexible manner that addresses the subsistence, commercial and recreational demand for the walleye resource.

The MNRF recognizes the Aboriginal and Treaty rights of both Dokis and Nipissing First Nation's to fish Lake Nipissing for sustenance. In addition, R. v. Commanda 1991 recognized Nipissing First Nation's right to commercially fish Lake Nipissing. A collaborative approach will foster an understanding and respect between the fisheries resource managers and their objectives. Open and transparent data collection and sharing among parties will contribute to an overall understanding of the use patterns from each fishery for the betterment of the walleye population, the fisheries, and the lake ecosystem as a whole.

Over the duration of the previous management plan, MNRF and NFN collaborated on a number of assessment projects, including the 2012 FWIN and 2013 Creel survey. The *Lake Nipissing Walleye Management Risk Assessment Model* was also collaboratively developed to help inform fisheries resource managers on setting appropriate annual harvest levels for both the commercial and recreational fisheries.

Collaboration is very important amongst Lake Nipissing fisheries managers, and should continue into the future. This includes increasing the participation of Dokis First Nation in the resource management activities occurring on the lake.

**5) Continue collaborative studies with researchers** using stable isotope analyses among other indices identified to infer changes to the Lake Nipissing ecosystem.

To date, MNRF has collaborated with several stakeholder groups including Lake Nipissing Partners in Conservation (LNPC), Cooperative Freshwater Ecology Unit/Vale Living with Lakes Centre and Nipissing University. These studies have provided insight into recent changes associated with the invasion and rapid proliferation of spiny water flea and its effect on fish trophic levels and walleye reproductive output. These studies are important and will be expanded where necessary into the future.

**6) Expand the scope of studies to enhance existing data sets and address information gaps** pertaining to walleye status and sustainable harvest levels, for example:

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1. **Explore the feasibility and necessity to calibrate the FWIN** survey specifically to Lake Nipissing and examine the potential for a more accurate estimate of fish density. This would be done with the use of a mark/recapture technique incorporated into the spring walleye spawning assessments and would run through the course of the open water fishing season and the FWIN. This would provide direct estimates of fishing mortality, natural mortality and population density, which can then inform model-based management decisions with empirical data (actual observation data from experiments) versus theoretical data (generalized scientific rules of thumb).
2. **Additional data collection to determine if the reference points derived from the surplus production model are relevant and accurate into the future.** The surplus production model has derived these reference points during a period of population decline, and recent literature has pointed to examples where fish populations have not behaved as predicted during the recovery phase, despite management actions that were consistent with model predictions of population growth (e.g., Neubauer et al. 2013). Specific to Lake Nipissing, there are questions regarding potential reductions in walleye carrying capacity (and therefore biomass at maximum sustainable yield) in light of a changing ecosystem.
3. **Examine science-based alternatives to traditional stocking practices** (e.g., eyed-egg imprinting, trained fry predator avoidance techniques, summer fingerlings vs. fall fingerlings, etc...) that could benefit walleye (and other species as appropriate, such as pike).

#### **7) Increase public awareness and education on walleye biology, status, resulting management actions, and stewardship initiatives and actions.**

1. The angling regulation implemented in May, 2014 represents a change to walleye management on Lake Nipissing. Past management efforts and their education component have focussed on the protection of all spawning-sized fish as a means to ensure population sustainability. The regulation identified herein allows for some harvest of larger spawning-sized fish, those 46cm or greater in length, while allowing the majority of walleye to reach spawning size before becoming eligible for harvest. The regulation change will require significant effort to educate the public on what we have learned about the combined effects of the harvest patterns of both the recreational (current harvest is mostly under 40cm) and commercial (current harvest is mostly over 40 cm) fisheries along with the results of the previously implemented regulations, the protected slot-size.
2. Education efforts will also focus on our new productivity estimates and in turn, new sustainable harvest levels, which have been reduced for the walleye population in Lake Nipissing. This topic will touch on the unsustainable fishing mortality of past decades. The reduction in estimates of walleye productivity in particular, represents a significant adjustment in expectations for resource managers and users on the lake.
3. In addition to this, public outreach initiatives should also emphasize science-based stewardship initiatives that support the management objectives for walleye in the lake.
4. Educational efforts will include the implications of our new understanding of the effect of overexploitation on Lake Nipissing, and the implications of overexploitation on the management of our less-studied and less-productive walleye waters throughout the Fisheries Management Zone, Region and Province in the context of taking a risk-management approach.

## 5.2 Northern Pike

As noted above, the single biggest management issue and challenge on Lake Nipissing, which has remained constant since active management of the fisheries began, is human exploitation. This is true for northern pike as it is for walleye. The majority of fishing pressure on the lake targets walleye, however, northern pike ranks second in popularity for recreational fishing. On average, anglers spend 70,000 hours fishing for northern pike on Lake Nipissing with the majority of the harvest occurring during the winter season. This accounts for a targeted effort of about 15% for northern pike. The average size of pike being kept by recreational anglers is 56cm (22 inches).

### ASSESSING THE NORTHERN PIKE FISHERY

To assess our achievement of northern pike objectives, FWIN and Ice-Out Trap Netting Surveys (IOTN), are the tools used to collect data which provide us with measures of northern pike relative abundance and biomass, as well as information on their growth rates and other life history characteristics.

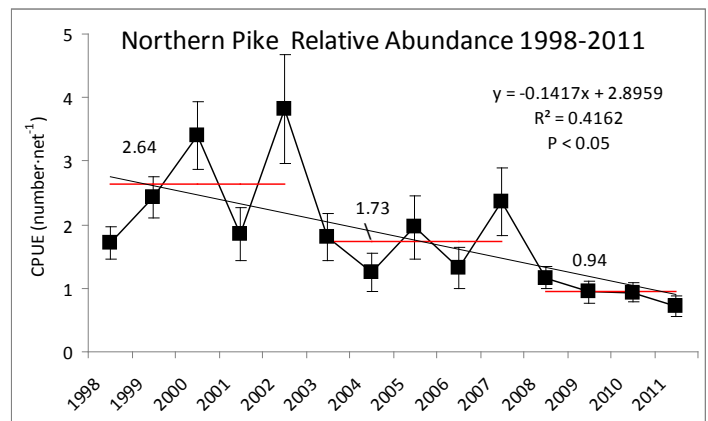
Creel surveys are used to estimate the recreational fishing harvest (size and number of fish) and effort (hours) of northern pike. Together, these surveys help determine the overall health and sustainability of the population and whether current regulations are appropriate.

### STATUS OF NORTHERN PIKE IN LAKE NIPISSING

Assessment data collected prior to 2004 indicated that the northern pike population was healthy and sustainable, although, somewhat lower than expected considering the amount of available habitat and the productivity of the lake. More recent results reveal a continuous decline in northern pike abundance in the lake (Figure 11) and adult mortality levels (54% of those fish >4 yrs old) that are above the threshold for a stressed population (50%).

The observed maximum age for pike is 13 years. Most fish are two to three years of age with the average fish being three years old.

Historically, growth rates for the population exceeded those predicted by the available habitat (with a theoretical maximum length of 101.6cm (40")). In the past, it was felt that Lake Nipissing had the potential to produce a high quality recreational fishery and more specifically, a high quality "trophy" fishery (pike greater than 101.6cm (40 in.)) (Roberts, 2007) yet these individuals continue to be rare and more recent results indicate that growth rates have slowed.



**Figure 11: Abundance of northern pike in Lake Nipissing from 1998-2011 represented by the number caught per net in annual FWIN surveys.**

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Figure 12 illustrates the harvest patterns on the lake dating back to 1998. Previous assessments show that northern pike were subjected to over-harvest in the 1980s. In 2009, over 30,000 fish were harvested by recreational anglers. Although this was the highest recreational harvest in the past 15 years, it is still below historical harvest numbers from the 1970s and 1980s. In 2011, the total harvest for the species reached a new low, with a total of 6,059 fish being harvested by recreational anglers.

FWIN surveys have shown pike abundance declining since at least 1998; it has gone from 2.5 fish/net to more recently less than 1 fish/net (Figure 11). Average length of pike harvested based on creel information has increased slightly over the

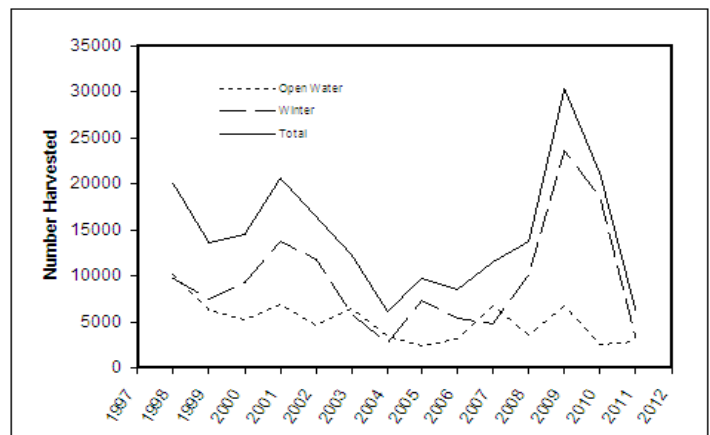
past several decades (Figure 13). The limited ice-out trap netting results available for pike confirm these results as well.

A more thorough data review is required in order to acquire a better understanding of the pike population dynamics and status in Lake Nipissing in order to make informed management decisions that meet FMP objectives.

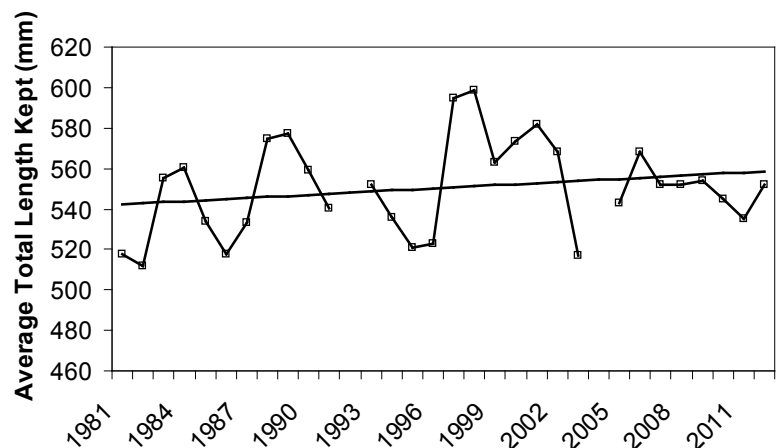
### **MANAGEMENT ISSUES, CHALLENGES AND OPPORTUNITIES**

#### **Issues and Challenges:**

- Limited assessment data specific to northern pike exists; more work is required to refine abundance estimates for both the recreational and commercial fisheries
- The unknown level of harvest of northern pike as both commercial harvest and by-catch in the commercial netting gear; controlling the by-catch harvest
- The unknown level of First Nation subsistence harvest for this species
- The degradation of the ecological role of northern pike in structuring the lake's fish community and more specifically as a top predator that targets perch
- The unknown status of significant habitat (quality, quantity, composition and water levels - periods of inundation and ramping rates as it relates to spawning, rearing, staging, foraging, weed beds) for northern pike on the lake
- Unknown if walleye centric minimum flows and levels set for managing fish habitat are suitable for pike as well
- Conflicting user demands on fishery - trophy versus consumption and non-resident versus resident angler demands
- Threats from viral hemorrhagic septicaemia (VHS), Lake Nipissing is considered high for potential for introduction of VHS into the system due to multiple vectors such as the use of infected baitfish and discharge of water from bilges or live wells where VHS is present.
- Evidence that climate change may have a negative impact on pike recruitment



**Figure 12: Annual harvest of northern pike in Lake Nipissing from 1998-2011 represented by the number harvested per year as collected via the open water and winter creel surveys.**



**Figure 13: Average total length of pike kept by anglers on Lake Nipissing from 1981 – 2011 as measured in the creel.**

## **Opportunities**

- Ability to develop regulations which protect the reproductive output (spawning adults), yet promote both consumptive and trophy fisheries
- Improving the collaboration between MNRF and NFN's recreational and commercial fisheries
- Expanding the collaborative approach to include Dokis First Nation, surrounding municipalities, and key stakeholders
- Expanding collaborative efforts to work with key partners and stakeholders to complete northern pike habitat inventory and mapping exercise on the lake, and in turn suitable habitat enhancement projects where warranted
- Northern pike fishery has diversified demands (i.e., trophy and consumption), which reduces the risk of overexploitation of any one size class
- Increase the transparency of monitoring results to foster greater public understanding and acceptance of management actions
- Commitment to annual monitoring for VHS, existing provincial VHS program supporting prevention and reduced risk of introductions into non-contaminated waters

## **OBJECTIVES FOR NORTHERN PIKE MANAGEMENT IN LAKE NIPISSING**

### **BIOLOGICAL AND AQUATIC ECOSYSTEM OBJECTIVES**

1. *To have a sustainable and robust northern pike population that meets the demands of the fishery and in so doing recognizes the importance of the role of northern pike in the lake as a top predator.*
2. *To reduce northern pike adult mortality in the lake.*
3. *To maintain and enhance where appropriate, northern pike habitat in the lake.*

### **SOCIO-ECONOMIC OBJECTIVES**

4. *To explore opportunities to minimize commercial by-catch of northern pike in the commercial fishery.*

### **EDUCATIONAL OBJECTIVES**

5. *To increase public awareness of northern pike biology, role and status in Lake Nipissing and stewardship for the species.*

## **MANAGEMENT ACTIONS TO MEET NORTHERN PIKE MANAGEMENT OBJECTIVES FOR LAKE NIPISSING**

Appendix 8 provides a more detailed summary of the objectives, indices, targets and timelines associated with each management objective and action for northern pike.

### **1) Complete a thorough northern pike data review to inform future management actions for pike to address the management objectives for the species.**

Preliminary data suggest the pike population is showing signs of decline with decreased levels of abundance (from 2.54 fish/net to 0.94 fish/net; Figure 11). A more thorough data review is required in order to acquire a better understanding of the pike population dynamics and status in

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the lake and in order to make informed management decisions that meet the objectives set herein.

**2) Continue the annual monitoring and assessment program** on the lake as identified for northern pike (Appendix 8) to track abundance indices through time, determine sustainable harvest levels, and continue to monitor and evaluate imposed regulations or management actions to meet objectives for northern pike.

The following activities are key components of the monitoring and assessment program that will continue to be implemented on an annual basis, or as specified, to assess the status of the northern pike fishery, the effectiveness of management objectives and strategies identified herein, and to inform any management actions to be implemented in the future.

1. Annual FWIN Survey
2. Annual Creel Survey
3. Biannual Ice Out Trap Netting Survey

**3) Continue and enhance collaborative efforts with First Nations on resource monitoring** in a proactive, flexible manner that balances the commercial, subsistence and recreational harvest and demand for the northern pike. There is a need to enhance existing data collection, reporting and sharing for both fisheries to facilitate appropriate management decisions and actions for not only commercial harvest, but by-catch harvest levels.

**4) Continue to participate on the Sturgeon/Nipissing/French River (SNF) Water Management Group** to review operating plans and determine whether minimum flows, levels, periods of inundation and ramping rates adequately meet the needs for northern pike spawning and rearing habitats, and make recommendations to improve the Lake Nipissing operating plan for northern pike if necessary.

**5) Expand the scope of studies to enhance existing data sets and address information gaps** pertaining to northern pike status, sustainable harvest levels, and significant habitat, for example:

- 1. Enhance existing assessment efforts with regards to northern pike to address data and information gaps** on their population dynamics and stressors
- 2. Explore feasibility of calibrating FWIN survey** to provide a more accurate estimate of pike density. This would be completed using mark and recapture techniques incorporated into the ice out trap netting and would run through the course of the open water fishing season and the FWIN. This would provide direct estimates of fishing mortality, natural mortality and population density, which can then inform model-based management decisions.
- 3. Collaborate with First Nations and stakeholders to complete habitat inventory,** mapping and assessment on the lake (to include: water levels, periods of inundation of spawning and rearing habitat, spawning, rearing, foraging, and weed bed distribution, quality, quantity and composition). Use updated habitat mapping and suitability assessment results to inform and prioritize future habitat enhancement projects and to inform suitable operational ranges (minimum flows, levels, periods of inundation and ramping rates) for northern pike.
- 4. Explore alternate commercial harvesting techniques or gear that eliminates or minimizes commercial harvest of non-targeted species** (i.e., by-catch – those

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species that have little current market value, such as pike). The intention is to collaboratively explore and evaluate the effectiveness and palatability of other commercial harvesting techniques or gear that eliminates or minimizes by-catch from commercial harvesting operations.

#### **5. Explore feasibility and opportunities to enhance existing data sets by accessing angler diaries of participants in annual pike tournaments.**

#### **6) Increase public awareness and communication of northern pike biology, status, resulting management actions and stewardship initiatives or actions.**

Increased public outreach on the value and need for future changes to regulations may be required to ensure that both public and stakeholder understanding and acceptance occur. This could be done in part with a ruler campaign as part of the creel and via coordination and collaboration with key stakeholders.

In addition to ensuring public awareness of regulation changes, education efforts should focus on the following topics and should be accomplished in cooperation with key stewardship groups or stakeholders:

1. The value of northern pike as a top predator in Lake Nipissing and their significant role of structuring its ecosystem
2. The value in harvesting small pike
3. The consumptive value of smaller northern pike (low contaminant loading relative to other fish in Lake Nipissing)
4. Northern pike cleaning techniques
5. Proper handling and successful catch and release techniques as it relates specifically to trophy sized northern pike
6. Proper identification of northern pike versus muskellunge

### **5.3 Yellow Perch**

Yellow perch play a dual role in the Lake Nipissing ecosystem as both predator and prey. Both roles are important for the function of the ecosystem and need to be considered in future resource management decisions. Yellow perch are currently the most abundant sport fish in the lake and have recently experienced a six fold increase in population numbers. They are now being considered a possible threat to the recovery of walleye in Lake Nipissing. On average, anglers spend 50,000 hours per year fishing Lake Nipissing for perch. While this represents only about 10 percent of all angling effort, yellow perch is currently the most harvested fish (177,406 fish/year) from Lake Nipissing at twice the level of walleye.

#### **ASSESSING THE LAKE NIPISSING YELLOW PERCH FISHERY**

To assess our achievement of yellow perch objectives, FWIN and creel survey data are used to determine the overall health and sustainability of the population and harvest levels.

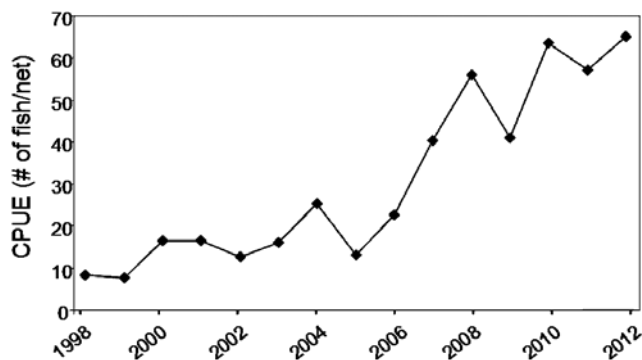
#### **STATUS OF YELLOW PERCH IN LAKE NIPISSING**

Index netting results indicate that the relative abundance of yellow perch has increased significantly (six fold) in recent years (Figure 14).

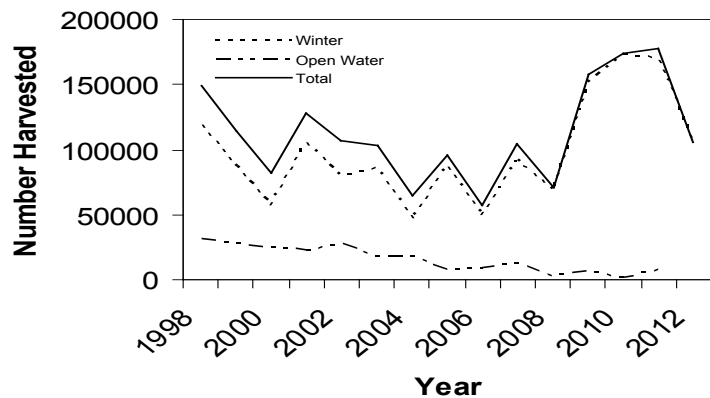


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Despite a peak harvest experienced in the late 1980s, perch harvest had been relatively stable. More recently however, there has been a surge in perch harvest and targeted effort for the species (Figures 14 and 15) which appears to coincide with the known stressed walleye population and the increase in the abundance of yellow perch.



**Figure 14: Relative abundance of yellow perch in Lake Nipissing as measured as catch per unit effort represented by the number of fish caught per net during FWIN.**



**Figure 15: Angler harvest of yellow perch on Lake Nipissing as represented by numbers of fish harvested during both the open water and winter seasons.**

## **MANAGEMENT ISSUES, CHALLENGES AND OPPORTUNITIES**

### **Issues and Challenges:**

- Potential for a major community shift should measures not be taken to address the recent increase in perch numbers
- Difficult to shift significant angler effort to alternative species (e.g. moving effort from walleye to yellow perch)
- Limited ability to grow jumbo perch in the lake, with the intention of marketing it as a potential alternative fishery
- Currently no commercial market for yellow perch from Lake Nipissing
- The unknown level for First Nation subsistence harvest for this species
- Limited knowledge on the ecological impact and role of yellow perch, as both predator and prey, in structuring the lake's fish community
- Evidence that climate change may favour yellow perch (i.e., result in increased abundance)
- Limited information on the quality of this fishery with regard to fish diseases/parasites, conflicting comments from the public

### **Opportunities:**

- Increased abundance equates to potential benefits to walleye fishery and recovery should fishing pressure be directed away from walleye onto perch
- Little-targeted effort to date on the lake, now starting to increase
- No issues with sustainability at this time
- Increase public awareness on the productive capacity of the lake for producing yellow perch and the rationale for management actions taken to date
- Potential to increase the transparency of monitoring results to foster greater public understanding and acceptance of management actions

**OBJECTIVES FOR YELLOW PERCH MANAGEMENT IN LAKE NIPISSING**

**BIOLOGICAL OBJECTIVES**

1. *To manage the perch fishery in order to maintain and sustain the broader Lake Nipissing ecosystem and complex fish community and fisheries.*

**AQUATIC ECOSYSTEM OBJECTIVES**

2. *To better understand the relationship of yellow perch in a changing ecosystem and more specifically, the relationship between walleye and yellow perch in Lake Nipissing.*

**SOCIO-ECONOMIC, EDUCATIONAL AND PARTNERSHIP OBJECTIVES**

3. *To increase public and stakeholder awareness on the role of yellow perch in the broader Lake Nipissing ecosystem.*
4. *To identify and establish (1-3) partners to support the perch fishery's objectives on the lake.*

**MANAGEMENT ACTIONS TO MEET YELLOW PERCH MANAGEMENT OBJECTIVES FOR LAKE NIPISSING**

Appendix 10 provides a more detailed summary of the objectives, indices, targets and timelines associated with each management objective and action for yellow perch.

**1) Change angling regulation, increase sport catch limit to 50 for implementation January 1, 2014**

As part of the Lake Nipissing fisheries management plan, a recent data review of the lake resulted in new fishing regulations being implemented for yellow perch (as of January 1, 2014). The intent is to facilitate the recovery of walleye, (Lake Nipissing's primary fishery) and in turn, help manage the secondary fisheries by keeping perch numbers in check.

The intent of the new regulation is to:

1. Cautiously increase harvest of yellow perch from the lake
2. Decrease the abundance of yellow perch in the lake to historical levels
3. Facilitate recovery of walleye by reducing competition for resources with perch

This regulation change was the result of two recent fishery reviews: the review of the *2007-2010 Lake Nipissing Interim Fisheries Management Plan*; and the *Lake Nipissing Data Review* (Morgan 2013) which was triggered by recent concerns on the status of the walleye fishery.

Both reviews included an update on the status of both Lake Nipissing's walleye and perch fisheries. This review looked at the walleye population data from 1998 to 2011 and was compared against early data sets from the 1970's/80's. The data review indicated that the walleye biomass in Lake Nipissing is about 1/5 of what it was during the 1970's. In contrast, the perch biomass has increased six fold in the last six years. This increase has been identified as a

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possible threat to the recovery of the walleye fishery due to the interspecific competition that exists between the two species.

This regulation allows for an increase in harvest (increased catch limit for sport licence) to address the recent increase in perch numbers, while taking a somewhat cautious approach to prevent an overexploitation of this resource (i.e., keeping the same season and not extending it or opening it up year round as in some other zones).

This regulation change will also serve to provide economic development (tourism) and additional angling opportunities by redirecting angler efforts onto perch.

LNFMPC selected this option because the regulation was able to balance the objectives (maintain a sustainable perch population and mitigate any further increase in perch numbers) proposed for the plan and in doing so, mitigate concerns as noted above, with the recovery of walleye in the lake.

The changes are also consistent with the regulations (aside from the season, which remains open all year in the zone) being proposed for FMZ 11 by the FMZ 11 Council.

More importantly, the changes are also in line with the findings put forward in the recent data review which indicate that a major fish community shift could occur should measures not be taken to address the recent increase in perch numbers.

Appendix 9 provides the rationale for the alternate management actions that were considered as part of the development of this plan.

**2) Continue the annual monitoring and assessment program** as identified for yellow perch (Appendix 10) to track abundance indices through time; continue to inform sustainable harvest levels; and continue to monitor and evaluate imposed regulations or management actions identified to support the management objectives for perch.

The following monitoring activities will continue to be implemented on an annual basis, or as specified to assess the status of the yellow perch fishery; the effectiveness of the management objectives and strategies identified herein; and to inform any future management actions to be implemented.

1. Annual FWIN Survey
2. Annual Creel Survey

**3) Continue and expand the scope of partnerships and studies to enhance existing data sets and address information gaps** pertaining to yellow perch in Lake Nipissing:

1. Continue working with Science and Research Branch (MNRF) and initiate partnerships with other organizations (e.g., Nipissing University) to leverage support for studies on the Lake Nipissing ecosystem (e.g., effects of water temperature, competition for resources, predator:prey dynamics)

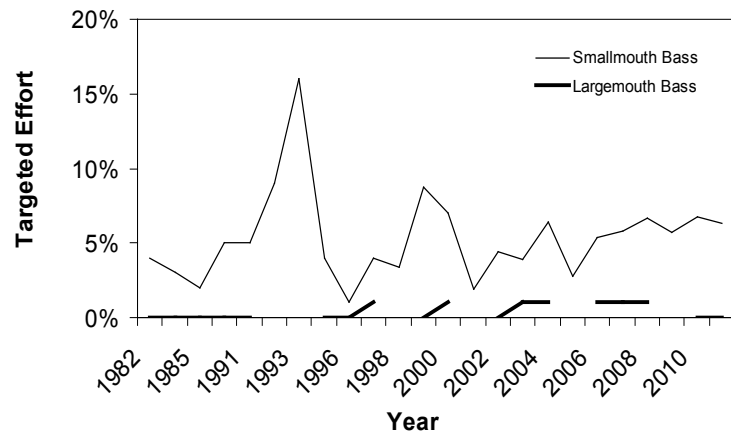
**4) Increase partnerships to raise public awareness on yellow perch biology, status, and the resulting management actions** to increase public (e.g., anglers, stakeholders, tourism industry) understanding of the necessity and rationale for management decisions and actions on the lake to date and into the future.

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With the implementation of the new regulations, outreach will be required for all users, including the tourist operators on the lake. This effort should also emphasize the status and role of yellow perch in the lake's broader fish community and promote this fishery as a resource for both the recreational and tourism sectors.

## **5.4 Smallmouth and Largemouth Bass**

In Ontario, smallmouth (SMB) and largemouth bass (LMB) are amongst the most popular fish targeted by the sport fishing community; however, relatively low targeted effort is expended for them in Lake Nipissing. Average angling hours for bass on Lake Nipissing are estimated at only 10,000 hours per year, or 2.5% of all angling pressure on the lake (Figure 16). Smallmouth bass make up on average, 5% of the total open water effort while largemouth make up <1%. The annual harvest of bass averages approximately 2200 fish, with the



**Figure 16: Proportion of targeted effort for bass in Lake Nipissing fishery as determined from creel surveys.**

average fish taken at 33cm (13") in length. The theoretical maximum for the lake based on modelling is 60cm (24"); however larger bass currently being caught from the lake generally do not exceed 50cm (20"). LMB do not grow as quickly, reaching lengths of 45cm (18"), congruent to the modelled potential maximum size of 47cm (18.5").

## **ASSESSING THE LAKE NIPISSING SMALLMOUTH (AND LARGEMOUTH BASS) FISHERIES**

To assess our achievement of bass objectives, IOTN, Nearshore Community Index Netting (NSCIN), creel surveys and derby statistics are used to determine the status of the fishery.

## **STATUS OF THE SMALLMOUTH AND LARGEMOUTH BASS FISHERY IN LAKE NIPISSING**

Smallmouth and largemouth bass populations in Lake Nipissing are considered to be healthy with robust age distributions and relatively low adult mortality. Growth is rapid but levels off quickly. Relatively low angling effort is directed specifically onto bass. Incidental bass harvest during walleye angling is predicted to account for a majority of the harvest. Total angler harvest of both species is low compared to other species (e.g., perch is 20,000 fish/yr). Catch rates range from 1 fish per two hours to 3.5 fish per hour.

## **MANAGEMENT ISSUES, CHALLENGES AND OPPORTUNITIES**

### **Issues and Challenges:**

- Existing assessment efforts may not adequately estimate bass abundance, more work may be required to refine abundance estimates for both species
- Inability to control species targeted by anglers, intention of increasing/shifting effort away from walleye during their recovery and onto other species like bass

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- Poor understanding of the impacts of bass on the recovery of walleye; need a better understanding of their dynamics
- Limited ability to grow trophy sized fish in the lake due to geography and current climate
- Relatively little interest in bass for consumption
- Low harvest of small sized fish, despite moderate catch rates
- The unknown level of First Nation subsistence harvest of this species
- Evidence that climate change may favour bass (annual increase in recruitment/abundance) at the disadvantage of other species
- The growing season is longer, which has resulted in increased survival of both young of the year and small males
- Bass spawning season is earlier by as much as 10 days (1980-2010), the lake's ecosystem is changing
- Bass nesting numbers have noticeably increased from 1958-2010 on Lake Nipissing; need to understand the above implications on the broader fish community

#### **Opportunities:**

- Ability to develop regulations which protect the reproductive output (spawning adults) while increasing angling opportunities on the lake
- General agreement that bass have potential and value to the tourism industry
- Potential benefits for walleye by directing fishing pressure away from walleye, and onto bass
- Little-targeted effort to date, no issues with sustainability at this time
- Improving the collaboration between MNRF and NFN recreational and commercial fisheries
- Opportunity to expand the collaborative approach to include Dokis First Nation, surrounding municipalities, hunter and angler clubs, fishing derbies/tournaments, etc.
- Opportunity to increase public awareness on the productive capacity of bass and the rationale for the management actions taken
- Opportunity to increase the transparency of monitoring results to foster greater public understanding and acceptance of management actions
- Opportunity to focus education efforts on their sporting quality and tourism value

### **OBJECTIVES FOR BASS MANAGEMENT IN LAKE NIPISSING**

#### **BIOLOGICAL OBJECTIVES**

- 1. To manage and promote this fishery in a way that maintains a sustainable and robust lake-wide bass population.*

#### **AQUATIC ECOSYSTEM OBJECTIVES**

- 2. To better understand the implications of a changing ecosystem as they relate to bass and more specifically, the relationship between bass and walleye in a changing ecosystem.*

#### **SOCIO-ECONOMIC, EDUCATIONAL AND PARTNERSHIP OBJECTIVES**

- 3. To promote angling for bass, focusing on their sporting qualities (eagerness to bite, fishing style and fighting ability)*
- 4. To manage and promote the bass fishery supporting a high quality recreational and tourism fishery and diversified fishing opportunities on the lake.*
- 5. Identify and establish (1-3) partners to support the bass fishery's objectives.*

**MANAGEMENT ACTIONS TO MEET BASS MANAGEMENT OBJECTIVES FOR LAKE NIPISSING**

**1) Change angling regulation (earlier opener by one week)**

**Table 2: Comparison of Previous to New Regulation for Bass**

<b>Previous Regulation</b>	<b>New Regulation</b>
<b>Season:</b> Open 4 <sup>th</sup> Sat in June - Nov 30  <b>Catch Limits:</b> Sport – 6 Conservation – 2	<b>Season:</b> Open 3 <sup>rd</sup> Sat in June - Nov 30  <b>Catch Limits:</b> Sport – 6 Conservation – 2

The new regulation is intended to:

1. Maintain sustainable bass populations.
2. Expand the diversity of fishing opportunities on the lake to divert pressure away from any one single species, such as walleye.

The changes are consistent with the current management objectives for bass (monitor and maintain the current bass population) and the objectives recently developed by the LNFMPAC for the plan (to take advantage of increased bass production given the low harvest pressure and favourable climate change implications).

The changes for Lake Nipissing are also consistent with the regulations being proposed for FMZ 11 by the FMZ 11 Advisory Council.

Appendix 11 provides the rationale for the alternate management actions that were considered as part of the development of this plan.

Appendix 12 provides a more detailed summary of the objectives, indices, targets and timelines associated with each management objective and action for bass.

**2) Continue the annual monitoring and assessment program** as identified for bass (Appendix 12) to track abundance indices through time, continue to inform sustainable harvest levels, and continue to monitor and evaluate regulations and management actions supporting bass objectives.

The following monitoring activities will continue to be implemented on an annual basis, or as specified to assess the status of the bass fishery, the effectiveness of the management objectives and strategies identified herein and to inform any management actions to be implemented in the future.

1. Annual FWIN Survey
2. Annual Creel Survey
3. Ice Out Trap Netting Survey

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#### **3) Continue and expand the scope of studies and partnerships to enhance existing data sets and address information gaps** pertaining to bass in Lake Nipissing:

1. To establish location specific benchmarks for bass abundance
2. To enhance existing assessment program for bass to acquire a better understanding of the status of the LMB fishery
3. To study the impacts of an advantaged bass population on the recovery of walleye
4. To examine the degree of niche overlap between bass and walleye
5. To monitor ecosystem changes as they relate to bass life history patterns
6. Continue working with Aquatic Research and Development Section (MNRF) and initiate partnerships with other organizations to leverage support for studies on the Lake Nipissing ecosystem (e.g., effects of water temperature, competition for resources, predator-prey dynamics)

#### **4) Increase partnerships to raise public awareness on bass biology, status and the resulting management actions** to increase public (e.g., anglers, stakeholders, tourism industry) understanding of the necessity and rationale for management decisions and actions to date and into the future.

With the implementation of the new regulations, public outreach will be required for all users including tourist operators on the lake, as the earlier season opener during the historical spawning period for bass is contrary to the previous management strategies for this species. This effort should emphasize the status of the population, the recent changes in bass spawning habits and what this means for the lake's broader fish community. Promotion of this fishery as an alternative fishing opportunity/resource for both the recreational and tourism sectors is also an important component of these communications.

Educational efforts should emphasize:

1. Bass biology and the implications of a changing Lake Nipissing ecosystem
2. Angling for bass, focusing on their sporting qualities (eagerness to bite, fishing style, fighting ability, and great experience for kids)

## **5.5 Muskellunge**

Muskellunge (muskie) are primarily targeted in a catch and release trophy fishery which contributes to only 1-2% of all open water effort. Assessment data suggests that Lake Nipissing has a high quality muskie fishery, producing large fish. On average one thousand hours of open water angling effort targets muskie on the lake.

### **ASSESSING THE LAKE NIPISSING MUSKELLUNGE FISHERY**

To assess our achievement of muskie objectives, IOTN, creel surveys and angler diaries are used to provide us with measures of relative abundance, as well as information on growth and other life history characteristics for the species and harvest levels of muskie.

### **STATUS OF MUSKELLUNGE IN LAKE NIPISSING**

Assessment data specific to muskellunge indicate that the population has a robust age distribution. Trap-netting studies conducted on the lake have observed a large number of very large fish in the lake, measuring from 117 to 137 cm (46" to 54") and weighing 18 kg or more.

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This, in addition to anecdotal information received from the angling public, suggests that Lake Nipissing has a high quality muskellunge fishery that produces large fish. As a result, management objectives have typically focussed on trophy (fish  $\geq 127$  cm or 50") opportunities, an approach that has gathered public support as indicated during the previous public consultation process.

Studies on muskie growth rates were used to develop biologically-based size limits designed to protect large individuals in a population. The current regulation for muskie allows anglers to catch and keep one over 122 cm (48") for a sport licence and zero fish for a conservation licence.

### **MANAGEMENT ISSUES, CHALLENGES AND OPPORTUNITIES**

#### **Issues and Challenges:**

- Controlling the magnitude of recreational harvest in an open-access fishery
- High value trophy fishery, catch and release induced stress to fish
- Limited assessment data specific to muskellunge for the lake
- Threats from Viral Hemorrhagic Septicaemia (VHS) (muskie populations are known to be susceptible to lethal effects from this disease)

#### **Opportunities:**

- High value trophy fishery that provides other angling opportunities on the lake
- Ability to develop regulations which protect the reproductive output (spawning adults), yet promote a trophy fishery
- Simple, provincially-implemented regulation, limits angler access to 5% of the population, which in turn gives multiple opportunities for fish to spawn
- Existing advocacy by devoted anglers for strict enforcement, provides opportunity to expand and highlight this type of conservation/stewardship effort
- Ability to expand collaborative efforts with First Nations to reduce muskellunge as by-catch in the commercial fishery, similar to pike
- Ability to expand collaborative efforts with First Nations and stakeholders to complete muskellunge habitat inventory and mapping exercise on the lake
- Commitment to annual monitoring for VHS, provincial program supporting prevention and reduced risk of introductions into non-contaminated waters
- Potential for use of the Muskies Canada angler diary program as a tool in monitoring muskies.

### **OBJECTIVES FOR MUSKELLUNGE MANAGEMENT IN LAKE NIPISSING**

#### **BIOLOGICAL OBJECTIVES**

1. *To manage for a sustainable muskellunge population that provides for a premiere trophy muskie fishery in Northeastern Ontario.*

#### **AQUATIC ECOSYSTEM OBJECTIVES**

2. *To minimize the risks to the muskie population from invasive species and fish disease (VHS).*



**SOCIO-ECONOMIC, EDUCATIONAL AND PARTNERSHIP OBJECTIVES**

3. *To use muskie as a model species for the effectiveness of conservation advocacy and to promote proper muskie identification, proper catch and release techniques.*
4. *Identify and establish (1-3) partners to support the muskie fishery's objectives.*

**MANAGEMENT ACTIONS TO MEET MUSKELLUNGE MANAGEMENT OBJECTIVES FOR LAKE NIPISSING**

Appendix 13 provides a more detailed summary of the objectives, indices, targets and timelines associated with each management objective and action for muskie.

**1) Maintain current regulation as per the status quo (Catch limit and Size limit)**

Since the muskie fishery on Lake Nipissing is primarily a trophy fishery that at this time appears to be sustainable, the existing regulation is being carried forward. The current regulation appears to be effectively meeting the needs of both the species, from a sustainability perspective, in addition to meeting the needs and interests of the anglers targeting these fish.

The regulation is consistent with the current and proposed regulation for the zone (FMZ 11).

Feedback received from both the LNFMPAC and the public, fully support this decision.

**2) Maintain the current fish sanctuaries** on the lake that are designed to protect spawning adult walleye, but also serve to protect spawning muskie that may be feeding and may also be vulnerable to the gear at this time of year in these locations.

- **Iron Island:** No fishing from March 16 to Fri. before 3<sup>rd</sup> Sat. in May
- **Wasi Falls:** No fishing from March 16 to Fri. before 3<sup>rd</sup> Sat. in May & Oct. 1 - Nov. 30
- **South River (Chapman Chutes):** No fishing from March 16 to Fri. before 3<sup>rd</sup> Sat. in May & Oct. 1 to Nov. 30

**3) Continue the annual monitoring and assessment program** as identified for muskie (Appendix 13) to track abundance indices through time, continue to inform sustainable harvest levels, and continue to monitor and evaluate imposed regulations or management actions identified to support the management objectives for muskie.

The following monitoring activities will continue to be implemented on an annual basis, or as specified to assess that status of the muskie fishery, the effectiveness of the management objectives and strategies identified herein and to inform any future management actions to be implemented in the future.

1. Annual FWIN and Creel Surveys
2. Ice Out Trap Netting Survey

**4) Increase partnerships to raise public awareness on muskie biology, status, resulting management actions and stewardship initiatives or action** for the lake to increase public (e.g., anglers, stakeholders, tourism industry) understanding of the necessity and rationale for management decisions and actions to date and into the future.

Education efforts should:

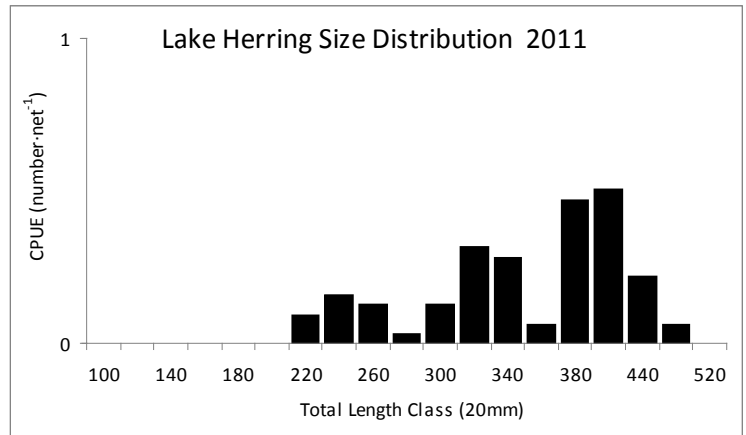
1. Promote the significant quality of the muskie population in Lake Nipissing as an exciting alternative angling quarry.
2. Promote proper identification of muskie
3. Use muskie as a model species for the effectiveness of conservation advocacy
4. Promote proper handling and successful catch and release techniques as it relates specifically to muskie
5. Promote proper use and disposal of baitfish

## **5.6 Lake Herring (Cisco)**

Of the two coregonids in the lake (lake herring and lake whitefish), herring is the more plentiful species. Figure 17 illustrates a typical size class distribution of herring captured in the FWIN in Lake Nipissing.

Angling and harvest of herring remains very low (<0.5 % targeted effort) and as such management of the species to date has been conducted through the baitfish program.

Despite the limited demand on the species, herring play an important role within the Lake Nipissing ecosystem, not only as a key forage (prey) species for walleye (among other fishes e.g., pike), but also as indicators of ecosystem health. Therefore, it is important that they continue to be monitored, assessed and managed to ensure they persist in the lake.



**Figure 17: 2011 Lake Nipissing Lake Herring size distribution (mm) as measured as catch per unit effort represented by the number of fish caught per net during Fall Walleye Index Netting.**

### **ASSESSING THE HERRING FISHERY IN LAKE NIPISSING**

FWIN data is used to provide measures of relative abundance, as well as information on growth and other life history characteristics for herring in the lake although estimates generated through the FWIN assessment may not be precise due to the pelagic nature of the species.

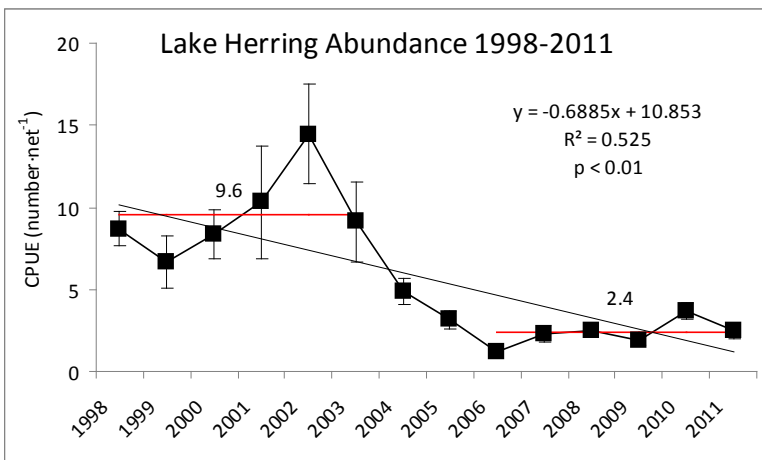
Creel surveys are used to estimate fishing pressure and catch and harvest rates for the fish. Together, these surveys help determine the overall status of the population and whether current regulations are adequately protecting this fishery.

### **STATUS OF HERRING IN LAKE NIPISSING**

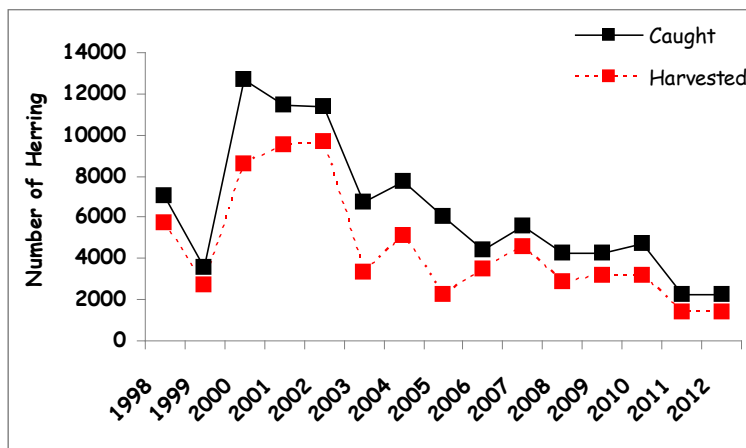
The herring population in the lake appears to have undergone a major decline in abundance since 1998. Figure 18 illustrates that prior to 2003 the average catch per FWIN net was 9.6 fish. After 2003 the average catch declined significantly to the current 2.4 fish per FWIN net. Herring harvest levels, a non-targeted/incidental species caught by anglers, also indicate a decline (<1%). Figure 19 illustrates the changes in harvest that have occurred, reflecting the decline in abundance since 2003.

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The life history pattern of this species is heavily influenced by water temperature which is directly associated with their need for high levels of oxygen. Thus, monitoring of ecosystem changes as they relate to water temperature is of particular importance for this species. Changes towards a warmer lake could have negative impact on the species as well as those that rely on them as a high energy forage species.



**Figure18: Abundance of lake herring in Lake Nipissing as measured as catch per unit effort represented by the number of fish caught per net during Fall Walleye Index Netting from 1998-2011.**



**Figure19: Number of herring caught and harvested on Lake Nipissing from 1998-2011 as measured in both the open water and winter creel surveys.**

## **MANAGEMENT ISSUES, CHALLENGES AND OPPORTUNITIES**

### **Issues and Challenges:**

- Limited assessment data specific to herring for the lake
- Threats from climate change, more specifically the loss of cool-cold water habitat
- Threats from invasive species such as the spiny water flea
- The unknown level of First Nation subsistence fishing
- The degradation of the ecological role of the species in structuring the lake's fish community and more specifically as an important high energy prey item for walleye
- Heavily parasitized, not a popular species for consumption, and hence very low demand on the species

### **Opportunities:**

- Improving collaboration between MNRF and NFN recreational and commercial fisheries
- Increasing public awareness on the importance of herring in the lake, as forage species

**OBJECTIVES FOR HERRING MANAGEMENT IN LAKE NIPISSING**

**BIOLOGICAL OBJECTIVES**

1. *To establish a benchmark for herring in the lake and to maintain the population at its current level at a minimum and to monitor the population for additional signs of stress.*

**AQUATIC ECOSYSTEM OBJECTIVES**

2. *To better understand the effects of a changing Lake Nipissing ecosystem (i.e., climate change, spiny water flea) on the herring population.*

**SOCIO-ECONOMIC, EDUCATIONAL AND PARTNERSHIP OBJECTIVES**

3. *To educate the general public on the value of herring as an indicator species.*
4. *Identify and establish (1-3) partners to support the herring's fishery's objectives.*

**MANAGEMENT ACTIONS TO MEET HERRING MANAGEMENT OBJECTIVES FOR LAKE NIPISSING**

Appendix 14 provides a more detailed summary of the objectives, indices, targets and timelines associated with each management objective and action for herring.

**1) Maintain current regulation**

Since there is very little demand on the herring fishery by recreational anglers, the existing regulation was carried over into the new plan. However, there is evidence to suggest the population is declining and a more thorough data review is required to inform future management efforts. This may require enhanced monitoring of the population in order to assess its status and acquire a better understanding of the herring dynamics in the lake.

This management option is consistent with the current and proposed regulation for the zone (FMZ 11).

**2) Continue the annual monitoring and assessment program** on the lake as identified for herring (Appendix 14) to track abundance indices through time; enhance data collection as necessary in order to inform sustainable harvest levels; and continue to monitor and evaluate regulatory impacts or management actions identified herein or in the future to support management objectives for herring.

The following monitoring activities will continue to be implemented on an annual basis, or as specified to assess the status of the herring fishery, the effectiveness of the management objectives and strategies identified herein and to inform any management actions to be implemented.

1. Annual FWIN
2. Annual Creel Surveys
3. Lake Temperature Survey

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**3) Continue collaborative efforts with First Nations on resource monitoring** in a proactive, flexible manner that addresses the subsistence, commercial (by-catch) and recreational harvest and demand for herring from the lake.

**4) Continue and expand the scope of studies and partnerships to enhance existing data sets and address information gaps** pertaining to herring in Lake Nipissing:

1. To solidify our understanding of the capacity, population status and thresholds for herring.
2. To continue to engage strategic partners on an integrated research project to study the effects of a changing ecosystem on herring.

**5) Increase partnerships to raise public awareness on herring biology, status, resulting management actions and stewardship initiatives or actions** for the lake in order to increase public (e.g., anglers, stakeholders, tourism industry) understanding of the necessity and rationale for management decisions and actions on the lake to date and into the future.

Education efforts should focus on:

1. Herring as an important component of the lakes food web as a key forage species.
2. Herring as an important ecosystem health indicator for the lake.
3. Maintaining the habitat (water quality) for herring to ensure its long term sustainability in the lake.

## **5.7 LAKE WHITEFISH**

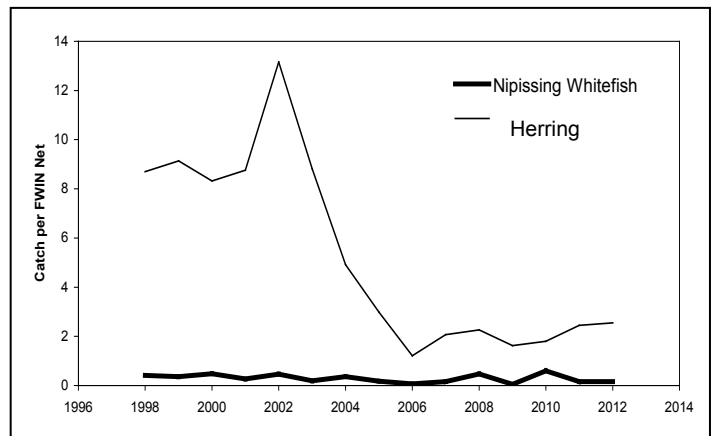
Whitefish harvest from Lake Nipissing remains low to this day, in contrast to the Great Lakes and Northwestern Ontario where whitefish are an important commercial fishery. Both recreational and commercial harvest of the species remains very low and therefore management efforts for the species has been limited to date.

### **ASSESSING THE LAKE NIPISSING LAKE WHITEFISH FISHERY**

FWIN provides us with measures of whitefish relative abundance, as well as information on growth and other life history characteristics of the fish, whereas creel surveys are used to estimate fishing pressure, catch and harvest rates.

### **STATUS OF LAKE WHITEFISH IN LAKE NIPISSING**

Whitefish have been represented relatively consistently in annual FWIN and creel surveys, potentially indicating a relatively stable population (Figures 20 and 21). The recreational whitefish fishery experiences extremely low targeted effort (<0.5% of total) with very little harvest (~1500kg/year). The commercial fishery harvests approximately 10,000kg per year.



**Figure 20: Relative abundance of lake whitefish and herring in Lake Nipissing as measured as catch per unit effort represented by the number of fish caught per net during Fall Walleye Index Netting.**

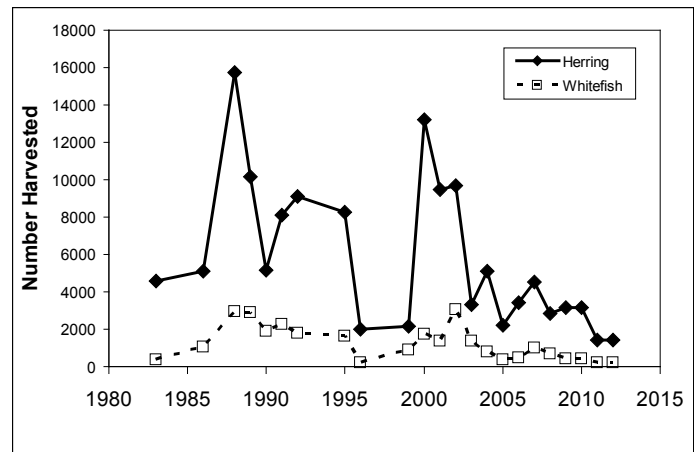
## MANAGEMENT ISSUES, CHALLENGES AND OPPORTUNITIES

### **Issues and Challenges:**

- Limited assessment data specific to whitefish for the lake
- Management of the whitefish population in the absence of an agreed upon allocation mechanism between commercial and recreational interests that facilitates the alignment of both fisheries management objectives and management actions and decisions
- The unknown level for First Nation subsistence and commercial harvest for this species

### **Opportunities:**

- Improve collaboration between MNRF and NFN recreational and commercial fisheries
- Expand the collaborative approach to include Dokis First Nation and surrounding municipalities



**Figure 21: Angler Harvest patterns of herring and lake whitefish on Lake Nipissing as represented by numbers of fish harvested during both the open water and winter seasons.**

## OBJECTIVES FOR LAKE WHITEFISH MANAGEMENT IN LAKE NIPISSING

### **BIOLOGICAL OBJECTIVES**

1. *To determine healthy population levels and establish a benchmark for whitefish in the lake and cautiously manage the whitefish fishery recognizing habitat constraints and limited information on the health of the population.*

### **AQUATIC ECOSYSTEM OBJECTIVES**

2. *To better understand the effects of a changing Lake Nipissing ecosystem (i.e., climate change, spiny water flea) on the lake whitefish population.*

## MANAGEMENT ACTIONS TO MEET LAKE WHITEFISH MANAGEMENT OBJECTIVES FOR LAKE NIPISSING

Appendix 15 provides a more detailed summary of the objectives, indices, targets and timelines associated with each management objective and action for whitefish.

**1) Maintain current regulation.** Since there is very little demand (<0.5% targeted effort) and harvest (~1500kg/year) of whitefish by recreational anglers at this time and since the population has remained relatively stable since the 1980's, it was determined there was no need to change the current regulation.

The regulation is also consistent with the current and proposed regulation for the zone (FMZ 11).

**2) Continue the annual monitoring and assessment program** as identified for whitefish (Appendix 15) to track abundance indices through time, continue to inform sustainable harvest

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levels, and continue to monitor and evaluate imposed regulations or management actions identified herein to support the management objectives for whitefish.

The following monitoring activities will continue to be implemented on an annual basis, or as specified to assess that status of the whitefish fishery, the effectiveness of the management objectives and strategies identified herein and to inform any management actions to be implemented.

1. Annual FWIN and creel surveys
2. Whitefish monitoring program
3. Ecosystem changes monitoring

#### **3) Continue and expand the scope of studies and partnerships to enhance existing data sets and address information gaps** pertaining to lake whitefish in Lake Nipissing:

1. To establish a benchmark for whitefish in the lake
2. To determine healthy population levels and sustainable harvest levels for the lake
3. To better understand the effects of a changing Lake Nipissing ecosystem (i.e., climate change, spiny water flea) on the lake whitefish population.
4. To solidify our understanding of the thresholds for whitefish with regards to habitat availability in the lake; MNRF, with key stakeholders to complete the lake wide habitat inventory, mapping, and monitoring exercise as it relates specifically to whitefish in the lake.

#### **4) Increase communications and partnerships to raise public awareness of whitefish biology, status, resulting management actions and stewardship initiatives** to increase public (e.g., anglers, stakeholders, tourism industry) understanding of the necessity and rationale for management decisions and actions to date and into the future.

Education efforts should focus on:

1. Increased understanding and acceptance from users about management actions and alternative stewardship initiatives that influence whitefish, their habitat, and threats from invasive species

## **6.0 Management Strategies for Lake Ecosystem Health**

An ecosystem is a community of living organisms (plants, animals and microbes) interacting with the nonliving components of their environment (e.g. air, water and mineral soil). Key characteristics of healthy, integrated ecosystems include structural elements such as species composition, native biodiversity and the availability of a variety of habitat types, and functional processes such as energy flow, material transport and hydrological processes (Karr 1991; Maddock 1999; Bain *et al.* 2000).

Healthy aquatic flora and fauna are symbolic of the health of aquatic ecosystems and our ability to manage our resources. Fish are relatively long-lived, require distinct habitats and are generally sensitive to environmental stressors and pollutants; they integrate the effects of their environment. A variety of species are usually present in all freshwater systems, and many species are important for social and economic reasons. It is common to monitor a single species of economic or recreational value, or a set of community parameters to measure the effects of human alteration to lake ecosystems (Metcalf *et al.* 2013).

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An ecosystem approach to fisheries management moves away from single species, static population management strategies. It recognizes that diversity is important to ecosystem functioning and that multiple scales interact within and among ecosystems. Components of ecosystems are linked together and change with time.

An ecosystem approach to fisheries management considers the interactions that a target fish stock has with predators, competitors, and prey species; the effects of weather and climate on fish stock biology and the aquatic ecology; the complex interactions between fishes and their habitat; and the effects of fishing on fish stocks and their habitat. Essentially, an ecosystem approach to fisheries management governs key components of the lake to promote a resilient diverse ecosystem that reflects the natural range of variation for the lake.

This section of the plan addresses components that are directly or indirectly related to the health of the lake's aquatic ecosystem and the fisheries that rely upon it.

## **6.1 Water Quality and Quantity**

### **6.1.1 Water Quality**

Water quality in aquatic ecosystems strongly influences lake productivity and biodiversity. It is a function of complex interactions between lake hydrology, climate, watershed (e.g. soils, topography), and biotic variables. Chemical characteristics (e.g. dissolved oxygen (DO), alkalinity, pH, and nutrients), and physical characteristics (e.g. water temperature, turbidity and light transmission) are all influenced by flow and level regimes, climate/weather, geology, land use patterns, and sources of organic matter (Metcalf et al. 2013).

There are numerous environmental indicators that fisheries managers use to assess and monitor water quality conditions of a particular water body over time (Shear et al. 2003). These can have either direct or indirect implications on a fishery or fish community, and as such should be evaluated at regular intervals during plan implementation. Alteration of water quality characteristics beyond the range of natural variability can cause changes in productivity shifts in biological communities that can result in shortened food webs and reduced biodiversity (OMOE 2009).

Benthic invertebrates, algae, plankton and fish are sensitive to changes in their physical and chemical habitat. For example, increasing amounts of algae are often correlated with higher concentrations of nutrients like phosphorus. Measuring the diversity and abundance of aquatic organisms can tell us a lot about the overall health of a lake. A diverse community made up of species that are sensitive to pollution indicates good water quality. Conversely, a community that is dominated by a few species that are tolerant of pollution can indicate degraded water quality.

### **Environmental Indicators**

**Physical Indicators:** water temperature, specific conductance, total suspended solids (TSS), total dissolved solids (TDS), secchi depth or nephelometric turbidity.

**Chemical indicators:** pH, alkalinity, dissolved organic carbon, dissolved oxygen (DO), total phosphorus, nitrate/nitrite, total ammonia, total Kjeldahl nitrogen.

**Biological indicators:** chlorophyll a (primary productivity), phytoplankton, zooplankton, macroinvertebrates (ephemeroptera (mayfly), plecoptera (stonefly), trichoptera (caddisfly)).



Water quality is not regulated by MNRF, but does influence the status of our fisheries resources. As such, MNRF works closely with several other agencies to collect and evaluate water quality information that pertains to the management of fish (MOE, DFO, NBMCA, Nipissing University). Appendix 17 provides a suite of water quality indicators for fisheries management purposes.

### **ASSESSING THE LAKE NIPISSING WATER QUALITY**

MNRF does not formally monitor the lake's water quality however will continue to support any water quality monitoring programs and encourage the development of further partnerships.

### **STATUS OF THE LAKE NIPISSING WATER QUALITY**

Comparative water quality testing has been conducted periodically on Lake Nipissing since before 1988 (Kelly-Hooper 2001). The most recent study occurred in 2004, with a report from the environmental monitoring and reporting branch of the Ministry of Environment (2010). Generally, water chemistry has not changed significantly since the 1980's (OMOE 2009, 1992). Some elevations in particular components have been observed, however the lake is still deemed to be within acceptable parameters, as related to the Provincial Water Quality Objectives. It has been further noted that Lake Nipissing contains two bays, Callander and Cache, which exhibit notably different water chemistry than the rest of the lake.

Nipissing University has also participated in various types of water quality monitoring programs on the lake, either directly as part of a "Status of the Basin Report" by the North Bay-Mattawa Conservation Authority or indirectly via a zooplankton assessment and a blue-green algae study on the lake (Filion 2005).

Many local user groups have voiced concern over water quality in Lake Nipissing, and suggest that frequent testing be done to monitor any changes in water chemistry. This need becomes further supported by the increase in activity and development that is occurring around the lake.

### **MANAGEMENT ISSUES, CHALLENGES, AND OPPORTUNITIES**

#### **Issues and challenges:**

- Confusion over various agency regulatory roles for managing water quality
- Information pertaining to how water quality has been monitored and managed has not been widely disseminated to the public
- There is some concern for the current status of the water quality of the lake as it relates to fish habitat (e.g., changing weed populations and locations, water temperature, algae blooms)

#### **Opportunities:**

- There are several agencies (government and non-government) involved in formal or informal water quality monitoring programs on the lake
- MNRF has the equipment and trained staff to support monitoring of some water quality parameters relevant to fish productivity via the Broad Scale Fisheries Monitoring Program

**OBJECTIVES FOR WATER QUALITY ON LAKE NIPISSING**

**BIOLOGICAL OBJECTIVE**

- 1. To maintain or enhance water quality to support a healthy, sustainable, naturally-reproducing native fish community in the lake.*

**ECOLOGICAL OBJECTIVE**

- 2. To anticipate, prevent, or where feasible adapt to water quality changes that affect aquatic ecosystems or the fish communities that rely on them.*

**PARTNERSHIP OBJECTIVE**

- 3. To balance the varying needs amongst other agencies for water quality information on Lake Nipissing.*

**MANAGEMENT ACTIONS TO MEET WATER QUALITY OBJECTIVES FOR LAKE NIPISSING**

Appendix 16 provides a more detailed summary of the objectives, indices, targets and timelines associated with each water quality management objective and action for the lake.

**1) MNRF resource managers and planners to consider and adhere to all relevant legislation, policy and FMP objectives** when reviewing project proposals that have the potential to adversely affect water quality for fish.

**2) MNRF to communicate objectives with partner resource managers upon plan approval and encourage key partner resource managers to incorporate plan objectives** into their decision making processes when reviewing projects that have the potential to adversely affect water quality for fish.

**3) Collaborate with key partners (Nipissing University, NBMCA, MOE, DFO) to:**

1. Capture existing Lake Nipissing water quality condition and share historical water quality information.
2. Develop a factsheet describing the regulatory roles and responsibilities of each agency when reviewing development proposals that may affect water quality and healthy aquatic ecosystems.
3. Monitor water quality indicators that may have an influence on ecosystem condition to determine if changes to the Lake Nipissing water quality will alter fish population reference points.

**MONITORING STRATEGY FOR WATER QUALITY**

**1) Develop a water quality information sharing agreement with key partners** (Nipissing University, NBMCA, MOE, DFO) to coordinate data collection, analysis and data management of key indicators of interest to all parties.

### **6.1.2 Water Quantity**

Daily, seasonal, annual and inter-annual patterns of events regulate the characteristics of a lake ecosystem and must be taken into account when developing objectives for aquatic ecosystem health. Understanding the regulated water level regime of Lake Nipissing and looking for opportunities to consider management actions that maintain and generate natural variability in lake levels is likely to foster greater ecosystem resilience. Incorporating natural variability into regulated systems allows issues affecting the aquatic ecosystem to be addressed in a more comprehensive manner and facilitates an ecosystem approach to management. Closer identification of valued ecosystem components compliments the ecosystem approach by ensuring the water flow and level needs of sensitive and indicator species and features are also met (e.g. walleye or pike spawning habitat).

Lake Nipissing is regulated by three main dams at the outflow of the Upper French River (Big Chaudière, Little Chaudière, and Portage) that are operated by Public Works and Government Services Canada (PWGSC) for water control. The major inflows to the lake are the regulated South River and the Veuve and Sturgeon Rivers.

PWGSC manages water level operations as directed by the Sturgeon-Nipissing-French Water Management Plan and works with the Sturgeon-Nipissing-French (SNF) Water Management Group to monitor operations. Directed by MNRF, this group includes representatives of local private and municipal watershed stakeholders, including the City of North Bay, the North Bay-Mattawa Conservation Authority, Ontario Hydro, provincial agencies, and federal watershed management partners.

Through a process of consultation, information-sharing and exchange of expertise, the partners strive to balance the varying needs and watershed considerations throughout the Lake Nipissing, French River and Sturgeon River Watershed. Important considerations for these water management partners include: public safety, early warning of potential flood conditions, sportfish habitats and spawning beds, waterfowl nesting, year-round tourist operations, cottager and boating needs, water quality and oxygen levels, ice and water damage, water intake and sewage outfalls, and Ontario Hydro operations.

The working group strives to minimize the impact of variable conditions and maximize the benefits to the lake. The current summer operating range for Lake Nipissing is 195.75 to 195.95 MASL (metres above sea level) from approximately the beginning of May to the beginning of October; considered the “navigation season”. In October PWGSC begins a drawdown of the lake to a target elevation of 194.50 MASL typically by the middle of March to mitigate the spring freshet. The operating plan also includes target water levels and timing of water levels, to provide for maintenance of significant fish habitat and adequate water levels for spawning. Specifically, once walleye spawning begins at Wasi Falls, the minimum water levels must remain above 195.3 MASL to ensure that adequate habitat (continuous flows and levels) is provided for spawning fish both at Wasi Falls and elsewhere on the lake.

#### **ASSESSING THE LAKE NIPISSING WATER LEVELS**

MNRF participates as a member of SNF Water Management Group on a co-operative approach to water level management on the lake and will continue to do so into the future. Priorities for the future will include the maintenance of water levels to account for the balanced needs of the public and environment of Lake Nipissing and its fisheries.

## **STATUS OF THE LAKE NIPISSING WATER LEVELS**

To date, there have been no incidents of non-compliance with the prescribed flows and levels designated to provide for fish habitat during spawning seasons.

## **MANAGEMENT ISSUES, CHALLENGES, AND OPPORTUNITIES**

### **Issues and challenges:**

- To date, information pertaining to how water levels have been and are being managed has not been widely disseminated, as such there has been some concern from the general public based on a lack of understanding.
- There is some concern that perhaps the existing minimum flows and levels are not meeting the needs of pike.

### **Opportunities:**

- MNRF is already participating in a water level management program that is intended to meet the needs of identified valued ecosystem components such as spawning habitat.
- Explore incorporating key elements of the natural daily, seasonal, annual and inter-annual patterns in this regulated system to address issues that may be affecting components of the broader lake ecosystem.
- MNRF can increase public understanding of how we are managing water levels on the lake.

## **OBJECTIVES FOR WATER LEVELS ON LAKE NIPISSING**

### **BIOLOGICAL AND ECOLOGICAL OBJECTIVES**

1. *To manage for aquatic ecosystem health through maintaining or restoring hydrological characteristics, including natural variability, for water level operations that more closely approximate those with which local species and communities have evolved.*

### **SOCIO-ECONOMIC OBJECTIVES**

2. *Promote development on the lake that accounts for the needs of resource users and the aquatic ecosystem of Lake Nipissing when designing flow and level operations.*

### **EDUCATIONAL OBJECTIVES**

3. *Increase public awareness of the water management practices used by the SNF Water Management Group to maintain or restore aquatic ecosystem health.*

## **MANAGEMENT ACTIONS FOR WATER LEVELS ON LAKE NIPISSING**

Appendix 17 provides a more detailed summary of the objectives, indices, targets and timelines associated with each management objective and action for Lake Nipissing water levels.

### **1) Maintaining or restoring hydrological characteristics.**

1. MNRF to continue participating in the SNF Water Management Group to ensure that priorities consider water level operations for aquatic ecosystem structure, compositions and function.

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2. Assess the degree of alteration of indicators for current operations relative to the long term historical operations and simulated natural flows and levels for the Sturgeon-Nipissing-French watershed.
3. Resource Managers to ensure staff, across all program areas, consider these plan objectives when managing for other resources.

#### **2) Development that accounts for the needs of resource users and the aquatic ecosystem.**

1. As new facilities (dams or power generating stations) are proposed within the Lake Nipissing watershed, or existing facilities are reviewing their operating plans, resource managers and planners will need to ensure that the objectives, indicators, benchmarks and targets for water levels are considered during planning and approval processes.

#### **3) Increase public awareness**

1. Evaluate and report to the LNFMPAC and Sturgeon Nipissing French Advisory Council water level incidents from the public and waterpower industry.
2. Include evaluation of water levels in annual Lake Nipissing SOR report, and create factsheet on how water levels are managed on the lake.
3. Make products publically available in accessible, central locations (e.g., Lake Nipissing website, MNRF office, local Service Ontario offices).
4. Participate in local forums (Lake Nipissing Summit), requests for presentations to local OFAH, rod and gun clubs, media releases, etc.

### **RATIONALE FOR SELECTION OF MANAGEMENT ACTIONS FOR WATER LEVELS**

Based on feedback received from LNFMPAC, it was determined that existing objectives are relevant to the new FMP. A need was identified to further communicate how Lake Nipissing water levels are being managed. Future water development projects must that plan objectives and dam operations balance the needs of the public as well as those of the environment.

### **MONITORING STRATEGIES FOR WATER LEVELS ON LAKE NIPISSING**

The following monitoring activities have been developed to assess whether the management actions are effectively achieving the objectives:

1. Assess the variability in the long term water level data record against the simulated natural variability for Lake Nipissing.
2. Ongoing monitoring and assessment of compliance with the monitoring and reporting requirements of the Sturgeon Nipissing French water management plan and dam operating plan relative to the number of public complaints.

#### **6.1.3 Fish Habitat**

Ecosystem-based fishery management aims to conserve the structure and function of aquatic ecosystems (i.e., fish habitat) in addition to conserving the fishery resources. By managing the key components of Lake Nipissing's fish habitat, resource managers can promote a naturally reproducing, genetically diverse, resilient and self-sustaining fishery.

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Fish habitat is protected under national fish habitat protection provisions of the Federal [Fisheries Act](#). The Federal Fisheries Act (the Act) and Fisheries and Oceans Canada (DFO) (who have the decision-making authority for the conservation and protection of fish and fish habitat) define **fish habitat** as:

*“spawning grounds and any other areas, including nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly to carry out their life processes.”*

MNRF is responsible for fisheries management planning, fish and fish habitat information management, and aspects of fish habitat rehabilitation. MNRF governs under the authority of the *Public Lands Act*, the *Lakes and Rivers Improvement Act*, and the *Crown Forest Sustainability Act*, all of which have provisions supporting the protection of fish and fish habitat.

Amendments to the *Fisheries Act* in 2012 changed the focus of the Act’s regulatory regime to ***managing threats to the sustainability and ongoing productivity of commercial, recreational and Aboriginal (C/R/A) fisheries.***

New fisheries protection provisions of particular interest to Ontario and Lake Nipissing include Section 35, the prohibition against causing serious harm to fish (and their habitat) that are part of or that support a commercial, recreational or Aboriginal fishery.

Four factors are considered by DFO before making decisions on impact (Section 6):

- a) the contribution of the relevant fish to the ongoing productivity of commercial, recreational or Aboriginal fisheries;
- b) fisheries management objectives (such as those incorporated into lake or FMZ management plans);
- c) measures and standards to avoid, mitigate or offset serious harm to fish that are part of or support a commercial, recreational or Aboriginal fishery; and
- d) the public interest.

### **ASSESSING THE LAKE NIPISSING FISH HABITAT**

Habitat assessments are the means by which MNRF assesses the quantity, quality, and distribution of fish habitat in the lake using standardized protocols.

### **STATUS OF LAKE NIPISSING FISH HABITAT**

There is a comprehensive understanding of fish habitat availability and use for some species on portions of Lake Nipissing; however a comprehensive inventory of habitat availability and use does not exist for all species and locations. The existing dataset is the result of historical efforts to inventory the lake and needs to be updated and completed.

### **MANAGEMENT ISSUES, CHALLENGES, AND OPPORTUNITIES**

#### **Issues and challenges:**

- MNRF has limited legislative authority and influence on activities that affect fish habitat
- Naturalized shorelines which promote fish habitat and healthy aquatic ecosystems do not always provide for shorelines preferred by property owners
- Fish habitat mapping and enhancement projects are often not viewed as rewarding or providing immediate benefit to volunteers/stakeholders

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- Inventory of habitat for all species in the lake (distribution, quantity, and quality) does not currently exist

#### **Opportunities:**

- Habitat enhancement efforts focussed on providing diverse habitat features for naturally reproducing populations may enhance recruitment within the lake and promote genetically diverse, resilient and naturally sustaining fisheries
- DFO's *Recreational Fisheries Conservation and Partnerships Program* focuses solely on habitat restoration projects that are associated with recreational fisheries and could provide funding to support local initiatives
- There are a number of opportunities to partner with First Nations, sister agencies, stakeholders or other key partners to achieve habitat management objectives
- There is an opportunity to increase the transparency of monitoring results to foster greater public understanding and acceptance of management actions and participation in stewardship actions and initiatives
- May be willingness to shift focus of long standing tradition/culture on the lake to help achieve these objectives

### **OBJECTIVES FOR FISH HABITAT ON LAKE NIPISSING**

#### **BIOLOGICAL OBJECTIVES**

1. *Maintain or enhance healthy aquatic ecosystem structure (fish habitat), function and diversity to support a healthy, sustainable, naturally-reproducing native fish community in the lake.*

#### **SOCIO-ECONOMIC OBJECTIVES**

2. *Sustainable development of the lake's finite capacity to be recognized in planning strategies, and actions for, or associated with, the lake.*
3. *Future development of the Lake Nipissing shoreline to minimize any significant negative ecological impacts on either specific habitats or species (e.g., loss of significant habitat, water quality, SAR), while balancing the needs of the public, social, cultural and economic interests.*

#### **ECOSYSTEM OBJECTIVES**

4. *Anticipate, prevent, or where feasible, adapt to large scale environmental changes that affect aquatic ecosystems and the fish communities that rely on them.*
5. *Minimize cumulative environmental effects that could impact fish communities and their supporting ecosystems.*

#### **EDUCATIONAL OBJECTIVES**

5. *Promote public participation and awareness in an ecosystem-based fisheries management approach which aims to conserve the structure and function of aquatic ecosystems supporting a healthy, sustainable and naturally-reproducing native fish community in the lake.*

**MANAGEMENT ACTIONS TO MEET LAKE NIPISSING FISH HABITAT OBJECTIVES**

A detailed summary of the objectives, indices, targets and timelines associated with each management objective and action for fish habitat can be found in Appendix 18.

**1) MNRF resource managers and planners to consider and adhere to all relevant legislation, policy and FMP objectives** when reviewing project proposals along the shoreline of Lake Nipissing. This will ensure a consistent, credible approach to managing the lake's shoreline and associated fish habitat.

**2) MNRF to communicate objectives with partner resource managers upon plan approval**, and encourage key partner resource managers to incorporate plan objectives into their decision making processes when reviewing project proposals along the shoreline of Lake Nipissing within their jurisdictions or delegated authority. Again, this will promote a consistent approach to resource management, build and strengthen partnerships, and ultimately provide consistency to the appropriate protection of fish habitats and the aquatic ecosystem.

**3) Expand the Scope of Studies to:**

1. **Collaborate with key partners (e.g., Nipissing First Nation, LNSA, Stewardship Councils, Nipissing University) to complete fish habitat inventory**, mapping and limiting habitat factor analysis on the lake for walleye, perch, pike, muskie, bass, whitefish, herring, sturgeon, and silver lamprey as appropriate.
2. **Collaborate with key partners (e.g., LNSA, Stewardship Councils, Nipissing University) to develop a project plan identifying priority locations or types of habitat**, for future habitat enhancement or creation projects on the lake, and to refer to National criteria for suitability of habitat enhancement efforts.
3. **Collaborate with key partners (e.g., LNSA, Stewardship Councils, Nipissing University) to maintain, enhance or restore habitat** on the lake to support the recovery of species at risk including lake sturgeon and silver lamprey where they currently or historically existed.
4. **Collaborate with key partners (e.g., Nipissing University, Stewardship Councils) to capture the existing condition of Lake Nipissing's shoreline** for use as baseline data for future reference.
5. **MNRF to devise a strategy that reflects objectives in FMP to prevent and when necessary mitigate significant cumulative effects** that could have or previously had an impact on the lake ecosystem or fish community.
6. **Collaborate with key partners (e.g., NBMCA, local municipalities, First Nations, Nipissing University, Stewardship Councils, MOE) to develop shoreline stewardship and etiquette factsheets for property owners** (residential, seasonal, tourist operators, and businesses) on the shores of Lake Nipissing. Messaging to include importance of maintaining septic systems and naturalized shorelines which retain fish habitat features, buffer the lake from nutrient loading and reduce erosion. Have NBMCA, First Nations and local municipalities endorse factsheets and include as part of resource management planning or municipal governance.
7. **Develop and implement a workshop focused on educating the public on habitat conservation**. Such a workshop should be geared towards waterfront property owners, and outline the measures which should be taken to avoid any adverse impacts on shoreline habitat



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8. **Collaborate with key partners to monitor ecosystem indicators that may have an influence on habitat conditions** on the lake to determine if changes to the Lake Nipissing ecosystem will alter population reference points in the future and respond accordingly.

#### **4. Education about fish habitat and management:**

1. MNRF, in collaboration with key partners to increase public awareness of the value of an **ecosystem-based fishery management approach** which aims to conserve the structure and function of aquatic ecosystems, in addition to conserving the fishery resource.
2. MNRF, in collaboration with key partners (e.g., local municipalities, First Nations, Nipissing University, Stewardship Councils, NBMCA, MOE) to raise public awareness and participation of property owners along the shores of Lake Nipissing in **shoreline stewardship and etiquette that promote the long-term sustainability of the fish habitat and water quality** in the lake and associated rivers.
3. **Promote the value of an ecosystem based approach** which emphasizes habitat management and stewardship actions, prepare a factsheet or include section in annual SOR for Lake Nipissing raising awareness on the importance of protecting significant fish habitat which includes not only spawning habitat, but also nursery, rearing, staging, foraging and dispersal areas.
4. **MNRF in collaboration with key partners to create a variety of products as part of education campaign** (e.g., factsheets, posters, signs, stickers, rulers, presentations) that can be distributed widely to increase public awareness and understanding by making them accessible in a central location and distributed widely.

## **6.2 Biological Changes**

Aquatic ecosystem monitoring generally involves measuring and monitoring biological indicators of change. Biological indicators can be affected by the environment they live in and can provide information about changing climate, habitats, water quality and quantity and respond to changing resource use patterns over time. For Lake Nipissing, the biological indicators selected are: fish community, including species at risk and invasive species; Double Crested Cormorants and fish disease.

### **6.2.1 Fish Community Composition**

The fish community within Lake Nipissing historically was comprised of a number of species which differ in life history characteristics and the basic habitat requisites of cover, feeding and spawning activities (see Appendix 1: Lake Nipissing Fish Species List). These characteristics and habitat elements can be altered by stressors to the lake ecosystem which could include: exploitation of specific target species, water level alterations potentially compromising spawning/nursery habitat availability, introduction of invasive species capable of displacing populations and their habitats, etc.

The assessment and monitoring of the fish community composition can provide a more comprehensive indication of the lake ecosystem condition than would be provided if merely examining status for any single species (Metcalf et al., 2013). Over the long term, monitoring

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and assessment of the fish community can provide a back-drop of ecosystem information used to elucidate shifts in the abundance of target species (e.g. Walleye, Yellow Perch, Northern Pike), the progress of Species at Risk (Lake sturgeon) and the presence or absence of aquatic invasive species (see Nienhuis and Haxton, 2013). Similarly, attributes of the fish community composition can serve as a useful tracking mechanism to provide indications of the success or consequences of particular management actions on the health of the lake's aquatic ecosystem.

#### **ASSESSING THE LAKE NIPISSING FISH COMMUNITY**

To date these techniques have not been formally explored or adopted to describe and assess fish community state and trends in changes to the fish community for Lake Nipissing. The establishment of a monitoring program is included, complete with assessment methods, benchmarks, indicators and targets (desired future state) for the Lake Nipissing fish community. The program will include a suite of established methods to sufficiently characterize the fish community and enable temporal comparisons throughout the duration of the plan and beyond. As such the program will serve as supplementary information to this plan as well as provide useful data to any potential future-planned Integrated Monitoring Programs.

#### **STATUS OF THE FISH COMMUNITY IN LAKE NIPISSING**

Presently there has been no evaluation on the status of the Lake Nipissing fish community in terms of how the community may reflect relative ecosystem health. However, recent changes in the fish community and food web structure of Lake Nipissing have raised concerns for both user groups and fisheries managers (Johnston et al., 2012). Some of these changes include a decrease in adult biomass of walleye accompanied by increases in yellow perch biomass as well as rainbow smelt.

The recent explosion of spiny water flea throughout the lake appears to have altered the size, taxonomic composition as well as the seasonal production cycle of the zooplankton community with food web shifts extending all the way up to walleye (Johnston et al. 2012). These shifts accompanied with increasing gonadal-somatic index measures observed in walleye are consistent with the compensatory, density-dependant response in reproductive effort reported for exploited walleye populations (Colby and Baccante, 1996; as cited in Johnston et al. 2012).

It is apparent therefore that the larger aquatic ecosystem (which is comprised of both the invertebrate and fish communities), have experienced changes over the years and that some of these changes at lower levels may inflict consequences to target fish species further up the chain.

This section of the plan will focus just on Fish Community. Any further studies on the food web and invertebrate community levels will likely be dealt with through individual research initiatives (See section 5.1 Walleye).

#### **MANAGEMENT ISSUES, CHALLENGES AND OPPORTUNITIES**

##### **Issues and Challenges:**

- Limited broader fish community surveys, indicators or status reports completed for the lake to date;
- Need to establish a benchmark for Lake Nipissing fish community composition and relative abundance
- Need for desired future state or target for Lake Nipissing fish community composition and relative abundance

**Opportunities:**

- Standardized methods (Broad-Scale Fisheries Program) have been developed for large bodied fishes and small bodied fishes; these can be deployed in Lake Nipissing to provide a fish community index, for each Basin of the lake or stratified volumetrically or both; indicators exist that provide suitable representation of lake fish species composition and these can be deployed for Lake Nipissing; these methods, indicators and subsequent results can form the basis for periodic (every 5 yr) status reports/updates;
- A benchmark which represents either historic or present fish community composition can be discussed, negotiated and ratified by a group comprising fishery managers and user-groups. Historic benchmark would be established if historic data exists to enable a reasonably accurate reflection/reconstruction of the Lake Nipissing fish community composition, and the gear used for future monitoring is the same standard. Present fish community composition could be established as a benchmark by initiating a new community index netting program which uses the Broad-Scale standard nets (mesh gangs for small and large-bodied fish) over a stratified selection of basins throughout the lake;
- Desired Future State (DFS) for the fish community could also be determined by a group comprising fishery managers and user-groups and could, for example, reflect the historic benchmark or a different scenario that might exclude present invasive species. Measure of success could be tracked by comparing results from each monitoring event with benchmark and DFS-stated targets.

**OBJECTIVE FOR FISH COMMUNITY**

The primary objective for the Lake Nipissing fish community component of this plan is to develop assessment, monitoring and evaluation techniques to improve our understanding of fish community dynamics throughout the lake.

Knowledge of changes within the fish community (e.g. progress of Species at Risk; diminishment of invasive species) will supplement the more specific information collected for target species. Similarly, data collected regarding changes within the targeted fisheries will likely help explain, to some extent, observed changes within the fish community composition.

**RATIONALE FOR FISH COMMUNITY MANAGEMENT ACTIONS**

Appendix 19 provides a more detailed summary of the objectives, indices, targets and timelines associated with each Lake Nipissing fish community management objective and action.

*“It is often held that communities with high species richness and diversity are more stable and resilient to disturbances and invasions than species-poor communities”* (Stachowicz et al., 1999; Fridley et al., 2007 as cited in: Nienhaus and Haxton, 2013).

The fish community composition within the lake is usually determined by sampling using standard methods (e.g. AFS; Bonar, et al., 2009) or other standardized sampling techniques deployed by MNRF (e.g. NSCIN) as deemed appropriate and usually as directed by the particular sampling objectives. These standardized methods presently exist and can be appropriately adapted to suit a fish community composition data collection programme for Lake Nipissing.

The indicators of interest for describing fish community composition and changes thereto include: a) species presence and, b) relative abundance of each species within the fish community. Additional metrics and indices can be generated from these data to describe species diversity, richness, evenness and dominance.

Once fish community composition is initially determined, the assessment and evaluation of indicators to biological change within a lake ecosystem first requires **establishment of a baseline or benchmark condition** from which to compare subsequent changes to that initial reference or baseline condition. The benchmark is required to examine, assess and evaluate how the community responds to internal biological changes within the Lake Nipissing ecosystem over time (modified after: Metcalfe et al., 2013). In addition to the benchmark condition, fishery managers and user-groups need to agree upon and articulate a **desired future state** for the fish community.

Subsequent results will provide fishery managers and user-groups with a gauge for tracking the fish community composition over time - examine from a perspective beyond single species - how the Lake Nipissing ecosystem is responding to both management actions and other environmental factors impinging on the lake.

In particular, the management actions will track changes to the lake's fish community diversity, species dominance and other attributes of the community that will enlighten our understanding of the health of Lake Nipissing aquatic ecosystem as well as provide valuable back-drop information to corroborate changes observed to the target species of prime interest in this lake.

## **6.2.2 Species at Risk**

### **LAKE STURGEON (GREAT LAKES –UPPER ST. LAWRENCE POPULATION)**

**Status:** Threatened (2009).

**Protection:** Species and Habitat Protection under ESA (2007)

The sturgeon has often been described as a “living dinosaur” because of its prehistoric appearance. It has existed for at least 200 million years, back to a time when the dinosaurs roamed the earth, and has changed very little since that time. Lake sturgeon are Ontario's largest and longest living species of freshwater fish. They can grow to lengths of 2.5 metres (over eight feet) and weigh a staggering 150 kilograms (330 pounds). They are found throughout Ontario, especially in the Great Lakes and their tributary rivers and the large rivers in the north. However, their numbers have significantly declined, and in some cases are no longer found in many waters (including Lake Nipissing) throughout their historic range.

Sturgeon can live to 100 years or more. They are slow growing and take a long time to reach reproductive age. Females spawn for the first time at 15 to 25 years of age, with males spawning slightly younger. Once a female sturgeon has reached spawning age, she will only spawn once every five to nine years.

The Lake Nipissing lake sturgeon population is listed as extant (still exist) and the population trajectory is listed as increasing. Lake sturgeon spawn in two major tributaries in Lake Nipissing: the Sturgeon River and the South River. Spawning assessments over the past two decades indicate that successful natural recruitment is occurring and suggest there is a possibility of a modest recovery.

**Assessment work to date, currently underway and planned for the future:** Assessments have occurred and continue to determine the locations of critical habitat locations including: staging, spawning, nursery and overwintering areas. Future assessments should consider understanding the impacts of climate change and development pressures on lake sturgeon and their critical habitat features. There are currently lake sturgeon in Lake Nipissing that have been

### *Fisheries Management Plan for Lake Nipissing*

implanted with a Passive Inductive Transponder (PIT) tag. When lake sturgeon are captured in assessment nets, they are checked for PIT tags. Information such as body condition, weight and location are recorded to understand the health of the fish, habitat use, movement patterns and general behaviour. There are also additional lake sturgeon in Lake Nipissing that are tagged with a radio tag. These fish (adults and juveniles) are regularly tracked using radio telemetry to monitor seasonal movements and assess types of habitat used. These and additional fish will continue to be tracked.

#### **SILVER LAMPREY (GREAT LAKES –UPPER ST. LAWRENCE POPULATION)**

**Status:** Special Concern (2013)

**Protection:** Species Protection under ESA (2007)

The silver lamprey is an eel-shaped fish with a sucking disc mouth. Adults range from 9 to 39cm long. The silver lamprey is a parasite that attaches to other fish to feed off their tissues. This fish is found in lakes as an adult, and then migrates upstream to spawn. After spawning, their life cycle is complete and the lamprey dies. The larvae burrow into the mud at the bottom of streams and remain there until they are mature. They emerge as adults and begin their parasitic life. Lamprey will remain attached to their host fish for a very long time, but rarely kill the host fish. The main threat to silver lamprey includes impacts from lampricide to areas where sea lamprey are present. They are also impacted by the presence of dams which restrict their ability to migrate.

The species is known to inhabit Lake Nipissing; however MNRF has little information on the status of the population. Silver lamprey have been caught incidentally in other fish assessments, such as the Fall Walleye Index Netting project. Silver lamprey will occasionally be attached to a host fish that has been captured in the assessment nets.

**Assessment work to date, currently underway and planned for the future:** There is currently no assessment work underway for silver lamprey. Crews conducting fisheries assessments on Lake Nipissing will be asked to provide information regarding incidental capture of silver lamprey to the District SAR Biologist since silver lamprey has been added to the Species at Risk in Ontario List on January 24, 2013. There are currently no timelines set for silver lamprey specific surveys or assessments.

### **6.2.3 Invasive Species**

#### **SPINY WATER FLEA**

Spiny water flea has been confirmed in Lake Nipissing and has become established. However, population numbers appear to be stabilizing post-colonization. Options to remove or reduce their abundance are limited to none at this time. There is evidence to suggest they have had an impact on the food chain, adding an additional half-step in the trophic feeding levels. This has resulted in fish feeding higher up in the food chain than traditionally. A shift in foraging habits has been observed, with fish moving from nearshore feeding to more offshore feeding behaviours.

Nipissing University has continued to perform zooplankton assessments initiated by the Lake Nipissing Partners in Conservation and have confirmed the presence of Bythotrephes in the lake (Filion 2011).

#### **BLACK CRAPPIE**

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Black crappie has been confirmed in small numbers in the lake via annual creel surveys and fisheries assessments. Only one has been seen in the FWIN since it began in 1998 and one was observed in the creel in 2006. At this time, it is thought that black crappie has not established itself in the lake and it is felt that it is not currently having a negative impact on the lake and its fisheries.

Currently, there is no formal monitoring program for crappie on the lake. They are informally being monitored as incidentals in the FWIN, creel surveys, or public reports to the MNRF, and they will continue to be monitored as such until further efforts are required.

### **RAINBOW SMELT**

Rainbow smelt were first introduced into Lake Nipissing during the early 1970's and have become naturalized.

No formal monitoring program currently exists for smelt on the lake. They are informally being monitored as incidentals in the FWIN survey and will continue to be monitored until such time additional assessments are required.

### **COMMON CARP**

Common carp have been observed in the lake since the early 1990's. Prior to 2013, reports were limited to the western basin of the lake; as of spring 2013 they have been confirmed in Callander Bay. There is very limited assessment data on the species, and they are currently considered a minor component of the food web.

No formal monitoring program currently exists for carp on the lake. They are informally being monitored as incidentals in the fisheries assessments (FWIN, IOTN), creel surveys, or public reports to the MNRF.

## **6.2.4 Double-Crested Cormorants (*Phalacrocorax auritus*)**

The double-crested cormorant (cormorant) is a relatively large, diurnal, fish eating, migratory water bird that is native to Canada (OMNR 2006c). Cormorants are opportunistic feeders. They prey on abundant or easy-to-catch species.

Cormorants are colonial nesting birds, which typically nest on islands that are safe from ground predators and close to feeding areas (usually < 10km) (Wires et al. 2001). On Lake Nipissing, they build ground nests composed of sticks, leaves, weed stalks and other available material. Both male and female birds share in building the nest, incubating the eggs and feeding the chicks. Cormorants lay an average of three or four eggs each year. In addition to nesting, cormorants also need suitable places for night roosting and daytime resting. These sites are often exposed places such as rocks, sandbars or trees near preferred fishing sites that are ideally off shore or are free from predators (e.g., raccoons, coyotes, and foxes).

Under the *Fish and Wildlife Conservation Act* (FWCA, 1997) cormorants are protected as a species *wild by nature*. A person shall not destroy, take or possess the nest or eggs of a bird that belongs to a species that is wild by nature. As the cormorant is *not a game bird*, there is no hunting or trapping season for the species.

In 1998, due to heightened public concern with rising population numbers, a provincial policy was implemented following a public consultation period. In 2006, the policy was reviewed, and it was determined that no changes to the existing policy were warranted (OMNR, 2006c). The policy

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confirmed that “...**control of cormorant numbers should only be considered in specific local areas if the birds are found to be having significant negative ecological impacts on specific habitats or on other species**”. It was recommended that a site-by-site approach for cormorant management be taken on Crown lands. If control measures were to be implemented, the province would require reasonable evidence of the significant negative effects, as well as require public consultation prior to any individual control program.

### **ASSESSING THE LAKE NIPISSING DOUBLE-CRESTED CORMORANT**

Population estimates are obtained by means of conducting an annual cormorant population monitoring programme on Lake Nipissing.

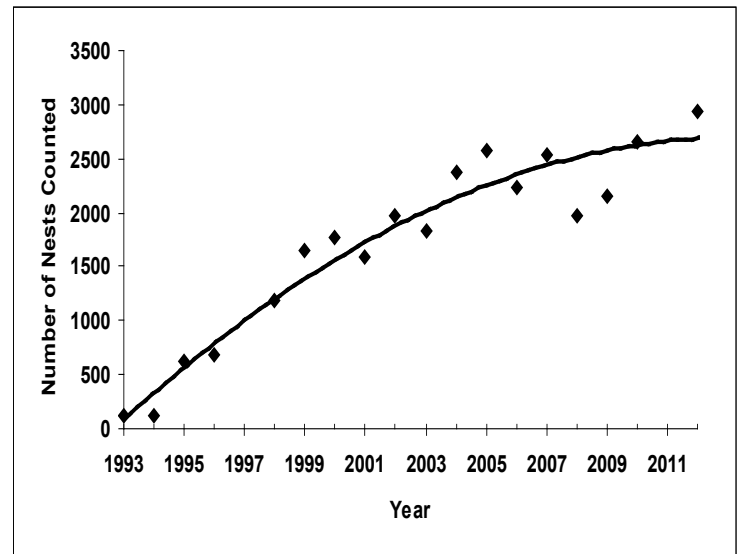
### **STATUS OF THE LAKE NIPISSING CORMORANT POPULATION**

Ontario's double-crested cormorant population has increased dramatically over the past 30 years. This rapid population growth has resulted in cormorants now being found throughout the Great Lakes, up to James Bay, and on Lake Nipissing. The earliest record of breeding evidence for cormorants on the lake was captured in the first *Atlas of Breeding Birds of Ontario*, 1981 (Cadman *et al.*, 2007).

Annual surveys to monitor the birds commenced during the early 90's during which time there was a marked rise in their population as they colonized the lake (Figure 22). More recent surveys indicate that the population is stabilizing as expected with the introduction of a new species to a system.

In addition to population estimates, studies have also been completed not only on Lake Nipissing, but also on the Great Lakes, that looked at the composition of their diet. These studies found that cormorants consume approximately seven perch to one walleye. Cormorants are opportunistic feeders that take what is most abundant or easiest to catch.

Currently perch are the most numerous and optimally sized prey item in the lake. While they do consume walleye, cormorants are not the main reason for the decline of walleye in the lake.



**Figure 22: Annual number of cormorant nests counted on Lake Nipissing from 1993-2013.**

### **MANAGEMENT ISSUES, CHALLENGES AND OPPORTUNITIES**

#### **Issues and Challenges:**

- The public perception of threats to the walleye population by cormorants
- The public perception of water quality impacts from cormorants
- The general public opinion of cormorants as a “nuisance”
- The limited understanding of the ecological role of cormorants as a top predator in structuring the lake’s fish community
- The limited understanding of the impact of the species on the aquatic ecosystem
- The occurrence of the public taking illegal action (e.g. oiling eggs on nest sites)

#### **Opportunities:**

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- To increase public awareness of the importance of cormorants as part of the ecosystem and as part of Ontario's natural heritage and in turn, the rationale for various management actions taken
- To increase the transparency of monitoring results to foster greater public awareness to management actions

## **OBJECTIVES FOR CORMORANT MANAGEMENT IN LAKE NIPISSING**

### **BIOLOGICAL, AQUATIC ECOSYSTEM AND SOCIO-ECONOMIC OBJECTIVE**

1. *To monitor the cormorant population on an ongoing basis and consider, anticipate, prevent, and where feasible mitigate, any significant negative impacts cormorants may have on the Lake Nipissing ecosystem or fishery.*

### **EDUCATIONAL OBJECTIVE**

2. *Increase public and stakeholder awareness of cormorant life history, status, applicable legislation, and MNR's management strategies and actions regarding cormorants on the lake.*

## **MANAGEMENT ACTIONS TO MEET CORMORANT MANAGEMENT OBJECTIVES FOR LAKE NIPISSING**

Appendix 20 provides a more detailed summary of the objectives, indices, targets and timelines associated with each management objective and action for cormorants.

**1) Continue the annual monitoring and assessment program** for cormorants to track population numbers through time.

The following monitoring activities will continue to be implemented annually or as specified to assess the status of the cormorant population, the effectiveness of the management objectives and strategies identified herein and to inform any future management actions to be taken:

1. Annual Nest Count Survey
2. Annual Calculation of Population Status related to Carrying Capacity
3. Annual Dietary Analysis (or as per frequency identified in standardized protocol)

**2) Continue to monitor the cormorant population on an ongoing basis and consider, anticipate, prevent, and where feasible mitigate, any significant negative impacts cormorants may have on the Lake Nipissing ecosystem or fishery in accordance with provincial policy for cormorant control measures.**

At present, there appears to be no proof of significant negative ecological impacts being realized to the Lake Nipissing ecosystem or fishery by the cormorant population. Therefore, cormorant management will remain as status quo, and no control measures will be implemented at this time.

**3) Continue and expand the scope of studies and partnerships to enhance existing data sets and address information gaps** pertaining to cormorants on Lake Nipissing.

1. Expand studies with researchers to use stable isotope analyses to further understand the diet composition of the Lake Nipissing cormorant population.



**4) Increase communications and partnerships to raise public awareness on double-crested cormorant biology, status and resulting management actions** to increase public (e.g., anglers, stakeholders, tourism industry) understanding of the necessity and rationale for management decisions and actions taken to date on the lake and into the future.

## **6.2.5 Fish Disease**

In fish, stress is the primary factor for the pathogens or parasites they may carry to cause harmful effects. This can be brought on by a range or combination of conditions including extreme weather conditions such as drought, predators, pollution, degraded water quality, species introductions, and parasite and pathogen introductions. Fish are typically more susceptible to disease when they are congregated in high densities and experiencing heightened levels of stress, such as spawning periods.

Healthy individuals, fish populations and aquatic ecosystems are more resilient to disease and as such, the prevention or mitigation of anthropogenic stressors as noted above is a key management consideration to maintaining a healthy fishery in the lake.

### **ASSESSING LAKE NIPISSING FISH DISEASES**

Fish disease monitoring for the lake to date includes: annual VHS sampling, informal monitoring via lake assessments and public reporting.

### **STATUS OF THE LAKE NIPISSING FISH DISEASES**

Lake Nipissing has been home to many common fish pathogens and parasites and to date there have been no known major fish disease epidemics. Of primary concern for Lake Nipissing and Ontario at this time is the emerging invasion of VHS (viral hemorrhagic septicemia) across the landscape. The establishment of VHS in Lake Nipissing has the potential for significant biological and socio-economic impacts.

As of 2012, Lake Nipissing was confirmed VHS free. Due to its location, Lake Nipissing has a high risk of becoming contaminated with VHS. This is due to the nature of the disease, the close proximity to VHS positive zones, the option for baitfish retailers to purchase baitfish from Lake Simcoe, and a significant user base that comes from or travels through that zone.

VHS was first detected in Lake Ontario in 2005. There are several strains of VHS that affect fresh and saltwater fish species. The Great Lakes strain of the virus affects or is carried by many species of fish including: walleye, yellow perch, muskellunge, smallmouth bass, rock bass, white bass, black crappie, Chinook salmon, emerald shiner, bluntnose minnow, spottail shiner, freshwater drum, round goby and gizzard shad; the majority of which reside in Lake Nipissing.

The waters of Lakes Ontario, Erie, and Huron and their connecting waterways and adjacent tributaries up to the first impassable barrier for all fish species are considered positive for VHS. In 2011, VHS was detected in Lake Simcoe.

VHS can be fatal for fish, and it can result in significant fish die-offs. There remains much to be learned about the disease and how it persists and behaves in Ontario, but once established in a waterbody it is there to stay. VHS disease outbreaks may happen at any time, but are most likely during the spring as temperatures fluctuate and fish are reproducing.

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MNRF has conducted surveillance for VHS in Ontario in partnership with the Canadian Food Inspection Agency (CFIA) since it was first detected in Ontario waters by:

- sampling high risk lakes,
- sampling any die-offs of fish, and,
- conducting random sampling across Ontario

To slow the spread of VHS, the Ministry of Natural Resources and Forestry has established two management areas in Ontario: the VHS Management Zone (established 2007) and the Lake Simcoe Management Zone (established 2011). The purpose of these zones is to delineate the boundary for specific permitted uses, transport and sale of baitfish that are either VHS positive or free.

Common symptoms of VHS include: pale gills and organs, bloated abdomen, bulging eyes, haemorrhages (bleeding) on body and organs, and darker body colour. However, some fish do not show any signs of infection.

VHS can spread through the water, on both live and dead fish that have been infected, or via their body fluids. Thus, VHS may be spread from one waterbody to the next by any method that involves the movement of fish, water, vessels or equipment that has had contact with the virus.

**The virus does not affect humans.** Fish carrying the VHS virus are safe to eat and handle. As a precaution however, do not harvest fish that appear sick, dying or dead.

*More information about VHS, and MNRF's role in protecting fish health, can be accessed at:*

[Information on VHS - MNRF Website](#)

*More information on how and when to report fish die-offs, and precautions can be accessed at:*

[Fish Die-offs - MNRF Website](#); or call: 1-800-667-1940

Field staff responding to occurrences of fish die-offs will follow the most recent version of MNRF's Protocol for Collecting Wild Fish Samples for Surveillance or Disease Diagnosis.

## **MANAGEMENT ISSUES, CHALLENGES, AND OPPORTUNITIES**

### **Issues and challenges:**

- The issues associated with VHS and other pathogens are often complex and beyond the FMP from a government policy perspective
- Once VHS is in the lake, it will remain
- Keeping the lake VHS free within the current bounds of MNRF policy
- Keeping the lake VHS free without causing significant economic loss to the baitfish industry
- Keeping the lake VHS free on such a large lake with so many access points
- Keeping the lake VHS free with such a wide range of potential sources of contamination (both dead and live fish, or fish parts/bodily fluids) and then for a wide range of species
- Communicating the significant risk that VHS and other pathogens pose to not only local anglers, but also the broader public/anglers that use the lake

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- Switching solely to the use of artificial baits/lures versus baitfish or other fish products could have serious social and economic issues
- Changing anglers traditional fishing habits
- The lack of comprehensive understanding on how VHS behaves in different environments for different species, both in the short and long terms
- Other pathogens or diseases may emerge that are currently unknown or currently not a significant issue

#### **Opportunities:**

- A monitoring program exists on the lake that may be used to track the incidence of VHS or other aquatic pathogens
- Opportunities exist to partner with First Nations, sister agencies, stakeholders or other key partners to communicate the risk and prevent VHS introduction into the lake and in doing so, increase public awareness on the importance of prevention
- Opportunity exists to increase the transparency of monitoring results to foster greater public understanding and acceptance of management actions and participation in stewardship actions and initiatives

### **OBJECTIVES FOR FISH DISEASES ON LAKE NIPISSING**

#### **BIOLOGICAL OBJECTIVES**

1. *Prevent expansion of aquatic diseases, especially VHS into Lake Nipissing.*

#### **SOCIO-ECONOMIC OBJECTIVES**

2. *To consider and prevent, where feasible, any significant negative impacts that fish diseases (especially VHS) may have on Lake Nipissing's socio-economic opportunities.*

#### **ECOSYSTEM OBJECTIVES**

3. *To minimize disease-related mortality in the lake's fish species.*

#### **EDUCATIONAL OBJECTIVES**

4. *To increase public awareness and participation in the prevention of the expansion of aquatic diseases, especially VHS, into Lake Nipissing.*
5. *To increase public awareness and understanding on the following topics: alternative fishing techniques that support healthy fisheries and the ecosystems that support them; parasites versus disease; die-off's and their causes.*

### **MANAGEMENT ACTIONS TO MEET LAKE NIPISSING FISH DISEASES OBJECTIVES**

A detailed summary of the objectives, indices, targets and timelines associated with each management objective and action for fish diseases can be found in Appendix 21. Although the plan discusses VHS primarily, strategies and actions for other emerging aquatic diseases may be amended into the plan as required.

#### **1) Continue VHS monitoring and response to reports of fish die-offs on the lake**

**2) Expand Collaborative efforts with:**

1. Key partners to develop VHS stewardship/etiquette factsheets for both anglers and the public.
2. Key partners and stakeholders to devise prevention strategy that clearly outlines vectors and efforts to be made to prevent or reduce the chances of the introduction of VHS (and other relevant diseases) via those vectors into the lake (e.g., ban the use of live bait, ban import and use of emerald shiners, promote use of artificial lures only, only permit the use of live bait purchased from the Lake Nipissing watershed or certified baitfish shops, public education and awareness initiatives, factsheets, posters/signs at key access points/launches/ice roads, enforcement blitzes, posters and pamphlets at bait shops).

**3) Increase public awareness on:**

1. Participation in the prevention of the expansion of aquatic diseases, especially VHS, into Lake Nipissing.
2. Alternative fishing techniques that support healthy fisheries and the ecosystems that support them;
3. Parasites versus disease; fish die-off's and their causes.

## **6.3 Climate change**

Ontario's climate is warming and becoming increasingly variable. The combined effects of continued warming and increased occurrences of extreme events are expected to change ecosystem functions, with significant implications for people who depend on them.

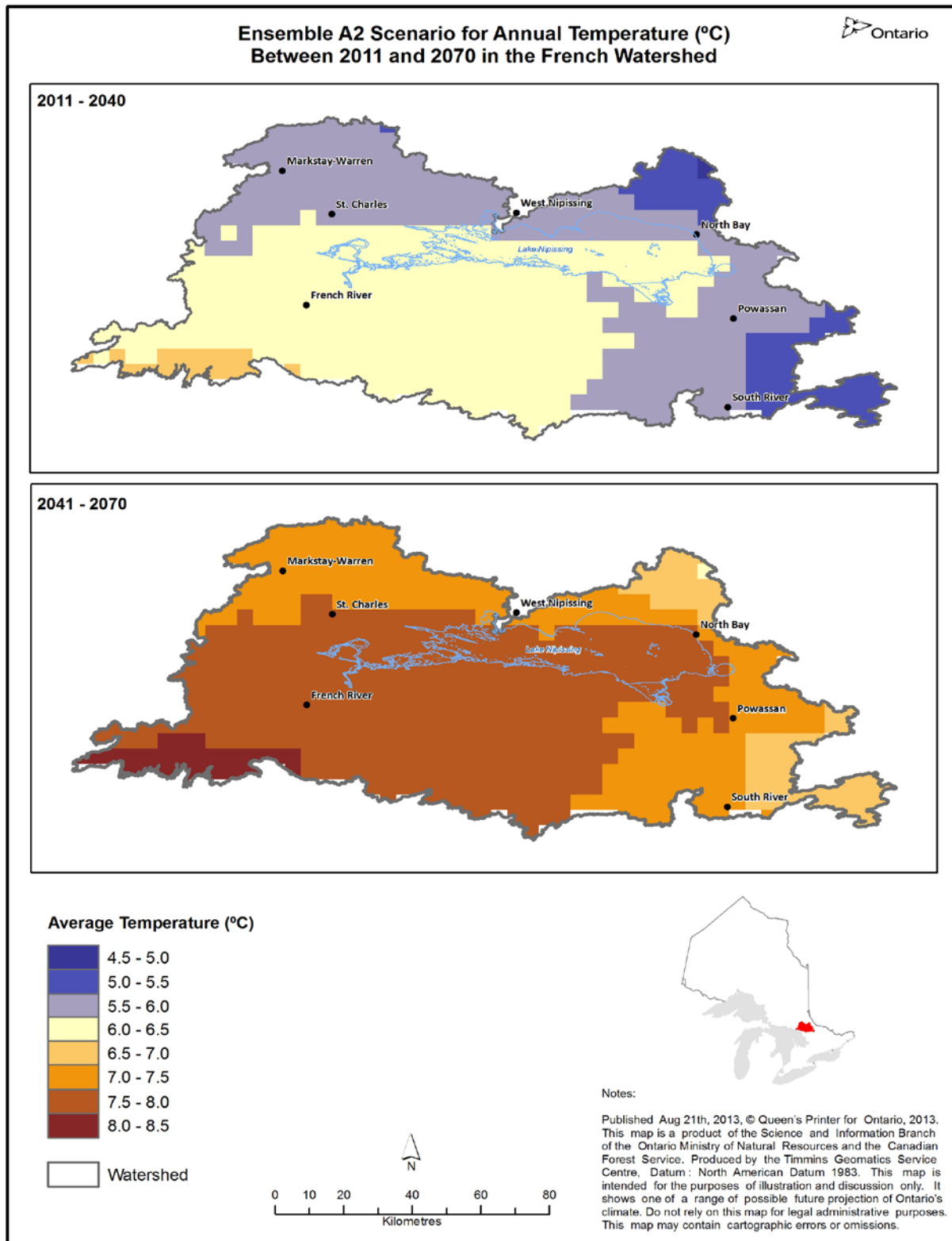
Climate change impacts on aquatic ecosystems will result due to higher air and water temperature, fluctuations in ice and snow cover, and changes in the timing and amount of rainfall. These impacts will be felt by freshwater fauna and within the hydrological cycle as water levels, flows, and chemistry will be altered. In addition, there are also significant implications for fish species such as altering thermal habitat and potential range expansion and contraction (Dove-Thompson et al. 2011).

### **ASSESSING CLIMATE CHANGE**

This is a new suite of objectives for the lake, assessment techniques will be defined as part of the vulnerability assessment for the lake.

### **STATUS OF CLIMATE CHANGE IMPACTS**

Climate projections using the Canadian Global Circulation Model's (version 2) A2 climate scenario for the French watershed suggest that the average air temperature will increase 2°C over the next 60 years (Figure 23).



**Figure 23: Ensemble A2 Scenario for Annual Temperature (°C) between 2011 and 2070 in the French River Watershed**

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From a seasonal perspective, temperature data (using the same model and scenario) from 1971-2000 compared with projected data from 2041-2070 suggests summer months will have temperatures differences of 2 to 3°C warmer. Winter months have similar warming trends, with temperature differences between 1971-2000 and 2041-2070 being 3 to 4°C warmer (Colombo et al. 2007).

Not all impacts of climate change (i.e., warmer air temperature) on aquatic ecosystems are completely understood at this time. It is important to manage for climate change now. By identifying and applying appropriate effective mitigation and adaptive management strategies, we can help maintain healthy aquatic ecosystems and a sustainable fishery in the future.

## **MANAGEMENT CHALLENGES AND OPPORTUNITIES**

### **Challenges:**

- Limited understanding of impacts of climate change on the Lake Nipissing's watershed
- Although there exist several monitoring programs, data has yet to be used to track trends that could be related to climate change
- Vulnerabilities of the watershed to impacts from climate change are unknown
- Mitigation needs and options have not been developed or presented to stakeholders
- Adaptation needs and options have not been developed or clearly defined

### **Opportunities:**

- MNRF is already participating in a number of monitoring programs that can be used to assist with future climate change work
- MNRF can increase public understanding of how we are managing for climate change on the lake
- By conducting a climate change vulnerability assessment, most of the above current challenges will be addressed
- North Bay Mattawa Conservation Authority is also beginning to explore climate change effects on Lake Nipissing (Stantec draft 2013)

## **OBJECTIVES FOR CLIMATE CHANGE ON LAKE NIPISSING**

### ***BIOLOGICAL AND ECOLOGICAL OBJECTIVE***

1. *To mitigate and/or adapt to climate change influences on the Lake Nipissing ecosystem.*

### ***SOCIO-ECONOMIC OBJECTIVE***

2. *To mitigate or adapt to climate change influences on Lake Nipissing's recreational fishery.*

### ***EDUCATIONAL OBJECTIVE***

3. *Increase public, stakeholders, and First Nations awareness of climate change influences on the Lake Nipissing ecosystem.*

## **MANAGEMENT ACTIONS TO MEET LAKE NIPISSING CLIMATE CHANGE OBJECTIVES**

Appendix 22 provides a more detailed summary of the objectives, indices, targets and timelines associated with each management objective and action for climate change.

### *Fisheries Management Plan for Lake Nipissing*

- 1) Conduct a targeted climate change vulnerability assessment on Lake Nipissing's watershed, synthesizing existing data from a few key ecosystem indicators. Results from the assessment will assist in:
  1. Identifying and prioritizing adaptation needs;
  2. Developing adaptation strategies;
  3. Developing or expanding on existing monitoring programs;
  4. Understanding if vulnerabilities have increased, decreased, or been eliminated.
- 2) Use MNRF's Climate Change Strategy (OMNR 2011c) as a basis for adaptive management decisions related to the recreational fishery and aquatic ecosystem response to climate change.
- 3) Review existing monitoring programs and determine which are most applicable to assist with understanding and managing for climate change influences.
- 4) In collaboration with key partners, collect climate change information and provide general and topic specific climate change information sessions to the public, stakeholders, and First Nations.

### **RATIONALE FOR SELECTION OF MANAGEMENT ACTIONS FOR CLIMATE CHANGE**

To manage for climate change, the Ontario government uses two complementary approaches: mitigation and adaptation. Over the last few years there have been a number of strategic documents which address these two approaches:

- 2007: Go Green: Ontario's Action Plan on Climate Change (Government of Ontario 2007).
- 2009: Expert Panel on Climate Change Adaptation (Expert Panel on Climate Change Adaptation 2009).
- 2011: Climate Ready: Ontario's Adaptation Strategy and Action Plan, 2011-2014 (Government of Ontario 2011)

One common recommendation in each document is for the use of vulnerability assessments to inform development of adaptation options. Moreover, within Climate Ready, the MNRF is committed to the development of vulnerability assessment tools and techniques to inform adaptive natural resources-related decision making. In support of these government commitments, MNRF issued a renewed program-level strategy, Sustainability in a Changing Climate (OMNR 2011c), which aligns MNRF's actions and priorities for 2011 to 2014 with the provincial strategy.

Vulnerability in the context of climate change is defined as 'the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, and the sensitivity and adaptive capacity of that system (IPCC, 2007).

The MNRF has previous experience developing and leading vulnerability assessments within the province. Lake Simcoe and Clay Belt climate change vulnerability assessments were used to explore how ecosystems may be vulnerable to change and adaptive solutions were scoped from these results. These projects could be used as templates and guidelines to help direct a vulnerability assessment done on Lake Nipissing.

## **MONITORING STRATEGIES FOR CLIMATE CHANGE ON LAKE NIPISSING**

The following monitoring activities have been selected to assess whether the management actions are effectively achieving the objectives:

1. Water temperature and dissolved oxygen
2. Water chemistry (nutrients)
3. Ice-on and Ice-off dates
4. Water levels
5. Spawning habitat
6. Groundwater movement (patterns)
7. Species distribution
8. Additional data collection that is occurring elsewhere on the watershed (i.e., stream/river flow, wind and storm events) that can be used to inform climate change management.

## **7.0 Other Management Considerations**

A wide range of “other” issues were brought forward that needed to be addressed in the fisheries management plan as they either directly or indirectly affected the fisheries on the lake.

### **7.1 *Enforcement***

The role of enforcement within the Ministry is to safeguard the public interest by leading and delivering professional regulatory protection of Ontario's natural resources.

Enforcement following development of the fisheries management plan and its associated regulations is extremely important. Without enforcement there is serious risk that unregulated fishing activities could compromise the implementation of the management plan and impact the resource.

#### **STATUS OF LAKE NIPISSING ENFORCEMENT**

MNRF Enforcement prioritizes workloads on an annual basis and will continue to promote the use of and respond to information received by the TIPS line on an as needed basis.

#### **Risk-based Approach to Compliance**

The Ministry has moved to a formalized risk-based approach to compliance that assists with the identification and setting of provincial compliance and enforcement priorities (illegal activities that impact on risk receptors) as well as identifying provincial new and emerging areas of interest. In addition to setting priorities at the provincial level, the MNRF sets priorities at the regional/great lakes and district/lake level. These regional/great lakes and district /lake priorities are a result of unique local attributes of the local landscape, industry or communities.



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- The new compliance framework is based on risk assessment principles that will enable the MNRF to focus its work and response to incidents on the risk posed to:
  - human health and safety
  - natural resources
  - the economy
  - social and cultural values
- The risk-based compliance framework will enable the Ministry to focus enforcement resources on the area of greatest risk. These will include:
  - Focusing proactive work on areas of highest risk
  - Prioritizing incident/complaint response based on risk
  - Prioritizing resources for special investigations based on risk
- MNRF's Enforcement Branch leads the coordination of the MNRF's Risk Based Compliance Framework. The implementation of the framework into the day to day operation of the enforcement program is accomplished through the Enforcement Branch Operational Plan (EBOP) which is developed on an annual basis by the Provincial Enforcement Operations Section by reviewing and revising enforcement branch commitments as appropriate to ensure they reflect the operational needs of the organization.
- The enforcement continuum is based on four main principles; promotion and education of sustainable natural resource use and applicable laws, violation reporting, monitoring compliance and taking appropriate enforcement action.

### **Report a Violation - TIPS**

All Ontarians can play a part in protecting our natural resources from waste, abuse and depletion. If you are witness to a resource violation within Ontario, please call the MNRF's TIPS line at:

### **1-877-TIPS-MNR (847-7667)**

To investigate an occurrence, it will assist an officer to know the following information:

- Nature of the violation
- Vehicle information
- Location of violation (address, county, township, municipality, lot, concession)
- Particulars of violation, other relevant information

### **MANAGEMENT ISSUES, CHALLENGES, AND OPPORTUNITIES**

#### **Issues and Challenges:**

- Increased presence is desired to protect resources that so many people rely on for income, cultural, spiritual, sustenance, or recreational uses

### *Fisheries Management Plan for Lake Nipissing*

- Differences between public expectations regarding enforcement and our management needs
- Enforcement is challenging while the public does not understand MNRF's fisheries management decisions
- MNRF is unable to dedicate full time effort to one lake
- Known/anecdotal high levels of non-compliance on the lake

#### **Opportunities:**

- The public and stakeholders support an increased presence on the lake
- As MNRF has more points of contact with the public via recent development of the FMP and the associated consultation requirements, the public is becoming more aware of sustainability issues

### **OBJECTIVES FOR ENFORCEMENT ON LAKE NIPISSING**

#### **BIOLOGICAL AND ECOSYSTEM OBJECTIVES**

1. *To safeguard the public interest and protect the long-term health and sustainability of the fishery and lake ecosystem by leading and delivering professional regulatory protection of the lake's natural resources, through ongoing enforcement activity and by continuing to respond to complaints and conducting investigations related to unlawful fishing activities on the lake.*

#### **SOCIO-ECONOMIC OBJECTIVES**

2. *The North Bay MNRF enforcement unit will continue to work with and support local First Nations, (within MNRF mandate and jurisdiction) to enhance and build First Nations enforcement capacities on the lake where and when opportunities arise.*
3. *When opportunities arise, MNRF enforcement unit will continue to support and work directly or indirectly with other enforcement agencies when appropriate. (e.g., OPP, Anishinabek PS, West Nipissing Police).*

### **MANAGEMENT ACTIONS TO MEET LAKE NIPISSING ENFORCEMENT OBJECTIVES**

Appendix 23 provides a more detailed summary of the objectives, indices, targets and timelines associated with each management objective and action for enforcement.

**1) District staff to continue to review enforcement issues on the lake on an annual basis and to work with Enforcement to establish annual enforcement priorities** for the lake that are to be included in the Enforcement Branch Operating Plan.

**2) Enforcement Staff to continue to collaborate with First Nations** to enhance or build capacities on the lake.

**3) Enforcement staff to continue to support the District with education efforts on the lake, such as:**

1. Development and implementation of a communication plan and key products for any regulation changes that are applicable to the lake that occur over the duration of the plan
2. Public outreach initiatives promoting reporting of natural resources violations and the use of the reporting line (1-877-TIPS-MNR (847-7667))
3. Public outreach initiatives on both existing and new broader ecosystem and fishery-related regulations on the lake as they arise

## 7.2 Commercial Ice Huts

Commercial ice huts are now commonplace on the lake; there are over 20 operators offering commercial ice hut services with 90% offering on-ice overnight accommodations. This trend has occurred recently and has increased in popularity since the early to mid-2000's.

Lake Nipissing is the only waterbody in the province to require specific registration of commercial ice huts. Growing concern from the general public over the impact of overnight ice huts (ice condos) led to the creation of the commercial ice hut licence. The licence was created in 2004, with the inclusion of an immediate moratorium on new licences. The new licence moratorium was to be revisited once studies were conducted to confirm that there would be no significant negative ecological impacts if the moratorium was removed. Current (2013) regulations pertaining to the use of ice fishing huts on Lake Nipissing state: Tourist operators on Lake Nipissing must register ice huts being placed on the ice (same number for all huts) (O. Reg. 664/98 ss. 37(3)).

MNR is committed to reviewing our existing policies and regulations regarding recreational and commercial use of ice huts in Ontario at a provincial scale. As such, the moratorium on new licences will remain in place until the MNR's review has been completed.

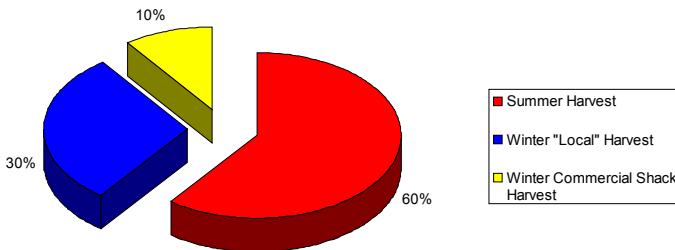
### ASSESSING THE LAKE NIPISSING COMMERCIAL ICE HUTS

Results obtained from the winter creel survey are used to assess the impacts of the commercial ice huts on the lake.

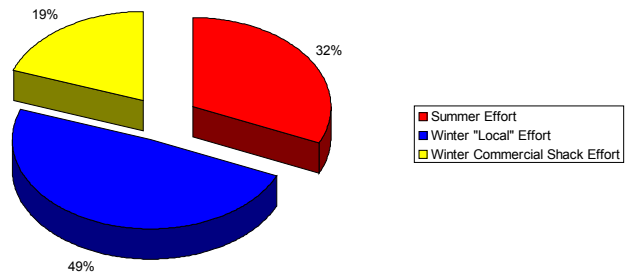
### STATUS OF THE LAKE NIPISSING COMMERCIAL ICE HUTS

The winter fishery makes up 40% of the angler harvest, of which, 10% is from the overnight commercial ice huts (Figures 24 and 25). Although commercial ice huts account for 19% of effort, it has not measurably increased overall effort for walleye. Walleye harvest has actually declined since 2004, despite commercial shacks.

**Allocation of Angling Walleye Harvest**  
(Avg. 2007-2010)



**Allocation of Effort**  
(Avg. 2007-2010)



**Figure 24: Allocation of recreational walleye harvest, summer versus winter, versus commercial ice huts on Lake Nipissing from 2007-2010, as measured during both open water and winter creel.**

**Figure 25: Allocation of effort, summer versus winter, versus commercial ice huts on Lake Nipissing from 2007-2010, as measured during both open water and winter creel.**

## **MANAGEMENT ISSUES, CHALLENGES, AND OPPORTUNITIES**

### **Issues and Challenges:**

- The moratorium on new commercial ice hut licences is not the appropriate tool to address the fundamental issue affecting the walleye population in the lake
- Public perception associated with commercial ice huts on the lake and the perceived negative impacts they have on fisheries resources
- Limited resources to support all aspects of the program (from licensing through to effectiveness monitoring and reporting)

### **Opportunities:**

- There is support from the public and stakeholders for the implementation of a fee for commercial ice hut use on the lake
- There is support from the LMFMPAC to develop stewardship products that promote both proper ice hut use and ice fishing etiquette on the lake
- Consider standardizing commercial ice hut registration and licensing for province.

## **OBJECTIVES FOR COMMERCIAL ICE HUTS ON LAKE NIPISSING**

### **BIOLOGICAL AND ECOSYSTEM OBJECTIVES**

1. *MNR to continue to assess the biological impacts of all types (recreational, commercial, including commercial ice huts) of harvest on the Lake Nipissing fishery.*

### **SOCIO-ECONOMIC OBJECTIVES**

2. *To provide fair and equitable access to the winter fishery for commercial use.*

### **EDUCATIONAL OBJECTIVES**

3. *To increase public awareness of proper ice fishing and ice hut use on the lake with the intention of reducing impacts of these types of uses on the lake's aquatic ecosystem and fisheries.*

## **MANAGEMENT ACTIONS TO MEET LAKE NIPISSING COMMERCIAL ICE HUT OBJECTIVES**

Appendix 24 provides a more detailed summary of the objectives, indices, targets and timelines associated with each management objective and action for commercial ice huts.

**1) Continue to implement the commercial ice hut program within existing guidelines**, to include the moratorium and licence requirement without a fee until provincial review is complete.

At this time, there was no desire by LNFMPAC to move away from the current commercial ice hut licensing program on the lake. There was however, a desire to introduce fees for the licences and to increase angler participation in proper handling of fish (ice fishing) and ice hut stewardship/etiquette.

Until the provincial ice hut program review has been completed, the status quo will remain.

**2) Continue to assess the biological impacts of all types (recreational, commercial, including commercial ice huts) of harvest** on the Lake Nipissing fishery via the FWIN and creel surveys currently being carried out.

**3) Expand collaborative efforts with stakeholders to:**

- 1) Develop stewardship/etiquette factsheet(s) for both ice fishing and ice hut use on the lake
- 2) Increase public awareness on ice fishing and ice hut stewardship and etiquette to reduce the impacts of these types of uses on the lake's aquatic ecosystem and fisheries

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## 9.0 Glossary

**Abundance** - A measure of how many fish are in a population or a fishing ground.

**Adaptation** – Initiatives or actions to reduce the negative effects of climate change or take advantage of the positive effects.

**Adaptive management** – A systematic process for continually improving management policies and practices by learning from the outcomes of previously employed policies and practices.

**Biodiversity** - The variation of life forms within an area. In the context of fisheries the number and variety of organisms found within a fishery.

**Biomass** - The total weight of a fish species in a given area. Can be measured as the total weight in kilograms or tonnes of a stock in a fishery, or can be measured by area (e.g. per hectare).

**Bycatch** - The harvest of aquatic life during fishing operations when other fish were the target. For example bass caught in a gillnet while walleye fishing. Or it might consist of fish of the targeted species, but not of the targeted age or size. See also incidental catch.

**Catch per unit Effort (CUE)** – CUE is an indirect measure of the relative abundance of a target species. Changes in the catch per unit effort are inferred to signify changes to the target species' true abundance. A decreasing CPUE indicates a declining population, while an unchanging CPUE indicates a sustained abundance.

**Climate Change** – Any change in climate over time due to natural variability or as a result of human activity.

**Commercial Fishery** - An umbrella term covering the process of catching and marketing fish. It includes the fishermen and their boats, and all activities and resources involved in harvesting, processing, and selling.

**Creel Surveys** - The term creel survey is applied to sampling surveys that target recreational anglers. Traditionally, the survey is conducted on-site at access points along the water and the angler is asked about the fish species that have been targeted, the numbers of each species caught and released, and the time spent fishing. These data are used to estimate the total catch and effort for that recreational fishery in order to manage its harvest. Additionally, other measures such as catch per unit effort are used to assess qualities of the fishery that lead to angler satisfaction with his/her recreational experience. Anglers can also be contacted by other means, such as by telephone or mail, and may also be asked other questions, such as those related to economic expenditures.

**Crown Forest Sustainability Act (CFSA)** – Sustainable forest resource management legislation mandated by MNR.

**Depletion** - Reducing the abundance of a fish stock through fishing.

**Ecologically sustainable development** – Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

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**Ecological Framework for Fisheries Management (EFFM)** - Operational framework that provides the building blocks for improving the way in which recreational fisheries are managed in Ontario.

**Endangered species** - A species is classified as endangered if it lives in the wild in Ontario but is facing imminent extinction or extirpation. The IUCN has calculated the proportion of endangered species as 40 percent of all organisms based on the sample of species that have been evaluated through to 2006.

**Endangered Species Act (ESA)** – Endangered species legislation mandated by MNRF

**Environmental Assessment Act (EA Act)** – Environmental assessment legislation mandated by the Ontario Ministry of Environment and Climate Change.

**Environmental Registry (ER)** - The Environmental Registry contains "public notices" about environmental matters being proposed by all government ministries covered by the Environmental Bill of Rights. The public notices may contain information about proposed new laws, regulations, policies and programs or about proposals to change or eliminate existing ones.

**Fall Walleye Index Netting (FWIN)** – Standardized method for the collection of biological information to support management of a percid fishery dominated by walleye. This is a fisheries independent data collection survey that captures data including: estimates of relative abundance (# and kg), size distribution, age distribution, mortality, growth and condition, sex ratio, maturity and reproductive characteristics (# eggs, gonadosomatic index)

**Fish** - Any of various cold-blooded, aquatic vertebrates, having gills, commonly fins, and typically an elongated body covered with scales; the term "fish" can refer to more than one fish, particularly when the fish are from the same species; the term "fishes" refers to more than one species of fish.

**Fish and Wildlife Conservation Act (FWCA)** - Fish and wildlife legislation mandated by MNRF.

**Fish stocking** - The practice of raising fish in a hatchery and releasing them into a waterbody to supplement existing populations, or to create a population where none exists. Stocking may be done for the benefit of commercial, recreational, or Aboriginal fishing, but may also be done to restore or increase a population of threatened or endangered fish in a body of water.

**Fisheries Act (FA)** - Fisheries legislation mandated by Fisheries and Oceans Canada

**Fishery** - Activities leading to and resulting in the harvesting of fish. It may involve capture of wild fish or raising of fish through aquaculture. A fishery is characterized by the people fishing, the species caught, the fishing gear used, and the area of operation.

**Fishery Management Zone (FMZ)** – The designated geographic unit for fisheries assessment, monitoring, planning and management in Ontario.

**Fork length** - In fishes with forked tails, this standard measure is from the tip of the snout to the fork of the tail. It is used in fishes when it is difficult to tell where the vertebral column ends.

**Gillnet** - Fishing nets constructed so that fish are entangled or enmeshed, usually in the gills, by the netting. According to their design, ballasting and buoyancy, these nets can be used to fish on the surface, in mid-water or on the bottom. The mesh size of the net determines the size of fish caught, since smaller fish can swim through the mesh.

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**Global positioning system (GPS)** - A system or device using satellite signals to accurately determine position and course.

**Growth overfishing** - Growth overfishing occurs when fish are harvested at an average size that is smaller than the size that would produce the maximum yield per recruit. A recruit is an individual that makes it to maturity, or into the limits specified by a fishery, which are usually size or age. This makes the total yield less than it would be if the fish were allowed to grow to an appropriate size. It can be countered by reducing fishing mortality to lower levels and increasing the average size of harvested fish to a size that will allow maximum yield per recruit.

**Habitat** - The place where an organism lives.

**Harvest** - The number or weight of fish caught and retained from a given area over a given period of time.

**Hatchery** - The process of cultivating and breeding a large number of fish in an enclosed environment. The fish are then released into lakes, rivers or fish farm enclosures.

**Ice out trap netting survey (IOTN)** - Independent fisheries assessment technique that uses a standard live release trap netting program designed to estimate the relative abundance of a fish stock and provide other biological measures to assess the status of pike, muskie and bass.

**Impact** – In climate change; the effects of existing and projected changes in climate in natural, built, and human systems.

**Incidental catch** - The catch of non-fish species, caught in the course of commercial fishing practices. Examples of non-fish species are birds, and mammals and reptiles, such as turtles. Incidental mortality can be contrasted with bycatch, which is a general term for the catch of all fish and non-fish species other than the targeted species.

**Introduced species** - Species brought into an area where it does not naturally occur, but is able to survive and reproduce there.

**Invertebrates** - Animals without a backbone, such as insects. See also vertebrates.

**Juvenile** - A young fish or animal that has not reached sexual maturity.

**Lakes and Rivers Improvement Act (LRIA)** – Lakes and rivers sustainable development and use legislation mandated by MNRF

**Lake Nipissing Fisheries Management Plan Advisory Council (LNFMPAC)** - A group of a wide variety of stakeholders, formed the initial point of contact for the MNRF to seek stakeholder input into the development of the plan and to commence drafting the objectives and management strategies for the plan based on the current status of the resource, known management issues, challenges and opportunities on the lake.

**Lake Nipissing Stakeholders Association (LNSA)** – A stakeholder group whose goal is to provide for the long term health and sustainability of Lake Nipissing and its fishery.

**Littoral** - the shallow water region around the lake where significant light penetrates to the bottom. Typically occupied by rooted plants.

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**Mark and recapture** - marking or attaching a tag to a fish so that it can be identified on recapture. Used for the study of fish growth, movement, migration, and stock structure and size.

**Maximum sustainable yield (MSY)** - The maximum harvest that can be taken from a species' stock over an indefinite period. Under the assumption of logistic growth, the MSY will be exactly at half the carrying capacity of a species, as this is the stage at when population growth is highest. The maximum sustainable yield is usually higher than the optimum sustainable yield. Studies have shown that fishing at the level of MSY is often not sustainable.

**Mitigation** - Actions to reduce or minimize risk; in fisheries management: Application of fishing regulations, restoring or enhancing fish habitat, etc.; in climate change: Actions to reduce the sources or enhance the sinks of greenhouse gases.

**Model** (population) - A hypothesis of how a fish population functions. It often uses mathematical descriptions of growth, recruitment and mortality.

**Mortality** - Mortality is a death rate from various causes, such as the proportion of a fish stock dying annually.

**Natural Resources Act (NRA) – Legislation governing the duties and responsibilities of the Ministry of Natural Resources and Forestry**

**Nearshore waters** - Relatively shallow inshore waters that may be affected by wave-driven processes and generally experiences light penetration and plant growth.

**Nearshore Community Index Netting Survey (NSCIN)** - Nearshore Community Index Netting (NSCIN) is a standard live release trap netting program designed to evaluate abundance and other attributes of fish species that inhabit the littoral zone of Ontario's lakes.

**Nitrate** - A water-soluble molecule made up of nitrogen and oxygen, naturally occurring but also commonly found in agricultural fertilizers, and therefore in land runoff. Higher concentrations of nitrate can be toxic to many aquatic organisms and may promote algae and plant growth leading to decreased dissolved oxygen concentrations.

**North Bay Mattawa Conservation Authority (NBMCA)** - The North Bay-Mattawa Conservation Authority (NBMCA) was founded in 1972 by the Province of Ontario and the NBMCA's 10 member municipalities. As a community-based, non-profit environmental organization, the NBMCA is dedicated to conserving, restoring, developing and managing renewable natural resources on a watershed basis. The NBMCA is one of 36 Conservation Authorities who are members of Conservation Ontario.

**Nursery** – Habitat that supports congregations of larval and/or juvenile fish.

**Ontario Biodiversity Strategy (OBS)** - MNRF strategic direction document.

**Our Sustainable Future: A Renewed Call to Action (OSF)** - MNRF strategic direction document.

**Overfishing** - Occurs when fishing activities reduce fish stocks below an acceptable level. This can occur in any body of water from a pond to the oceans.

**Parameter** – A parameter in fisheries management is a characteristic measure of some aspect of a fish stock. It is usually expressed as a numerical value, such as the "natural mortality rate".

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**Phosphate** - A chemical compound containing phosphorus and oxygen, naturally occurring in the ecosystem but also commonly found in agricultural fertilizers and land runoff. A nutrient in the aquatic ecosystem that limits productivity.

**Plankton** - Consist of any drifting organisms (animals or plants) that inhabit the open water or pelagic zones, particularly the surface areas of bodies of water.

**Population** - A specific portion of the fish population being studied (e.g. spawning adult portion of a walleye population may be referred to as “spawning stock”). Often referred to as a fish stock.

**Population dynamics** - The study of fish populations and how fishing mortality, growth, recruitment, and natural mortality affect them.

**Precautionary principle** - A moral and political principle which states that if an action or policy might cause severe or irreversible harm to the public or to the environment, in the absence of a scientific consensus that harm would not ensue, the burden of proof falls on those who would advocate taking the action.

**Predator-prey** - A predator is a species that feeds on other species. A prey is a species that is being eaten by a predator.

**Primary Productivity** - A measurement of plant production that is the start of the food chain. Much primary productivity in aquatic systems is made up of phytoplankton, which are tiny single-celled algae that float freely in the water.

**Projection** - With the help of a mathematical model as a numerical representation of the population, a projection is a prediction of what may happen in the future under a variety of conditions.

**Phytoplankton** - Tiny, free-floating, photosynthetic organisms in aquatic systems.

**Public Lands Act (PLA)** – Crown land resource use legislation mandated by MNRF

**Public Works and Government Services Canada (PWGSC)** – Operators of dams controlling water levels of Lake Nipissing as directed by SNF.

**Quota** - The amount of catch that can be legally landed in a time period. It could refer to a fishery as a whole (total allowable catch) or to an amount allocated to an individual or company.

**Recruitment** - The number of new young fish that enter a population in a given year. More pragmatically, it can be defined as the number of young fish that attain a size where they can be legally caught, or become susceptible to being caught by a given fishing gear.

**Recreational fishery** - Fishing for sport or competition; fishing that does not constitute the individual's primary resource to meet nutritional needs and are not generally sold or otherwise traded on export or domestic markets.

**Recruitment overfishing** - Occurs when the mature adult (spawning biomass) population is depleted to a level where it no longer has the reproductive capacity to replenish itself—there are not enough adults to produce offspring. Increasing the spawning stock biomass to a target level is the approach taken by managers to restore an overfished population to sustainable levels.

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This is generally accomplished by placing moratoriums, quotas and minimum size limits on a fish population.

**Risk analysis** – Evaluation of the possible outcomes of various harvesting strategies or management options.

**Sample** - A portion of a fish stock which is removed for study, and which ideally is representative of the whole. The greater the number and size of the samples, the greater the confidence that the information obtained accurately reflects the status (such as abundance by number or weight, or age composition) of the stock.

**Selectivity** - Ability of a type of fishing tackle or gear to catch a certain size or kind of fish, compared with its ability to catch other sizes or kinds.

**Sensitivity** - The degree to which a system is affected when exposed to a stress.

**Shoal** - or *sandbar* - A somewhat linear landform within or extending into a body of water, typically composed of sand, silt or small pebbles.

**Sturgeon-Nipissing-French (SNF) Water Management Group** – Group of local watershed stakeholders including the City of North Bay, NBMCA, Ontario Hydro and provincial agencies that provide direction to PWGSC for Lake Nipissing water level operations.

**Socioeconomics** - A word used to identify the importance of factors other than biology in fishery management decisions. For example, if management results in more fishing income, it is important to know how the income is distributed between small and large boats or part-time and full-time fishermen.

**Spawning** – The act of reproduction by fish. The deposition and fertilization of eggs in water.

**Specially Designated Water (SDW)** – In Ontario there are currently 22 waterbodies or groups of waterbodies including Lake Nipissing with significant biological, social and economic value locally, regionally and provincially that have been identified as “Specially Designated Waters”. SDW’s are designated to recognize the importance of specific water bodies to the broader region or Province of Ontario. These waters may have unique challenges requiring more intensive monitoring and planning separate from that of the broader FMZ.

**Species** - a group of organisms capable of interbreeding and producing fertile offspring.

**Stakeholder** - anyone who has a stake or interest in the outcome of the project, as well as anyone one who is affected by the project.

**Standardization** - procedures which maintain methods and equipment as constant as possible. Without standardization one cannot determine whether yearly differences in measures are caused by actual fluctuations within the stock or by differences in the measurement procedure used. Lack of standardization is one reason why surveys using different methods in different years do not produce comparable information.

**Statement of Environmental Values (SEVs)** - MNR’s statement of environmental values and guiding principles to be considered as part of the resource management decision making process.

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**Stock** – A specific portion of the fish population being studied (e.g. spawning adult portion of a walleye population may be referred to as “spawning stock”); Often referred to as population.

**Strategic Plan for Ontario Fisheries (SPOF)** - MNRF fisheries management strategic direction document.

**Surplus production** - Surplus production is the inherent productivity of a fish stock that can be harvested on a sustainable basis. Based on the theory that at a large stock size, reproductive rates and rate of stock growth are slowed by self-regulating mechanisms, and that stock growth rates are faster after removals as the stock attempts to rebuild. In theory, fishing can be moderated to take advantage of the more productive stock growth rates, provided that it does not exceed the stock recovery capacity.

**Sustainable yield** - Sustainable yield is the catch that can be removed over an indefinite period without causing the stock to be depleted. This could be either a constant yield from year to year, or a yield which is allowed to fluctuate in response to changes in abundance.

**Threatened species** - A species is classified as a threatened species if it lives in the wild in Ontario, is not endangered, but is likely to become endangered if steps are not taken to address factors threatening to lead to its extinction or extirpation.

**Trophic level** - The position that a species occupies in a food chain. The species it eats are at a lower trophic level, and the species that eats it are at a higher trophic level.

**Vertebrates** - animals with a backbone, including fish, amphibians, reptiles and mammals. See also invertebrates.

**Viral Hemorrhagic Septicemia (VHS)** - VHS is an infectious disease of fish. The Great Lakes strain of the virus affects or is carried by many species of fish including: game fish and baitfish (Walleye, Emerald Shiners, Yellow Perch, Bluntnose Minnows, Muskellunge, Spottail Shiners, Smallmouth Bass, Rock Bass, along with other species such as Chinook Salmon, Freshwater Drum, Black Crappie, Round Goby, White Bass, and Gizzard Shad.

**Wetlands** - Areas of land where the soil is saturated with moisture, such as swamps, fens, marshes.

**Wild fish** - are fish which live free, not penned in, in lakes or rivers. They can be contrasted with farmed/hatchery-raised fish.

APPENDIX 1

Lake Nipissing Fish Species List (as of June 2013)

FISH COMMON NAME	FISH SCIENTIFIC NAME	COMMENTS
Northern Brook Lamprey	<i>Ichthyomyzon fossor</i>	SAR: Special concern
Silver Lamprey	<i>Ichthyomyzon unicuspis</i>	SAR: Special concern
Lake Sturgeon	<i>Acipenser fulvescens</i>	SAR: Threatened
Longnose Gar	<i>Lepisosteus osseus</i>	
Bowfin	<i>Amia calva</i>	
Brook Trout	<i>Salvelinus fontinalis</i>	Incidental catches/occasional migrant from Duchesney Creek
Lake Whitefish	<i>Coregonus clupeaformis</i>	
Cisco/Lake Herring	<i>Coregonus artedii</i>	
Rainbow Smelt	<i>Osmerus mordax</i>	Introduced
Northern Pike	<i>Esox lucius</i>	
Muskellunge	<i>Esox masquinongy</i>	
Central Mudminnow	<i>Umbra limi</i>	
White Sucker	<i>Catostomus commersoni</i>	
Greater Redhorse	<i>Moxostoma valenciennesi</i>	
Finescale Dace	<i>Chrosomus neogaeus</i>	
Lake Chub	<i>Couesius plumbeus</i>	
Common Carp	<i>Cyprinus carpio</i>	Introduced – incidental catches on west end of lake and Callander Bay
Golden Shiner	<i>Notemigonus crysoleucas</i>	
Emerald Shiner	<i>Notropis atherinoides</i>	Introduced
Common Shiner	<i>Luxilus cornutus</i>	
Blacknose Shiner	<i>Notropis heterolepis</i>	
Spottail Shiner	<i>Notropis hudsonius</i>	
Sand Shiner	<i>Notropis stramineus</i>	
Mimic Shiner	<i>Notropis volucellus</i>	
Bluntnose Minnow	<i>Pimephales notatus</i>	
Fathead Minnow	<i>Pimephales promelas</i>	
Longnose Dace	<i>Rhinichthys cataractae</i>	
Creek Chub	<i>Semotilus atromaculatus</i>	
Fallfish	<i>Semotilus corporalis</i>	
Brown Bullhead	<i>Ameiurus nebulosus</i>	
Burbot	<i>Lota lota</i>	
Threespine Stickleback	<i>Gasterosteus aculeatus</i>	
Ninespine Stickleback	<i>Pungitius pungitius</i>	
Trout-perch	<i>Percopsis omiscomaycus</i>	



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FISH COMMON NAME	FISH SCIENTIFIC NAME	COMMENTS
White Bass	<i>Morone chrysops</i>	
Rock Bass	<i>Ambloplites rupestris</i>	
Pumpkinseed	<i>Lepomis gibbosus</i>	
Smallmouth Bass	<i>Micropterus dolomieu</i>	
Largemouth Bass	<i>Micropterus salmoides</i>	
Black Crappie	<i>Pomoxis nigromaculatus</i>	Introduced – incidental catches reported to MNRF
Yellow Perch	<i>Perca flavescens</i>	
Walleye	<i>Sander vitreus</i>	
Iowa Darter	<i>Etheostoma exile</i>	
Johnny Darter	<i>Etheostoma nigrum</i>	
Logperch	<i>Percina caprodes</i>	
Tessellated Darter	<i>Etheostoma olmstedii</i>	
Freshwater Drum	<i>Aplodinotus grunniens</i>	
Mottled Sculpin	<i>Cottus bairdii</i>	

## **APPENDIX 2**

### **LAKE NIPISSING FISHERIES MANAGEMENT PLAN ADVISORY COUNCIL TERMS OF REFERENCE**

#### **Background**

The Lake Nipissing Interim Fisheries Management Plan 2007-2010 has expired. While recent management activity has focussed on assessing the current status of the walleye population, there remains the requirement to prepare a renewed, holistic fisheries management plan for the lake. The plan will cover the next 20 years (2014-2034), with formal reviews on the trajectory of management actions every 5 years.

#### **General**

At 871 km<sup>2</sup>, Lake Nipissing is the fifth largest lake in Ontario (excluding the Great Lakes) and is the seventh most fished lake (including the Great Lakes). Lake Nipissing fisheries are an important economic and social engine within Fisheries Management Zone (FMZ) 11, contributing to a local tourism industry estimated at \$69–125 Million annually. The lake also provides cultural and economic benefits to Nipissing (NFN) and Dokis First Nations (DFN) — both pursue a subsistence fishery and NFN also has a court-recognized treaty right to commercially fish. There have been recent challenges to the lake ecosystem through the introduction of invasive species such as spiny water flea and common carp, the re-colonization by double crested cormorants and changing climate. These changes make predicting future conditions refractory.

#### **Recent Activities**

Initial efforts are underway to address decreasing adult walleye abundance and to initiate a rebuilding of the walleye population due to the findings of a peer reviewed draft report entitled *Lake Nipissing Walleye Data Review* (1967 – 2011). The report examined all available data back to 1967 for historical context and determined that current adult walleye abundance has declined by about 50% since the early 1980s.

An Advisory Committee was established in the summer of 2012 to advise MNRF on the socio-economic effects of any proposed changes to the recreational angling fishery. It is anticipated that that group will form the core of the LNFMPAC, with the addition of other organizations, to assist in the development of a new fisheries management plan. Harvest reduction through an interim lower walleye creel limit for the recreational angling fishery and on-going dialogue with NFN are anticipated to initiate rebuilding the adult walleye biomass.

#### **FMZ 11 Context**

North Bay District is the lead district for Fisheries Management Zone (FMZ) 11. An Advisory Council is in place to advise North Bay District on matters relating to the management of recreational fisheries in FMZ 11. Lake Nipissing is the largest lake in FMZ 11 and is classified as a Specially Designated Water (SDW). SDWs are created to recognize certain water bodies as being of critical importance to the effective management of an entire FMZ and it is assumed that SDWs will have their own management plans within the context of the broader FMZ plan as a whole. This project is designed to run in parallel with the initiative to develop a FMZ 11 management plan.

Angling effort on Lake Nipissing has declined by about half since the 1970s, from more than 11500 hours/km<sup>2</sup> to a current level of just over 5700 hours/ km<sup>2</sup>. Nonetheless, it still is a significant sink for angling effort within FMZ 11 and consideration must be given to the implications of any potential dispersal of effort at the landscape scale. A representative from the FMZ 11 Council participated on the recent Lake Nipissing Walleye Project Advisory Committee to ensure the FMZ 11 Council was aware of the Lake Nipissing situation and resulting

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management action. In recognition of the potential changes to the recreational angling regulations for walleye on Lake Nipissing, FMZ 11 council will need to discuss and evaluate implications of the potential change to zone wide walleye management.

The following Terms of Reference (TOR) describe the purpose, principles, organizational details, roles and responsibilities and operating costs for the Lake Nipissing FMP Advisory Council. It is anticipated that the recommendations of this Council will be derived in consultation with, and having regard to, those of the FMZ 11 Advisory Council.

#### **Purpose**

The purpose of the Lake Nipissing Advisory Council is to provide advice to assist the MNRF in describing management direction concerning recreational fisheries on Lake Nipissing.

#### **Objectives**

- To provide an effective mechanism for the public to become engaged in the management of the Lake Nipissing fisheries.
- To provide a forum where a broad range of stakeholders can work together to develop objectives for the future state of the fisheries.
- To work with MNRF and to provide advice to MNRF on strategies to achieve the desired future state of the fishery.
- To provide MNRF with social and economic perspectives as they pertain to the management of the lake's fisheries.
- To provide MNRF with local knowledge of the fishery.
- To help the MNRF communicate and consult with the broader public on management strategies and issues.

#### **Principles**

**ECOLOGICAL APPROACH:** An ecological approach to fisheries management will be followed to ensure conservation and use of the resource in a sustainable manner.

**LANDSCAPE LEVEL MANAGEMENT:** In general, fisheries are managed at a landscape scale. Lake Nipissing, however, is a major component of the fishery resources within FMZ 11 and it has its own unique use patterns and consequential effects, partly rooted in the history of resource development. It is understood that there may be major differences in the resource or objectives between Lake Nipissing and the broader FMZ which may require different approaches to management within the Zone.

**BALANCED RESOURCE MANAGEMENT:** Strategies and actions will consider the ecological, economic, social and cultural benefits and costs to society, both present and future.

**SUSTAINABLE DEVELOPMENT:** The finite capacity of the resource is recognized in planning strategies and actions for the lake. Only natural resources over and above those essential to long-term sustainability are available for use and development. Only those which exceed the requirements of subsistence fishing are available for other uses such as commercial fishing, recreational fishing or tourism development.

**BIODIVERSITY:** Fisheries management will ensure the conservation of biodiversity by committing to healthy ecosystems, protecting and preferring native, natural fish populations and sustaining their genetic diversity. All of the lake's species, including non-sport fish and Species-at-Risk, must be considered.

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**NATURAL REPRODUCTION:** Priority will be placed on native, naturally reproducing fish populations that provide predictable and sustainable benefits with minimal long-term cost to society.

**HABITAT PROTECTION:** The natural productive capacity of the habitats of fish and of the organisms upon which fish depend will be protected and habitat will be enhanced where possible.

**VALUING THE RESOURCE:** Stakeholders and other users will be invited to understand and appreciate the value of fisheries resources and to participate in decisions to be made by MNRF that may directly or indirectly affect aquatic ecosystem health.

**RESPONSIBILITY:** Effective fish management is a cooperative venture with responsibility being shared by local, regional, provincial and federal governments, by First Nations and by citizens generally. Through cooperation and the sharing of knowledge, solutions to challenges will be sought so fisheries can attain and remain at levels from which all parties can derive a sustainable level of benefits.

**MULTI-PARTY INVOLVEMENT:** A wide range of stakeholders, Aboriginal peoples, and interested parties will provide fisheries management advice to ensure an open and transparent process that acknowledges their valuable role in the process.

**ABORIGINAL INTERESTS:** Ontario is committed to building better relationships with Aboriginal peoples and in involving them in decisions that affect them. It is the responsibility of the government to ensure that the subsistence needs of Aboriginal peoples are met, within the constraints of a sustainable resource base.

**DIRECT ACTION:** Before acting upon the resource, the broadest possible constellation of options will be considered and the feasibility of implementing actions will be carefully evaluated. It is expected that our actions may have to evolve as situations change and our knowledge improves.

**KNOWLEDGE:** The best available information will be used when objective setting, in strategy development and in implementation. Monitoring and assessment needs and the sufficiency thereof will be re-evaluated as knowledge improves.

**ADAPTIVE MANAGEMENT:** Lake Nipissing will be managed using an adaptive management approach. Objectives will be set, actions implemented and monitoring will occur so that results can be continually compared against objectives. In this way, our management can be adjusted as necessary and as possible to ensure attainment of objectives.

**PRECAUTIONARY PRINCIPLE:** When an activity raises threats to human health or the environment, precautionary measures should be taken even if some cause-and-effect relationships are not fully established scientifically. Every effort will be made to ensure our systems are robust and fault-tolerant. We should expect that the future is inherently unpredictable and, thus, be cautious in our manipulations of the natural system.

### **Operating Principles**

The Advisory Council will operate in a manner consistent with the Ecological Framework for Recreational Fisheries Management. Councils will work towards the provincial level objectives of resource sustainability, biodiversity conservation, landscape scale management, enhanced stewardship, streamlined regulations, protected areas management (Provincial Parks, Conservation Reserves and Wilderness Areas) and enhanced angling opportunities. In addition

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council will consider allied concerns or other fishery-dependent activities such as tourism, commercial fishing and habitat protection.

The Advisory Council's primary responsibility is to advise MNRF on fishery objectives for Lake Nipissing. This will be accomplished under direction from MNRF, through consultation with stakeholders and the public and in consideration of the broader public interest. The objectives will clearly describe the desired characteristics (quality and quantity, fish community type) of the fisheries resource and the associated benefits expected from that resource. It is anticipated that there will likely be the need for broader public consultation (e.g. posting on Environmental Registry, public forums) on proposals, particularly the setting of goals and objectives. Given the recognized "honour of the crown" and legal obligations to consult with aboriginal communities about management proposals that may infringe on the ability of aboriginal people to access their recognized aboriginal or treaty rights, the Council will recognize that aboriginal peoples have ample and meaningful opportunity for input to the development of fisheries management proposals.

The Advisory Council operates at the scale of Lake Nipissing but must remain cognizant of and must act cooperatively with broader landscape concerns, as represented by the FMZ 11 Council. Meetings and consultative processes of the Lake Nipissing Fishery Management Plan Advisory Council will document both majority and minority opinions and will, whenever possible, strive for consensus. The Council's operations will be conducted in a manner that ensures equality and respect among all members.

#### **Roles & Responsibilities**

##### MNRF:

- Develop and maintain the Advisory Council, including advertising for members and canvassing stakeholder groups to secure candidate members, appointing new members and removing members when necessary, recommending the frequency of meetings and providing approved financial support derived from program funds.
- Arrange for meetings and ensure minutes of meetings are taken and distributed.
- The MNRF will chair the Advisory Council.
- With agreement from the LNFMP Advisory Council, MNRF may invite representatives from other councils to meet with Council, when appropriate.
- Appoint a staff member who will be the main contact for supporting the operations and functioning of the council.
- Provide basic logistical support to the Advisory Council (facilities for meetings, etc.).
- Increase the understanding and awareness of members of the council regarding the subjects of aquatic resources and their use through presentations and written materials.
- Distribute information relevant to the meeting and the meeting agenda prior to each meeting. This does not include presentation materials, which will be available to the Council members following the meeting.
- Ensure that other MNRF-affiliated citizens groups and stakeholders not represented on the LNFMP Advisory Council are kept apprised of the business of Council.
- As an aid to Council's deliberations, MNRF will provide or make arrangements for the provision of available science-related expertise, as required or requested by Council.
- Establish a network of MNRF managers whose districts or parks are contained in, overlap or are adjacent to Lake Nipissing to ensure good communications and understanding regarding Council's development, deliberations, decisions and operation.
- Review advice provided by Council with other responsible MNRF managers and make decisions on management actions to be taken.

##### LNFMP Advisory Council will:

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- Provide advice for consideration by MNRF managers on fisheries management, including the setting of fisheries objectives, review of monitoring and reporting results and with implementation of management actions to meet the fisheries objectives for Lake Nipissing.
- Review any existing fisheries management plan or plans (e.g. Ontario Parks Fisheries Management Plans, Watershed management plans etc.) as required.
- Work with existing organizations and groups with an interest in Lake Nipissing to ensure that local initiatives are complementary and supportive to objective-setting and management activity at the lake level.
- Assist with MNRF consultation processes by engaging and educating the public on fisheries management using any partnership networks available including Lake Associations, Fish and Game clubs, tourism organizations, etc. with an interest in the fisheries of Lake Nipissing.

#### Council Chair will:

- Lead the Council membership through the fisheries management planning process.
- Ensure Council members are aware of areas where their advice will be solicited with as much notice as possible prior to a council meeting.
- Ensure that all representatives on the council are given the opportunity to contribute to advice developed by Council.
- Ensure that Council develops a set of ground rules by which they will operate – run meetings, respond to media contacts, liaise with other groups etc.
- Keep Council members focused on the stated purpose and role of Council as contained in these ToRs.
- Meeting-related duties

#### LNFM Council Chair will:

- Begin meetings on time
- Maintain meetings on schedule
- Cut off circular or inappropriate discussions
- Summarize council discussions as a motion
- Solicit opinions from non-vocal council members and ensure that everyone has a chance to be heard
- Voice minority opinions for documentation in minutes

#### Plan Advisors will:

- Provide MNRF with official positions and perspectives from their respective agencies
- Present, when asked, the role of their respective agencies with regards to Lake Nipissing.

### **Organization**

#### Governance

North Bay District MNRF has the responsibility for fish management and for developing and maintaining the Lake Nipissing FMP Advisory Council (LNFM PAC). Advising the MNRF on issues related to the fisheries of Lake Nipissing, however, is the combined responsibility of the LNFM PAC and of the FMZ 11 AC. MNRF will often, also, solicit input from other agencies of government such as the federal Department of Fisheries and Oceans, the Ministry of Tourism, or Ontario Parks. The LNFM PAC Advisory Council will provide advice to the MNRF managers. Advice received will be considered when MNRF and the government take fisheries management decisions.

#### Jurisdiction

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The Advisory Council has the primary responsibility of advising MNRF on the management of Lake Nipissing's fisheries. In order to accomplish this, it is expected that members of the Council will liaise with their constituent organizations or with the general public.

#### Membership

The Advisory Council will be a standing committee consisting of 10-15 volunteers representing a broad array of stakeholder groups including, but not limited to:

- Nipissing First Nation
- Dokis First Nation
- FMZ 11 Council
- Tourist Operators
- Anglers-at-large
- Fish and Game Clubs
- Lake Nipissing Partners in Conservation
- Greater Nipissing Stewardship Council
- Local Municipalities

First Nations are welcome to and will be invited to participate in the Advisory Council. It is freely acknowledged that having any number of aboriginal people sitting on the Council does not meet the Crown's responsibility for aboriginal consultation.

Advisory Council members are expected to attend meetings where they will represent the interests of their sector or stakeholder group before their own interests.

MNRF will canvas stakeholder groups to secure candidate members who will be appointed by the lead FMP manager.

The lead FMP manager may remove members from the council if their continued membership is not in the best interest of the council or the MNRF (e.g. poor attendance, promoting personal interests, disruptive behaviour)

Members will serve for a term equal to the required time to complete the fisheries management plan.

Members are expected to attend all meetings, and pre-designated alternates will be allowed. Where a pre-designated alternate attends along with the primary representative, he or she is welcome to observe the proceedings but will have neither voice nor vote.

Quorum for the LNFMPAC is defined as 60% of the Advisory Council membership, as of that date, being present.

#### Advisors

Advisors to the plan will be representatives from other governmental agencies that have a shared interest in the management of Lake Nipissing. Invitations will be sent to:

- North Bay – Mattawa Conservation Authority
- Ontario Ministry of Tourism, Culture and Sport
- Ontario Ministry of Environment and Climate Change
- Ontario Parks

It is expected that advisors will represent the official position of their respective agency. If requested, advisors will present information to the AC on their roles in the management of Lake Nipissing.

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Advisors will not be required to attend all meetings, but encouraged to do so. In addition, advisors may be asked to participate in MNRF planning team meetings.

#### Alternates

Any Council member or their constituent organization may wish to designate an alternate member to the LNFMPAC in the event that the primary member cannot attend a particular meeting. Those named alternates must be communicated to the MNRF lead manager and the participation of the person so designated is subject to the approval of MNRF.

Purpose of the alternates:

The purpose of an alternate member is to ensure that all constituencies have representation at as many meetings as possible. The role of the alternate is to attend a meeting in place of the primary member. Alternates may become full members should the primary member leave the council, if approved by MNRF.

Rules regarding alternates:

- All member organizations (or individual members in the case of anglers-at-large) are entitled to appoint an alternate member.
- Alternate members must be identified to and approved by the MNRF.
- Alternates should attend in place of the primary member. When attending in place of a primary member, the alternate has the same rights to voice and vote as would the primary member were she or he in attendance.
- It is the responsibility of the primary member to notify their alternate if he or she is unable to attend a meeting. Notice that an alternate will be attending should be sent to the Council chair and the MNRF.
- In the event that the primary member will be leaving the council, a transition period where the alternate and primary member can attend meetings may be helpful, provided:
- The alternate contributes to the discussion only through the primary member and does not form part of the decisions or consensus of Council.
- Attendance of the alternate needs to be approved in advance by MNRF and the Advisory Council chair(s).
- Alternates will be distributed all materials electronically. The primary member is responsible for maintaining communications with the alternate to ensure they are aware of Council proceedings.
- Alternates only count towards the establishment of a quorum when the primary member is not in attendance.

#### Chairperson

Due to the short-term tenure of the Council, MNRF will provide a chairperson to lead the meetings.

#### Council Support

MNRF will provide clerical and logistical support for the Council.

#### Linkages

The Advisory Council will be encouraged to develop linkages with other stewardship based initiatives and networks. It is understood that the LNFMPAC will need to maintain a particularly strong link to the FMZ 11 AC.



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A regular opportunity for communication between the LNFMPAC and the FMZ Advisory Council should be provided. Routine liaison and communication is the responsibility of the FMZ 11 representatives to the LNFMPAC.

#### Meetings

- Meetings will occur on a regularly scheduled basis.
- Attendance at meetings will be limited to members and designated alternates.
- Visitors and observers will be permitted if there is agreement of the council at a previous meeting or at least 6 weeks prior to the date of the meeting the visitor or observer is to attend.
- Council members will be expected to attend other fisheries related public meetings where consultation on fisheries management decisions may occur.
- Additional sessions with the public may be scheduled as the need arises.
- MNRF, in discussion with the Council members, will decide on how meetings will be run and decisions will be made, etc. (e.g. consensus, recording of minority opinion)
- Motions require both a mover, a seconder and discussion before any decision is taken. Consensus is the preferred and first approach to determining advice of council. If consensus cannot be reached, dissenting opinion will be documented.

#### Relationship to other committees

- Sub-committees or task teams of the LNFMPAC may be formed, if required, to deal with specific topics.
- Any sub-committee or task team that may be struck will be provided with direction by the broader Advisory Committee and such direction captured in the meeting minutes.
- The institution of such sub-committees or task teams will be predicated on the efficient and effective use of resources, and must be inclusive of the interests its parent Councils.

#### Conflict of Interest

Members must consider potential conflict of interest situations and must declare such during their tenure on the committee. Members finding themselves in conflict must declare a potential conflict and remove themselves from participating in all associated Council discussions.

The following are some cues that may indicate that a conflict of interest situation is possible: The use of your position on the Council could be construed as of direct or indirect benefit outside of the mandate of your organization, sector or stakeholder group.

- If you are representing the Advisory Council at a related function, do not accept a gift if a reasonable person might conclude that the gift could influence you in the performance of your duties. Never accept a gift, direct or indirect, that could be interpreted as being in exchange for the disclosure of confidential information, in exchange for your representations before Council, or in exchange for the positions you take or the way you cast your vote.
- You may accept a gift of nominal value given as an expression of courtesy or hospitality if doing so is reasonable in the circumstances.
- Do not disclose confidential information obtained during the course of your council duties to anyone, unless authorized to do so by the Council Chair(s).
- Do not use confidential information in a business or undertaking outside the Council.
- Avoid any actions which could create the appearance of preferential treatment being given to the benefit of any person or entity.
- In cases where you are uncertain, potential conflict situations should be identified to the Advisory Council chair(s) for discussion and clarification.

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### Formalizing Committee Advice to MNRF

Although MNRF will strive to build consensus in the Advisory Council's advice to the Ministry, this may not occur due to the very nature of the broad interests represented in the AC's membership. However, it is not the intent of MNRF to rely on a majority rule approach (i.e., voting) to garner advice. As such:

- In the event that a consensus decision is not reached, MNRF will record dissenting opinions.
- All members can contribute their opinions.
- Recommendations will be formally summarized and noted in the minutes

### Confidentiality

Members of the LNFMPAC will respect the confidentiality of any information, including personal information, identified as being confidential by MNRF during discussions held at council meetings or functions. Minutes of meetings and other documentation of council activities will not be shared beyond the council membership until the minutes or documentation have been approved for release by the council.

LNFMPAC members and alternates are expected to represent their organization or broad stakeholder group. In instances where the council is being asked to generate formal advice, it is reasonable for council members to be provided with an opportunity to consult with their membership prior to providing their input. At this time, it is important that LNFMPAC members are clear to their organization that the information being provided is still in discussion by the Council, that no formal recommendations have yet been made by Council, nor have decisions been taken on the particular subject. Where possible, these discussions should be limited to the executive of the organization.

For members not representing a specific organization (e.g. anglers-at-large), specific recommendations being considered by the Council should not be discussed with the public until formal recommendations have been made. Broader public input will be solicited via public consultation initiatives.

During public consultation, it is strongly recommended that the LNFMPAC develop standard messaging to deal with questions anticipated from the public, and only indicate a Council preference for a preferred management option when such a preference has been formally endorsed by a resolution of Council. The LNFMPAC may wish to identify a media spokesperson(s) to handle media requests.

Advisory Council members may be asked to sign a confidentially agreement with respect to the protection of personal information under FOIPPA. In any case, if such an agreement is tabled, the Council will be provided appropriate training before signature.

### Council Tenure

The Advisory Council will continue until a final Fisheries Management Plan has been submitted and approved. In unforeseen circumstances, the Council may be dissolved at the MNRF lead manager's discretion prior to completion of the FMP.

### Operating Costs

Costs related to meetings (e.g. room rental, coffee, etc.) will be covered by MNRF.

Council members will be reimbursed for travel, meal and accommodation costs following the principles in the OPS Travel Directive and as approved by MNRF.

Per diems will not be paid.

**LAKE NIPISSING FISHERIES MANAGEMENT PLAN ADVISORY COUNCIL MEMBERSHIP**

**Advisory Council**

Nipissing First Nation Representative  
Nipissing First Nation, alternate  
Dokis First Nation Representative  
Dokis First Nation, alternate  
FMZ 11 Council  
Northern Ontario Tourist Operators  
Anglers At Large  
Anglers At Large  
North Bay Anglers and Hunters  
North Bay Anglers and Hunters, alternate  
Lake Nipissing Partners in Conservation  
Lake Nipissing Partners in Conservation, alternate  
Greater Nipissing Stewardship Council  
City of North Bay  
Municipality of Callander  
Municipality of French River  
Upper French River Cottagers Association  
Commercial Ice Hut Operator

**Advisors**

Ministry of Tourism, Culture and Sport  
Ministry of Northern Development and Mines  
North Bay-Mattawa Conservation Authority

**MNRF Staff**

Mitch Baldwin	MNRF North Bay – District Manager
Randy McLaren	MNRF North Bay – Nipissing Area Supervisor
Scott Kaufman	MNRF North Bay – Large Lake Biologist
Melanie Alkins	MNRF North Bay – Supporting Management Biologist
Kathy Hansel	MNRF North Bay – Minute-taker

## **APPENDIX 3**

### **MANAGEMENT ISSUES, CHALLENGES AND OPPORTUNITIES**

The LNFMPAC and MNRF staff had extensive discussions of the management issues, challenges and opportunities facing the fisheries resources on the lake which have been presented within this document.

Management issues, challenges and opportunities were listed for each species and topic. This list was used in consideration of the management objectives to identify management strategies or actions to be taken to address issues and challenges and to capitalize on the opportunities.

### **MANAGEMENT OBJECTIVES, INDICATORS, BENCHMARKS, ACTIONS, AND TARGETS**

One of the advantages of taking an objective based approach to a plan is that this type of planning clearly identifies the fisheries management actions that are required to achieve and allow both MNRF and the public to assess whether management actions are working to achieve the desired results.

The following sections describe the management objectives, indicators, benchmarks, actions and targets that are associated with the various management issues and challenges. Each of these factors needs to be described so that it is understood what they are meant to do and how they fit together.

#### **MANAGEMENT OBJECTIVES**

Management objectives describe what you want to achieve in the future or the “desired end result”. Objectives need to contribute to the broad fisheries management goal for the zone, be consistent with strategic direction and the guiding principles, and must be measurable. Objectives can reflect biological, economic or social considerations. In most cases, a range of objectives were identified to reflect the range of benefits people would like to see from the lake.

#### **INDICATORS**

Indicators are specific things or metrics that resource managers will use to measure whether or not they are achieving the management objectives. Indicators are directly linked to the management objectives and need to be measurable by monitoring programs. In most cases, if you have a biological objective and two social objectives then there will be indicators for each of those objectives and there must be a monitoring program identified that is capable of measuring whether the objective is being achieved or not.

#### **BENCHMARKS**

Benchmarks are associated with each of the indicators. They are a very specific measure that resource managers use to determine progress from the existing, or defined condition towards the future desired condition (the target) for a specific objective. Benchmarks essentially describe the current or the historical state.

#### **TARGETS**

Targets translate a management objective that is described in words into one that is described in terms of numbers. It is this number that makes the objective measurable. Since they are very

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specific measures of an indicator, targets help the public and resource managers understand when an objective is achieved.

It is important to remember that there is always some variability around the measurement of indicators. In answering whether targets are being met, the question really becomes “Is this difference between the value of the indicator and the target significant?”. This will need to be taken into account when determining whether objectives are being achieved.

### **ACTIONS**

Actions are the specific things that resource managers will do to accomplish the management objective. Actions are directly linked to the indicators and the monitoring programs, in that each provides the unit of measure and the actions (e.g., monitoring program, communications) to be taken.

For each of the species and “other topics” to be included in the plan, issues, challenges, opportunities, objectives, indicators, benchmarks and targets have been described and summarized in a table with clear parameters of measure and timelines for tracking progress. In some cases, the indicators or targets have not been completely defined as the science or project plan is still in development. As they are developed, these tables will be completed and at the very least, prior to the 5 year plan review, all targets and indicators will be defined.

**APPENDIX 4**

**ABORIGINAL CONSULTATION SUMMARY**

**List of Aboriginal communities:**

Nipissing First Nation

Dokis First Nation

**List of any community representatives on the advisory council:**

Nipissing First Nation – 2 Representatives

Dokis First Nation – 1 Representative

**Summary of correspondence provided to each community:**

- Nipissing First Nation and Dokis First Nation were sent an invitation to participate on the Lake Nipissing Fisheries Management Plan Advisory Council
- The following Aboriginal Communities were sent an invitation to participate in the fisheries management plan development information centre on April 23 & 24, 2013:
  - North Bay Metis (a copy was also sent to Metis Nation of Ontario Main Office)
  - Antoine Algonquin First Nation/Mattawa-North Bay Algonquin First Nation
  - Algonquins of Ontario Consultation Office Union of Ontario Indians
- On March 25, 2014, a notice was sent to the following Aboriginal Communities inviting input on the draft plan at the start of the 30-day public consultation period:
  - Nipissing First Nation
  - Dokis First Nation
  - Mattawa-North Bay Algonquin First Nation
  - Antoine Algonquin First Nation

**Summary of additional communication efforts within each community:**

- On March 25<sup>th</sup>, 2013 – The MNRF discussed with NFN and DFN an invitation for specialized consultation and meetings to discuss plan development; NFN expressed some interest; however, they showed interest in meeting in the future.
- On April 8, 2013 – The MNRF again offered a specialized consultation meeting with NFN, including assistance with communication to their Band members, hall rental, and additional topics of discussion; however, they were unable to meet due to other commitments.
- On May 6, 2013 – The MNRF participated in a community meeting at DFN.

**Summary of participation at information sessions and special community information centres**

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On May 6, 2013, the Ministry participated in a public meeting at Dokis First Nation to discuss the Lake Nipissing Fisheries Management Plan.

On March 25, 2014, the Ministry engaged local municipal leaders and First Nation representatives in discussions on the draft plan during a technical presentation on the key elements of the draft plan. Notification of an opportunity to review and comment on the draft plan was provided. Representatives from Nipissing First Nation and Dokis First Nation attended.

#### **Summary of comments or input received from each, and responses**

No written comments were received on the draft plan.

Nipissing First Nation and Dokis First Nation provided direct input into plan development through participation on the Advisory Council.

## **APPENDIX 5**

### **PUBLIC CONSULTATION SUMMARY**

#### **2013**

In 2013, the ministry requested input into the development of a new Lake Nipissing Fisheries Management Plan. Public information sessions were held in North Bay and Sturgeon Falls, May 1 & 2, 2013, respectively. The public was notified of the opportunity to participate in plan development through:

- Direct mailing to individuals, businesses, and other stakeholders with a known interest on the project mailing list.
- Advertisement of a public notice in the North Bay Nugget and the Sturgeon Falls West Nipissing Tribune (English & French).

#### **2014**

The ministry further requested public input into the development of the draft Lake Nipissing Fisheries Management Plan during a 30-day comment period commencing March 25, 2014. The public was notified of the opportunity to review the plan through:

- Direct mailing to individuals, businesses, and other stakeholders with a known interest on the project mailing list.
- Advertisement of a public notice in the North Bay Nugget (March 27, 2014), Almaguin News (April 3, 2014), Sturgeon Falls West Nipissing Tribune (English & French) (April 2, 2014).
- Posting a policy proposal notice on the Environmental Registry, March 25, 2014 until April 24, 2014.

In addition, the draft plan was available for public review at the MNRF North Bay District office.

Leading up to the release of the draft plan, Ministry staff met with the Lake Nipissing Fisheries Management Plan Advisory Council (LNFMPAC) to communicate the upcoming opportunity to provide input on the draft plan. Ministry staff encouraged members of the LNFMPAC to communicate to their respective sectors (e.g. tourism operators, local anglers) that the draft plan was available for public review.

On March 25, 2014, the ministry engaged local municipal leaders in discussions on the draft plan during a technical presentation on the key elements of the draft plan. Notification of an opportunity to review and comment on the draft plan was provided.



## **APPENDIX 5 (CONTINUED)**

### **Summary of comments received on the draft plan:**

The ministry received a total of 39 comments on the draft plan. The majority of comments received related to the proposed walleye recreational regulation change. There were no comments that warranted a fundamental change to the plan; however, some comments resulted in editorial changes. The ministry reviewed all comments in preparation of the final plan.

In general, comments on the draft plan consisted of:

- A general concern that the proposed minimum size limit for the walleye regulation change is too big and will deter fishers from Lake Nipissing.
- A general concern that the proposed walleye regulation change will have negative impacts on local tourism operators.
- Some concern for fish mortality associated with releasing small walleye as a result of the proposed walleye regulation.
- A general concern regarding the impacts of the commercial fishery on the walleye population.
- A number of recommendations for the closure of both the recreational and the commercial fishery.
- Some concern for increased fishing pressure to surrounding lakes as a result of the proposed walleye regulation change.
- Some concern for the ability of the Ministry of Natural Resources and Forestry to effectively enforce the proposed walleye regulation.
- Some concern that the proposed bass regulation change have impacts on bass during spawning season.
- A number of comments directed toward cormorant management.
- General support for walleye stocking programs.

## APPENDIX 6

### COMPARISON OF OPTIONS CONSIDERED FOR WALLEYE REGULATIONS ON LAKE NIPISSING.

Option #	Description	In toolkit (Y/N)	Biological Effectiveness (H/M/L)	Rationale	Council Support (H/M/L)
<b>Option #1: Status Quo Current Regulation</b>	<p><b>Season:</b> Open Jan 1- March 15, 3<sup>rd</sup> Sat. in May to Oct. 15</p> <p><b>Catch Limits:</b></p> <p><b>Sport – 2 Conservation – 1</b></p> <p><b>Size Limit:</b> none between 40-60 cm (15.7-23.6in)</p>	Season – Yes Limits – Yes	Low	Based on the detailed data review results and model results that evaluated the effectiveness of this regulation to support the recovery of the walleye population, it was determined that this regulation was not appropriate and that it needed to be reconsidered.	Low
<b>Option #2: Proposed Regulation: Change current catch and size limits</b>	<p><b>Season:</b> Open Jan 1- March 15, 3<sup>rd</sup> Sat. in May to Oct. 15</p> <p><b>Catch Limits:</b></p> <p><b>Sport – 4 Conservation – 2</b></p> <p><b>Size Limit:</b> none less than 46 cm</p>	Season – Yes Limits – Yes	Moderate	<p>The goals of this option are to:</p> <ol style="list-style-type: none"> <li>1. Increase recruitment of juvenile walleye into spawning stock status to ensure at least one reproductive event per fish per lifetime</li> <li>2. Increase the abundance of spawning females (&gt;400mm, age 4.2)</li> <li>3. Increase the abundance and biomass of walleye in the lake to remove the ‘stressed population’ status.</li> </ol> <p>The detailed data review and subsequent FWIN and creel surveys in 2012 and early 2013 identified juvenile mortality as the factor preventing the entry of juvenile fish into spawning stock status in the lake. This was identified as the greatest barrier to the recovery of the walleye population today. Given the current state of the walleye population, and the MNRF’s stated intent of returning the walleye population to a healthy condition, the Advisory Council was nearly unanimous in advocating for a strategy that had a low to moderate risk tolerance and that fully addressed excessive juvenile mortality rates. The proposed regulation will protect approximately 100% of the male walleye spawning stock and approximately</p>	High

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Option #	Description	In toolkit (Y/N)	Biological Effectiveness (H/M/L)	Rationale	Council Support (H/M/L)
				<p>50% of the female walleye spawning stock with the intention of ensuring that individuals have at least one reproductive event/opportunity in their lifetime.</p> <p>Public feedback from the interim regulation change on January 1, 2013 strongly indicated that a 2(1) fish limit was not supported or acceptable to both the recreational anglers and the tourist industry. In addition, computer modeling of the proposed minimum size limit indicated that walleye harvest would be within the recovery trajectory with a 4(2) fish limit.</p> <p>It should be understood that over the short term, harvest rates in the recreational fishery will be low. Once fish from the 2009, 2010, 2011 and 2012 year classes are recruited to the fishery, harvest rates should increase substantially. It is felt that this is a necessary compromise so the fishery can remain sustainable into the future and recover sooner rather than later.</p> <p>With the minimum size limit set above the size at first maturation for a significant portion of the female population, this will help to ensure that each individual has at least one reproductive event during their lifetime and will ultimately help guard against 2 of the 3 types of overfishing (recruitment and growth overfishing) persisting into the future.</p> <p>Note: MNRF elected to retain the 2(1) fish limit for walleye due to continued sustainability concerns until assessment shows a clearer trajectory towards recovery.</p>	
<b>Option #3: Change current catch and size limits</b>	<p><b>Season:</b> Open Jan 1- March 15, 3<sup>rd</sup> Sat. in May to Oct. 15</p> <p><b>Catch Limits:</b> <b>Sport – 4</b> <b>Conservation – 2</b></p> <p><b>Size Limit:</b> Between</p>	Season – Yes Limits – Yes	Moderate	<p>This option represents a slightly less conservative approach to walleye recovery compared to the proposed size limit. This regulation will protect 50% of females in Lake Nipissing to spawn at least once in their lives. It will then make them vulnerable to angling harvest for 2 or 3 years before being protected once again. This regulation achieves a balance of allowing harvest on the most abundant portion of the spawning stock, but protecting the largest, most fecund individuals that survive vulnerability. This regulation is also the</p>	Moderate

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Option #	Description	In toolkit (Y/N)	Biological Effectiveness (H/M/L)	Rationale	Council Support (H/M/L)
	45-55 cm only (fishable slot)			closest to an alignment of the recreational fishery to the commercial catch, since the commercial fishery cannot sell fish greater than 57cm due to mercury contamination. The significant drawback to this regulation would be extremely low harvest rates if two consecutive weak year classes moved through the fishable slot in the same year.	
<b>Option #4: Change current catch and size limits</b>	<b>Season:</b> Open Jan 1- March 15, 3 <sup>rd</sup> Sat. in May to Oct. 15  <b>Catch Limits:</b>  <b>Sport – 4 Conservation – 2</b>  <b>Size Limit:</b> Between 45-50 cm only	Season – Yes Limits – Yes	High	This regulation is similar to Option 2. It has the potential to have the same end result in that it is one of the lowest risk options with this fishable slot being more conservative than the minimum size limit. This fishable slot will allow 50% of females to spawn at least once in their lifetime, but would only expose them to vulnerability to angling harvest for 1 or 2 years before they are protected once again. The benefit of this regulation is that it is very robust and has the ability to sustain populations under very intense pressure. The negative would be low harvest rates, particularly if consecutive weak year classes move through the fishery.	Low

## APPENDIX 7

### SUMMARY OF WALLEYE MANAGEMENT OBJECTIVES AND MANAGEMENT ACTIONS

<b>Objectives</b>	<p><b><u>Biological Objectives</u></b></p> <ol style="list-style-type: none"> <li>1) To rebuild the walleye biomass in Lake Nipissing to healthy levels (4.6 kg/ha) in 10 years</li> <li>2) To rebuild the age structure of the population to include healthy levels of spawning sized walleye</li> <li>3) To decrease juvenile mortality and increase recruitment into the spawning stock</li> <li>4) MNRF, in collaboration with partners to examine previously recommended alternatives to current stocking practices in addition to any new science-based options to traditional stocking of walleye in the lake.</li> </ol> <p><b><u>Socio-economic Objectives</u></b></p> <ol style="list-style-type: none"> <li>5) Reduce total harvest to a low/moderate risk level over 10 years to initiate recovery of the population               <ol style="list-style-type: none"> <li>a) Overall harvest should be reduced to approximately 0.33 - 0.43kg/ha based on 2012 data</li> <li>b) MNRF should plan for an angling harvest of no more than 50% of the overall safe annual harvest (of recreational and commercial fisheries)</li> <li>c) Increase the sustainable walleye yield to 0.8 kg/ha in 10 years</li> <li>d) Harvest numbers should be updated as new information becomes available</li> </ol> </li> <li>6) To balance the effects of managing a sustainable fishery with cultural, social and economic interests               <ol style="list-style-type: none"> <li>e) To provide sustenance for local First Nations</li> <li>f) To balance the needs of commercial and recreational fisheries</li> <li>g) Provide opportunities to fish and to harvest fish for consumption</li> </ol> </li> </ol> <p><b><u>Aquatic Ecosystem Objectives</u></b></p> <ol style="list-style-type: none"> <li>7) To determine the changes to Lake Nipissing ecosystem and its impacts on walleye recovery rates and endpoints</li> <li>8) To minimize the risk of new environmental stressors such as species introductions</li> <li>9) To provide input on, and mitigation measures for activities that impact walleye productivity</li> </ol> <p><b><u>Education Objectives</u></b></p> <ol style="list-style-type: none"> <li>10) To educate all users on walleye biology, status, resulting management actions and the appropriate use of stocking as a management tool on Lake Nipissing.</li> <li>11) To promote awareness about the natural limitations of the walleye population in Lake Nipissing</li> <li>12) To annually report on the state of the walleye population</li> <li>13) To promote safe fish handling techniques to improve post-release survival</li> </ol>
<b>Indicators</b>	<p><b><u>Biological Indicators</u></b></p> <ol style="list-style-type: none"> <li>1) <b>Walleye Biomass Indicator:</b> Walleye biomass will be determined using 2 sources: FWIN (1 kg/net ~ 1/kg/ha) and the Surplus production model</li> <li>2) <b>Walleye Age Structure Indicator:</b> Age structure will be determined using selectivity corrected catch at age data from FWIN</li> <li>3) <b>Juvenile Mortality Indicator:</b> Juvenile mortality rates will be determined using selectivity corrected catch at age data from FWIN</li> <li>4) <b>Number of partnerships and development of project plan</b></li> </ol> <p><b><u>Socio-economic Indicators</u></b></p>

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	<p><b>5) Measured Harvest and Sustainable Harvest Indicators:</b></p> <ul style="list-style-type: none"> <li>a) Angler harvest will be measured through roving creel surveys, commercial harvest will be provided by Nipissing FN</li> <li>b) Annual sustainable harvest will be determined by predictions from the Risk Assessment Model</li> </ul> <p><b>6) Management Balance Indicators:</b></p> <ul style="list-style-type: none"> <li>a) Determination of sustenance harvest and need by Dokis and Nipissing FN</li> <li>b) Relative harvest of recreational and commercial fisheries</li> <li>c) Length of the walleye angling open season and the yield of walleye harvested</li> <li>d) Economic value of walleye fishing on Lake Nipissing to the region</li> </ul> <p><b><u>Aquatic Ecosystem Indicators</u></b></p> <ul style="list-style-type: none"> <li>7) Alteration of walleye life history characteristics resulting from changing ecosystem (e.g. change in aquatic community composition, water quality and quantity, habitat availability etc.)</li> <li>8) Number of new invasive species</li> <li>9) Number of Environmental Assessment screenings that directly impact Lake Nipissing</li> </ul> <p><b><u>Education Indicators</u></b></p> <ul style="list-style-type: none"> <li>10) The number of public meetings attended by MNRF</li> <li>11) The number of public meetings hosted by MNRF</li> <li>12) The number of status updates given/published by MNRF through accessible outlets (i.e., website, social media, stakeholder distribution networks)</li> </ul>
<p><b>Benchmarks</b></p>	<p><b><u>Biological</u></b></p> <p><b>1) Biomass estimates:</b></p> <ul style="list-style-type: none"> <li>a) 2012 FWIN = 2.8kg/ha</li> <li>b) 2013 Surplus Production Model Estimate = 1.8kg/ha</li> </ul> <p><b>2) 2012 Age Structure from FWIN:</b></p> <ul style="list-style-type: none"> <li>4 year olds = 0.17/net</li> <li>5 year olds = 0.04/net</li> <li>6 year olds = 0.04/net</li> <li>7 year olds = 0.12/net</li> <li>8 year olds = 0.02/net</li> </ul> <p><b>3) 2012 Juvenile Mortality Rates from FWIN:</b></p> <ul style="list-style-type: none"> <li>2 to 3 year old = 64%/year</li> <li>3 to 4 year old = 69%/year</li> </ul> <p><b>4) 2013 number of partnerships (0) and development of project plan (0)</b></p> <p><b><u>Socio-economic</u></b></p> <p><b>5) 2012 Harvest and 2013 Sustainable Harvest:</b></p> <ul style="list-style-type: none"> <li>a) 2012 Harvest: 0.22kg/ha recreational; 0.33kg/ha commercial; sustenance unknown; Total 0.55kg/ha</li> <li>b) 2013 projected low risk sustainable harvest = 0.34kg/ha</li> </ul> <p><b>6) 2012 values:</b></p> <ul style="list-style-type: none"> <li>a) Unknown value; no benchmark available</li> <li>b) Relative Harvest: 40:60 recreational:commercial</li> <li>c) 75 days in winter season, 149 days open water season, 0.22kg/ha recreational; 0.55kg/ha total</li> <li>d) Roughly estimated at \$65 – 120 million annually</li> </ul> <p><b><u>Aquatic Ecosystem</u></b></p> <p><b>2012 Baseline:</b></p> <ul style="list-style-type: none"> <li>7) 1 study on the effects of spiny water flea on trophic position and energy flow</li> <li>8) Approximately 3 fish species (rainbow smelt, black crappie, common carp) and 1 zooplankter (spiny water flea)</li> <li>9) Unknown value; no benchmark available</li> </ul> <p><b><u>Education</u></b></p>

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	<p><b>2012 Baseline:</b></p> <ul style="list-style-type: none"> <li>10) Unknown value; no benchmark available</li> <li>11) Unknown value; no benchmark available</li> <li>12) 1 Walleye tabloid; 5 in approval process for other species</li> </ul>
<b>Targets</b>	<p><b><u>Biological Targets</u></b></p> <ul style="list-style-type: none"> <li>1) <b>Biomass:</b> <ul style="list-style-type: none"> <li>a) FWIN: 5 year target = 4.23kg/ha; 10 year target = 4.70kg/ha</li> <li>b) Surplus Production Model: 5 year target = 3.75kg/ha; 10 year target = 4.65kg/ha</li> </ul> </li> <li>2) <b>Age Structure 10 year target:</b> <ul style="list-style-type: none"> <li>4 year olds &gt; 0.59/net</li> <li>5 year olds &gt; 0.36/net</li> <li>6 year olds &gt; 0.23/net</li> <li>7 year olds &gt; 0.14/net</li> <li>8 year olds &gt; 0.09/net</li> </ul> </li> <li>3) <b>Juvenile Mortality Rates 5 year target:</b> <ul style="list-style-type: none"> <li>2 to 3 year old ~ 0.21%/year</li> <li>3 to 4 year old ~ 0.21%/year</li> </ul> </li> <li>4) <b>Number of partnerships (1-2) and development of project plan (1-2)</b></li> </ul> <p><b><u>Socio-economic Targets</u></b></p> <ul style="list-style-type: none"> <li>5) <b>Sustainable Harvest:</b> <ul style="list-style-type: none"> <li>Year 1 harvest ~ 0.34kg/ha</li> <li>Year 5 harvest ~ 0.57kg/ha</li> <li>Year 10 harvest ~ 0.80kg/ha</li> </ul> </li> <li>6) <b>Balance (~50% each) the commercial/recreational harvest while keeping the recreational harvest ≤ 50% of the total harvest from the lake:</b> <ul style="list-style-type: none"> <li>a) Establishment of subsistence fishing level/need and ensure the need is met</li> <li>b) Angler harvest ≤ 50% of the commercial/recreational split</li> <li>c) Commercial harvest ≤ 50% of the commercial/recreational split</li> <li>d) 75 days in winter, 149 days open water; ≤ 0.40kg/ha recreational harvest; ≤ 0.80 total harvest</li> <li>e) Establishment of a firm estimate of economic value</li> </ul> </li> </ul> <p><b><u>Aquatic Ecosystem Targets</u></b></p> <ul style="list-style-type: none"> <li>7) 2 new studies; Calibration of FWIN to actual density and effects on reference points</li> <li>8) Zero new invaders or introductions</li> <li>9) Input on 100% of the EA screenings under the PLA, LRIA permits where required</li> </ul> <p><b><u>Education Targets</u></b></p> <ul style="list-style-type: none"> <li>10) attendance at 100% of meeting requests or invitations received requesting participation</li> <li>11) 1 per year</li> <li>12) 3 per year (end of winter season, end of open water season, end of FWIN)</li> </ul>
<b>Dates</b>	<p><b><u>Biological</u></b></p> <ul style="list-style-type: none"> <li>1-3) Annual FWIN and Creel</li> <li>4) 2015, 2016</li> </ul> <p><b><u>Socio-Economic</u></b></p> <ul style="list-style-type: none"> <li>5) Annual Creel</li> <li>6) 2015, 2016</li> </ul> <p><b><u>Aquatic Ecosystems</u></b></p> <ul style="list-style-type: none"> <li>7-9) Annually</li> </ul> <p><b><u>Education</u></b></p> <ul style="list-style-type: none"> <li>10-12) Annually</li> </ul>

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<b>Management Actions</b>	<p><b><u>Biological</u></b> 1-3)  a) Change angling regulation; collaboration with local FNs on integrated management, implementation of risk assessment model  b) Annual implementation of FWIN, creel surveys, and spawning assessments  c) Calibration of FWIN to get actual densities versus estimate</p> <p>4) Seek out partners to assist with alternative research initiatives or population enhancement projects on the lake with regards to walleye. prepare project plan and implement project</p> <p><b><u>Socio-economic</u></b> 5-6)  a) Change angling regulation; collaboration with local FNs on integrated management, implementation of risk assessment model</p> <p><b><u>Aquatic Ecosystem</u></b> 7-9)  a) 2 new studies; Calibration of FWIN to actual density and Effects on reference points  b) Zero new invaders or introductions  c) Input on 100% of the EA screenings under the PLA, LRIA permits where required  d) Continuation of walleye reproductive ecology studies  e) Continuation of stable isotope dietary analysis</p> <p><b><u>Education</u></b> 10- 13)  a) attendance at 100% of meeting requests or invitations received requesting participation (e.g., Lake Nipissing Summit)  b) 1 public meeting per year (e.g., Lake Nipissing Summit)  c) 3 status updates per year (end of winter season, end of open water season, end of FWIN)  d) Increased communication with stakeholder groups  e) Completion of Walleye SOR for Lake Nipissing, to include piece on stocking, to make accessible in central location</p>
<b>Monitoring Strategies</b>	<p>1) Annual FWIN Surveys  2) Annual Creel Surveys  3) Annual Spawning Population Assessments at Major spawning sites (for fish tagging/markings)  4) Annual walleye reproductive ecology and stable isotope dietary analysis studies</p>



**APPENDIX 8**

**SUMMARY OF NORTHERN PIKE MANAGEMENT OBJECTIVES AND MANAGEMENT ACTIONS**

<b>Objectives</b>	<ol style="list-style-type: none"> <li>1. To have a sustainable and robust northern pike population that meets the demands of the fishery and in so doing recognizes the importance of the role of northern pike in the lake as a top predator.</li> <li>2. To reduce northern pike adult mortality in the lake.</li> <li>3. To maintain and enhance where appropriate, northern pike habitat in the lake.</li> <li>4. To explore opportunities to minimize commercial by-catch of northern pike in the commercial fishery.</li> <li>5. To increase public awareness of northern pike biology, role and status in Lake Nipissing and stewardship for the species.</li> </ol>
<b>Indicators</b>	<p><b>Biological Metrics</b></p> <p><b>1) Population Indicators:</b></p> <ul style="list-style-type: none"> <li>➤ Size Structure in Ice Out Trap Netting</li> <li>➤ Relative Abundance</li> <li>➤ Number of age classes</li> <li>➤ Age at full recruitment (to ice-out trap netting gear)</li> <li>➤ Maximum age</li> <li>➤ Abundance of trophy sized fish</li> <li>➤ CUE from Creel/FWIN</li> <li>➤ Targeted effort and harvest from Creel</li> <li>➤ Pike: prey (perch) ratio</li> <li>➤ Abundance of predacious pike</li> </ul> <p><b>2) % Adult mortality</b></p> <p><b>Ecosystem Metrics</b></p> <p><b>3)</b> Minimum water levels, periods of inundation and rates of change of water levels at pike spawning and rearing areas; quality, quantity and composition of pike spawning, rearing, and weed beds)</p> <p><b>4)</b> Harvest levels of northern pike as by-catch in commercial fishery</p> <p><b>Education Metrics</b></p> <p><b>5)</b> Number of outreach efforts or products developed and distributed, increase in angler effort and harvest of smaller pike</p>
<b>Benchmarks</b>	<p><b>Biological Metrics</b></p> <p><b>1) Population Indicators</b></p> <ul style="list-style-type: none"> <li>➤ ~12.5 % of the sample &gt;100cm TL, L infinity = 101.6cm</li> <li>➤ FWIN Average of 2.5 fish/net (1998 -2002)</li> <li>➤ 13 age classes represented in catch</li> <li>➤ Age at full recruitment = 4</li> <li>➤ Maximum age = 13</li> <li>➤ 2012 CUE from FWIN of trophy sized fish (≥ 40", 100 cm) and smaller fish (&lt;18", 45cm)</li> <li>➤ 2012 Targeted effort and harvest from Creel</li> <li>➤ 2012 pike: prey (perch) ratio from FWIN and IOTN</li> <li>➤ Abundance of predacious pike (≥ 24", 61 cm)</li> </ul> <p><b>2) 2012 % Adult Mortality (54%)</b></p> <p><b>Ecosystem Metrics</b></p> <p><b>3)</b> Historical range of variability of water levels (13<sup>th</sup> to 87<sup>th</sup> percentile) &amp; rising and falling rate of change of lake levels during spawning, incubation and rearing.</p> <p><b>4)</b> Historic harvest levels of northern pike as by-catch in commercial fishery gear</p>

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	<p><b>Education Metrics</b></p> <p>5) Unknown value; no benchmark, 2012 Creel angler effort and harvest of smaller pike (&lt;15", 40cm)</p>
<b>Targets</b>	<p><b>Biological Metrics</b></p> <p>1) <b>Population Metrics</b></p> <ul style="list-style-type: none"> <li>➤ &gt;10% of the sample &gt;100cm TL, L infinity &gt;=100 cm</li> <li>➤ Average of 2.5 fish/net in FWIN and IOTN</li> <li>➤ 13 age classes in sample</li> <li>➤ Age at full recruitment = 4</li> <li>➤ Maximum age = 13</li> <li>➤ &gt; 2012 CUE from FWIN of trophy sized fish (≥ 40", 100 cm)</li> <li>➤ &gt; 2012 CUE from Creel/FWIN of trophy sized fish (≥ 40", 100 cm) and smaller fish (&lt;18", 45cm)</li> <li>➤ &gt; 2012 Targeted effort and harvest from Creel</li> <li>➤ 2011 (pre-perch explosion) numbers: FWIN, IOTN, pike: prey (perch) ratio</li> <li>➤ 2011 (pre-perch explosion) abundance of predacious pike (≥ 24", 61 cm)</li> </ul> <p>2) <b>Maintain adult mortality below 50%</b></p> <p><b>Ecosystem Metrics</b></p> <p>3) Range of variability, represented by the 38<sup>th</sup> to 62<sup>nd</sup> percentile, of median water levels during pike spawning and rearing times, optimization of suitable pike habitat in the lake (distribution, quality and quantity) that provides for successful pike spawning through to dispersal.</p> <p>4) <b>Significant reduction or elimination</b> of northern pike caught as by-catch in commercial gear</p> <p><b>Education Metrics</b></p> <p>5) Increase in number of outreach efforts, 2012 Creel angler effort and harvest of smaller pike (&lt;15", 40cm)</p>
<b>Dates</b>	<p><b>Biological</b></p> <p>1-2) <b>Annually (FWIN, Creel, IOTN)</b></p> <p><b>Ecosystem</b></p> <p>3) Complete pike habitat inventory, assessment and identification of future management actions by year 5</p> <p>4) Complete literature review and devise pilot project by year 5 (2019) to evaluate effectiveness of alternative commercial harvesting techniques or gear that reduce harvest of by-catch species, carry out project and implement results accordingly by end of planning period.</p> <p><b>Education</b></p> <p>5) Annually (FWIN, Creel, IOTN)</p>
<b>Management Actions</b>	<p><b>Biological</b></p> <p>1-2) Assess current angling regulation and continue annual monitoring, assessment, reporting and adaptive resource management on the lake to ensure the long-term sustainability of the resource and a quality fishery.</p> <p>1-2) Complete thorough data review for northern pike to inform future management strategies for safe harvest.</p>

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	<p><b>Ecosystem</b></p> <p>3) Complete northern pike habitat inventory, mapping and assessment project to identify, prioritize and complete future habitat enhancement projects on the lake</p> <p>3) Review dam operating plans to determine if minimum flows, levels, periods of inundation and ramping rates of pike spawning and rearing habitat adequately meet the needs for northern pike spawning in the lake; make changes to SNF operating plan if necessary</p> <p>4) Complete literature review and devise pilot project by year 5 (2019) to evaluate effectiveness (ecological and economical) of alternative commercial harvesting techniques or gear that reduce harvest of by-catch species.</p> <p><b>Education</b></p> <p>5) In collaboration with stewardship groups and key stakeholders devise products that will support education and awareness on the above noted topics that relate to the management of northern pike and their use (e.g., factsheets, rulers, branded filleting knives or sharpening stones, “know the difference” posters and post cards, host or participate in workshop/forum, presentations, etc.) make products (to the extent possible) accessible in central location and distribute widely amongst users and stakeholders</p>
<p><b>Monitoring Strategies</b></p>	<p>1-2) Annual FWIN, Creel and Ice Out Trap Netting surveys</p> <p>3) TBD as per literature review and project plan</p>

## APPENDIX 9

### Comparison of Options Considered for Yellow Perch Regulations on Lake Nipissing.

Option #	Description	In toolkit (Y/N)	Biological Effectiveness (H/M/L)	Rationale	Council Support (H/M/L)
<b>Current Regulation</b>	<p><b>Season:</b> Open Jan 1- March 15, 3<sup>rd</sup> Sat. in May to Oct. 15</p> <p><b>Catch Limits and Possession Limits):</b> Sport – 25(50); Conservation – 25 (25).</p>	<p>Season – Yes</p> <p>Limit - Yes</p>	Low-Medium	Based on the data review results and indications that the perch population is exploding.	Low
<p><b>Option #1: Proposed Regulation Change:</b> <b>Increase Catch Limit to 50(50), 25 (25), Maintain season</b></p>	<p><b>Season:</b> Open Jan 1- March 15, 3<sup>rd</sup> Sat. in May to Oct. 15</p> <p><b>Catch Limits and Possession Limits):</b> <b>Sport – 50(50);</b> <b>Conservation – 25 (25).</b></p>	<p>Season – Yes</p> <p>Limit – Yes</p>	Moderate - High	<p>As part of the Lake Nipissing fisheries management plan review and a recent data review on the lake, new fishing regulations are being implemented for yellow perch as of January 1, 2014. The intent is to facilitate the recovery of walleye, the primary fishery in the lake and in turn, help manage the secondary fisheries and keep perch numbers in check.</p> <p>The goals of the newly proposed regulations are to:</p> <ol style="list-style-type: none"> <li>1. Increase harvest of yellow perch from the lake</li> <li>2. Decrease the abundance of yellow perch in the lake back to historical levels</li> <li>3. Facilitate recovery of walleye by reducing competition for resources with perch</li> </ol> <p>This regulation change was the result of two recent fishery reviews going on within the district: the review of the <i>2007-2010 Lake Nipissing Interim Fisheries Management Plan</i>; and the <i>Lake Nipissing Data Review</i> (Morgan 2013) which was triggered by recent concerns on the status of the walleye fishery in the lake.</p> <p>Both reviews involved and included an update on the status of both the walleye and the perch fisheries in the lake. This review looked at the walleye population data from 1998 to 2011 and was compared against early data sets from the 1970's/80's. The data review indicated that the walleye biomass in Lake Nipissing is about</p>	High

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Option #	Description	In toolkit (Y/N)	Biological Effectiveness (H/M/L)	Rationale	Council Support (H/M/L)
				<p>1/5 of what it was during the 1970's. In contrast, the perch population has increased six fold in the last six years, with this increase being identified as a possible threat to the walleye fishery due to the interspecific competition that exists between the two species.</p> <p>This regulation allows for an increase in harvest (increased catch limit for sport licence) to address recent six fold increase in perch numbers whilst taking a somewhat cautionary approach to prevent an overexploitation of this resource (i.e., keeping the same season and not extending it or opening it up year round as do other zones).</p> <p>This regulation change will also serve to provide economic development (tourism) and additional angling opportunities on the lake by redirecting angler efforts onto perch.</p> <p>Council selected this option because it was the regulation that was able to balance the objectives (maintain a sustainable perch population and mitigate any further increase in perch numbers) proposed for the new plan and in doing so, mitigate concerns as noted above, with the recovery of walleye in the lake.</p> <p>The proposed changes are also consistent with the regulations (aside from the season, which remains open all year in the zone) being proposed for FMZ 11 by the FMZ 11 Council.</p> <p>More importantly, the proposed changes are also in line with the findings put forward in the recent data review which indicate that a major community shift could occur should measures not be taken to address the recent increase in perch numbers.</p> <p>Note: this regulation option was implemented January 1, 2014.</p>	
<b>Option #2 Increase Catch Limit, Maintain season</b>	<p><b>Season:</b> Open Jan 1- March 15, 3<sup>rd</sup> Sat. in May to Oct. 15</p> <p><b>Catch Limits and Possession Limits:</b></p>	Season – Yes Limit – Yes	High	<p>This option represents a less conservative approach that hits the perch fishery hard, and could result in an overharvest, which is contrary to the management objectives for the lake.</p> <p>Another significant drawback to this regulation is that it does not fall in line with the regulations for the zone (higher catch and</p>	Low

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Option #	Description	In toolkit (Y/N)	Biological Effectiveness (H/M/L)	Rationale	Council Support (H/M/L)
	<b>Sport – 50 (100); Conservation – 25 (50).</b>			possession limits, different season) and as such could create additional enforcement and compliance issues due to lack of consistency, simplicity and interpretation of the regulations.	
<b>Option #3 Increase Sport Catch Limit, Extend Season</b>	<b>Season:</b> Open Jan 1- March 15, 3 <sup>rd</sup> Sat. in May to Nov. 30 <b>Catch Limits and Possession Limits:</b> <b>Sport – 50 (50); Conservation – 25 (25).</b>	Season – Yes Limit - Yes	Low-High	Although this regulation is only a slight variation on the selected regulation, the significant drawback to this regulation is that it offers a season extension that does not line up with the seasons for walleye on the lake. This would not only create enforcement and compliance issues, but may also jeopardize the recovery of walleye.  Climate change was also a concern that was raised. It is unknown what climate change means for the future of the lake and thus, taking an aggressive move at this time may not be wise.	Low

## APPENDIX 10

### SUMMARY OF YELLOW PERCH MANAGEMENT OBJECTIVES AND MANAGEMENT ACTIONS

<b>Objectives</b>	<p>1) To manage and promote this fishery in a way that maintains sustainable characteristics of the perch population size and age structure in the broader Lake Nipissing ecosystem, improves the quality of this fishery (i.e., more larger sized fish) and diverts pressure away from the recovering walleye population.</p> <p>2) To better understand the relationship of yellow perch in a changing ecosystem and more specifically, the relationship between walleye and yellow perch in Lake Nipissing.</p> <p>3) To increase public and stakeholder awareness on the role of yellow perch in the broader Lake Nipissing ecosystem.</p> <p>4) To identify and establish (1-3) partners to support the perch fishery's objectives.</p>
<b>Indicators</b>	<p><b>Biological Indices</b></p> <p>1a) <b>Size Structure in FWIN</b></p> <ul style="list-style-type: none"> <li>➤ % of Population &gt;20cm</li> </ul> <p>1b) <b>Age Structure in FWIN</b></p> <ul style="list-style-type: none"> <li>➤ Number of age classes</li> <li>➤ Maximum age</li> </ul> <p>1c) <b>Relative Abundance in FWIN</b></p> <p>1d) <b>Angler Catch per unit Effort</b></p> <p>1e) <b>Average Size in Creel</b></p> <p><b>Ecosystem Indices</b></p> <p>2) % of perch in fish community composition</p> <p><b>Socio-economic, Educational and Partnership Indices</b></p> <p>3) Number of outreach efforts or products developed and distributed, increase in angler targeted effort and harvest of yellow perch</p> <p>4) Identification and establishment of partnerships</p>
<b>Benchmarks</b>	<p><b>Biological Metrics</b></p> <p>1a) <b>Size Structure in 2012 FWIN</b></p> <ul style="list-style-type: none"> <li>➤ 2012 % of the sample &gt;20cm TL (i.e., current #)</li> </ul> <p>1b) <b>Age Structure in 2012 FWIN</b></p> <ul style="list-style-type: none"> <li>➤ Number of age classes = 10</li> <li>➤ Max age = 10 years old</li> </ul> <p>1c) <b>Relative Abundance in FWIN (60 per net)</b></p> <p>1d) <b>Estimated total CUE = 0.63/ang hr</b></p> <p>1e) <b>Average Size in Creel = 22.5 mm TL</b></p> <p><b>Ecosystem Metrics</b></p> <p>3) Pre-perch explosion CUE from FWIN for perch : other species ratios, Pre-perch explosion average of the walleye: perch ratio and historical lake species composition proportions</p> <p><b>Socio-economic, Educational and Partnership Metrics</b></p> <p>3) 2013 number of outreach efforts (0)</p> <p>4) 2013 number of partnerships (0)</p>
<b>Targets</b>	<p><b>Biological Metrics</b></p> <p>1a) <b>Size Structure in FWIN</b></p> <ul style="list-style-type: none"> <li>➤ &gt; 30% of the sample &gt;20cm TL from 2012 FWIN</li> </ul> <p>1b) <b>Age Structure in FWIN</b></p> <ul style="list-style-type: none"> <li>➤ Number of age classes = 10</li> <li>➤ Max age = 10 years old</li> </ul> <p>1c) <b>Relative Abundance in FWIN (no more than 60 per net)</b></p>

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	<p>1d) Estimated total CUE &gt;0.5/ang hr 1e) Average Size in Creel = &gt;=225mm TL</p> <p><u>Ecosystem Metrics</u> 2) Ratio of perch to fish community relative abundance pre-explosion and post-explosion (on 5yr intervals). See Fish Community section (Appendix 20)</p> <p><u>Socio-economic, Educational and Partnership Metrics</u> 3) Number of outreach efforts (5) 4) Number of partnerships (3)</p>
<b>Dates</b>	<p><u>Biological Metrics</u> 1) Annually, every 5 years</p> <p><u>Ecosystem Metrics</u> 2) Annually</p> <p><u>Socio-economic, Educational and Partnership Metrics</u> 3) January 1, 2015, release factsheet or promotional material to support objective, 2019, 2034 4) January 1, 2015, summer opener event/initiative with partners, 2034</p>
<b>Management Actions</b>	<p><u>Biological</u> 1a-b) Annual FWIN and creel surveys 1b) Detailed sampling of size structure and age structure every 5 years 1) Review and adjust catch limits and/or season as necessary 1) Keep season opener status quo 1) Continue working with Aquatic Research and Development Section (MNRF) and initiate partnerships with other organizations (e.g., Nipissing University) to leverage support for studies on the Lake Nipissing ecosystem</p> <p><u>Aquatic Ecosystems</u> 2) Collect data to support these studies (e.g., effects of water temperature, relative fish community composition, competition for resources, predator: prey dynamics (from the bottom or top down?))</p> <p><u>Socio- economic, Educational and Partnerships</u> 3-4) a) Use of outreach to promote the perch fishery, increase awareness of role of perch in Lake Nipissing by creating fact sheets, communication package, including on Lake Nipissing webpage, participation in meetings, derbies, etc... b) Prepare Lake Nipissing perch fact sheet for public consumption and distribute at open houses, MNRF website, Fish On Line, etc. c) Develop strategic partners to market the perch fishery (i.e., workshops, tournament, tourist camps, etc.) d) Identify initiatives for strategic partners that will help achieve fishery objectives e) Work with district partnership specialist to identify strategically positioned groups to engage public f) Tourist camp/angler diary/tournament result program to assess fishery quality</p>
<b>Monitoring Strategies</b>	<p>1) Annual FWIN Surveys 2) Annual Creel Surveys</p>



## APPENDIX 11

### Comparison of Options Considered for Bass Regulations on Lake Nipissing.

Option #	Description	In toolkit (Y/N)	Biological Effectiveness (H/M/L)	Rationale	Council Support (H/M/L)
<b>Option #1: Status Quo</b>	<b>Season:</b> Open 4 <sup>th</sup> Sat in June - Nov 30  <b>Catch Limits and Possession Limits:</b> <b>Sport – 6</b> <b>Conservation – 2</b>	Season – Yes  Limit - Yes	Low-Medium	<p>This option assumes there are no sustainability issues with regards to bass in the lake – which at this time, is the case. However, bass may be impacting other species. Changes in bass spawning behaviour have already hinted at what might be the impacts of climate change. It was felt that a somewhat more aggressive option may have to be implemented.</p> <p>Based on changing life history patterns for bass, it was determined that this regulation should be re-evaluated taking into consideration earlier ice out dates, earlier bass spawning dates and an increase in growing degree days; all of which enhance bass recruitment.</p>	Moderate
<b>Option #2: Proposed Regulation Change: 1 week earlier opener</b>	<b>Season:</b> Open 3 <sup>rd</sup> Sat in June - Nov 30  <b>Catch Limits and Possession Limits:</b> <b>Sport – 6</b> <b>Conservation – 2</b>	Season – Yes  Limit – Yes	High	<p>This regulation is intended to meet the following goals:</p> <ul style="list-style-type: none"> <li>• Manage early life survival to keep bass numbers in check by aligning life history strategies specific to the species as they change with the changing climate and ecosystem (e.g., earlier spawning season, longer growing season and ultimately increased annual recruitment),</li> <li>• Attempt to promote a trophy fishery on the lake by reducing the density of young fish in the lake, with hopes of producing more trophy (larger) sized fish.</li> <li>• Ensure adult mortality remains in check via appropriate regulations.</li> <li>• Provide for increased tourism value/opportunities on the lake, by promoting this species, and in so doing diverting pressure away from any single species (such as walleye) with the hopes of supporting their recovery.</li> </ul> <p>The proposed changes are consistent with the current management objectives for bass on the lake (monitor the</p>	High

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Option #	Description	In toolkit (Y/N)	Biological Effectiveness (H/M/L)	Rationale	Council Support (H/M/L)
				<p>bass population and maintain the current population) and the objectives recently developed by the LNFMPAC for the 2015-2035 plan (to take advantage of increased bass production given the low harvest pressure and favourable climate change implications).</p> <p>The proposed changes are also consistent with the regulations being proposed for FMZ 11 by the FMZ 11 Council.</p> <p>Note: this option was implemented June 21, 2014.</p>	
<b>Option #3 Early Season (align with walleye, long weekend)</b>	<p><b>Season:</b> Open 3<sup>rd</sup> Sat. in May to Nov 30</p> <p><b>Catch Limits and Possession Limits:</b> <b>Sport – 6</b> <b>Conservation - 2</b></p> <p><b>Size Limits:</b></p> <p><input type="checkbox"/> 3<sup>rd</sup> Sat in May to Fri before 4<sup>th</sup> Sat in June no bass &gt;40cm</p> <p><input type="checkbox"/> 4<sup>th</sup> Sat in June to Nov 30 no size limit</p>	Season – Yes Limit – Yes	High	<p>This option reflects the measures taken by our counterparts in the south (United States), where bass are aggressively being managed (open all season) to mitigate their prolific nature; especially in a changing climate with longer growing seasons resulting from earlier springs and resulting in much higher rates of juvenile recruitment into a fishery.</p> <p>Climate change (warmer water temperatures) may favour bass over the coolwater species (e.g., walleye) in the future. An Aggressive measure now may contribute to maintaining the present day fish community in the lake. By opening the season earlier, recruitment would be kept in check, additional opportunities would be provided, some fishing pressure would be taken off walleye with simultaneous openers, and resource managers could further explore the impacts that bass have on the recovery of walleye in the lake in the interim.</p> <p>Due to the aggressive nature of this regulation, there was limited support for this option by council at this time.</p>	Moderate

## APPENDIX 12

### SUMMARY OF BASS MANAGEMENT OBJECTIVES AND MANAGEMENT ACTIONS

<b>Objectives</b>	<ol style="list-style-type: none"> <li>1) To manage and promote this fishery in a way that maintains a sustainable and robust lake-wide bass population.</li> <li>2) To better understand the implications of a changing ecosystem as they relate to bass and more specifically, the relationship between bass and walleye in a changing ecosystem.</li> <li>3) To manage and promote the bass fishery supporting a high quality recreational and tourism fishery and diversified fishing opportunities on the lake.</li> <li>4) To promote angling for bass, focusing on their sporting qualities (eagerness to bite, fishing style and fighting ability)</li> <li>5) Identify and establish (1-3) partners to support the bass fishery's objectives.</li> </ol>
<b>Indicators</b>	<p><b><u>Biological Indices</u></b></p> <ol style="list-style-type: none"> <li>1a) Relative abundance</li> <li>1b) Adult Mortality</li> <li>1c) Number of age classes</li> <li>1d) Maximum age</li> <li>1e) Species composition</li> <li>1f) Targeted effort and harvest</li> </ol> <p><b><u>Ecosystem Indices</u></b></p> <ol style="list-style-type: none"> <li>2) Life history patterns/strategies, bass : walleye ratio, fish community composition (%)</li> </ol> <p><b><u>Socio-economic, Educational and Partnership Indices</u></b></p> <ol style="list-style-type: none"> <li>3-4) Number of outreach efforts or products developed and distributed, increase in angler targeted effort and harvest of bass</li> <li>5) Identification and establishment of partnerships</li> </ol>
<b>Benchmarks</b>	<p><b><u>Biological Metrics</u></b></p> <ol style="list-style-type: none"> <li>1a) Average Abundance in Ice Out Trapnetting (1.66 to 6.77 per net)</li> <li>1b) Adult Mortality: 36% for Smallmouth (23% for LMB)</li> <li>1c) Number of age classes: 12 for SMB (13 for LMB)</li> <li>1d) Maximum age: 15 years old for SMB (14 for LMB)</li> <li>1e) 2012 Species composition: TBD for SMB (TBD for LMB)</li> <li>1f) Provincial trends for bass targeted effort and harvest</li> </ol> <p><b><u>Ecosystem Metrics</u></b></p> <ol style="list-style-type: none"> <li>2) Historical average spawning dates and nesting numbers, Historical average bass:walleye ratio, historical average lake species composition (%)</li> </ol> <p><b><u>Socio-economic, Educational and Partnership Metrics</u></b></p> <ol style="list-style-type: none"> <li>3-4) 2013 number of outreach efforts (0)</li> <li>5) 2013 number of partnerships (0)</li> </ol>
<b>Targets</b>	<p><b><u>Biological Metrics</u></b></p> <ol style="list-style-type: none"> <li>1a) Size Structure in Ice Out Trapnetting = ~50% of the sample &gt;40cm TL</li> <li>1b) Adult Mortality = &lt;40% for both species</li> <li>1c) Number of age classes = number of age classes = 12\13</li> <li>1d) Maximum age = max age = 15\14 years old</li> <li>1e) Relative Abundance Ice Out Trapnetting = consistent between sites among years</li> <li>1f) To increase targeted effort for bass on the lake</li> </ol>

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	<p><b>Ecosystem Metrics</b> 2) minimize changes to life history patterns to extent possible, 2007 bass : walleye ratio and lake composition by species</p> <p><b><u>Socio-economic, Educational and Partnership Metrics</u></b> 3-4) 2013 number of outreach efforts (5) 5) 2013 number of partnerships (3)</p>
<b>Dates</b>	<p><b><u>Biological Metrics</u></b> 1) Annually, every 5 years</p> <p><b><u>Ecosystem Metrics</u></b> 2) Annually, every 5 years</p> <p><b><u>Socio-economic, Educational and Partnership Metrics</u></b> 3-4) January 1, 2015, release factsheet or promotional paraphernalia to support objective 5) January 1, 2015, summer opener event/initiative with partners</p>
<b>Management Actions</b>	<p><b><u>Biological</u></b> a) Implement Ice Out Trap-Netting every 5 years b) Increase targeted effort and harvest but keep adult mortality low via regulation change and promotion of resource c) Provide angling opportunities outside of normal seasons that reflect the changes in the life history patterns for the species (i.e., spawning dates) d) Provide a high quality bass fishery (i.e., more larger fish in fishery)</p> <p><b><u>Aquatic Ecosystem</u></b> a) Continue working with Aquatic Research and Development Section (MNRF) and initiate partnerships with other organizations to leverage support for studies on the Lake Nipissing ecosystem (e.g., effects of water temperature, competition for resources, predator-prey dynamics) b) Collect data as necessary to support these studies c) Conduct field research to examine the degree of niche overlap between bass and walleye</p> <p><b><u>Socio-economic, Educational and Partnership</u></b> a) Prepare Lake Nipissing Bass fact sheet for public consumption and distribute at open houses, MNRF website, Fish On Line, etc. b) Develop strategic partners to market the quality bass fishery (i.e., tournament, tourist camps, etc.) c) Identify initiatives for strategic partners that will help achieve fishery objectives d) Work with district partnership specialist to identify strategically positioned groups to engage public e) Tourist camp/angler diary/tournament result program to assess fishery quality</p>
<b>Monitoring Strategies</b>	<p>1) Ice Out Trap Netting Surveys 2) Annual Creel Surveys</p>

## APPENDIX 13

### SUMMARY OF MUSKELLUNGE MANAGEMENT OBJECTIVES AND MANAGEMENT ACTIONS

<b>Objectives</b>	<p>1) To manage for a sustainable muskellunge population that provides for a premiere trophy muskie fishery in Northeastern Ontario.</p> <p>2) To minimize the risks to the muskie population from invasive species and fish disease (VHS).</p> <p>3) To use muskie as a model species for the effectiveness of conservation advocacy and to promote proper muskie identification, proper use of baitfish and proper catch and release techniques.</p> <p>4) Identify and establish (1-3) partners to support the muskie fishery's objectives.</p>
<b>Indicators</b>	<p><b><u>Biological Indicators</u></b></p> <p><b>1a) Population Metrics:</b></p> <ul style="list-style-type: none"> <li>➤ Size Structure</li> <li>➤ Number of age classes,</li> <li>➤ Age at full recruitment (to ice-out trap netting gear)</li> <li>➤ Maximum age</li> <li>➤ Lake Nipissing Ranking in Muskies Canada angler diary program for NER</li> </ul> <p><b>1b) Catch Metrics:</b></p> <ul style="list-style-type: none"> <li>➤ CUE, Creel</li> </ul> <p><b><u>Ecosystem Indicators</u></b></p> <p><b>2) VHS Status</b></p> <p><b><u>Socio-economic, Educational and Partnership Indicators</u></b></p> <p><b>3) Number of outreach efforts, products distributed</b></p> <p><b>4) Number of partnerships</b></p>
<b>Benchmarks (current status)</b>	<p><b><u>Biological Metrics</u></b></p> <p><b>1a) Population Metrics</b></p> <ul style="list-style-type: none"> <li>➤ ~12.5 % of the sample &gt;127cm TL, L infinity = 128cm</li> <li>➤ 13 age classes represented in catch</li> <li>➤ Age at full recruitment = 10</li> <li>➤ Maximum age = 16</li> <li>➤ Maintain adult mortality below 50%</li> <li>➤ Lake Nipissing 2012 Ranking in Muskies Canada angler diary program for NER</li> </ul> <p><b>1b) Catch Metrics (Creel)</b></p> <ul style="list-style-type: none"> <li>➤ 2012 CUE, Creel, increased catch rate of trophy fish (&gt;50 inches)</li> </ul> <p><b><u>Ecosystem Metrics</u></b></p> <p><b>2) 2012 VHS Negative</b></p> <p><b><u>Socio-economic, Educational and Partnership Metrics</u></b></p> <p><b>3) 2013 (0 contact to date with this regard)</b></p> <p><b>4) 2013 (0 contact to date with this regard)</b></p>
<b>Targets</b>	<p><b><u>Biological Metrics</u></b></p> <p><b>1a) Population Metrics</b></p> <ul style="list-style-type: none"> <li>➤ &gt;10% of the sample &gt;127cm TL, L infinity &gt;=128cm</li> <li>➤ 13 age classes in sample</li> <li>➤ Age at full recruitment = 10</li> <li>➤ Maximum age = 16</li> <li>➤ Top three in lake for muskie in NER in Muskies Canada angler diary program</li> </ul>

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	<p><b>1b) Catch Metrics</b></p> <ul style="list-style-type: none"> <li>➤ CUE, Creel - increased targeted effort and catch rate of trophy-sized fish (&gt;50 inches)</li> </ul> <p><b><u>Ecosystem Metrics</u></b></p> <p><b>2) Remain VHS Negative</b></p> <p><b><u>Socio-economic, Educational and Partnership Metrics</u></b></p> <p><b>3) 2013 number of outreach efforts (5)</b></p> <p><b>4) 2013 number of partnerships (3)</b></p>
<b>Dates</b>	<p><b><u>Biological Metrics</u></b></p> <p><b>1) Annually, every 2 years</b></p> <p><b><u>Ecosystem Metrics</u></b></p> <p><b>2) Annually for duration of plan</b></p> <p><b><u>Socio-economic, Educational and Partnership Metrics</u></b></p> <p><b>3) January 1, 2015, release factsheet or promotional paraphernalia to support objective</b></p> <p><b>4) January 1, 2015, summer opener event/initiative with partners</b></p>
<b>Management Actions</b>	<p><b><u>Biological</u></b></p> <p><b>a) Ice Out Trap-Netting every 2 years</b></p> <p><b>b) Continuation of annual Creel surveys (open water and winter)</b></p> <p><b>c) Continuation of annual FWIN</b></p> <p><b><u>Ecosystem</u></b></p> <p><b>a) Complete annual VHS testing on lake</b></p> <p><b>b) Completion of muskie habitat inventory and assessment on lake</b></p> <p><b><u>Socio-economic, Educational and Partnership</u></b></p> <p><b>a) To promote the significant quality of the muskie population in Lake Nipissing as an exciting alternative angling quarry.</b></p> <p><b>b) To identify and establish (1-3) partners to support the muskie fishery's objectives</b></p> <p><b>c) To increase angler awareness on proper handling and successful catch and release techniques as it relates specifically to muskie</b></p> <p><b>d) To work with district partnership specialist to identify strategically positioned groups to engage public</b></p> <p><b>e) Increase angler awareness and participation on the proper use and disposal of baitfish to maintain VHS free status on lake, and reduce point sources for VHS</b></p> <p><b>f) To work with partner groups to disseminate the "Know the Difference" information products and use muskie as a model species for the effectiveness of conservation advocacy</b></p> <p><b>g) Identify initiatives for strategic partners that will help achieve fisher objectives (1-3)</b></p>
<b>Monitoring Strategies</b>	<p><b>1) Annual Creel Surveys</b></p> <p><b>2) Biannual Ice Out Trap Netting Survey</b></p> <p><b>3) Completion of muskie habitat inventory and assessment on lake</b></p> <p><b>4) Annual VHS testing</b></p>

## APPENDIX 14

### SUMMARY OF HERRING MANAGEMENT OBJECTIVES AND MANAGEMENT ACTIONS

<b>Objectives</b>	<p>1) To establish a location benchmark for herring and to maintain the population at its current level at a minimum and to monitor the population for additional signs of stress.</p> <p>2) To better understand the effects of a changing Lake Nipissing ecosystem (i.e., climate change, spiny water flea) on the herring population.</p> <p>3) To educate the general public on the value of herring as an indicator species.</p> <p>4) Identify and establish (1-3) partners to support the Herring's fishery's objectives.</p>
<b>Indicators</b>	<p><u><b>Biological Indices</b></u></p> <p>1a) Relative abundance</p> <p>1b) Age/size Structure</p> <p>1c) Recreational Creel statistics</p> <ul style="list-style-type: none"> <li>➤ Effort</li> <li>➤ Harvest</li> </ul> <p>1d) Commercial Creel statistics (By-Catch)</p> <ul style="list-style-type: none"> <li>➤ Numbers &amp; weight</li> </ul> <p><u><b>Ecosystem Indicators</b></u></p> <p>2) Lake species composition, spiny water flea stable isotope analysis</p> <p><u><b>Socio-economic, Educational and Partnership Objectives</b></u></p> <p>3) Number of outreach efforts, products distributed</p> <p>4) Number of partnerships</p>
<b>Benchmarks (current)</b>	<p><u><b>Biological Metrics</b></u></p> <p>1a) Relative abundance in FWIN: 2.4/net</p> <p>1b) Age/size Structure in FWIN: number of age classes = 14, max age = 15 years old</p> <p>1c) Recreational Creel statistics</p> <ul style="list-style-type: none"> <li>➤ Effort = No targeted effort</li> <li>➤ Harvest = 5 year average 2400 individuals</li> </ul> <p>1d) Commercial Creel statistics (By-Catch)</p> <ul style="list-style-type: none"> <li>➤ Numbers &amp; weight = Work with NFN to establish benchmark</li> </ul> <p><u><b>Ecosystem Indicators</b></u></p> <p>2) Historical lake species composition, pre-spiny water flea introduction stable isotope analysis results</p> <p><u><b>Socio-economic, Educational and Partnership Objectives</b></u></p> <p>3) 2013 (0 contact to date with this regard)</p> <p>4) 2013 (0 contact to date with this regard)</p>
<b>Targets</b>	<p><u><b>Biological Metrics</b></u></p> <p>1a) Relative abundance in FWIN: <math>\geq 2.4</math> per net</p> <p>1b) Age/size Structure in FWIN: number of age classes = 14, max age = 15 years old</p> <p>1c) Recreational fishery ~ 2400 individuals harvested</p> <p>1d) Commercial Creel statistics (By-Catch)</p> <ul style="list-style-type: none"> <li>➤ Numbers &amp; weight = maintain established benchmark</li> </ul> <p><u><b>Ecosystem Indicators</b></u></p> <p>2) Historical lake species composition, pre-spiny water flea introduction stable isotope analysis results – to the extent possible given changes to ecosystem</p>

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	<b>Socio-economic, Educational and Partnership Objectives</b> <b>3) January 1, 2015, release factsheet or promotional paraphernalia to support objective</b> <b>4) January 1, 2016, summer event/initiative with partners</b>
<b>Dates</b>	<b>1-2) Annually</b> <b>3-4) 2019</b>
<b>Management Actions</b>	<u><b>Biological and Ecosystem</b></u> <b>a) Annual FWIN and Annual creel surveys</b> <b>b) Detailed sampling of size structure and age structure every 5 years</b> <b>c) To establish a location benchmark for herring</b> <b>d) Work with NFN to establish benchmark for commercial by-catch harvest levels</b> <b>e) Incorporate commercial harvest daily catch reports into fisheries analysis</b>  <u><b>Socio-economic, Educational and Partnership</b></u> <b>a) Identify and establish 1 – 3 partnerships to support the herring fishery's objectives</b> <b>b) Engage strategic partners on an integrated research project to study the effects of a changing ecosystem on herring</b>
<b>Monitoring Strategies</b>	<b>1) Annual FWIN and creel surveys</b> <b>2) Ecosystem changes monitoring (e.g., water temperature, invasive species)</b>



**APPENDIX 15**

**SUMMARY OF WHITEFISH MANAGEMENT OBJECTIVES AND MANAGEMENT ACTIONS**

<b>Objectives</b>	<p>1) To determine healthy population levels and establish a benchmark for whitefish in the lake and cautiously manage the whitefish fishery recognizing habitat constraints and limited information on the health of the population.</p> <p>2) To better understand the effects of a changing Lake Nipissing ecosystem (i.e., climate change, spiny water flea) on the lake whitefish population.</p>
<b>Indicators</b>	<p><u><b>Biological Indicators</b></u></p> <p>1a) Relative abundance  1b) Age/size Structure  1c) % Adult Mortality  1d) Recreational Creel statistics  ➤ Effort  ➤ Harvest  1e) Commercial Creel statistics  ➤ Numbers &amp; weight</p> <p><u><b>Ecosystem Indicators</b></u></p> <p>2) Lake species composition (%), spiny water flea &amp; stable isotope analysis</p>
<b>Benchmarks</b>	<p><u><b>Biological Metrics</b></u></p> <p>1a) Relative abundance in FWIN: 2012 #/net  1b) Age/size Structure in FWIN: 2012 number of age classes  1c) % <b>Adult Mortality: 2012 % adult mortality</b>  1d) Recreational Creel statistics  ➤ Effort = No targeted effort  ➤ Harvest = 5 year average  1e) Commercial Creel Statistics  ➤ Numbers &amp; weight = work with NFN to establish benchmark</p> <p><u><b>Ecosystem Metrics</b></u></p> <p>2) Historical lake species composition (%), pre-spiny water flea introduction stable isotope analysis indices</p>
<b>Targets</b>	<p><u><b>Biological Metrics*</b></u></p> <p>1a) Relative abundance in FWIN: TBD  1b) Age/size Structure in FWIN: TBD  1c) Adult Mortality: &lt;50%  1d) Recreational fishery: TBD  1e) Commercial Harvest  ➤ Numbers &amp; weight = maintain established benchmark</p> <p><u><b>Ecosystem Metrics*</b></u></p> <p>2) Historical lake species composition (%), pre-spiny water flea introduction stable isotope analysis indices – to the extent possible given changes to ecosystem and with enhanced population assessment and analysis</p> <p>*To be refined with enhanced population assessments and analysis</p>
<b>Dates</b>	<p>1) Annually  2) Annually or as per frequency outlined in standardized protocol</p>
<b>Management Actions</b>	<p><u><b>Biological Metrics*</b></u></p> <p>a) Continue to implement annual FWIN and creel surveys  b) Detailed sampling of size structure and age structure every 5 years</p>

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	<p>c) Determine sustainable targeted effort and harvest levels as per enhanced population assessment and monitoring programs</p> <p>d) Establish benchmark for whitefish population in the lake</p> <p>e) Work with NFN to establish benchmark for sustainable commercial harvest</p> <p>f) Collaborate with NFN on Whitefish monitoring program</p> <p>g) Incorporate commercial harvest daily catch reports into fisheries analysis</p> <p>h) Continue to use cautious approach when managing whitefish population and modifying their regulations</p> <p><b><u>Ecosystem Metrics*</u></b></p> <p>a) Complete historical lake species composition (%), pre-spiny water flea introduction stable isotope analysis indices – to the extent possible given changes to ecosystem and with enhanced population assessment and analysis</p> <p>*To be refined with enhanced population assessments and analysis</p>
<b>Monitoring Strategies</b>	<p>1) Annual FWIN and creel surveys</p> <p>2) Whitefish monitoring program</p>

**APPENDIX 16**

**SUMMARY OF WATER QUALITY MANAGEMENT OBJECTIVES AND MANAGEMENT ACTIONS**

<b>Objectives</b>	<p>1) To maintain or enhance water quality to support a healthy, sustainable, naturally-reproducing native fish community in the lake.</p> <p>2) To anticipate, prevent, or where feasible adapt to water quality changes that affect aquatic ecosystems or the fish communities that rely on them.</p> <p>3) To balance the varying needs amongst other agencies for water quality information on Lake Nipissing.</p>
<b>Indicators</b>	<p><b><u>Physical Indicator</u></b>  Temperature profile  Specific conductance  Total suspended solids (TSS)  Total dissolved solids (TDS)  Secchi depth or nephelometric turbidity</p> <p><b><u>Chemical Indicator</u></b>  pH  Alkalinity  Dissolved organic carbon  Dissolved oxygen (DO)  Total phosphorus  Nitrate/nitrite  Total ammonia  Total Kjeldahl nitrogen.</p> <p><b><u>Biological Indicator</u></b>  Chlorophyll a</p>
<b>Benchmarks</b>	<p><b><u>Physical Indicator</u></b> – MOE PWQO or interim PWQO or CCEM guideline whichever is the most conservative (OMOE 1994, CCEM 2000).</p> <p><b><u>Chemical Indicator</u></b> – MOE PWQO or interim PWQO or CCEM guideline whichever is the most conservative (OMOE 1994, CCEM 2000).</p> <p><b><u>Biological Indicator</u></b> – MOE PWQO or interim PWQO or CCEM guideline whichever is the most conservative (OMOE 1994, CCEM 2000).</p>
<b>Targets</b>	<p><b><u>Physical Indicators</u></b> – TBD in discussion with MNRF and MOE</p> <p><b><u>Chemical Indicators</u></b> – TBD in discussion with MNRF and MOE</p> <p><b><u>Biological Indicators</u></b> – TBD in discussion with MNRF and MOE</p>
<b>Dates</b>	TBD
<b>Management Actions</b>	<p>1) MNRF resource managers and planner to consider and adhere to all relevant legislation, policy and FMP objectives when reviewing project proposals that have the potential to adversely affect water quality for fish.</p> <p>2) MNRF to communicate objectives with partner resource managers upon plan approval and encourage key partner resource managers to incorporate plan objectives into their decision making processes when reviewing projects that have the potential to adversely affect water quality for fish.</p> <p>3) Collaborate with key partners (Nipissing University, NBMCA, MOE, DFO) to:</p> <ol style="list-style-type: none"> <li>Capture existing Lake Nipissing water quality condition and share historical water quality information.</li> </ol>

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	<ul style="list-style-type: none"><li>b. Develop a factsheet describing the regulatory roles and responsibilities of each agency when reviewing development proposals that may affect water quality and healthy aquatic ecosystems.</li><li>c. Monitor water quality indicators that may have an influence on ecosystem condition to determine if changes to the Lake Nipissing water quality will alter fish population reference points.</li></ul>
<b>Monitoring Strategies</b>	<b>1)</b> Develop a water quality information sharing agreement with key partners (Nipissing University, NBMCA, MOE, and DFO) to coordinate data collection, analysis and data management of key indicators of interest to all parties.

**APPENDIX 17**

**SUMMARY OF WATER QUANTITY MONITORING AND MANAGEMENT ON LAKE NIPISSING**

<b>Objectives</b>	<p>1) To manage for aquatic ecosystem health through maintaining or restoring hydrological characteristics, including natural variability, for water level operations that more closely approximate those with which local species and communities have evolved.</p> <p>2) Promote development on the lake that accounts for the needs of resource users and the aquatic ecosystem of Lake Nipissing when designing flow and level operations.</p> <p>3) Increase public awareness of the water management practices used by the SNF Water Management Group to maintain or restore aquatic ecosystem health.</p>
<b>Indicators</b>	<p>1) Monthly median water levels (MASL) and monthly falling and rising rates of change (m<sup>3</sup>/s/d).</p> <p>2) Range of variation for natural, regulated and proposed monthly water levels (masl).</p> <p>3) Number of water level complaints by year.</p>
<b>Benchmarks</b>	<p>1) Long-term (53+yrs) monthly median water levels and interquartile range and median monthly rising and falling rates of change and interquartile ranges.</p> <p>2) Simulated natural and long term (53+yrs) regulated monthly 13<sup>th</sup> to 87<sup>th</sup> and 38<sup>th</sup> to 62<sup>nd</sup> interquartile ranges.</p> <p>3) Long term average and range of variation of the # of annual complaints.</p>
<b>Targets</b>	<p>1) Historical average monthly median water levels and rising and falling rates of change, and their range of variation.</p> <p>2) Monthly water levels within the 38<sup>th</sup> to 62<sup>nd</sup> interquartile range.</p> <p>3) # of annual complaints within one standard deviation of the long term average.</p>
<b>Dates</b>	<b>TBD</b>
<b>Management Actions</b>	<p>1) <b>Maintaining or restoring hydrological characteristics.</b></p> <ol style="list-style-type: none"> <li>4. MNRF to continue participating in the SNF Water Management Group to ensure that priorities consider water level operations for aquatic ecosystem structure, compositions and function.</li> <li>5. Assess the degree of alteration of indicators for current operations relative to the long term historical operations and simulated natural flows and levels for the Sturgeon-Nipissing-French watershed.</li> <li>6. Resource Managers to ensure staff, across programs, consider these plan objectives when managing for other resources.</li> </ol> <p>2) <b>Development that accounts for the needs of resource users and the aquatic ecosystem.</b></p> <ol style="list-style-type: none"> <li>2. As new facilities (dams or power generating stations) are proposed within the Lake Nipissing watershed or existing facilities are reviewing their operating plans, resource managers and planners to ensure that the objectives, indicators, benchmarks and targets for water levels are considered during planning and approval processes.</li> </ol>

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	<p><b>3) Increase public awareness</b></p> <ul style="list-style-type: none"> <li>a) Evaluate and report to the LNFMPAC and Sturgeon Nipissing French Advisory Council water level incidents from the public and waterpower industry.</li> <li>b) Include evaluation of water levels in annual Lake Nipissing SOR report, and create factsheet on how water levels are managed on the lake.  Make products publically available in accessible, central locations (e.g., Lake Nipissing website, MNRF office, local Service Ontario offices).</li> <li>c) Participate in local forums (Lake Nipissing Summit), requests for presentations to local OFAH, rod and gun clubs, media releases, etc.</li> </ul>
<b>Monitoring Strategies</b>	<p><b>1. Assess the variability in the long term water level data record against the simulated natural variability for Lake Nipissing.</b></p> <p><b>2. Assess compliance with the monitoring and reporting requirements of the Sturgeon Nipissing French water management plan and dam operating plan relative to the number of public complaints.</b></p>

**APPENDIX 18**

**SUMMARY OF FISH HABITAT MANAGEMENT OBJECTIVES AND ACTIONS**

<b>Objectives</b>	<p>1) Maintain or enhance healthy aquatic ecosystem structure (fish habitat), function and diversity that support a healthy, sustainable, naturally-reproducing native fish community in the lake.</p> <p>2) Sustainable development of the lake's finite capacity to be recognized in planning strategies, and actions for, or associated with, the lake.</p> <p>3) Future development of the Lake Nipissing shoreline to minimize any significant negative ecological impacts on either specific habitats or species (e.g., loss of significant habitat, water quality, SAR), while balancing the needs of the public social, cultural and economic interests.</p> <p>4) Anticipate, prevent or, where feasible, adapt to large scale environmental changes that affect aquatic ecosystems and the fish communities that rely on them in the lake.</p> <p>5) Minimize cumulative environmental effects that could impact fish communities and their supporting ecosystems.</p> <p>6) Promote public participation and awareness in an ecosystem- based fishery management approach which aims to conserve the structure and function of aquatic ecosystems that support a healthy, sustainable, naturally-reproducing native fish community in the lake.</p>
<b>Indicators</b>	<p>1) To include, but not limited to: ecosystem change indicators, results of limiting habitat analysis by species as appropriate</p> <p>2) Recognition of Lake Nipissing's finite capacity in strategic documents, management plans, and project planning for activities occurring on the lake</p> <p>3) No further loss of fish habitat (overall and individual components by species) or degradation of water quality, no new point sources of pollutants/contaminants, no additional loss of natural or naturalized shoreline, lower risk and fewer occurrences of nutrient and sediment loading into the lake and erosion of the shoreline</p> <p>4) To include, but not limited to: ecosystem change indicators, water quality parameters (i.e., water temperature, water level changes), incorporation of adaptation strategies in planning process and management plans</p> <p>5) To include but not limited to: ecosystem change indicators, habitat inventory and mapping, analysis of limiting habitat features by species, incorporation of adaptive management strategies in planning processes and management plans</p> <p>6) Increased public participation in stewardship actions that help maintain/enhance a healthy lake ecosystem as a whole. A public that is more knowledgeable and responsive to ecological concerns related to Lake Nipissing</p>
<b>Benchmarks</b>	<p>1, 4, 5) To extent possible, use historical data as reference point to track trends through time to present day conditions for the lake</p> <p>2) N/A</p> <p>3) To extent possible, use historical data to track trends through time to present day along with best available science</p> <p>6) 2013 public participation levels and attitudes towards stewardship actions on the lake</p>

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<b>Targets</b>	<p><b>1, 4, 5)</b> Annually monitor, assess and report the SOR for Lake Nipissing</p> <p><b>2)</b> As per review and development schedules for strategic documents, management plans and project plan submissions</p> <p><b>3)</b> No further loss of naturalized shoreline or fish habitat</p> <p><b>6)</b> Increase public participation in stewardship activities on the lake that meet the objective</p>
<b>Dates</b>	<p><b>1, 3-5)</b> Annually</p> <p><b>2)</b> As per review and development schedules for strategic documents, management plans and project plan submissions</p> <p><b>6)</b> Spring 2015</p>
<b>Management Actions</b>	<p><b>1)</b></p> <ul style="list-style-type: none"> <li>a) MNRF, in collaboration with key partners (e.g., LNSA, Stewardship Councils, Nipissing University) to complete fish habitat inventory, mapping and limiting-habitat factor analysis on the lake for walleye, perch, pike, muskie, bass, whitefish, cisco, sturgeon, and silver lamprey</li> <li>b) MNRF, in collaboration with key partners (e.g., LNSA, Stewardship Councils, Nipissing University) to develop a project plan identifying priority locations or types of habitat, for future habitat enhancement or creation projects on the lake. To refer to National criteria for suitability for habitat enhancement efforts</li> <li>c) MNRF, in collaboration with key partners (e.g., LNSA, Stewardship Councils, Nipissing University) to maintain, enhance or restore habitat on the lake to support the recovery of species at risk including lake sturgeon and silver lamprey where they currently or historically existed</li> <li>d) MNRF, in collaboration with key partners (e.g., Nipissing University, Stewardship Councils) to capture the existing condition of Lake Nipissing's shoreline as baseline data for future reference</li> <li>e) MNRF, in collaboration with key partners (e.g., NBMCA, local municipalities, First Nations, Nipissing University, Stewardship Councils, MOE) to develop shoreline stewardship and etiquette factsheet for property owners (residential, seasonal, tourist operators, and businesses) on the shores of Lake Nipissing. Messaging to include importance of maintaining septic systems and naturalized shorelines, which retain fish habitat features, buffer the lake from nutrient loading and reduce erosion. Have NBMCA, First Nations and local municipalities endorse factsheet and include as part of resource management planning or municipal governance</li> <li>f) Monitor ecosystem indicators that may have an influence on habitat conditions in the lake and respond accordingly</li> </ul> <p><b>2)</b></p> <ul style="list-style-type: none"> <li>a) Resource Managers, Planners, and Proponents to recognize and consider Lake Nipissing's finite capacity in strategic documents, management plans, and project planning for activities occurring on the lake</li> </ul> <p><b>3)</b></p> <ul style="list-style-type: none"> <li>a) Resource Managers and Planners to consider and adhere to all relevant objectives when reviewing project proposals along the shorelines of Lake Nipissing.</li> <li>b) Communicate objective with partner resource managers upon plan approval if not already aware, and encourage key partner resource managers to</li> </ul>



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	<p>incorporate objective into decision making process when reviewing project proposals along the shoreline of Lake Nipissing within their jurisdictions or delegated authority</p> <p>4-5)</p> <p>a) Continue to monitor ecosystem indicators that may have an influence on habitat conditions in the lake and respond accordingly</p> <p>5)</p> <p>a) Devise a strategy that reflects objectives in FMP to prevent and when necessary mitigate significant cumulative effects that could or have had an impact on the lake ecosystem or fish community</p> <p>6)</p> <p>a) MNRF, in collaboration with key partners to increase public awareness of the value of an <b>ecosystem-based fishery management approach</b> which aims to conserve the structure and function of aquatic ecosystems, in addition to conserving the fishery resource</p> <p>b) MNRF, in collaboration with key partners (e.g., local municipalities, First Nations, Nipissing University, Stewardship Councils, NBMCA, MOE) to raise public awareness and participation of property owners along the shores of Lake Nipissing in <b>shoreline stewardship and etiquette that promote the long-term sustainability of the fish habitat and water quality</b> in the lake and associated rivers</p> <p>c) Complete Section in FMP on the value of an ecosystem-based approach which emphasizes habitat management and stewardship actions, prepare a fact sheet or include section in annual SOR for Lake Nipissing raising awareness on the importance of protecting significant fish habitat which includes not only spawning habitat, but also nursery, rearing, staging, foraging and dispersal areas</p> <p>d) MNRF in collaboration with key partners to create a variety of products as part of education campaign (e.g., factsheets, posters, signs, stickers, rulers, presentations) that can be distributed widely to increase public awareness and understanding</p> <p>e) Make products publically available in accessible, central location (e.g., Lake Nipissing website, MNRF office, local Service Ontario offices)</p> <p>f) Participate in local forums (Lake Nipissing Summit), requests for presentations to local OFAH, rod and gun clubs, media releases, etc... Make publically available in accessible, central location (e.g., Lake Nipissing website)</p>
<b>Monitoring Strategies</b>	<b>1-6) As per the planned reviews of FMP and the assessment of the achievement of the fish habitat related objectives</b>

**APPENDIX 19**

**SUMMARY OF FISH COMMUNITY OBJECTIVES AND MANAGEMENT ACTIONS**

<b>Objectives</b>	3) To develop assessment, monitoring and evaluation techniques to improve understanding of fish community dynamics within Lake Nipissing.
<b>Indicators</b>	<p>Using existing, historic data, or data acquired via new assessment initiative:</p> <ol style="list-style-type: none"> <li>1) Fish community composition (species presence);</li> <li>2) Relative abundance of each species</li> </ol> <p>These 2 indicators can further generate useful metrics/indices for monitoring changes to the fish community, e.g. species diversity; species richness; evenness and dominance.</p>
<b>Benchmarks</b>	<p>To be Determined</p> <p>Benchmarks need to be determined, but first the fish community composition must be established either via reconstruction of existing or historic data or a new program needs to establish the present case as the benchmark. It is particularly important to consider gear and methods used to establish the benchmark and ensure consistent deployment of gear/methods in any subsequent monitoring activities. e.g. if FWIN was the standard in the past, this is not a good sampling method for fish community as it selects mainly for walleye; if BsM method is selected as the best standard for representation of fish community and there is no sufficient prior BsM data, then a new benchmark might have to be initiated using the appropriate BsM gear and methodology combined with a basin/volume stratification procedure appropriate to Lake Nipissing.</p>
<b>Targets</b>	<p>To be Determined</p> <p>Pending benchmark selection (see text on “Opportunities” regarding selecting Desired Future State)</p>
<b>Dates</b>	<b>TBD</b>
<b>Management Actions</b>	<ol style="list-style-type: none"> <li>1) Explore existing historic fish data for Lake Nipissing for potential reconstruction of fish community composition and relative abundance, or, initiate new fish community assessment programme for the lake, by basin. [NB: Sampling procedures for pre- and post-monitoring time frames must be consistent].</li> <li>2) Establish <b>benchmark</b> for Lake Nipissing fish community composition from which to base/compare future monitoring and assessment results; Products: <ul style="list-style-type: none"> <li>• Fish community composition histogram, by basin, and by collective basins (i.e. roll up for entire lake);</li> <li>• Relative abundance values for each species relative to each other.</li> </ul> </li> </ol>
<b>Monitoring Strategies</b>	<ol style="list-style-type: none"> <li>1) Conduct fish community netting exercise every 5 years using BsM methodology, by basin, and stratified by volume. Report at end of each 5 year stanzas any changes to fish community composition relative to benchmark and Desired Future State (target).</li> <li>2) Compare fish community monitoring results with results from other fish sampling programmes for the lake to examine for signs relating to changes in aquatic ecosystem health.</li> </ol>

## APPENDIX 20

### SUMMARY OF CORMORANT MANAGEMENT OBJECTIVES AND MANAGEMENT ACTIONS

<b>Objectives</b>	<p>1) To monitor the cormorant population on an ongoing basis and consider, anticipate, prevent, and where feasible mitigate, any significant negative impacts cormorants may have on the Lake Nipissing ecosystem or fishery.</p> <p>2) Increase public and stakeholder awareness of cormorant life history, status, applicable legislation, and MNRF's management strategies and actions regarding cormorants on the lake.</p>
<b>Indicators</b>	<p><u>Biological, Ecosystem and Socio-economic Indicators</u></p> <p>1a) Numbers nesting on lake 1b) Carrying Capacity 1c) Diet Composition</p> <p><u>Educational Indicators</u></p> <p>2) Number of outreach efforts, products distributed</p>
<b>Benchmarks</b>	<p><u>Biological and Ecosystem Metrics</u></p> <p>1a) Numbers nesting on lake: 2013 population estimate 1b) Carrying Capacity: carrying capacity estimate for lake from phase plot model 1c) Diet Composition: based on historical data from the 90's of 70: 1 (% Perch: % Walleye in diet); 2014 isotope analysis</p> <p><u>Educational Metrics</u></p> <p>2) Number of outreach efforts (5), products distributed(5)</p>
<b>Targets</b>	<p><u>Biological and Ecosystem Metrics</u></p> <p>1a-c) Cormorant population that does not increase above carrying capacity and is not having a significant negative ecological impact on the lake's ecosystem or fishery.</p> <p><u>Educational Metrics</u></p> <p>2) Number of outreach efforts (5), products distributed(5)</p>
<b>Dates</b>	<p>1a-b) Annually 1c) As per frequency identified in standardized protocol 2) Status of the resource report for Plan start/development and every 5 years</p>
<b>Management Actions</b>	<p><u>Biological and Ecosystem</u></p> <p>a) Continue to assess the status of the Lake Nipissing cormorant population</p> <p>b) Create phase plot model and update annually to determine status of the cormorant population with respect to carrying capacity</p> <p>c) Continue to engage partners to perform cormorant dietary analysis and assessment of impacts to the fishery (i.e., consumption levels and stable isotope analysis), assess feasibility of enhancing monitoring design to complete dietary stable isotope analysis of cormorants on the lake.</p> <p>d) Continue to monitor the cormorant population and consider, anticipate, prevent, and where feasible mitigate, any significant negative impacts cormorants may have on the Lake Nipissing ecosystem or fishery</p> <p>e) Continue to adhere to provincial policy for cormorant control measures</p> <p><u>Educational</u></p>

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	<p>a) Complete state of the resource report (plan start, year 5, 10, 15, 20/plan end) and make publically available in accessible, central location (i.e., Lake Nipissing website).</p> <p>b) Increase public understanding of cormorant status, life history, applicable provincial legislation (FWCA), and local management strategies and actions taken by participating in meetings/workshops and creating a fact sheet for cormorants on Lake Nipissing.</p>
<b>Monitoring Strategies</b>	<p>1a) Annual nest count survey</p> <p>1c) Dietary surveys (regurgitation survey and stable isotope study)</p>

**APPENDIX 21**

**SUMMARY OF FISH DISEASES MONITORING AND MANAGEMENT ON LAKE NIPISSING**

<b>Objectives</b>	<p>1) Prevent expansion of aquatic diseases, especially VHS into Lake Nipissing.</p> <p>2) <i>To consider and prevent, where feasible, any significant negative impacts that fish diseases (especially VHS) may have on lake Nipissing's socio-economic opportunities.</i></p> <p>3) To minimize disease-related mortality in the lake's fish species.</p> <p>4) To increase public awareness and participation in the prevention of the expansion of aquatic diseases, especially VHS, into Lake Nipissing.</p> <p>5) To increase public awareness and understanding on the following topics: alternative fishing techniques that support healthy fisheries and the ecosystems that support them; parasites versus disease; die-off's and their causes.</p>
<b>Indicators</b>	<p>1 and 2) VHS-Free Lake Nipissing and completion of prevention strategy</p> <p>3) Number of significant die-off instances, Number of reports of fish disease/parasites</p> <p>4) Improved angler and public knowledge, understanding and ultimately angler diligence and participation with regards to preventing the introduction of VHS into the lake</p> <p>5) Improved angler and public knowledge and understanding of the above mentioned topics as they relate to the health and long-term sustainability of the Lake Nipissing fisheries and ecosystem</p>
<b>Benchmarks</b>	<p>1 and 2) VHS-free status; existing strategies that have been developed elsewhere, include new strategies that suit Lake Nipissing, use of the best available science</p> <p>3) VHS-free status; to extent possible use historical data (die-offs) as reference point</p> <p>4) 2013 public knowledge and participation levels; use best available science, existing products that have already been created (factsheets, pamphlets, posters, workshops, presentations, forums)</p> <p>5) Best available science, existing factsheets</p>
<b>Targets</b>	<p>1) Remain VHS-free</p> <p>2) Remain VHS-free and completion of Prevention Strategy: January 1, 2015</p> <p>3) Maintain VHS-free status and maintain healthy aquatic ecosystem to support healthy resilient fish and fish populations; ongoing tracking and assessment as occurrences arise; annual reporting of incidences in the Lake Nipissing SOR as applicable.</p> <p>4) Increased angler knowledge, understanding and ultimately angler diligence and participation with regards to preventing the introduction of VHS into the lake.</p> <p>5) Increased angler knowledge and understanding of the above mentioned topics as they relate to the health and long-term sustainability of the Lake Nipissing fisheries and ecosystem.</p>
<b>Management Actions</b>	<p>1) Continue to complete annual VHS testing on the lake.</p> <p>2) MNRF, in collaboration with key partners and stakeholders to devise prevention strategy that clearly outlines vectors and efforts to be made to prevent or reduce the chances of the introduction of VHS (and other relevant diseases) via those vectors into the lake (e.g., ban the use of live bait, ban import and use of emerald shiners,</p>

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	<p>promote use of artificial lures only, only permit the use of live bait purchased from the Lake Nipissing watershed or certified baitfish shops, public education and awareness initiatives, fact sheets, posters/signs at key access points/launches/ice roads, enforcement blitzes, posters and pamphlets at bait shops).</p> <p>MNR to work with local baitfish industry (operators and suppliers) to seek input and solutions to enhance existing baitfish system with the intention of reducing the chances of the introduction of VHS into the lake and in doing so, ensuring their economic viability remains.</p> <p><b>3)</b> MNR to track fish die-offs as per provincial standardized protocol along with any other significant fish disease/parasite episodes reported from the lake and use as potential indicators of changes to the lake ecosystem where and when applicable.</p> <p><b>4-5)</b> Make prevention strategy publically available in accessible, central location (e.g., Lake Nipissing website).</p> <p>Create a variety of products as part of education campaign (factsheets, posters, signs, stickers, rulers, bait buckets, presentations) that can be distributed widely. Make publically available in accessible, central location (e.g., Lake Nipissing website).</p> <p>Distribute widely, especially to local Tourist Operators and fisheries related businesses to provide to clients.</p> <p>Participate in local forums (Lake Nipissing Summit), requests for presentations to local OFAH, rod and gun clubs, media releases, etc. Make communications products publically available in accessible, central location (e.g., Lake Nipissing website).</p>
<b>Monitoring Strategies</b>	<p><b>1) Annual VHS testing</b></p> <p><b>2) Provincial tracking database</b></p> <p><b>3) As per the planned reviews of FMP and the assessment of the achievement of the fish diseases related objectives</b></p>

**APPENDIX 22**

**SUMMARY OF CLIMATE CHANGE MONITORING AND MANAGEMENT ON LAKE NIPISSING**

<b>Objectives</b>	<p><u><b>Biological and Ecological Objective</b></u>  <b>1. To mitigate and or adapt to climate change influences on the Lake Nipissing ecosystem.</b></p> <p><u><b>Socio-Economic Objective</b></u>  <b>2. To mitigate or adapt to climate change influences on Lake Nipissing's recreational fishery.</b></p> <p><u><b>Educational Objective</b></u>  <b>3. Increase public, stakeholders, and First Nations awareness of climate change influences on the Lake Nipissing ecosystem.</b></p>
<b>Indicators</b>	<p>1) To be identified through a vulnerability assessment for the Lake Nipissing watershed.</p> <p>2) Annual estimated angler effort by species (angler hrs)</p> <p>3) Number of presentations delivered on climate change.</p>
<b>Benchmarks</b>	<p>1) To be determined by expert opinion when vulnerability assessment commences.</p> <p>2) Current (2013) recreational fishing activity levels.</p> <p>3) # past presentations delivered on climate change.</p>
<b>Targets</b>	<p>1) Completed vulnerability assessment and scoped adaptation options.</p> <p>2) N/A</p> <p>3) Minimum of 4 presentations conducted over plan term.</p>
<b>Dates</b>	2015 and TBD pending vulnerability study
<b>Management Actions</b>	<p>1) Conduct a climate change vulnerability assessment on Lake Nipissing's watershed synthesizing existing data from a few key ecosystem indicators. Results from the assessment will assist in:</p> <ul style="list-style-type: none"> <li>a. Identifying and prioritizing adaptation needs;</li> <li>b. Developing adaptation strategies;</li> <li>c. Developing or expanding on existing monitoring programs;</li> <li>d. Understanding if vulnerabilities have increased, decreased, or been eliminated.</li> </ul> <p>2) a) Review existing monitoring programs and determine which are most applicable to assist with understanding and managing for climate change influences.  b) Use MNRF's Climate Change Strategy (OMNR 2011) as a basis for adaptive management decisions related to the recreational fishery and aquatic ecosystem response to climate change.</p> <p>3) In collaboration with key partners, provide general and topic-specific climate change information sessions to the public, stakeholders, and First Nations.</p>
<b>Monitoring Strategies</b>	<p><b>Following vulnerability assessment, confirm/modify the following monitoring activities to assess success in achieving the ecological objective:</b></p> <ul style="list-style-type: none"> <li>1. <b>Water temperature and dissolved oxygen</b></li> <li>2. <b>Water chemistry (nutrients)</b></li> <li>3. <b>Ice-on and Ice-off dates</b></li> </ul>

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	<ol style="list-style-type: none"><li>4. <b>Water levels</b></li><li>5. <b>Spawning habitat</b></li><li>6. <b>Groundwater movement (patterns)</b></li><li>7. <b>Species distribution</b></li></ol> <p><b>Additional data collection that is occurring elsewhere on the watershed (i.e., stream/river flow, wind and storm events) that can be used to inform climate change management.</b></p>
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**APPENDIX 23**

**SUMMARY OF ENFORCEMENT MANAGEMENT ACTIONS FOR LAKE NIPISSING**

<b>Objectives</b>	<p>1) To safeguard the public interest and protect the long-term health and sustainability of the fishery and lake ecosystem by leading and delivering professional regulatory protection of the lake's natural resources, by continuing to respond to complaints and conducting investigations related to unlawful fishing activities on the lake.</p> <p>2) The North Bay MNRF enforcement unit will continue to work with and support local First Nations, (within MNRF mandate and jurisdiction) to enhance and build First Nations enforcement capacities on the lake where and when opportunities arise.</p> <p>3) When opportunities arise, MNRF enforcement unit will continue to support and work directly or indirectly with other enforcement agencies when appropriate. (e.g., OPP, Anishinabek PS, West Nipissing Police).</p>
<b>Indicators</b>	<p>1) Officer presence/effort on the lake.</p> <p>2) Collaboration with First Nations.</p> <p>3) Collaboration with other agencies.</p>
<b>Benchmarks</b>	<p>1) Based on annual needs</p> <p>2) 2012</p> <p>3) 2012</p>
<b>Dates</b>	<b>Annually</b>
<b>Targets</b>	<p>1) As per annual prioritization of efforts outlined in the Enforcement Branch Operating Plan (EBOP).</p> <p>2) Continued collaboration with First Nations on as needed basis.</p> <p>3) Continued collaboration with other agencies on as needed basis.</p>
<b>Management Actions</b>	<p>1) District staff to work with Enforcement to establish annual enforcement priorities for the lake to be included in the EBOP.</p> <p>2) Continued collaboration with First Nations for enhancing and building capacities.</p> <p>3) Continued collaboration with other agencies for enforcement efforts on the lake.</p> <p>4) Development and implementation of a communication plan for any regulation changes that are applicable to the lake that occur over the duration of the plan (e.g., create factsheets on new regulations, distribute widely, make available in an accessible central location, such as MNRF's website)</p> <p>5) Enforcement staff to continue to support the district in education efforts on both existing and new broader ecosystem and fishery-related regulations on the lake.</p>
<b>Monitoring strategy</b>	<b>N/A</b>

**APPENDIX 24**

**SUMMARY OF COMMERCIAL ICE HUT MANAGEMENT ON LAKE NIPISSING**

<b>Objectives</b>	<p>1) MNRF to continue to assess the biological impacts of all types (recreational, commercial, including commercial ice huts) of harvest on the Lake Nipissing fishery.</p> <p>2) To provide fair and equitable access to the winter fishery for commercial use.</p> <p>3) To increase public awareness of <u>both</u> ice fishing and ice hut stewardship and etiquette to reduce the impacts of these types of uses on the lake's aquatic ecosystem and fisheries.</p>
<b>Indicators</b>	<p><u>Biological Indicator</u></p> <p>1) Commercial Ice Hut Walleye Effort and Harvest</p> <p><u>Socio-economic Indicator</u></p> <p>2) Application of MNRF licensing policy</p> <p><u>Ecosystem and Educational Indicators</u></p> <p>3) Number of out-reach efforts, products distributed</p>
<b>Benchmarks</b>	<p><u>Biological Indicator</u></p> <p>1) 2007-2010 Commercial Ice Hut Effort (10%) and Harvest (19%)</p> <p><u>Socio-economic Indicator</u></p> <p>2) Status quo, unless changes to provincial policy occur</p> <p><u>Ecosystem and Educational Indicators</u></p> <p>3) Number of outreach efforts, products distributed (0 contact made to date)</p>
<b>Targets</b>	<p><u>Biological Indicator</u></p> <p>1) ≤2007-2010 Commercial Ice Hut Effort (10%) and Harvest (19%)</p> <p><u>Socio-economic Indicator</u></p> <p>2) Status quo, unless changes to provincial policy occur</p> <p><u>Ecosystem and Educational Indicators</u></p> <p>3) Number of outreach efforts (5), products distributed (80% winter anglers)</p>
<b>Dates</b>	<p>1) Annually</p> <p>2) January 1, 2015</p> <p>3) January 1, 2016, release factsheet or promotional material to support objective; and otherwise over the course of the plan</p>
<b>Management Actions</b>	<p>1) MNRF to continue to assess the biological impacts of all types (recreational, commercial, including commercial ice huts) of harvest on the Lake Nipissing fishery</p> <p>2) MNRF to provide fair and equitable use and access to the winter fishery for commercial use which aligns with government policy; and clearly communicates policy to stakeholders in a timely fashion.</p> <p>3) MNRF in collaboration with key partners to prepare ice fishing and ice hut use stewardship/etiquette factsheet for the general public and tourist operators; and to make accessible in central location and distribute widely for season opener.</p>
<b>Monitoring Strategies</b>	<p>1) Creel</p>