Management Plan for Fisheries Management Zone 15

Working Draft
September 6, 2022

Ontario

Ministry of Natural Resources and Forestry

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Titles and Approval

FISHERIES MANAGEMENT PLAN
for
FISHERIES MANAGEMENT ZONE 15

Encompassing portions of the Ministry of Natural Resources and Forestry Administrative Districts of Bancroft, Parry Sound and Pembroke.

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 Ministry of Natural Resources and Forestry strategic direction, the Ministry of Natural Resources and Forestry Statement of Environmental Values and direction from other sources. Thus, I recommend this fisheries management plan be approved for implementation.

Recommended by: _____
XXXXXX (Bancroft District Manager) (Date)

Recommended by: _____
XXXXXX (Parry Sound District Manager) (Date)

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Recommended by: _____
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Approved by: _____
XXXXXX (Regional Director – Southern Region) (Date)

Management Plan for Fisheries Management Zone 15

Encompassing portions of the Ministry of Natural Resources and Forestry Administrative districts of Bancroft, Parry Sound, and Pembroke.

This plan applies to all waterbodies within FMZ 15 except for those waterbodies within Algonquin Provincial Park. A separate planning process will be undertaken for a Fisheries Management Plan for Algonquin Provincial Park which will result in the *Fisheries and Aquatic Ecosystem Management Plan for Algonquin Provincial Park.*

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Prepared and submitted by: **Signature** **Date**

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Land Acknowledgment

We respectfully acknowledge that Fisheries Management Zone 15 is within treaty areas and traditional territories of First Nations and Métis people. First Nations and Métis peoples have cared for and stewarded these lands for generations, and we are honoured to work together to ensure the health and integrity of these lands and waters for generations to come. The knowledge and experience shared about fish and their habitat and the relationships that we continue to develop are invaluable.

Acknowledgements

We would like to thank all members of the Advisory Council for the many hours they spent informing this plan to support fisheries sustainability within Fisheries Management Zone 15. We would like to thank the Indigenous communities within zone 15 for valuable input throughout this process. We would also like to acknowledge the significant contributions from the Ministry of Natural Resources and Forestry staff who pioneered both the supporting science and the management plan. Particularly the Biologists and Resource Liaison Specialists from the Bancroft, Parry Sound and Pembroke Districts. We also would like to acknowledge the contributions of the Algonquin Provincial Park zone ecologist, who both attended Advisory Council meetings and worked closely with our core team. We also would like to thank numerous science staff for their input during this process as well as Fisheries Section, Climate Change and Invasives Species advisors. We thank you all for your professional expertise and commitment to excellence in natural resource management.

Executive Summary

The management plan for Fisheries Management Zone 15 (FMZ 15) is intended to outline the status of the fisheries in the zone, describe management objectives and provide direction for management actions.

Fisheries management planning is a key part of recreational fisheries management in Ontario. This plan is aligned with the document that guides fisheries management in Ontario; Ontario's Provincial Fish Strategy– Fish for the Future. This operational framework 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 (MNRF) current five-year strategic plan, Naturally Resourceful, and the goals and objectives of the Ontario Biodiversity Strategy.

The plan identifies monitoring that will take place to ensure that progress is being made towards meeting the management objectives and targets. The plan is a dynamic document designed to be flexible and adaptable to a wide range of future conditions and will be amended as needed with assistance from the Advisory Council and Indigenous Communities.

Purpose and Scope of the Plan

The FMZ 15 Management Plan was developed by MNRF with input and advice from the FMZ 15 Advisory Council, which is made up of Indigenous community representatives, anglers, stakeholders, researchers, and interested community members. Input and advice were also sought from Indigenous communities whose traditional territories fall within the zone landscape. The planning area extends from Georgian Bay in the west to the Ottawa River in the east. Its northern boundary follows the Pickerel River, Highway 522 and the northern edge of Algonquin Provincial Park (Figure 2.1).

This plan applies to all waterbodies within FMZ 15 except for those waterbodies within Algonquin Provincial Park. A separate planning process will be undertaken for a Fisheries Management Plan for Algonquin Provincial Park which will result in the *Fisheries and Aquatic Ecosystem Management Plan for Algonquin Provincial Park.*

The fisheries management plan identifies management strategies and proposes actions to meet the stated goals and objectives based on advice from the FMZ Advisory Council. The intent of the plan is to assist MNRF in balancing the demands placed on the resource with the biological capacity of the supporting ecosystems. This balance is based on analysis of fisheries data and collaborative discussions with members of the public, government and partner agencies, Indigenous communities and non-governmental agencies. The intent of this plan is to focus mainly on Regional Operations Division led actions.

Goal Statements

- Fish Populations: Manage for the improvement of fisheries, including conserving natural fish populations; enhance harvest and recreational usage while providing a safe food source where appropriate.
- Aquatic Ecosystems: While minimizing the risk of invasive species, maintain healthy aquatic ecosystems and restore damaged aquatic ecosystems.
- Education: Improve the general public's respect for natural resources, their awareness of ethical practices around aquatic ecosystems and their knowledge of management and regulatory principles and practices.
- Socio-Economic: Provide diverse ways for users to experience and interact with resources and support a fair valuation of the resources to promote socio-economic benefits from resource usage.

Management Plan Framework

The management plan is comprised of a series of broad management strategies that reflect management priorities within the zone. Each strategy identifies management issues, challenges, present status, and associated objectives and management actions for the following:

- Management of Brook Trout, Lake Trout, Lake Whitefish, Northern Pike, Muskellunge, Walleye, Smallmouth and Largemouth Bass and Panfish
- Fish stocking

These strategies, although target-specific, are largely consistent with the following objectives:

- To increase or maintain fish abundance
- To develop a habitat protection and restoration strategy
- To increase public awareness of fisheries management
- To work with partners to provide sustainable fishing opportunities
- To prevent the arrival, establishment and/or spread of non-native and invasive species

Fish Stocking

The appropriate use of fish stocking as a management tool is directed by the Guidelines for the Stocking of Inland Lakes (2002). This plan summarizes these guidelines and supports the practice that natural reproduction of fish populations will remain the primary strategy for management within FMZ 15, with enhancements via Put-Grow-Take (PGT)

stocking to create fisheries exclusively for public enjoyment. The use of salmonid PGT lakes creates diversionary fisheries which reduce the harvest pressure on naturally reproducing populations. However, there are limited opportunities to expand PGT salmonid stocking in the zone, due to the finite availability of suitable habitat and compatible aquatic community structure, and the plan is realistic about these limitations. Supplemental stocking, or stocking where natural populations occur, is discouraged since this practice can cause undesired impacts to existing natural populations.

Review and Plan Evaluations

The FMZ 15 Plan will be reviewed periodically to assess the level of achievement of the management objectives and to identify sections of the management plan requiring updates. Results of the review will be reported back to the FMZ 15 Advisory Council and the public. Plan evaluations may occur prior to or because of a comprehensive review following adaptive management principles. It is expected that a plan evaluation will only occur if there is a significant management issue (e.g., stemming from monitoring and assessment results or other data which suggest that action is needed).

Sommaire

Le Plan de gestion des pêches pour la zone de gestion des pêches 15 (ZGP 15) a été établi pour décrire l'état des pêches dans la zone, identifier les objectifs de gestion et donner une orientation aux mesures de gestion.

La planification de la gestion des pêches est une composante essentielle de la gestion de la pêche récréative en Ontario. Ce plan de gestion des pêches est conforme au document d'orientation qui gère les pêches en Ontario – Politique stratégique provinciale relative à la pêche pour l'Ontario : Assurer la pérennité des ressources halieutiques. Ce cadre opérationnel fournit les assises nécessaires à l'amélioration de la gestion de la pêche récréative en Ontario. La planification de la gestion des pêches est également conforme au plan stratégique quinquennal actuel du ministère des Richesses Naturelles et des Forêts (RNF) – Naturally Resourceful, ainsi qu'aux buts et objectifs de la Stratégie de la biodiversité de l'Ontario.

Le plan détermine le type de surveillance qui sera utilisé pour s'assurer que des progrès vers la concrétisation des objectifs et des cibles de gestion sont réalisés. Le plan est un document dynamique. Il est conçu pour être flexible et s'adapter à un grand ensemble de conditions pouvant survenir dans le futur. Il sera modifié au besoin avec l'aide du conseil consultatif et des communautés autochtones de la zone.

But et portée du plan

Le plan de gestion des pêches de la ZGP 15 a été élaboré par le RNF, en consultation avec le conseil consultatif de la ZGP 15. Ce conseil se compose d'un groupe de membre des communautés autochtones, pêcheurs, d'intervenants, de chercheurs et de membres de la communauté qui s'intéressent à ces questions. Des avis et des conseils ont aussi été demandés aux communautés autochtones dont certains territoires traditionnels touchent la zone. La zone de planification s'étend de la baie Georgienne dans l'ouest jusqu'à la rivière des Outaouais dans l'est. Sa frontière nordique suit la rivière Pickerel, la route 522 et la limite nord du parc Algonquin (voir la Figure 2.1).

Ce plan vise toutes les étendues d'eau situées à l'intérieur de la ZGP 15, sauf pour celles qui se trouvent dans le parc provincial Algonquin. Un processus de planification séparé sera entrepris pour la gestion des pêches dans ce parc, ce qui produira *le plan de gestion des pêches et de l'écosystème aquatique du parc provincial Algonquin*.

Le plan de gestion des pêches établit les stratégies de gestion et propose des mesures permettant de concrétiser les buts et objectifs énoncés en consultation avec le conseil consultatif de la ZGP. Le plan veut aider le RNF à équilibrer la demande sur les ressources avec la capacité biologique des écosystèmes dans lesquels ces ressources vivent. Cet équilibre est fondé sur l'analyse des données portant sur les pêches et sur des discussions avec la population, des organismes gouvernementaux et partenaires, des

communautés autochtones et des organismes non gouvernementaux. Ce plan vise particulièrement les mesures mises en œuvre par la Division des opérations régionales.

Énoncé des objectifs

- Populations de poissons : Faire une gestion qui favorise l'amélioration des pêches, notamment le maintien de populations naturelles de poissons; améliorer la récolte et l'utilisation récréative tout en fournissant une source de nourriture salubre, lorsque cela est approprié.
- Écosystèmes aquatiques : Tout en réduisant les risques d'apparition d'espèces envahissantes au minimum, maintenir des écosystèmes aquatiques sains et restaurer les écosystèmes aquatiques endommagés.
- Éducation : Améliorer le respect du grand public pour les ressources naturelles, sa sensibilisation aux pratiques éthiques touchant les écosystèmes aquatiques et sa connaissance des principes et pratiques de gestion et de réglementation.
- Socio-économie : Fournir aux utilisateurs différents moyens pour approcher et interagir avec les ressources, et soutenir une évaluation équitable des ressources afin de faire la promotion des avantages socio-économiques de l'utilisation des ressources.

Cadre de travail du plan de gestion

Le plan comprend un ensemble de grandes stratégies de gestion qui mettent en relief les priorités de gestion au sein de la zone. Chaque stratégie établit les problèmes de gestion, les défis, la situation actuelle ainsi que les objectifs et mesures de gestion associés pour les éléments suivants :

- Gestion de l'omble de fontaine, du touladi, du grand corégone, du grand brochet, du maskinongé, du doré jaune, de l'achigan à petite bouche et de l'achigan à grande bouche ainsi que du crapet
- Ensemencement de poissons

Ces stratégies, bien qu'elles ciblent un objectif en particulier, sont généralement conformes aux objectifs suivants :

- Augmenter ou maintenir l'abondance des poissons
- Élaborer une stratégie de protection et de restauration de l'habitat
- Augmenter la sensibilisation de la population à la gestion des pêches
- Collaborer avec des partenaires pour offrir des possibilités de pêche durables
- Empêcher l'arrivée, l'établissement et la propagation d'espèces étrangères envahissantes

Ensemencement de poissons

L'utilisation appropriée de l'ensemencement de poissons comme outil de gestion est soumise aux lignes directrices pour l'ensemencement des lacs intérieurs (2002). Le plan résume ces lignes directrices et soutient une approche de reproduction naturelle pour les populations de poissons comme principale stratégie de gestion au sein de la ZGP 15. Il soutient toutefois l'intégration de certaines améliorations provenant d'une approche « empoissonnement-croissance-prise » (ECP) pour créer des pêcheries exclusivement destinées au public. L'utilisation de l'ECP dans les lacs de salmonidés permet de créer des pêcheries de diversion qui réduisent la pression des récoltes sur les populations qui se reproduisent de manière naturelle. Toutefois, les possibilités d'augmenter la présence de salmonidés par l'ECP dans la zone sont limitées en raison de la disponibilité limitée d'un habitat convenable et d'une structure de communauté aquatique compatible; le plan est d'ailleurs réaliste au sujet de ces limites. L'ensemencement supplémentaire – ensemencement qui se fait en surplus des populations naturelles – s'est révélé inefficace pour soutenir le recrutement de la population et il est déconseillé.

Examen et évaluations du plan

Le plan de la ZGP 15 sera réexaminé périodiquement afin d'évaluer l'avancement de la réalisation des objectifs de gestion et d'établir quelles sont les sections du plan de gestion qui exigent des mises à jour. Les résultats de l'examen seront transmis au conseil consultatif de la ZGP 15 et à la population. Des évaluations du plan peuvent survenir avant un examen approfondi des effets d'une approche de gestion adaptative, ou comme conséquence d'un tel examen. Des évaluations du plan ne seront effectuées que s'il y a des problèmes de gestion importants (mis en relief par des résultats de surveillance et d'évaluation, ou d'autres données suggérant le besoin de nouvelles mesures).

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1. Introduction

In 2015, the Ministry of Natural Resources and Forestry (MNRF), hereafter, the Ministry, launched the Provincial Fish Strategy, Fish for the Future, to provide direction for the management of Ontario's fish, fisheries and supporting ecosystems (OMNRF 2015b). The Strategy was developed through input and the engagement of Indigenous communities, agency partners and key stakeholders.

The primary purposes of this strategy are to:

- Improve the conservation and management of fisheries and the habitat on which fish communities depend; and
- Promote, facilitate and encourage fishing as an activity that contributes to individual well-being and the social, cultural and economic well-being of communities in Ontario.

The goals of the Provincial Fish Strategy also provide critical direction for FMZ management. Briefly these goals are healthy ecosystems supporting self-sustaining fish communities; sustainable use of fish that provide benefits; and informed and involved Indigenous communities, stakeholders and the public. This is all supported by science and monitoring and an effective fish management program.

The Ministry manages natural resources and their use across Ontario – taking into consideration the differences in socioeconomic and ecological objectives that exist throughout the province. This requires the integration of management objectives and approaches for many species and their habitats, in the context of varied human activities and multiple stressors.

An ecosystem-based approach to management has long been advocated as the best way to address the complex resource management challenges associated with diverse and complex landscapes, whether terrestrial or aquatic. Moving toward this approach to managing Ontario's fisheries resources will mean shifting management to broader spatial scales, over longer time periods. It also requires acknowledgement of uncertainty. One of the greatest challenges of natural resources management is the absence of complete knowledge of natural systems. Decisions must therefore be based on the best available science and knowledge and reviewed periodically as the knowledge base improves and the ecosystem changes. The intent is to review periodically to address changes in threats (stresses), intensity and extent of existing threats (stresses) or emergence of new ones that may affect objectives and achievement of those objectives. The precautionary principle guides this process, confirming that where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent resource overuse.

Risk assessment is a tool that is used to help the Ministry set priorities when addressing threats and identifying vulnerable species and communities. Vulnerability assessment supports risk assessment by evaluating the ecological or biological mechanisms that prevent organisms, habitats and/or processes from coping with stress (e.g., warming climate) beyond a certain tolerance range. It can help fisheries managers identify ways to reduce risks and impacts to fisheries resources and the people that depend on them.

Risk assessment must consider the cumulative effects of past, present and future developments. This is particularly important for fisheries with past or ongoing challenges, those at higher risk, and those of significant social, economic or ecological importance. Cumulative impacts may be additive (e.g., impact of repeated activities in the same area over a period of time) or synergistic (e.g., combined impact of a warmer climate, increasing human development in the watershed, and deteriorating water quality). Cumulative impacts can be challenging to assess, so the precautionary principle must be used in evaluating actions or policies with the potential to contribute to cumulative impacts on fisheries.

This Fisheries Management Plan identifies specific objectives, indicators, benchmarks, targets and management actions that will be used to provide direction for fisheries management in FMZ 15, for ensuring the sustainable use of the fish resources within the zone.

The development of the Fisheries Management Plan for FMZ 15 was led by the Ministry, with the assistance of an Advisory Council. The Advisory Council was composed of First Nations and Métis representatives, various key stakeholders, members of the public, and avid anglers from across the entire zone. The Ministry drafted species goals, objectives, actions and regulation changes based on Advisory Council recommendations.

The focus of the Fisheries Management Plan is on the key recreational fisheries within FMZ 15, which include Brook Trout, Lake Trout, Lake Whitefish, Walleye, Largemouth and Smallmouth Bass, Northern Pike, Muskellunge, Black Crappie and Panfish (Yellow Perch, Pumpkinseed, and Bluegill). Strategies were also developed for invasive/non-native species, fish disease, education and outreach and climate change.

1.1 Legislative and Policy Framework for Fisheries Management in Ontario

Under Canada's *Constitution Act*, responsibility for fisheries management is divided between the federal government, which has authority over the seacoast and inland fisheries, and the provinces, which have authority over natural resources, management and sale of public lands, and property and civil rights. At the federal level, Fisheries and Oceans Canada (DFO) has primary responsibility for fisheries. At the provincial level, the primary agency is the Ministry. Other agencies and levels of government also have mandates that include aspects of fisheries management. Examples include Transport Canada (federal), the Ministry of Environment, Conservation and Parks (MECP), Ontario's Conservation Authorities, national parks, and municipalities.

The protection of fish and fish habitat is a responsibility of the federal government. DFO uses the federal *Fisheries Act* to protect fish and fish habitat, ensure passage of fish, and prevent pollution that can have detrimental impacts on fish populations. In 2019 amendments to the Act have shifted their focus to protecting fish habitat. DFO has created a *Fish and Fish Habitat Protection Policy Statement, August 2019* that outlines how DFO, and its regulatory partners (including the Ministry) will apply the Fisheries Protection Provisions of the *Fisheries Act*, guide the development of regulations, standards and directives, and provide guidance to proponents of projects on the application of the Fisheries Protection Provisions of the *Fisheries Act*.

The Ministry is the agency responsible for administering and enforcing the Ontario Fishery Regulations under the *Fisheries Act*, including allocation and licensing of fisheries resources, fisheries management (e.g., control of angling activities and stocking), fisheries management planning, fish and fish habitat information management, and fish habitat rehabilitation. Ontario works with DFO to help achieve the requirements of the *Fisheries Act* through agreements and protocols. The *Fish Habitat Referral Protocol for Ontario* is currently being updated to reflect the recent changes to the *Fisheries Act*. The ministry also has fisheries responsibilities under the federal *Aboriginal Communal Fishing Licences Regulations*, and the Ontario *Fish and Wildlife Conservation Act*. Under Ontario's Environmental Bill of Rights, the Ministry must consider the ministry's Statement of Environmental Values in evaluating each proposal for instruments, policies, statutes, or regulations that may significantly affect the environment.

Other federal and provincial laws and national and international agreements also touch on or support the management of fish, fisheries and their supporting ecosystems in Ontario. Examples include the *Lakes and Rivers Improvement Act*, the *Crown Forest Sustainability Act*, the *Public Lands Act*, the *Provincial Parks and Conservation Reserves Act*, the *Environmental Assessment Act* and the *Planning Act*. For example, under the *Crown Forest Sustainability Act*, forestry operations must follow Forest Management Plans and adhere to site-specific environmental protection requirements in and around water to protect fish habitat. Another example is land use planning for Crown lands; a public process that is led by the Ministry under the authority of the *Public Lands Act* and guided by the Guide for Crown Land Use Planning (2020). The outcome of this planning process is area-specific Crown land use policy that establishes broad direction for resource related activities (i.e., permitted uses) on Crown lands, including the beds of most lakes and rivers in Ontario. Crown land use policy also provides the context for more detailed resource management planning and project implementation that may impact fisheries and aquatic ecosystems. Area-specific land use policies for central and mid-northern Ontario can be found in the Crown Land Use Policy Atlas, an interactive database and mapping tool.

The Inland Ontario Lakes Designated for Lake Trout Management (OMNRF 2015f) and the Lakeshore Capacity Assessment Handbook: Protecting Water Quality in Inland Lakes on Ontario's Precambrian Shield (OMOE 2010) are also examples of documents that support fisheries management and provide important guidance given the significance of Lake Trout in FMZ 15. This Lakeshore Capacity Assessment Handbook was developed, along with the Lakeshore Capacity Model, to help municipalities to meet their obligations under the *Planning Act* and the Provincial Policy Statement (PPS). Cooperation among agencies, municipal planning authorities, residents and cottagers' associations, developers and the public will help to achieve sustainable development of Ontario's inland lakes. The PPS integrates all provincial ministries' land use interests related to municipal planning and development. While the Ministry of Municipal Affairs and Housing (MMAH) has overall responsibility for the PPS, the Ministry of Natural Resources and Forestry has the lead for policies and the provision of technical advice regarding the protection of fish habitat, as outlined in the Natural Heritage Reference Manual (OMNR 2010).

The Ministry's mission is to manage our natural resources in an ecologically sustainable way to ensure that they are available for the enjoyment and use of future generations. The Ministry is committed to the conservation of biodiversity and the use of natural resources in a sustainable manner.

The following aquatic ecosystem direction was derived from the Ministry's "Our Sustainable Future: A Renewed Call to Action" (OMNR 2011), "Horizon's 2020" (OMNRF 2015d), and "Naturally Resourceful" (OMNRF 2020c) strategic documents to ensure healthy, resilient ecosystems:

Biodiversity

Champion implementation of a renewed biodiversity strategy for Ontario to reduce threats to biodiversity, halt species losses, advance their recovery and inspire greater conservation action.

Aquatic Ecosystem Management

Work with other ministries, conservation authorities and other agencies to sustain aquatic ecosystems, including the maintenance and restoration of ecosystem structure, composition and function. This includes sustaining water resources and their hydrological function, maintaining water quantity and quality to sustain aquatic life, and protecting and restoring riparian and aquatic habitats.

Protected Areas

Manage provincial parks and conservation reserves to permanently protect representative ecosystems, biodiversity, and provincially significant elements of Ontario's natural and cultural heritage, and to maintain ecological integrity.

This plan applies to all waterbodies in FMZ 15, except for those waterbodies within

Algonquin Provincial Park (see Section 2). A separate planning process will be undertaken for a Fisheries Management Plan for Algonquin Provincial Park which will result in the *Fisheries and Aquatic Ecosystem Management Plan for Algonquin Provincial Park*.

There may be a potential need to integrate FMZ 15 and Algonquin Provincial Park Plan where waterbodies overlap or are connected to help achieve conservation objectives of Provincial Park. This review can be completed at the FMZ 15 plan evaluation and during the development of the new Algonquin Provincial Park Fish Plan.

An Agreement-in-Principle, signed in October 2016, between the Algonquins of Ontario and the provincial and federal governments, is not a legally binding document. However, it guides negotiations and includes provisions which speak to Algonquin participation in fisheries resource management planning in the Algonquin settlement area.

Approach to Compliance

For sound and effective governance, policies, and practices to be effective in achieving their intended objectives, it is important to achieve compliance by resource users. Compliance is encouraged through a combination of outreach, education, enforcement and by means of developing strong working relationships with the public, our partners and interested stakeholders.

Promoting compliance following the development of the fisheries management plan and its associated regulations is extremely important. Without enforcement there is a serious risk that unregulated fishing activities could compromise the effectiveness of the management plan and its objectives.

The Enforcement Branch within the Ministry is an important way that the Ministry fulfills its commitments to safeguard the public interest by leading and delivering outreach and natural resource compliance services, and this directly aligns with the Ministry's mission and strategic goals.

The branch's conservation officers enforce 27 acts and regulations and work from 51 locations across the province to lead year-round field compliance service delivery. Conservation officer activities include providing outreach to ensure people are aware of their responsibilities for safe and sustainable natural resource use, proactively monitoring compliance with natural resource and public safety laws, responding to tips and other information received from the public, conducting patrols, and undertaking focused enforcement operations.

Through work planning, the branch develops enforcement priorities that receive focused effort and dedicated support to ensure results are achieved within a specific period of time. This is done by developing specific objectives, multi-year strategies and tactics for each priority. Priorities are closely monitored and reflected in performance measures and reporting for the branch.

Compliance with laws that support the management of Ontario's natural resources is a primary goal for Enforcement Branch. Monitoring compliance helps the Ministry to assess how well people know and understand the rules and if efforts should be focused on specific issues or in particular areas. Conservation officers interact with people engaged in natural resource-based activities across the province to determine compliance with the natural resource and public safety-related laws they enforce. More specifically, they have been seeking to increase compliance with statutes and regulations and improve public and client awareness and understanding of the law by focusing on the following three priorities:

- Prevent illegal moose hunting in Ontario
- Prevent illegal trade and commercialization of Ontario's natural resources
- Prevent the introduction and spread of aquatic invasive species in Ontario

Some other recent Enforcement Branch priorities and commitments include:

- Promote compliance and best practices during hunting seasons and enforce hunting safety laws
- Enhance relationships and collaboration with Indigenous peoples
- Continue to investigate all tips
- Develop and implement innovative tools and systems to enhance field delivery
- Enhance planning, performance measures and reporting
- Continue to implement the public compliments and complaints process
- Provide learning and development opportunities for our staff

1.2 History of Fisheries Planning

Strategic planning for Ontario's fisheries by the Ministry began more than 40 years ago, in response to the fishery declines that occurred during the rapid economic growth of the post-World War II era.

In 2005, the province recognized the need for a stronger emphasis on landscape level management of fisheries. A new Ecological Framework for Recreational Fisheries Management (EFFM) in Ontario (OMNR 2005) replaced the 37-existing fishing divisions with 20 Fisheries Management Zones (FMZ's) based on biological, climatic and social considerations. Regulatory tool kits were developed for key sport fish species, establishing broad-scale standards for setting fishing regulations. Key components included standardized broad-scale monitoring approaches, adaptive management, enhanced public engagement, and systematic state-of-the-resources reporting.

Ontario's Provincial Fish Strategy: Fish for the Future (OMNRF 2015b) replaced the Strategic Plan for Ontario's Fisheries (SPOF II) and filled the need for a new overarching strategic plan that guides the immediate and long-term management of recreational,

commercial and Aboriginal fisheries resources in Ontario. It is based on the most recent science-based understanding of successful natural resources management approaches. It provides current context and identifies key social, economic and environmental trends with the potential to affect Ontario's fisheries resources and uses that information to guide identification of operational tactics, and ultimately the successful achievement of fisheries management goals and objectives.

1.3 Fisheries Management Planning Process

Fisheries management planning is a risk-based process that the ministry uses to plan for sustainable fisheries management. Fisheries management planning provides guidance for managing fisheries at multiple spatial and temporal scales. Planning is focused on ensuring the sustainability of fisheries and informs the allocation of fisheries resources within the planning area to provide a range of social, cultural and economic benefits.

Fisheries management planning uses an adaptive management approach (Figure 1.1). Monitoring the outcomes of management actions proposed to meet species objectives and goals is necessary to determine how they align with set benchmarks and targets. This allows for the measurement of progress being made towards the overall species goals and objectives. The results will be analyzed to assess the progress at which time management actions may be changed, added or removed based on progress towards the overall goals and objectives.

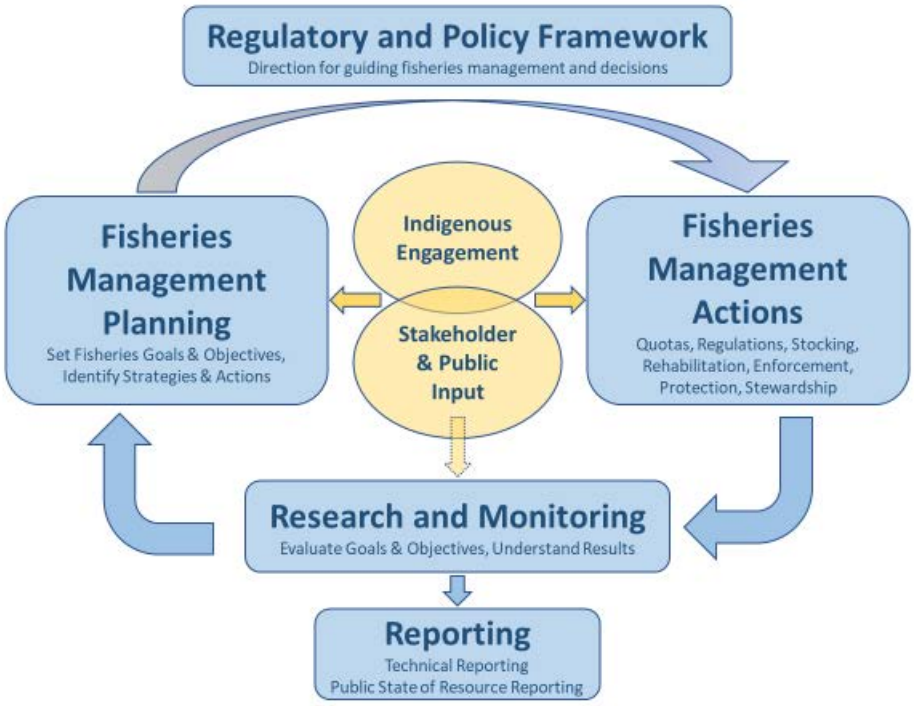

Figure 1.1 Adaptive management framework for fisheries management in Ontario.

There are multiple steps for proceeding through the Fisheries Management Planning process (Figure 1.2). The FMZ 15 management review and planning process was a collaborative effort involving a Steering Committee, a Planning Team and an Advisory Council.

The production of this plan was informed by the FMZ 15 Background Information Report. The Background Information Report summarizes relevant information about the zone including the status of the main sport fish species and the fishery based on the Ministry and DFO monitoring programs.

The core team worked both on the development of the plan and the Advisory Council meetings simultaneously during the planning stage.

Figure 1.2 Fisheries Management Planning steps and Advisory Council role.

1.3.1 Steering Committee

The FMZ 15 Steering Committee provided Manager-level direction to the establishment of the FMZ 15 Advisory Council and Fisheries Management Planning at the zone level.

The FMZ Steering Committee is an internal Ministry team that represents the various interests in the FMZ. This included:

- Regional Resources Manager as the Committee Chair
- District Managers from supporting Districts in the zone
- Regional Resources Planning Supervisor

1.3.2 Planning Team

The FMZ Planning Team is an internal Ministry team that is responsible for most aspects of plan preparation. Terms of Reference for the Planning Team were approved by the Steering Committee in March 2016. The planning team included:

- Ministry project manager lead (Regional Planning Biologist)
- Management Biologists from three primary Districts (Bancroft, Parry Sound, Pembroke)
- Regional Indigenous Relations Advisor
- Regional Aquatic Ecosystem Science Specialist.

1.3.3 Planning Schedule

The primary milestones in plan preparation are shown below.

March 2016	Planning Team established and initiated compilation of Background Information
December 2016	Selection of Advisory Council
March 2017	Initial Advisory Council Meeting
December 2021	Meeting #33 for Advisory Council

In addition to receiving input from the FMZ 15 Advisory Council, where and when appropriate, the Planning Team sought input from adjacent Fisheries Management Zone Resource Managers to ensure planning decisions were consistent with regional sustainable fisheries objectives.

The planning process provides the opportunity for First Nations and Métis, stakeholders, local anglers, the tourism sector, environmental non-government organizations, municipalities, local business representatives, cottagers and the public to:

- Be apprised of the current status of key fish species and management challenges/issues associated with the management of FMZ 15
- Provide input into the development of the objectives and management actions contained within the plan
- Engagement of the public at Environmental Registry (ER) posting

The intention of the planning process is to develop objectives that are measurable, achievable and support the long-term sustainability of the aquatic ecosystems and fisheries of the FMZ. This is achieved by compiling and analyzing relevant data, reviewing the available science, referencing provincial policies, guidelines and direction, and gathering input from stakeholders and Indigenous communities.

In addition to regular monitoring and reporting, periodic reviews of the plan will track the state of the resource relative to the targets and objectives described herein. This plan is considered a living document that can be amended as needed.

1.3.4 Advisory Council

The purpose of the FMZ Advisory Council is to provide advice and recommendations to the Ministry concerning recreational fisheries management within the zone. The Advisory Council will also provide advice to the Ministry regarding the development of landscape level plans or strategies for managing recreational fisheries. A Terms of Reference for the Advisory Council was ratified in May 2017.

Objectives of the Advisory Council:

- To provide an effective mechanism for First Nations and Métis to become engaged in the management of Ontario's fisheries at a zone-wide scale
- To provide an effective mechanism for stakeholders to become engaged in the management of Ontario's fisheries at a zone-wide scale
- To provide a forum where a broad range of fisheries interests can work together to develop objectives for the future state of the fisheries within a zone
- To work with the Ministry and provide advice to the Ministry on strategies to achieve the desired future state of the fishery
- To provide the Ministry with social and economic perspectives as they pertain to the management of fisheries at a zone scale
- To share knowledge of the fishery
- To help the Ministry to communicate and consult on information and management strategies with the broader public and with First Nations and Métis communities
- To assist the Ministry with the implementation of fisheries management recommendations
- To potentially provide the Ministry advice on fisheries management issues at scales smaller (e.g., Kawartha Highland Provincial Park) or larger (e.g., regional / provincial) than the Fisheries Management Zone. There are no proposed Provincially Significant Inland Fisheries within FMZ 15

The FMZ 15 Advisory Council is comprised of representatives from a diverse group of First Nations and Métis and local stakeholders. Through stages of the preparation of the management plan, the Advisory Council provided critical insight and information that shaped the management plan to reflect local interests and concerns. Their active and purely voluntary participation in the plan development process is very much appreciated. Two representatives for Ontario Parks attended each Advisory Council meeting; one from Algonquin Zone (including Algonquin Provincial Park) and one from the Southeast Zone of Ontario Parks, providing representation of all provincial parks in the zone.

Affiliation of FMZ 15 Advisory Council members:

- Algonquins of Ontario
- Almaguin Fisheries Improvement Association
- Bancroft Field Naturalists
- Carson, Trout, Lepine and Greenan Lakes Association
- Coalition of Haliburton Property Owners Association
- Curve Lake First Nation
- Haliburton Highlands Outdoors Association
- Hiawatha First Nation
- Métis Nation of Ontario
- Muskoka Watershed Council
- North Hasting Community Fish Hatchery
- Ontario Anglers and Hunters (OFAH)

Members were encouraged to keep their respective groups apprised of the developments in draft plan preparation throughout the planning period. The Advisory Council, in concert with Ministry staff, developed and distributed literature to their networks and communities on various species and their status in FMZ 15 during this period. Advisory Council members engaged their networks and communities throughout the planning process on key items such as Lake Trout regulation management, bait harvest and fish stocking priorities. In addition to deliberating on the development of the plan, Advisory Council members were also instrumental in acting as stewards of the zone's fisheries by communicating key messaging often produced by Advisory Council members and distributed to their networks and communities.

First Nations and Métis communities and organizations with a participant on the Fisheries Advisory Council updated their communities regarding activities of the Advisory Council with respect to the development of a Fisheries Management Plan. They also sought input

and/or information from community members and communicated this back to the Ministry and the Advisory Council and participated in Ministry meetings with communities. The Ministry sought input directly from First Nations and Métis communities at key stages in the development of the Fisheries Management Plan and, including the First Nations and Métis participants on the Advisory Council.

1.3.5 Indigenous Community Engagement Summary

The *Constitution Act, 1982* recognizes and affirms the Aboriginal and treaty rights of First Nations, Métis and Inuit peoples. The Ministry has a legal duty to consult First Nations and Métis communities when a proposed activity or decision may adversely impact those rights. First Nations and Métis peoples have constitutionally protected Aboriginal and treaty rights to fish for food, social and ceremonial purposes. With respect to fisheries, the courts have clarified that conservation of fishery resources is the priority, after which existing Aboriginal and treaty rights take priority before allocation and management of the resources for recreational, commercial food and bait fisheries.

The history of First Nations and Métis fisheries pre-dates the existence of the province. Harvest traditionally occurred year-round, including during spawning times. Harvesting tools included weirs, nets, traps, spears and baited hooks. Although tools have evolved over time, fishing continues to play a significant role in the lives of First Nations and Métis peoples, contributing to the dietary, social, cultural and economic needs of communities in Ontario today.

First Nations and Métis communities also have a long history of, and strong interest in, fisheries resources management. Indigenous traditional knowledge has been relied upon by First Nations and Métis peoples through generations of depending on the land and water resources for their survival and way of life.

The Ministry acknowledges the importance of Indigenous traditional knowledge and continues to explore opportunities to increase First Nations and Métis involvement in fisheries management through collaborative partnerships.

FMZ 15 is within Treaty Areas and Traditional Territories of First Nation and Métis communities; 29 communities are situated within or adjacent to FMZ 15. They include:

- The Anishinabek peoples who made the Robinson-Huron Treaty of 1850, include Dokis First Nation, Henvey Inlet First Nation, Magnetawan First Nation, Shawanaga First Nation, and Wasauksing First Nation.
- The Williams Treaties First Nations requested the inclusion of additional information about the Williams Treaties Settlement Agreement and other information that can be found below.

- Kawartha Nishnawbe resides in FMZ 15, whose rights and assertions include Treaty 20 and the surrounding area
- The Algonquins of Ontario (AOO) are engaged with Ontario and Canada in negotiation of a treaty in the Algonquin Settlement Area that intersects the eastern part of FMZ 15. The AOO Consultation Office coordinates consultation among the following member communities:
    1. Antoine
    2. Algonquins of Pikwàkanagàn First Nation
    3. Bonnechere
    4. Greater Golden Lake
    5. Kijicho Manito Madaouskarini (Bancroft)
    6. Mattawa/North Bay
    7. Ottawa
    8. Shabot Obaadjiwan (Sharbot Lake)
    9. Snimikobi
    10. Whitney and Area
- The Métis Nation of Ontario asserted Georgian Bay and Mattawa Nipissing Harvest Areas intersect with FMZ 15. The Community Councils for Moon River and Georgian Bay Métis are situated within FMZ 15, and the Community Council for Mattawa Métis lies to the north
- There are two communities in Quebec that have asserted traditional territory within the eastern part of FMZ 15. These include Kebaowek First Nation and Wolf Lake First Nation
- Wahta Mohawks and Moose Deer Point First Nation have communities that are situated in FMZ 15

The Williams Treaties First Nations include the Chippewas of Beausoleil, Georgina Island and Rama and the Mississaugas of Alderville, Curve Lake, Hiawatha, and Scugog Island. These seven First Nations are signatories to various 18th and 19th century treaties that covered lands in different parts of south-central Ontario.

In 1923, the Williams Treaties were signed between these seven First Nations and the Crown. The Williams Treaties First Nations have expressed that they entered into the Williams Treaties with the spirit and intent to share the lands and resources of Southern Ontario with European settlers. The Crown entered into these treaties after decades of requests by First Nation leaders and community members to address the matter of

settlers encroaching on Williams Treaties First Nations traditional lands. The Williams Treaties of 1923 were intended to resolve the Williams Treaties First Nations longstanding claims. Instead, the conclusion of these treaties created continuing injustices — insufficient compensation, inadequate reserve lands, and the inability to freely exercise harvesting rights. More information is available in the federal Crown's 2018 Statement of Apology for the Impacts of the 1923 Williams Treaties (rcaanc-cirnac.gc.ca).

In its interpretation of the 1923 Williams Treaties, the Crown failed to recognize the rights to hunt, fish, trap and gather on the William Treaties First Nations' pre-confederation treaty lands and the connection with the land, which is vitally important for cultural and spiritual sustenance, was severed.

In June 2018, the Williams Treaties First Nations ratified the Williams Treaties Settlement Agreement with Canada and Ontario. As it relates to harvesting, the Williams Treaties Settlement Agreement recognizes the Williams Treaties First Nations' continuing pre-confederation treaty harvesting rights to harvest fish, wildlife, trapping and gathering in Treaties 5, 16, 18, 20, 27, 27 ¼, the Gunshot Treaty and the Crawford Purchase. Aboriginal and treaty harvesting rights are protected under the Constitution 1982. The Williams Treaties Settlement Agreement affirms that harvesting rights are recognized and continue for food, social and ceremonial purposes. The Williams Treaties First Nations Harvesting Guide identifies that harvesting of fish, wildlife, trapping and gathering will be carried out in accordance with these values – the Seven Ancestors' Teachings: Truth, Love, Wisdom, Bravery, Humility, Respect, and Honesty.

The territories of the Williams Treaties First Nations are located primarily in the Georgian Bay and Lake Ontario watersheds and includes certain principal tributaries and streams. The Williams Treaties First Nations have a special relationship with the lands, including the water and resources — not only on their treaty territories but also throughout gichi mikinaak (Big Turtle). Protection, conservation, and sustainable collaborative management are a priority for the Williams Treaties First Nations. Please see the link to the Williams Treaties First Nations website (https://williamstreatiesfirstnations.ca).

The Ministry has encouraged Indigenous communities to be involved in the development of this Fisheries Management Plan. Each of the communities mentioned above were invited to take part in the planning process and at key stages through the planning process. This included invitations to meet to share information about Fisheries Management Planning and to seek input into planning. In addition to direct consultation with Indigenous communities, there were 4 participants from Indigenous communities on the FMZ 15 Advisory Council. The minutes of the FMZ 15 Advisory Council meetings were shared with First Nations and Métis communities. The Ministry will also consult with the listed Indigenous Communities at the draft Management Plan stage.

Input and perspectives shared by First Nations and Métis communities in meetings and in discussions and in the FMZ 15 Advisory Council are reflected in the fisheries management plan and the planning process.

1.3.6 Public Consultation Process Summary

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 show 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 First Nations and Métis, the public and stakeholders.

Under the Ecological Framework for Fisheries Management, public input is one of the key pillars of the planning process. There are many ways in which public consultation is incorporated into the planning process. The FMZ 15 Advisory Council represented First Nations and Métis and the public at large and served as the first point of contact for the Ministry in seeking input. Input from First Nations and Métis and stakeholders is important in the development of the objectives and management strategies for the plan when presented to the broader public for review and input.

In addition to receiving input from the FMZ 15 Advisory Council, the Planning Team sought input from adjacent fisheries management zone resource managers who were also actively engaged with Advisory Councils. This ensured FMZ 15 planning decisions were aligned with other resource management plans to the greatest extent possible.

Following development of the draft plan, the Ministry held public consultation sessions. Comments and recommendations from these sessions were compiled and reviewed in consideration of the final changes made to the plan.

Background Information Report

A FMZ 15 Background Information Report was completed in 2019 showing the current status of the aquatic resources in FMZ 15. The FMZ 15 Advisory Council reviewed the document prior to its completion. It is a technical document and available for inspection by the public. Since this time, additional information has been collected via the province's Broad-scale Monitoring (BsM) program and is reflected in information included throughout this plan.

Draft Plan Consultation

The draft plan consultation stage provides an opportunity for First Nations and Métis and the public to provide input on the proposed objectives and management actions to guide fisheries management in FMZ 15. Draft plan consultation consists of open houses, letters to First Nations and Métis communities, letters to stakeholders, posting on the Environmental Registry and, if requested, meetings with First Nations and Métis communities.

Draft Plan consultation notification was distributed through the following methods:

- Letters to Stakeholders
- Letters to Indigenous Communities, and community/council/regional consultation committee meetings, as requested
- Advisory Council members communicating with those they represent
- Policy Proposal Notice Published on the Environmental Registry (September 6, 2022).

The draft plan will be available at Ministry offices in Bancroft, Bracebridge, Minden, Parry Sound and Pembroke, on the Ministry website, and on the Environmental Registry for public review and comment.

1.4 Guiding Principles

The following principles of ecology and conduct are values that were used to guide fisheries management planning and decision making and are considered key to achieving the desired future state of the fisheries resources in Ontario. They are derived from broader Ministry Strategic Direction.

1.4.1 Ecological Principles

Natural Capacity

There is a limit to the natural capacity of aquatic ecosystems and hence the benefits that can be derived from them. Self-sustaining populations can provide long-term benefits when harvested at levels below Maximum Sustainable Yield (MSY).

Naturally Reproducing Fish Communities

Self-sustaining fish communities based on native fish populations will be the priority for management. Non-native fish species that have become naturalized are managed as part of the fish community, consistent with established fisheries management objectives.

Ecosystem Approach

Fisheries will be managed within the context of an ecosystem approach where all ecosystem components including humans and their interactions will be considered at appropriate scales. The application of the ecosystem approach includes the consideration of cumulative effects.

Protect

Maintaining the composition, structure and function of ecosystems, including fish habitat, is the priority for management, as it is a lower-risk and more cost-effective approach than recovering or rehabilitating ecosystems that have become degraded.

Restore, Recover, Rehabilitate

Where native fish species have declined or aquatic ecosystems have been degraded, stewardship activities such as restoration, recovery and rehabilitation will be undertaken.

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.

1.4.2 Principles of Conduct

Aboriginal and Treaty Rights

Aboriginal rights and interests in fisheries resources will be recognized and will help guide Ministry plans and activities. The Ministry is committed to meeting the province's constitutional and other obligations in respect of Indigenous peoples, including the duty to consult.

Informed Transparent Decision Making

Resource management decisions will be made in the context of existing management objectives and policies, using the best available science and knowledge in an open, accountable way through a structured decision-making process. 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 has a clear mandate for the management of fisheries in Ontario, successful delivery of this mandate requires collaboration with other responsible management agencies, First Nations and Métis communities, and others who have a shared interest in the stewardship of natural resources.

2. Description of Fisheries Management Zone

FMZ 15 spans an area of about 3.8 million hectares (37,832 km^2) in central Ontario and includes approximately 64,000 waterbodies covering an area of 369,500 ha (3,695 km^2), including those within Algonquin Provincial Park. The zone extends from Georgian Bay in the west to the Ottawa River in the east. Its northern boundary follows the Pickerel River, Highway 522 and the northern edge of Algonquin Provincial Park (Figure 2.1). Major communities include Parry Sound, Gravenhurst, Bracebridge, Huntsville, Minden, Haliburton, Whitney, Bancroft, Deep River, Petawawa, Pembroke and Renfrew.

FMZ 15 is located entirely within the Ontario Shield Ecozone and Georgian Bay Ecoregion in south-central Ontario. This region is primarily Precambrian bedrock, which is often exposed, creating a rugged landscape typified by many lakes and wetlands. Lakes and rivers cover over 10% of the surface area while wetlands are 2.5% of the total land cover.

The land cover in this ecoregion is primarily forest. The vegetation is representative of the Great Lakes – St. Lawrence Region, characterized by a mix of northern and southern species. Mixed forest (32.0%), deciduous forest (22.2%), coniferous forest (12.1%), and sparse forest (11.3%) form much of the land cover. Agricultural landforms cover only 3.0% of the area (Crins et al. 2009).

The forests, lakes and wetlands support a moderate diversity of fish, wildlife and plant species because of the combination of northern and southern habitat elements. As such, warm, cool and cold waterbodies can be found throughout FMZ 15 containing species such as Brook Trout, Lake Trout, Northern Pike, Walleye and Largemouth and Smallmouth Bass.

Administratively, the zone is in the Ministry's Southern Region with most of the area being in Parry Sound, Bancroft and Pembroke Districts. Small portions of the zone are within North Bay, Sudbury and Peterborough Districts.

Many provincial parks are located within FMZ 15, with the largest being Algonquin Provincial Park, followed by Kawartha Highlands Provincial Park, Queen Elizabeth II Wildlands Provincial Park, The Massasauga Provincial Park as well as many smaller parks and protected areas. In addition to regulated provincial parks, FMZ 15 has many Areas of Natural and Scientific Interest (ANSI), Enhanced Management Areas (EMA) and Conservation Reserves. Maps and permitted land use for these areas can be found on the Crown Land Use Policy Atlas.

About 23% of the total land and water area of FMZ 15 is contained within regulated provincial parks, 39% is privately owned, 37% is Crown Land, and 1% is federally owned and First Nation Reserves.

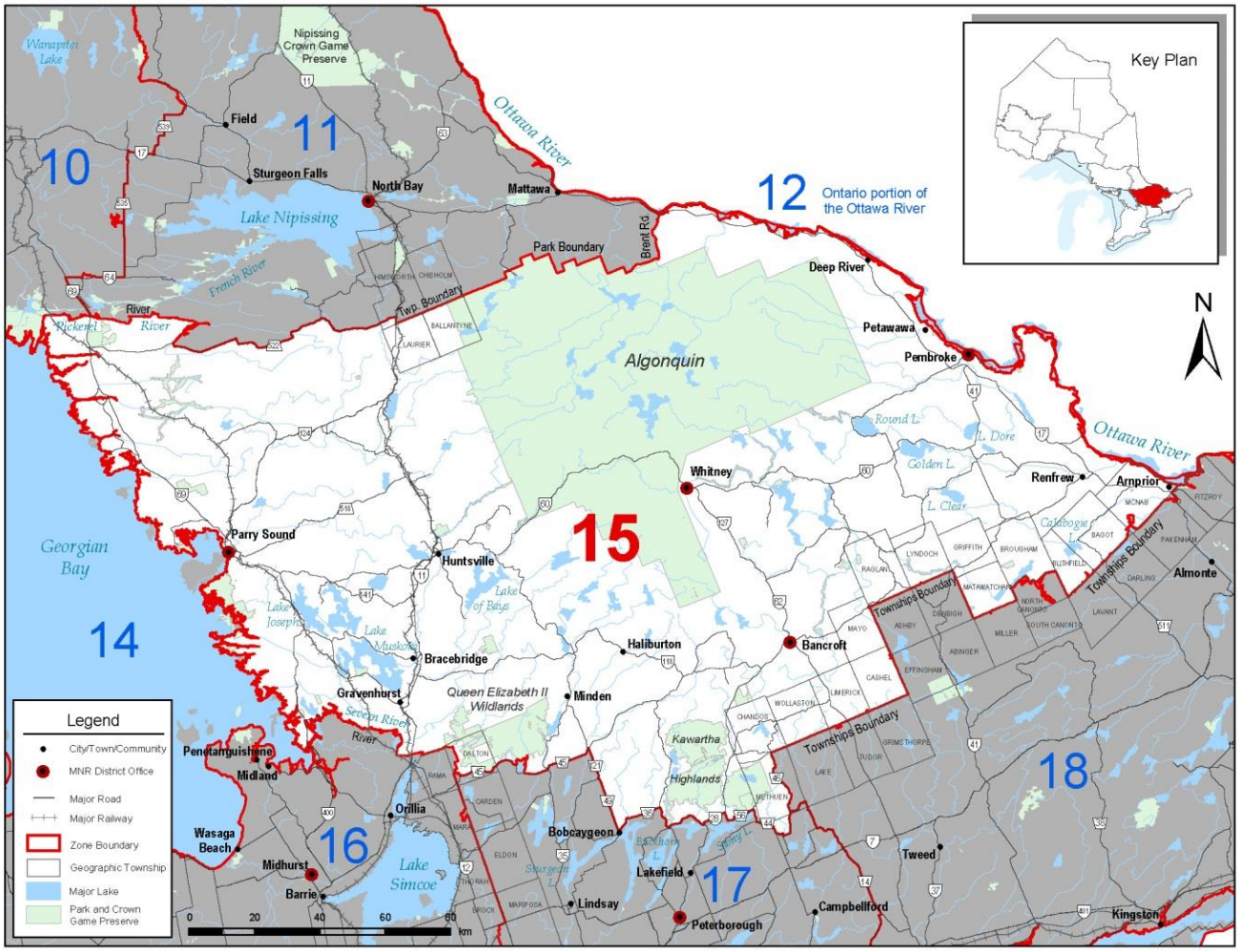

Figure 2.1 Map of Fisheries Management Zone 15.

Historically, the native fish community of much of FMZ 15 waters was dominated by the coldwater species Lake Trout and Brook Trout. Cool and warmwater fish species were limited primarily to lower elevation areas around the periphery of the zone. Extensive historic and ongoing range expansion have occurred. Walleye, Northern Pike and Smallmouth and Largemouth Bass are now widely distributed in the zone outside of Algonquin Provincial Park, and for some species, their ranges are continuing to expand.

2.1 Areas of Special Interest within Fisheries Management Zone

Algonquin Provincial Park is a major feature of FMZ 15; however, the waters in the park are not included in this plan. A separate planning process will be undertaken for fisheries within Algonquin Provincial Park.

Provincially Significant Inland Fisheries (PSIF) are major waterbodies or groups of waterbodies that are economically and socially important and have complex management challenges. PSIFs are managed individually and will have their own management plans. There are no designated PSIFs in FMZ 15.

Within the zone, not including Algonquin Provincial Park, there are variations in the distribution and characteristics of waterbodies that have been considered in the planning process. These include:

- Concentration of lakes with self-sustaining, naturally reproducing Brook Trout populations in the area surrounding Algonquin Provincial Park, especially on the west side
- Cluster of exceptionally large Lake Trout lakes in central Muskoka/North Haliburton area (Lakes Muskoka, Joseph, Rosseau, Lake of Bays, Kawagama)
- Substantial number of small Lake Trout lakes in the south-central part of the zone
- Concentration of highly productive waters in the Ottawa Valley on the east side of the zone

3. Long-term Fisheries Management Goals

The Provincial Fish Strategy (PFS) (OMNRF 2015b) was developed for managing fisheries resources in the province, and identified 5 aspirational goals to reflect the ideal future condition of the provincial fisheries:

1. Healthy ecosystems that support self-sustaining native fish communities
2. Sustainable fisheries that provide benefits for Ontarians
3. An effective and efficient fish management program
4. Fisheries policy development and management decisions that are informed by sound science and information and
5. Informed and engaged stakeholders, partners, First Nations and Métis communities and public.

Most of the provincial goals and objectives are applicable at the FMZ scale. Where possible, this plan links specific goals, objective and management actions to the PFS. Not every objective in the PFS is directly applicable to zone planning or are out of scope of a FMZ Fisheries Management Plan; therefore, not every objective from the PFS is referenced in this plan.

The goals and objectives in this plan are organized into two broad categories:

1. Objectives that apply zone-wide independent of species, or to multiple species
2. Objectives that apply to specific fish species.

The zone-wide objectives align broadly with the PFS goals and objectives. The zone goals are principles, encompass subjects that apply to many fish species or communities and generally do not have measurable indicators, targets and benchmarks associated with them.

Fish species objectives are organized by fish community thermal regime and are more specific and have quantifiable indicators, targets and benchmarks regarding population objectives. Aspects of zone-wide objectives that are species-specific are provided under the individual species sections but are cross-referenced back to the zone-wide objectives, where applicable.

4. Fisheries Management Zone Goals, Objectives and Actions

Fisheries management planning is a tool that is used by the Ministry to deliver part of its core mandate. The Fisheries Management Plan for FMZ 15 was compiled by the Planning Team, with comments, advice and recommendations from the Advisory Council.

Management Issues and Challenges

The FMZ 15 Planning Team, in collaboration with the Advisory Council, identified management issues and challenges that impact recreational fisheries of FMZ 15 at both a broad (community) and a species-specific level. Many issues and challenges were identified; however, all could be grouped into 3 main categories that were in scope of the FMZ 15 Fisheries Management Plan:

1. Sustainability/exploitation
2. Habitat
3. Education/outreach

Some of the issues and challenges identified during these exercises are out of scope of the FMZ 15 Fisheries Management Plan and are grouped into the following categories:

1. Water management
2. Enforcement
3. Science and research

These out-of-scope categories are addressed through other processes.

Management Goals and Objectives

Goals are overarching statement(s) made about a desired state of the fishery.

Objectives describe what is to be achieved in the future or the desired result. Objectives need to contribute to the broad fisheries management goal for the zone, be consistent with strategic direction and the guiding principles. Objectives must be specific, measurable, achievable, relevant and time bound. Objectives can reflect biological, economic or social considerations.

Indicators, Benchmarks and Targets

Indicators are specific attributes that are measured to determine whether management objectives are being achieved. Examples of indicators include measures of fishing mortality rate, biomass, or the number of age classes of a fish population. Indicators are linked to the management objectives and need to be measurable by monitoring programs.

Many indicators used in this plan originate from the provincial Broad-scale-Monitoring (BsM) program. Catch rates are expressed as catch-per-unit effort by number (CUE) or weight (CUEW) and as area-weighted (AW) means for core species (Lake Trout and Walleye) or equally-weighted (EW) means for other species. The Background Information Report provides more details on the calculation of metrics.

Benchmarks describe the baseline value of the indicator. Benchmarks will be compared to the future indicator status to measure progress towards targets and achievement of objectives. Most benchmarks in this plan are based on a historical value or the most current value available for each indicator. For example, indicators measured by Cycle 1 of the BsM program represent baseline values that will be compared to indicators measured by future cycles of BsM.

Targets describe a desired future indicator value or describe the direction the indicator must move to achieve the objectives. Targets can be set to describe incremental steps towards meeting the objective.

Targets are an important part of the adaptive management cycle as they are the measure used to determine if plan objectives have been achieved. The SMART acronym is often used to describe the ideal objective as being specific, measurable, achievable, realistic and time bound. Where possible, the Planning Team followed the SMART concept. Target values are based on species specific goals, baseline data provided through the BsM monitoring program and current knowledge of the life history of each species. Target values for indicators may be updated in the plan as additional data become available to the planning team. Currently, some targets are analyzed to detect a statistically significant trend in and indicator as well as the direction of that change. Analysis conducted by the planning team suggests that linear models may be more sensitive at detecting change in some metrics than the more typical approach of establishing a numerical target and testing whether it was achieved using paired t-test comparisons. Use of paired t-tests will continue until such time that sufficient data has been collected on individual metrics to allow for linear trend analysis.

Performance Measures will be used for objectives that are difficult to measure. Performance measures are actions that have an easily measured outcome and they determine if an action was completed. Benchmarks and targets will not be applied for objectives when performance measures are used.

Management Actions

Actions are the specific tasks that must be completed to meet management objectives.

The following sections describe the management strategies for both fish communities and individual species. The management goals, objectives, indicators, benchmarks, targets and strategies associated with each topic can be found in Sections 4.1 and 4.2.

Establishment of Short- and Long-term Indicator Target Timelines

The primary source of monitoring data for reporting on FMZ's across Ontario is BsM. Additional sources of monitoring data used in reporting on FMZ 15 include the Survey of Recreational Fishing in Ontario (OMNRF 2015c), the Aquatic Habitat Inventory Database (OMNRF) and the Muskies Canada Incorporated (MCI) angler diary. Additionally, information from the "Survey of Recreational Fishing in Canada: Results for Fisheries Management Zones of Ontario" (OMNRF 2015c, 2020a) was used in establishing and verifying fishing effort levels for Walleye and Lake Trout in FMZ 15 and applied to modelling exercises to evaluate the impact of regulation changes on these species. Statistics from the Survey of Recreational Fishing in Canada, including fishing effort, have been extracted from the database and used to estimate fishing effort levels in FMZ 15 and adjusted to account for bias (Hogg et al. 2010). Together, these sources of data allowed for the determination of indicators and their associated benchmark and target values.

One of the primary purposes of the FMZ planning process is to gather relevant information pertinent to the fisheries resources. This information is critical to the development of a management document that clearly identifies species-specific management objectives, indicators, indicator benchmarks and indicator targets. Defining specific timelines (short-term and long-term) for the indicator targets will assist with and guide management of recreational fisheries in FMZ 15. Establishing timelines for the indicators will add transparency to the planning process and encourage feedback from stakeholders and the wider public. Importantly, defining short- and long-term timelines for the indicator targets will help to ensure that the objectives of this plan are achievable. The long-term indicators reflect the biological change that can be expected given the life span and life history characteristics of a fish species. For example, Lake Trout population recovery timelines may take up to 50 years (8-10 BsM cycles) to obtain the desired Maximum Sustainable Yield. In comparison, the short-term targets reflect the expected progress in the next 20 years (3-4 BsM cycles). The text of this plan addresses the short-term objectives. Long-term objectives are addressed in the species-specific tables.

Assessment of short- and long-term indicator values guide future regulation changes and will be examined from several perspectives. First, directional changes in indicator values will be monitored. These directional shifts may be subtle and neither statistically nor biologically significant, however, they provide important information to managers regarding early responses of a fish population to regulation changes. Additionally, statistical analysis and biological meaningful change (power analysis) will be used to examine population responses in more detail.

The original BsM program design monitors the lacustrine resource of a zone on a five-year cycle. The number of lakes required are selected equally from five different lake size classes though two separate procedures, one that selects state lakes (sampled only in the cycle they were selected) and the other that selects trend lakes (chosen once during the first cycle, then sampled again in each subsequent cycle).

Monitoring trend lakes is best for detecting changes in fish populations and aquatic ecosystems over time, given that these lakes are sampled in every five-year BsM cycle. Monitoring of state lakes is best for describing the overall status of fish populations at a point in time. Because state lakes are selected randomly in each BsM cycle, the sample size of state lakes increases over time. Including both trend and state lakes within the monitoring program is important for providing a balance between detecting changes quickly and accurately describing the state of fishes and aquatic resources.

In FMZ 15, 41 trend lakes and 9 state lakes were selected to be surveyed in Cycle 1 (2008-2012) of BsM. In Cycle 2 (2013-2017), 52 trend lakes and 14 trend/state lakes were surveyed.

These lakes were selected through two independent selection processes. Once, when trend lakes were selected, and then again, when state lakes were selected. Often the double selection lakes (e.g., trend/state) tend to be from the largest size bins where few lakes exist (e.g., chances of re-selection are higher). Although selected twice, they were only sampled once. However, data was included in the reporting of trend lake results and the separate reporting of state lake results.

In the species-specific sections that follow, all lakes where the species was captured are used in the analysis.

A recent review of the BsM program to assess its effectiveness resulted in changes in the frequency of sampling trend and state lakes in each cycle as well as the number of lakes to be sampled in each FMZ. Changes to the program have resulted in alternating five-year cycles of sampling between trend and state lakes (Lester et al. 2020). In the new design, cycles in which only trend lakes will be sampled occur in alternating five-year periods with Cycle 3 being the first all-trend lake cycle. Cycle 5 (2028-2032) will be the next all trend-lake cycle followed by cycle 7 (2038-2042). Given the revised BsM monitoring program, status updates of the indicators will occur between alternating trend cycles as follows:

Short-term Status Update

Cycle 1 – Cycle 5 (25 years)

Long-term status update

Cycle 1 – Cycle 7 (50 years)

There are numerous species, or groups of species, that provide important cultural, recreational, commercial or ecological functions that are not addressed in species chapters in this plan, owing to a lack of sufficient data.

Common Carp (*Cyprinus carpio*), although not native to Ontario, are present in FMZ 15. They appear to be relatively uncommon in FMZ 15 lakes as few have been detected in recent netting surveys. Common Carp have the potential to grow quite large with lengths and weights commonly exceeding 80 cm (31 in.) and 10 kg (22 lbs.), respectively.

Brown Bullhead (*Ameiurus nebulosus*), a member of the catfish family, are one of the most widely distributed fish species in FMZ 15. They support a relatively low intensity recreational fishery. Local residents have identified a dramatic decline in Brown Bullhead abundance in some waterbodies within the zone. Current index netting is either ineffective at sampling bullheads or their 'clumped' distribution makes meaningful data interpretation difficult.

Rock Bass (*Ambloplites rupestris*) are also well distributed and established across FMZ 15. They occupy a similar niche to Bluegill, Pumpkinseed and Black Crappie, but are not harvested as intensively as other species of Panfish, even though they make suitable table fare and are easily caught. Rock Bass can influence the composition of fish communities as a significant predator of the early life history stages of various sport fish species.

Burbot (*Lota lota*), also known as ling or ling cod, is a coldwater fish and a member of the cod family. Although present throughout FMZ 15, little information exists on its abundance, however it appears to be frequently caught during the ice fishing season

Channel Catfish (*Ictalurus punctatus*) are found in the tributaries of the Ottawa River and a couple lakes, within FMZ 15, and where present, they usually occur in high densities. This species is an excellent food fish and a formidable sport fish (Scott and Crossman, 1998).

4.1 Fish Community Objectives

Fish community objectives provide context for individual species objectives. The fish community objectives describe the management priority and emphasis for distinct groups of species and provide broad direction to guide individual species management (Figure 4.1). They help resolve potentially competing objectives for species of different thermal regimes.

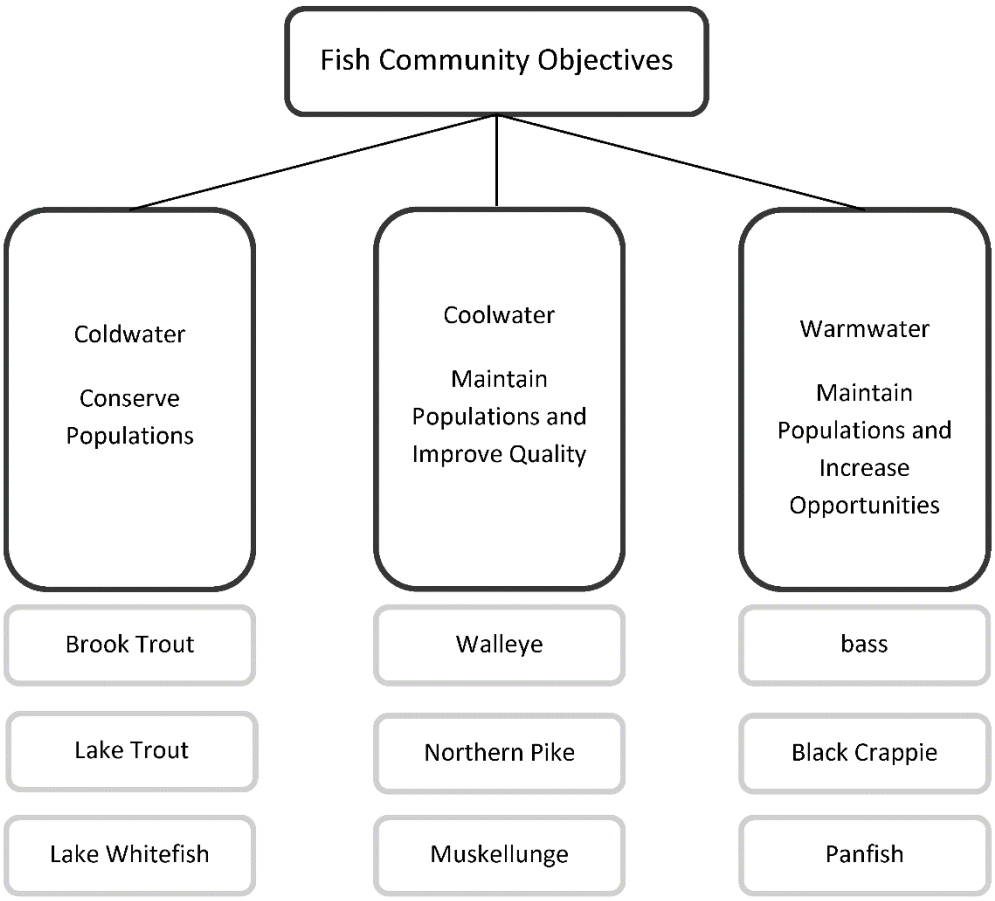

Figure 4.1 Fish community objectives for FMZ 15.

4.1.1 Coldwater Fish Community

Brook Trout, Lake Trout and Lake Whitefish are the primary native coldwater fish species in the zone. Populations are subjected to several common threats and issues, including:

- Impacts from introduced species
- Habitat change and loss
- Climate change
- Fishing

The distribution of these species in the zone is limited by the natural availability of suitable habitat. Unlike many of the cool and warmwater species, habitat requirements of coldwater species are more specific and there are limited opportunities to expand or improve the range of waters suitable for these species. Many populations of coldwater species have been reduced, marginalized or completely removed by introduction of non-native species. For example, Rainbow Smelt, Yellow Perch, Smallmouth and Largemouth

Bass and other species impact coldwater species through natural dispersal, competition and as predators on early life history stages of coldwater species. The distribution of these competing species continues to expand through unauthorized introductions. In the long term, climate change is expected to reduce the amount of coldwater habitat and favour cool and warmwater competitive species. All three species are important game fish species that are subject to varying levels of fishing pressure. Consistent with overall goals for FMZ 15 and recognizing the large numbers of stressors on these species, the management emphasis will be to conserve and rehabilitate populations of coldwater species on the landscape and build resilient populations by taking a conservative, precautionary approach to management.

Goals

1. Conserve and rehabilitate populations of native coldwater species by managing in a conservative, precautionary manner
2. Protection of populations that are threatened by a variety of stressors will take precedence over provision of fisheries
3. Conserve and rehabilitate habitat of native coldwater species by managing lakes in a conservative, precautionary manner. (e.g., lakes at development capacity)

4.1.2 Coolwater Fish Community

Walleye, Northern Pike and Muskellunge are the primary coolwater species in the zone. All three had limited natural ranges which have expanded greatly through stocking, both authorized and illegal. Walleye is the most desired sport fish species in the zone and Muskellunge is a prized trophy fish. Northern Pike have a varied status ranging from undesirable to highly valued. The management emphasis on coolwater species, especially for Walleye and Muskellunge, will be to maintain their current distribution (minimize expansion), and to maintain or improve fishing quality.

Goals

1. Maintain the distribution and abundance of Northern Pike and Muskellunge populations while providing quality fisheries
2. Increase the abundance of Walleye while providing quality fisheries
3. Balance the protection of populations with providing quality fishing and harvest opportunities

4.1.3 Warmwater Fish Community

Smallmouth and Largemouth Bass, Black Crappie and Panfish are the warmwater species in the zone. Like coolwater species, the ranges of bass and Black Crappie have expanded greatly due to stocking. Increases in the range and abundance of warmwater species within a lake are anticipated to increase owing to increases in habitat because of climate change. Historically, purposeful stocking of these species resulted in expansion of their ranges in FMZ 15. Currently, stocking of these species has ceased. Given that bass and Black Crappie compete with and forage on cold and coolwater species, there is a management perspective of wanting to minimize their populations. However, they are also highly desired sport fish, making these opposing views difficult to reconcile. Despite their popularity as sportfish, many of the warmwater species are harvested to a much lesser degree than cool and coldwater species. The management emphasis for warmwater species will be to manage them liberally, to maximize opportunities and to possibly ameliorate impacts on other species, such that the desired fishing quality will be provided owing to their resilient nature.

Goals

1. Maintain current number of lakes having warmwater fish populations while simultaneously trying to limit the abundance of individual populations
2. Sustainable warmwater fish populations will maximize fishing opportunities

4.2 Recreational Fisheries

Ontario has the largest freshwater recreational fishery in Canada and one of the largest in the world. The fishery, dependent on high quality fish habitat and healthy aquatic ecosystems, is a renewable resource that provides considerable benefits to Ontario.

In 2010, more than 1.2 million anglers actively fished in Ontario waters. Over $3.12 million was attributed to angling expenditures in Zone 15 in 2010 (OMNRF 2015c). The economic benefits of Ontario's recreational fisheries are of particular importance to the local economies of northern Ontario that are heavily dependent on resource-based tourism.

The social and cultural benefits of recreational fishing are difficult to quantify. In addition to the opportunity to catch fresh healthy food, fishing provides a variety of nonmaterial benefits such as spiritual enrichment, relaxation, anxiety and stress relief, aesthetic experience, exercise, healthy lifestyles, and activities that build social cohesion and connections. Fishing is an activity that starts, builds and strengthens intergenerational relationships, where values and skills are passed on and generations share healthy outdoor activity together.

4.2.1 Brook Trout

Brook Trout is a coldwater species with specific habitat requirements. It prefers summer water temperatures between 12-16°C and is restricted primarily to lakes that thermally stratify in the open water season and have sufficient levels of oxygen in and below the thermocline. For stream-dwelling Brook Trout, the preferred temperatures and high oxygen level requirements are maintained, in part, from sufficient groundwater inputs. Brook Trout need areas with groundwater discharge for spawning and incubation of eggs. Brook Trout are extremely sensitive to interactions with other species and reach their greatest abundance in waters with simple fish communities, especially those without other piscivorous predators which share the same thermal summer tolerances (e.g., bass, Walleye, Yellow Perch).

The life history of Brook Trout is extremely variable, ranging from small-bodied, early maturing populations in small streams to very large-bodied populations dwelling in lakes. It can be very vulnerable to angling, but its life history characteristics allow for faster recovery times than those of Lake Trout.

FMZ 15 has the second highest number of Brook Trout lakes in the province, surpassed only by FMZ 10. Within the zone, suitable habitats are restricted primarily to the Algonquin and Madawaska Highlands and are absent from lower elevation areas around the periphery of the zone.

For Brook Trout lakes outside of Algonquin Provincial Park, a considerable proportion of the number and even larger proportion of the surface area of native Brook Trout lakes has been impacted by introduced species with the result that, in many lakes, they persist only as remnant populations. Pristine populations, unimpacted by introduced species, are becoming fewer in number and are mostly restricted to small lakes close to Algonquin Provincial Park that have relatively poor access.

Of the 8 trend Brook Trout lakes sampled in BsM Cycle 2, Brook Trout were captured in 7 of the lakes. The value for Recruit-CUEW in the indicators table in the Management Plan (R_CUEW = 0.45) is based on the seven lakes where Brook Trout were captured (e.g., Dunstan Lake is removed form analysis as there were no Brook Trout captured. Arbuckle, South Branch and Cripple lakes had only 1, 1, and 2 Brook Trout captured (not much different from catching zero Brook Trout)).

Management Issues and Challenges

- Historic and ongoing loss and degradation of Brook Trout populations due to introduced species, both intentionally and accidentally.
- Threats to Brook Trout specific habitat requirements due to landscape changes from shoreline and watershed development.

- Angler harvest of natural Brook Trout due to relative rarity and angler demand, small populations mostly in small lakes making them vulnerable, unlimited access etc.
- Climate change is expected to greatly reduce the amount of Brook Trout habitat due to warming temperature, changing water regime and improving conditions for competing species.
- Difficulty of monitoring large numbers of small, isolated populations and fisheries (natural and stocked, lake and stream).
- Incomplete and out-of-date information for lake populations.
- Limited, mostly occurrence, information for stream populations.
- Limited, mostly qualitative, information on the fishery.
- Limited information generated by BsM program on individual population parameters (e.g., mortality).

Management Strategy

The Ministry, with the advice of the Advisory Council, developed goals, objectives, strategies and management actions to address the issues and challenges related to Brook Trout (Table 4.1, Table 4.2).

The Power to Detect Change, for all species, can be found in Appendix A

Table 4.1 Brook Trout management strategy.

Goal *Conserve natural Brook Trout populations*

Objectives	Indicator(s)	Benchmark(s)	Targets
Maintain the number and distribution of natural Brook Trout populations (O1)	**Primary – Short Term**		
	Number of lakes with natural populations, classified by population and sampling status (presence – absence, fish community, year of sampling)	Not possible to define currently due to the large proportion of waters where current information is not available	Not possible to define currently due to the large proportion of waters where current information is not available

Objectives	Indicator(s)	Benchmark(s)	Targets
Improve the status of natural Brook Trout populations and fishing opportunities (O2)	**Primary - Short Term**		
	Average CUEW (kg/gang) of recruit-sized fish (>250 mm) captured with large-mesh (NA_1) gill nets	Recruit CUEW for BsM Cycle 2 = 0.45 kg/gang	Recruit CUEW ≥ 0.45 kg/gang
	Average number of Brook Trout cohorts	Number of cohorts for BsM Cycle 2 = 3.0	Number of cohorts to be ≥ 3.0; continue to monitor
	Supporting – Short Term		
	Estimated summer and winter angling intensity (hrs/ha per year) for targeted Brook Trout lakes	BsM aerial surveys of angling intensity (hrs/ha per year) on Brook Trout target lakes in Cycle 1: Summer Intensity = 3.52 Winter Intensity = 1.51 Annual intensity = 5.03	Angling intensity (hrs/ha per year) to remain at or below baseline values
	Primary – Long Term		
	Percentage of FMZ 15 Brook Trout lakes where the observed biomass of Brook Trout is 30% above Biomass at maximum sustainable yield (biomass ≥ 1.3 B_{MSY})	Percentage of Brook Trout lakes in FMZ 15 where the observed biomass values for Brook Trout are ≥ than the biomass reference point. Note: baseline values are to be determined in future BsM cycles when adequate Brook Trout sampling has been completed in FMZ 15	Currently, it is not possible to determine target values for biomass due to small numbers of Brook Trout sampled in the first two cycles of BsM

Objectives	Indicator(s)	Benchmark(s)	Targets
	Percentage of FMZ 15 Brook Trout lakes where fishing mortality is at or below 75% of natural mortality (F ≤ 0.75M)	Percentage of Brook Trout lakes where fishing mortality is ≤ 75% of natural mortality (F ≤ 0.75 M). Note: baseline values to be determined in future BsM cycles when adequate Brook Trout sampling has been completed in FMZ 15	Currently, it is not possible to determine target values for fishing mortality due to small numbers of Brook Trout sampled in the first two cycles of BsM
Enhance angling opportunities for stocked Brook Trout (O3)	**Primary - Short Term**		
	Number of lakes and fish stocked	2016—2020: 195 waterbodies 125 waterbodies/year Yearling: 139,318/year Sub-adult: 5,411/year Adult: 756/year	Number of lakes and fish stocked > 2016-2020 benchmark

Table 4.2 Brook Trout management actions. Values in brackets denote which objectives each action addresses.

Brook Trout Management Actions

• Educate the public on the impact of introduced species on Brook Trout populations and promote the protection of lakes from introduced species (O1, O2, O3), including:
  ◦ Post signs on roads and access points to Brook Trout lakes,
  ◦ Distribute information through Ontario.ca website, Ministry publications, Fish ON-Line and social media.
• Prohibit the use of live baitfish while fishing for Brook Trout in natural lakes that have not been impacted by introduced species. (O1, O3)
• Implement a conservative sport fishing regulation on natural Brook Trout waters. (O2)
• Promote the appreciation and protection of natural Brook Trout. (O1)
• Use the term 'wild' in educational and promotional materials. (O1, O2)
• Identify, protect and restore Brook Trout habitat; especially critical habitat associated with groundwater features. (O1, O2, O3)

- Continue to participate in established planning processes (forest management, municipal planning, etc.). (O1, O2)
- Mitigate in-stream barriers. (O1, O2)
- Investigate methods and feasibility of, and candidate waters for, eradication of introduced species. (O1, O2, O3)
- Manage access of natural Brook Trout lakes to minimize the risk of intentional species introductions. (O1, O2)
- Implement a mechanism to minimize the introduction of new species through regulation and/or education where appropriate. (O1, O2, O3)
- Develop criteria to define candidate populations and implement lake-specific rehabilitation or re-introduction strategies where appropriate. (O1, O2, O3)
- Implement a stocking strategy for Brook Trout. (O3, see Section 4.3.4)

Objectives and Rationale for Brook Trout

The Ministry, with advice from the Advisory Council, developed the following objectives to work towards the goal of conserving natural Brook Trout populations in FMZ 15, using the best available information, local knowledge, and social considerations.

Objective 1: Maintain the number and distribution of natural Brook Trout populations

Brook Trout populations will be managed to support long-term viability and resilience of populations to major stressors including high exploitation, species introductions and habitat loss due to climate change. To do so, the first objective is to manage as many populations as naturally reproducing and self-sustaining as possible. By maintaining natural populations in a high-quality state and educating anglers about the impact of introduced species it is hoped that anglers will value them and want to protect them.

Objective 2: Improve the status of natural Brook Trout populations and fishing opportunities

Abundant populations with a broad range of age classes are most resilient to changes from habitat loss due to climate change, introduced species and other stresses. Efforts to maintain and improve the status of natural Brook Trout populations will be accomplished, in part, through the proposed angling regulation changes.

The management actions outlined in Table 4.2 are recommended to address the first two objectives and are focused on educating the public on the impacts of introduced species, eliminating the use of live baitfish, implementing conservative harvest regulations, and protecting critical fish habitat.

Objective 3: Enhance angling opportunities for stocked Brook Trout

Fishing opportunities for Brook Trout will be provided primarily through PGT stocking, especially in the winter when natural populations are most vulnerable to high levels of exploitation. The stocking program will be reviewed for operational efficiency. Additional information on stocking actions and strategies is presented in Section 4.3.4.

Brook Trout Regulation Options

The current open season and catch limits for Brook Trout in FMZ 15 are:

- Season: January 1st to September 30th and
- Catch Limit: 5(S) and 2(C).

There are many regulation exceptions that apply to Brook Trout waters in the zone including:

- Additional opportunity lakes that are open all year (90 lakes)
- Size limits; must be greater than 28 cm (17 lakes)
- Winter or all year sanctuaries (11 lakes and all of Algonquin Provincial Park)
- Use and possession of live baitfish is prohibited, including natural lakes (86 lakes and all of Algonquin Provincial Park)

Many lakes have a combination of exceptions.

Proposed Regulation Options and Rationale

A complex regulatory regime is necessary to manage the Brook Trout resource (Table 4.3). This approach was required due to the varied types of Brook Trout fisheries, the degraded state of the resource and the threat posed by introduced species.

Table 4.3 Preferred Brook Trout regulation option.

Proposed Regulation Option		Advisory Council Advice
Zone-Wide (Applies to all waters, unless listed as an Exception)	Season Open: • 4th Saturday in April to September 30th Catch Limit: • 2(S) and 1(C)	There was majority support from the Advisory Council for a shorter season. There was mixed support from the Advisory Council for a lower catch limit due to concern for impact to the stream fishery, especially on streams where the average size of Brook Trout caught is smaller. AOO supports a reduction in catch and no winter season.

Proposed Regulation Option		Advisory Council Advice
Prime Natural Lakes (Absence of harmful introduced species and support high quality fisheries and/or at high risk of intentional species introductions)	Season Open: • 4th Saturday in April to September 30th Catch Limit: • 2(S) and 1(C) Bait, Gear and Other Restrictions: • Use and possession of live baitfish prohibited • Brook Trout fishing only	There was majority support from the Advisory Council for a shorter season, lower catch limit and a ban on the use of live baitfish. There were some Advisory Council members skeptical of the effectiveness of a "Brook Trout fishing only" regulation and whether anglers would understand the intent of the proposal to prohibit fishing of other species in the prime lakes. The Advisory Council felt that this could be effective if there was an educational program to accompany the regulation change to maximize effectiveness. AOO supports the innovative approach.

Zone-Wide Regulation

It is proposed that the open season be shortened to eliminate winter fishing and the catch limit be reduced for natural Brook Trout waters to meet the objectives set for natural Brook Trout populations. No winter fishing would align with Algonquin Provincial Park.

Currently, winter fishing is already prohibited in 23 lakes (and Algonquin Provincial Park). The elimination of winter fishing zone-wide will protect populations at the time that they are most vulnerable to exploitation and the lower catch limit will reduce open water harvest. The intent is that by maximizing the quality of the open water fishery, it may reduce the risk of intentional introductions of other sport fish species that compete with Brook Trout. The size limits that are currently in place on a small number of lakes in the zone will be eliminated. A shorter season and lower catch limit will achieve a similar result, without the necessity of measuring fish and potential associated mortality. This proposed regulation is a Management Action to achieve both Objective 1 and Objective 2.

Prime Natural Lakes

Prime natural Brook Trout lakes are those which do not have populations of competitive spiny-rayed species such as Yellow Perch and bass and have habitat that supports quality, fishable populations. In addition to the zone-wide regulation, it is proposed that the use and possession of live baitfish be prohibited in prime lakes to minimize the risk of the introduction of harmful species via the personal and commercial bait industry pathways. These lakes would be listed as Exceptions.

Currently, 40 natural lakes have a ban on the use of live baitfish. The list will be updated based on the latest information available at the time of implementation of this management plan and the provincial bait management strategy. A working list of lakes proposed is found in Appendix B .

Additionally, it is proposed that a sub-set of prime natural Brook Trout lakes will have a novel regulation applied as a disincentive to illegal stocking of other sport fish species. The selected lakes are those lakes that are at a high risk of illegal sport fish introductions due to accessibility and/or support particularly high-quality fisheries. For these lakes, the season will be closed all year for species that are commonly stocked illegally. The intent of this regulation is to discourage the intentional stocking of competing sport fish species. The hope is that anglers will be less likely to illegally stock other sport fish species if there is no open season to fish for them. It is currently illegal to transfer live fish without a licence, but it was felt that additional actions are needed to try to protect remaining high-quality fisheries. If other sport fish species do become established, the closed seasons will be kept maintaining the disincentive for illegal stocking.

Ontario's Sustainable Bait Management Strategy

In 2020, during the preparation of this plan, the province released Ontario's Sustainable Bait Management Strategy, 2020 (OMNRF 2020b). The strategy states that the use and storage of bait will be prohibited in native Brook Trout lakes. The determination of what constitutes a native Brook Trout lake for the purposes of the bait strategy is ongoing. It is expected to be more inclusive than the list of prime Brook Trout lakes presented in this plan. Therefore, the bait restrictions proposed in this plan are likely to be superseded by the implementation of the provincial bait strategy.

New rules that came into effect on January 1, 2022:

- Establishing four Bait Management Zones (BMZs) to limit the movement of baitfish and leeches in Ontario
- Restricting the transportation of baitfish or leeches, whether live or dead, into or out of a BMZ with some limited exceptions
- Anglers fishing outside their home BMZ must purchase baitfish and leeches locally, retain a receipt and use or dispose of their bait within two weeks from when they were purchased
- Harvesting of baitfish and leeches by anglers may only occur in their home BMZ

Stocked Lakes: Additional Opportunities

Lakes that are stocked to create artificial fisheries, where significant natural reproduction is not known to occur, will be identified as providing 'additional' opportunities to offset the more conservative approach to natural waters. Stocked lakes will be open to fishing all year, with an unreduced catch limit.

Alternate Brook Trout Regulations

Other combinations of regulations were considered in addition to the preferred option shown above. These included keeping the existing zone-wide open season and/or catch limit (Table 4.4). Retaining the existing season was not preferred because only waters listed as exceptions would receive the desired reduction in winter fishing effort.

Table 4.4 Alternate Brook Trout regulations considered.

Proposed Regulation Option		Advisory Council Advice
Zone-Wide (Applies to all waters, unless listed as an Exception)	Season Open: • January 1st to September 30th Catch Limit: • 5(S) and 2(C)	A minority of the Advisory Council supported keeping the existing season. There was mixed support from the Advisory Council for keeping the existing catch limit due to concern for impact to the stream fishery, especially on streams where the average size of Brook Trout caught is smaller.
Prime Natural Lakes (Absence of harmful introduced species and support high quality fisheries and/or at high risk of intentional species introductions)	Season Open: • 4th Saturday in April to September 30th Catch Limit: • 2(S) and 1(C) Bait, Gear and Other Restrictions: • Use and possession of live baitfish prohibited. • Brook Trout fishing only, or, • Season closed for illegally introduced species after establishment	There were some Advisory Council members skeptical of the effectiveness of a "Brook Trout fishing only" regulation and whether anglers would understand the intent of the proposal to prohibit fishing of other species in the prime lakes. The Advisory Council felt that this could be effective if there was an educational program to accompany the regulation change to maximize effectiveness.

All streams and non-prime natural lakes (the substantial number of lakes that support minimized or remnant populations) would be open to winter fishing, as is currently the case. A potential advantage of keeping the existing season is that stocked lakes would not have to be listed as exceptions to provide a winter fishery. However, stocked lakes would have to be listed as exceptions if the chosen option was to provide a year-round fishery, as is currently the case on some stocked lakes.

Similarly, an option to keep the existing zone-wide catch and possession limit was considered. An advantage would be increased consistency; most natural water and stocked waters would have the same limit and only prime natural lakes would have the reduced limit. The main disadvantage is that many low abundance and remnant populations would have a liberal limit which is inconsistent with the Planning Team's desire to establish limits that reflect the productivity of the resource and to divert angling effort away from natural waters.

Finally, a variation of the alternate option is to prohibit fishing for introduced species in prime natural Brook Trout lakes after a species has become established, rather than pro-actively prohibiting fishing for undesirable species before they are introduced.

Depending on the final option selected for the zone-wide season and catch limit, the details of the exceptions for the prime natural lakes will be adjusted accordingly, with the intent that the shorter season and reduced limit would apply.

The Planning Team and Advisory Council explored the possibility of creating 'special' regulation waters with the intent of either providing particularly high quality or unusual fishing opportunities and/or to bring profile to them. The Big East River was discussed as a candidate for a catch and release fishery. The river section located within the regulated boundary of Big East River Provincial Park between the Algonquin Provincial Park boundary and the Distress dam has a reputation for supporting a quality small river population and fishery. However, because of relatively poor access and an absence of quantitative information on the population or the fishery a decision has been deferred. Gathering information has been identified as a monitoring need at this time.

Monitoring and Assessment

Monitoring of the Brook Trout resource is challenging due to the large numbers of lakes and streams, many of which are small and are difficult to access. A benchmark and target for the number of natural Brook Trout lakes in the zone could not be established because of the large number of lakes of undetermined status and the significant amount of time that has passed since many lakes were last sampled. Improving our understanding of the current distribution and status of Brook Trout will be a monitoring priority. Please refer to the Background Report for further information.

Lakes selected for Brook Trout monitoring in Cycle 1 and 2 of the BsM program included many lakes with marginalized populations. Consequently, few or no Brook Trout were caught in many lakes making it difficult to establish some population indicators. The low abundance of Brook Trout in these lakes is reflective of the state of the resource for Brook Trout in FMZ 15.

Beginning in Cycle 3, changes to the BsM program are aimed at increasing the sample size of Brook Trout lakes in FMZ's across Southern Region, to improve the quality and quantity of information collected. Additional data collection initiatives, such as local targeted assessments, may serve to complement the BsM program, providing valuable information on presence/absence across a large number of lakes and increase our confidence in assessments of Brook Trout status.

Currently, there is no provincial monitoring program for streams. Information on streams is used in other planning processes (e.g., forest management, municipal planning) so that populations and their habitat may be protected. Local targeted assessments could support and enhance the information that is acquired through these various initiatives, thereby contributing to the achievement of the objectives of this plan. The priority for local inventory is to determine the presence/absence of Brook Trout in watersheds in the zone as well as to identify the locations of important habitat features.

Currently, there are no provincial monitoring programs that assess stocked Brook Trout lakes. The need for effectiveness assessments, that is post-stocking assessment, should be carefully considered and guided by the stocking objectives and strategies of this plan (see Section 4.3). Specific information needed for the stocking program include:

- Status of access
- Fish community composition (presence/absence of natural Brook Trout and harmful species (perch, bass etc.)
- Habitat suitability
- Angling effort
- Demographic/social information on angler preferences

4.2.2 Lake Trout

Lake Trout are the keystone species of FMZ 15. The zone is one of three areas in the province with a high concentration of lakes that support native Lake Trout populations, which underscores the importance of managing this species sustainably within the zone. Lake Trout occupy many lakes across the zone, including most large lakes and support a large and intense fishery. Major stressors include climate change, shoreline development, introduced species and exploitation. There is a high level of risk of significant declines and losses of Lake Trout populations. Following the broad fish community objectives, a conservative approach to Lake Trout management is proposed.

Management Issues and Challenges

- Innate low productivity of the species due to habitat requirements, slow growth and late maturation.
- Diverse population characteristics such as lake size and geographic distribution and fish growth and size potential.
- Climate change is expected to have a significant impact on habitat suitability and productivity.
- Unsustainable exploitation.
- Vulnerability to impacts from introduced species, including Rainbow Smelt, Smallmouth Bass and Walleye.
- Management of Lake Trout is complex within multi-species fisheries, which may have management objectives that conflict with Lake Trout (e.g., Walleye).
- Intensive shoreline development on a high proportion of lakes and vulnerability to this shoreline development (direct impact on water quality and habitat with temperature and dissolved oxygen changes and phosphorus loading).
- Vulnerability of Lake Trout to impacts from fishing practices that cause unintended mortality (temperature sensitivity, deep hooking, artificial bait ingestion and barotrauma).
- Existing complex and inconsistently applied suite of regulations.

Management Strategy

The Ministry, with the advice of the Advisory Council, developed goals, objectives, strategies and management actions to address the issues and challenges related to Lake Trout (Table 4.5, Table 4.6).

Table 4.5 Lake Trout management strategy.

Goal *Conserve natural Lake Trout populations*

Objectives	Indicator(s)	Benchmark(s)	Targets
Maintain the number and distribution of natural Lake Trout populations (O1)	**Primary – Short Term**		
	Number of designated Natural lakes	176 lakes (OMNRF 2015a)	≥ 176 natural lakes
	Supporting – Short Term		
	Hypolimnetic volume (proportion of BsM lake volume) of BsM trend lakes to determine thermal loss of habitat	Proportion of hypolimnetic volume for BsM Cycle 1 = 0.57	Maintain proportion of hypolimnetic volume (0.57)
	Mean volume-weighted hypolimnetic dissolved oxygen concentration of BsM trend lakes	Mean volume-weighted hypolimnetic dissolved oxygen concentration (mg/l) for BsM Cycle 1 = 9.43 mg/l Note: taken from sampling that occurred after August 1st in each sampling season	Maintain mean volume-weighted hypolimnetic dissolved oxygen concentration (mg/l) (9.43 mg/l)
	Mean volume-weighted hypolimnetic dissolved oxygen concentration of designated FMZ 15 lakes	To be determined; benchmark will be established using Lakeshore Capacity Assessment Program database	Maintain volume-weighted hypolimnetic oxygen concentration relative to baseline value established using Lakeshore Capacity Assessment program database

Objectives	Indicator(s)	Benchmark(s)	Targets
Improve the status of natural Lake Trout populations and fishing opportunities (O2)	**Primary - Short Term**		
	Recruit CUEW (recruits > 350 mm) captured with large-mesh (NA1) gill nets	Average (area weighted) recruit (> 350 mm) CUEW from BsM Cycle 1 = 0.41 kg/gang	Average (area weighted) recruit (>350 mm) CUEW ≥ 0.41 kg/gang
	Average AW (area-weighted) number of Lake Trout cohorts	Average AW (area weighted) number of Lake Trout cohorts from BsM Cycle 1 = 6.73	Average (area weighted) number of Lake Trout cohorts ≥ to 6.73
	Supporting – Short Term		
	Hypolimnetic volume (proportion of BsM lake volume) of BsM trend lakes to determine thermal loss of habitat	Proportion of hypolimnetic volume for BsM Cycle 1 = 0.57	Maintain proportion of hypolimnetic volume (0.57)
	Mean volume-weighted hypolimnetic dissolved oxygen concentration of BsM trend lakes	Mean volume-weighted hypolimnetic dissolved oxygen concentration (mg/l) for BsM Cycle 1 = 9.43 mg/l Note: taken from sampling that occurred after August 1st in each sampling season	Maintain mean volume-weighted hypolimnetic dissolved oxygen concentration (mg/l) (9.43 mg/l)
	Mean volume-weighted hypolimnetic dissolved oxygen concentration of designated FMZ 15 lakes	To be determined; benchmark will be established using Lakeshore Capacity Assessment Program database	Maintain mean volume-weighted hypolimnetic dissolved oxygen concentration (mg/l) for designated lakes sampled through Lakeshore Capacity Assessment Program

Objectives	Indicator(s)	Benchmark(s)	Targets
	Estimated summer and winter angling intensity (hrs/ha per year) for targeted Lake Trout lakes	BsM Aerial surveys of angling intensity (hrs/ha per year) on Lake Trout target lakes in Cycle 1: • Summer Intensity = 2.85 • Winter Intensity = 2.52 • Average annual angling intensity = 5.37	Angling intensity (hrs/ha per year) to remain at or below baseline values
	Primary – Long Term		
	Percentage of FMZ 15 Lake Trout lakes where observed biomass of Lake Trout is 30% above biomass at maximum sustainable yield (biomass ≥ 1.3 B_{MSY})	Percentage of Lake Trout lakes in FMZ 15 where the observed biomass values for Lake Trout are ≥ than the biomass reference point. Note: baseline values are to be determined in future BsM cycles when adequate Lake Trout sampling has been completed	Currently, it is not possible to determine target values for biomass due to small numbers of Lake Trout sampled in the first two cycles of BsM. Additional sampling in future BsM cycles will allow for determination of target values
	Percentage of FMZ 15 Lake Trout lakes where fishing mortality of Lake Trout is ≤ 75% of natural mortality (F ≤ 0.75 M)	Percentage of Lake Trout lakes where fishing mortality is ≤ 75% of natural mortality (F ≤ 0.75 M). Note: baseline values to be determined in future BsM cycles when adequate Lake Trout sampling has been completed in FMZ 15	Currently, it is not possible to determine target values for biomass fishing mortality due to small numbers of Lake Trout sampled in the first two cycles of BsM. Additional sampling in future BsM cycles will allow for determination of target values

Objectives	Indicator(s)	Benchmark(s)	Targets
Enhance angling opportunities for stocked Lake Trout (O3)	**Primary - Short Term**		
	Number of lakes and fish stocked	72 waterbodies (2016—2020): • 38 waterbodies/year • Yearling: 44,831/year • Sub-adult: 8,459/year	≥ 2016—2020 number of waterbodies and fish stocked

Table 4.6 Lake Trout management actions. Values in brackets denote which objectives each action addresses.

Lake Trout Management Actions
• Prohibit the use of live baitfish in natural Lake Trout lakes that have not been impacted by introduced species. (O1, O2) • Implement a conservative sport fishing regulation on natural Lake Trout lakes. (O2) • Educate anglers on the impacts of fishing practices on mortality and means of reducing it. (O2) • Educate anglers on the impact of introduced species to discourage illegal stocking. (O1, O2) • Identify or confirm body size of natural Lake Trout populations where uncertainty exists using BsM and local targeted assessments. (S1, S2) • Implement mechanism to minimize the introduction of new species through regulation and/or education where appropriate. (O1, O2) • Develop criteria to define candidate populations and implement lake-specific rehabilitation or re-introduction strategies where appropriate. (O1, O2) • Protect Lake Trout thermal habitat by continuing to implement the dissolved oxygen policy for determining lakeshore capacity. (O1, O2, O3) • Identify and implement opportunities for spawning habitat restoration and enhancement where it can be demonstrated that habitat is limiting. (O1) • Continue to participate in established review and planning processes (e.g., forest management, municipal planning, water management) to protect fish habitat. (O1, O2) • Implement stocking strategy for Lake Trout. (O3, Section 4.3) • Encourage and promote harvest opportunities for other species, especially introduced species that may impact Lake Trout. (O1, O2) • Support Fisheries Policy Section in their maintenance and periodic review of the formal list of designated Lake Trout Lakes and “At capacity” designation, including local monitoring population status, Dissolved Oxygen monitoring and developing criteria for defining natural population status. (O1, O2)

Objectives and Rationale for Lake Trout

The Ministry, with advice from the Advisory Council, developed the following objectives to work towards the goal of conserving natural Lake Trout populations in FMZ 15, using the best available science and research, local knowledge, and social considerations.

Objective 1: Maintain the number and distribution of natural Lake Trout populations

Lake Trout populations will be managed to support long-term viability and resilience of populations to major stressors including shoreline development, high exploitation, species introductions and climate change. To do so, the first objective is to manage as many populations as naturally reproducing and self-sustaining as possible. This will be achieved primarily by protecting habitat, stocking only in accordance with the Lake Trout stocking strategy (Section 4.3), implementing a conservative harvest regulation to increase the resiliency of populations and implementing mechanisms to minimize the introduction of new species through regulation and education where appropriate.

Habitat protection will continue to occur through application of the Dissolved Oxygen Criterion for the Protection of Lake Trout Habitat (OMOE 2010); it will continue to be applied with other measures such as buffers in partnership with MECP and municipalities through the municipal planning process to protect Lake Trout habitat from the impacts of shoreline and watershed development. The concentration of dissolved oxygen in the hypolimnion is included as a supporting indicator of this objective owing to its importance as a critical habitat feature needed to support healthy Lake Trout populations. Currently, dissolved oxygen concentration data is being collected via the BsM program as well as through a partnership program with MECP Locally identified opportunities for spawning habitat restoration or enhancement will also be pursued.

Objective 2: Improve the status of natural Lake Trout populations and fishing opportunities

Abundant populations with a broad range of age classes are most resilient to changes from habitat loss due to climate change, introduced species and other stresses. Efforts to maintain and improve the status of natural Lake Trout populations will be accomplished, in part, through the proposed angling regulation changes (Table 4.7). Increasing the abundance of Lake Trout populations will be challenging and will depend on the degree to which habitats are altered or degraded as a consequence of various habitat stressors. Reducing angler harvest through regulation changes is an important management tool that will allow populations to withstand other stressors, while still providing a vibrant recreational fishery. The stocking strategy provides more detail on the proposed role of Lake Trout stocking in providing additional angling opportunities.

Objective 3: Enhance angling opportunities for stocked Lake Trout

Lake Trout will continue to be stocked on a PGT basis to create angling opportunities and divert effort from natural lakes. One option is to increase stocking in lakes near towns that are easily accessible. Determining the success of this option will be important in future management decisions. It is expected that the proposed change to the regular open season will result in increased use of, and demand for, stocked lake opportunities. The stocking program will be reviewed to address this expectation (Section 4.3.4).

Lake Trout Regulation Options

Regulation options were developed with the assistance of the Fisheries Management Support System (FMSS) model. Many regulation scenarios were explored using a range of fishing effort levels to predict how different population and fishery parameters would react. Details of the model calibration and scenarios examined are found in the Background Report.

Proposed Regulation Options and Rationale

To meet the goal and objectives for Lake Trout, a conservative approach to managing the recreational fishery is proposed. Owing to the diverse nature of Lake Trout populations and the fishery, a suite of standard regulations is needed to balance a desire to tailor regulations to individual lakes and avoiding excessive complexity (Table 4.7).

Productive capacity is the driver of Lake Trout growth potential. Productive capacity of lakes varies by lake size. Larger lakes tend to have longer food chains (e.g., open water forage fish) which allows for the greater growth potential relative to lakes having plankton-feeding Lake Trout. Therefore, it is proposed that natural lakes be categorized by these factors and that a different combination of regulations be applied to each category. The four categories are:

- Small lakes (<500 ha) with small-bodied Lake Trout populations
- Small lakes with large-bodied Lake Trout populations
- Large lakes (>500 ha) with small-bodied Lake Trout populations and
- Large lakes with large-bodied Lake Trout populations.

Table 4.7 Proposed angling regulations for Lake Trout, FMZ 15. A draft list of lakes to which each option would apply are found in Appendix C .

	Small-bodied Populations	Large-bodied Populations
Small Natural Lakes (<500 ha)	Zone-wide Regulation (Applies to all lakes not listed as Exceptions) Open Season: • 3rd Sat. in May to Labour Day Catch Limit: • 2(S) and 1(C) Size Limit: • Minimum 40 cm	Standard Exception Open Season: • 3rd Sat. in May to Labour Day Catch Limit: • 2(S) and 1(C) Size Limit: • Minimum 50 cm
Large Natural Lakes (>500 ha)	Standard Exception Open Season: • Saturday before Family Day to 3rd Sun. in March and 3rd Sat. in May to Labour Day Catch Limit: • 2(S) and 1(C) Size Limit: • Minimum 40 cm Gear Restriction • Only one line may be used when angling through the ice	Standard Exception Open Season: • Saturday before Family Day to 3rd Sun. in March and 3rd Sat. in May to Labour Day Catch Limit: • 2(S) and 1(C) Size Limit: • Minimum 50 cm Gear Restriction • Only one line may be used when angling through the ice
Put-Grow-Take Stocked Lakes	Open Season: • Open All Year Catch Limit: • 2(S) and 1(C) Size Limit: • None Gear Restriction: • None; two lines may be used when angling through the ice	

	Small-bodied Populations	Large-bodied Populations
Advisory Council Advice	The Advisory Council was divided on the preferred management approach for Lake Trout. Of the three options considered (Table 4.7, Table 4.8, Table 4.9) the preferred was intermediate in restrictiveness. Some members preferred a more restrictive alternative approach of no winter fishing in all natural Lake Trout lakes, while some preferred the somewhat more liberal approach of allowing winter fishing in most lakes. In both instances, very small lakes (<100 ha) could be considered as exceptions, where winter fishing would not be permitted. Similarly, the Advisory Council had differing views regarding the spring opening season date and fall closing date. Some felt that the reduction in the spring and/or fall seasons was excessive considering that all lakes would have a minimum size limit and reduced or no winter season. Rationale for allowing the early spring fishery included: i) the season for cool and warm water species was also not open at that time of year leaving few other angling opportunities ii) the potential diversion of fishing effort to Algonquin Provincial Park iii) the low catch and release mortality rate when the surface water is cold iv) fish are in shallow waters at this time of year. Reasons for not supporting the earlier fall closing included: i) economic impacts to businesses ii) the observation that fishing effort and boat traffic on the lakes is relatively light at this time of year The FMZ 15 Advisory Council members were asked for their preference of allowing one line in the winter or prohibiting the use of baitfish. Most members did not support either option, but when asked to specify a preference, chose the one-line option over the bait restriction. Most members favour education instead.	

The proposed open season for small lakes (<500 ha) occurs between the 3rd Saturday in May to Labour Day in September. Populations in small lakes are typically more susceptible to over-exploitation than those in larger lakes. Lake Trout are highly catchable during the winter and early spring; in early fall, mature female Lake Trout are feeding heavily in preparation for spawning. The proposed season would eliminate fishing during these vulnerable times with the goal of reducing overall fishing effort and mortality. Many small lakes in the zone are already closed to winter fishing and some have delayed spring opening. The proposed season would be applied more consistently than is currently the case and extended up to lakes that are 500 ha. Some of the existing winter closures are in the form of sanctuaries. Most sanctuaries will be removed, and the standard season applied. This will allow fishing for other species where they exist and reduce the complexity of the angling rules.

Populations in larger lakes tend to be less prone to over-harvest, therefore a short winter season is proposed. Large lakes are proposed to be open from the Saturday of the Family Day weekend to the 3rd weekend in March. The timing of the winter season was chosen to occur when ice conditions are generally most reliable and matches that already in place in adjacent FMZ 11.

It is proposed that size limits be applied to all natural Lake Trout lakes based on the growth and body-size potential of each population. Lakes with small-bodied populations will have a 40 cm minimum size limit and those with large-bodied populations will have a 50 cm minimum size limit. The minimum size limits will replace the existing protected slot size limits that are currently in place (and inconsistently applied) on 85 lakes in the zone and be applied to all other lakes that currently do not have a size limit. The size limits approximate the size at maturity of each population type. Minimum size limits are suitable for application to Lake Trout due to their low natural mortality; if caught and released using good practices fish have a high probability of contributing to the fishery and/or spawning population in the future.

Protection of small-bodied Lake Trout populations under the proposed minimum 40 cm regulation should allow for an increase in both juvenile and recruit-sized individuals. In addition, modelling results indicate that anglers will benefit from increased catch and harvest rates. In contrast, modelling results using the minimum 50 cm regulation for large-bodied populations will stabilize juvenile and recruit-sized individuals while ensuring that current catch and harvest rates are maintained. Applying a more restrictive regulation (minimum 55 cm) on large-bodied populations would have further reduced angler catch and harvest rates. Fishing effort levels above the current zone-wide average of 6 hrs/ha would result in reduced population abundance of both small- and large-bodied Lake Trout populations. Modelling simulations using a fishing effort level of 12 hrs/ha resulted in the collapse and near collapse of small-and large-bodied populations, respectively. Limiting the harvest to fish of a larger size will help maintain yields as the

average size of harvested fish will be larger than is currently the case in many lakes.

Designated natural Lake Trout lakes were screened to determine their surface area and the body size of the population. The combination of no winter season and minimum size limit of 40 cm is proposed to be the zone-wide standard because the greatest number of lakes are small lakes with small-bodied populations. Applying the zone-wide regulation to these lakes minimizes the number of lakes that must be listed as exceptions in the regulations and the published summary.

A small number of lakes >500 ha in surface area which are currently managed for rehabilitation (e.g., Eels Lake) or have extremely limited volumetric habitat for Lake Trout (e.g., Baptiste Lake) were assigned to the more conservative season regulation that did not match their lake size. Refer to Appendix F for further details on the rationale and plan for implementation on these lakes.

The existing daily catch and possession limit of 2(S) and 1(C) will be retained. Reducing the limit to 1(S) and 0(C), respectively was considered. Lower limits may convey to anglers a more realistic expectation of the harvest potential of Lake Trout lakes but would not likely reduce harvest significantly on most lakes. Retaining the higher limit will allow anglers to harvest 2 fish on those lakes with higher abundance that can sustain more harvest.

To address the potential impact of catch and release mortality caused by the release of fish subject to the size limit, it is proposed that only one line may be used while fishing through the ice. Persons and Hirsch (1994) found that mortality rates are reduced when only one line is used while not greatly impacting angling catch rates. The use of one line would be needed regardless of which fish species are being sought. The Planning Team also considered a regulation controlling the use of baitfish, but that option had little support from the Advisory Council, therefore it is not being proposed as an option. Instead, education is proposed to support regulations to inform anglers of means to reduce mortality of live-released fish. Education is also needed on other aspects of angling practices such as discarding artificial baits that are later ingested by fish potentially impacting growth and even causing death.

If the proposed option is implemented, existing slot size limits would be removed and most winter sanctuaries would be removed, allowing winter fishing for other species (where they exist). Allowing winter fishing for other species may help reduce the impact of introduced species on Lake Trout. The existing early winter sanctuary on Lake Joseph is proposed to be kept due to the size and importance of the fishery.

A small number of Lake Trout lakes have not yet been impacted by introduced species; the use and possession of live baitfish will be prohibited in those lakes to protect their integrity.

Stocked Lakes: Additional Opportunities

Lakes that are managed to provide artificial fisheries supported by stocking will be managed with liberal regulations to divert fishing pressure from natural lakes and to provide more fishing opportunities. Lakes will be open to fishing for Lake Trout all year and no size limits nor a reduction in the number of lines will be in place as is currently the case for most stocked Lake Trout lakes. The stocking program will be reviewed and implemented in the following direction in Section 4.3.4.

Supplemental stocking refers to the ongoing stocking of fish into a waterbody where a naturally reproducing population is present. The primary objective of supplemental stocking is to improve fishing quality. As described in Section 4.3.4, supplemental stocking of Lake Trout will only occur when supported by a lake-specific management strategy. Currently, two lakes have been screened for the appropriateness of continued ongoing supplemental stocking, Lake Muskoka and Lake Bernard (Appendix D). It is proposed that supplemental stocking of Lake Muskoka be discontinued, and that Lake Bernard be continued. Due to the importance of the Lake Bernard fishery in FMZ 15, it is preferable to have a lake-specific regulation exception to mitigate the potential impact of supplemental stocking on the natural population.

Alternate Regulation Options

Two other regulation options were considered for natural Lake Trout (Table 4.8, Table 4.9). In the first alternative, the zone-wide open season would occur between the 3rd Saturday in May to Labour Day and only a small select group of the largest lakes would have a winter fishery. In this option, size limits would be applied in the same manner as the preferred alternative.

In the second alternative, the zone-wide open season would be from the Saturday of Family Day weekend to 3rd Sunday in March and 3rd Saturday in May to Labour Day. Size limits would apply as in the preferred alternative.

Table 4.8 Alternate angling regulation Option 1 for Lake Trout, FMZ 15.

Proposed Regulation Options	Advisory Council Advice
All Natural Lakes Open Season: • 3rd Saturday May - Labour Day Size restriction: • Minimum 40 cm; • exceptions 50cm for large-bodied populations ◦ Exceptions: Rosseau, Joseph, Muskoka, Lake of Bays with winter fishery of Saturday on Family Day weekend to 3rd Sunday in March with 1 line in winter PGT Lakes: • Open All Year • No Size Limit	More conservative than the preferred option as only a small number of the largest lakes would have a winter season. See Advisory Council advice in Table 4.7

Table 4.9 Alternate angling regulation Option 2 for Lake Trout, FMZ 15.

Proposed Regulation Options	Advisory Council Advice
All Natural Lakes Open Season: • Saturday of Family Day weekend - 3rd Sunday in March and 3rd Saturday May - Labour Day Size restriction: • Minimum 40 cm • Exceptions 50cm for large-bodied populations Very small lakes (<100 ha): • No winter season, 1 line in winter PGT Lakes: • Open All Year • No Size Limit • Two lines permitted in winter	Slightly more liberal than the preferred option as most lakes would be open for the winter season See Advisory Council advice in Table 4.7

Proposed Ban on the Possession and Use of Live Baitfish on Natural Lake Trout Lakes Absent of Deleterious Species

There are a limited number of natural Lake Trout lakes which do not currently contain deleterious species (Figure 4.2). To help prevent the introduction of deleterious species, a ban on the possession and use of live baitfish is being proposed on these waterbodies, consistent with the approach proposed for prime Brook Trout lakes (Table 4.10).

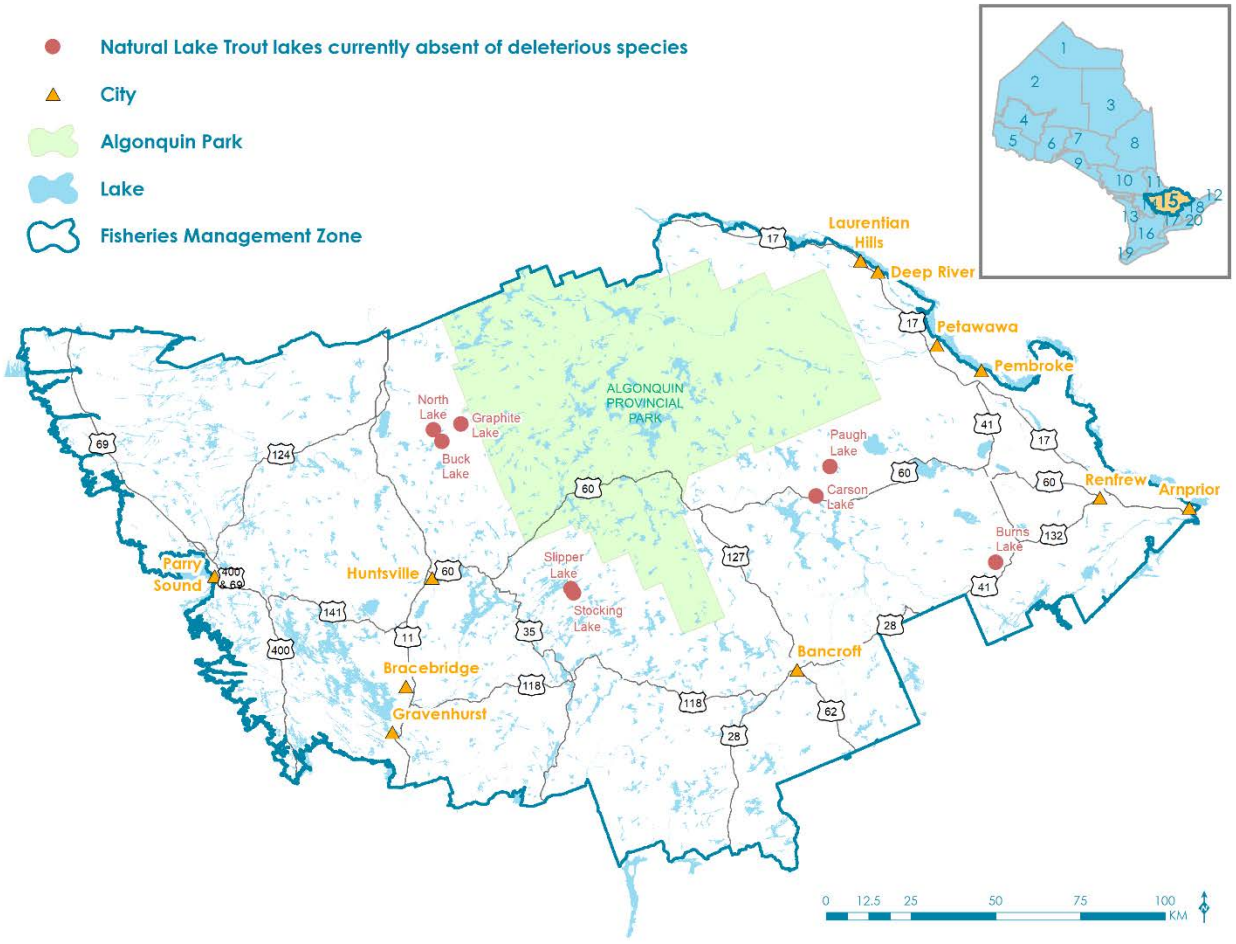

Figure 4.2 Natural Lake Trout lakes within FMZ 15 (excluding Algonquin Provincial Park), which do not currently contain deleterious species.

Updated fish community information for Slipper and Stocking Lake (Havelock Township) revealed the presence of Yellow Perch, consequently, these lakes were removed from Table 4.10. However, these two lakes remain under a proposed bait ban under the natural Brook Trout lake bait ban in accordance with Ontario's Sustainable Bait Management Strategy (OMNRF 2020b).

Table 4.10 Proposed management direction to protect natural Lake Trout lakes currently absent of deleterious species.

Lake Name	Township	Proposed Management Direction	Advisory Council Input
Buck Lake	Proudfoot	Live baitfish may not be used as bait or possessed for use as bait	Advisory Council strongly supported this.
Burns Lake	Griffith		
Graphite Lake	Butt		
North Lake	Proudfoot		
Paugh Lake	Burns		

Monitoring and Assessment

The provincial BsM program will comprise the core of the Lake Trout monitoring program. Long-term monitoring of the chosen set of trend lakes will provide information on changes in the abundance and population characteristics of natural lakes. Some additional lakes will be sampled as state lakes.

Local monitoring may be needed to supplement the data collected by the BsM program. This may take the form of increased BsM sampling intensity to improve the sample size of measured fish which would facilitate the calculation of mortality rate for more populations. In addition, sampling additional lakes may facilitate analyzing data to determine regulation options (season, size limit). Individual lakes being considered for lake-specific action, such as changing the management designation (natural or PGT, rehabilitation or supplemental stocking), may require local assessment to determine the appropriateness and effectiveness of these actions. Some lakes will also need to correctly identify or confirm body size of natural Lake Trout populations where uncertainty exists using BsM and local targeted assessments in order to apply correct regulation. In the small number of cases where uncertainty exists, the larger minimum size of 50 cm will be applied until the body size is confirmed.

FMZ 15 has the most comprehensive dataset of late summer dissolved oxygen measurements of anywhere in the province. Continuing to collect this data is critical to providing insight into changing habitat characteristics, particularly those caused by climate change. The Ministry and MECP have collaborated in collecting data from various parts of the zone. The Ministry will advocate MECP continuing to collect data and supplement what MECP can do with local District sampling. A standardized database for managing and analyzing the data will be required.

The BsM program does not sample stocked lakes, other than lakes randomly chosen as state lakes. A more conservative approach to managing natural lakes is expected to increase the importance of the PGT fishery and therefore the need for information to manage it effectively. Section 4.3 provides more detail on proposed monitoring approach for stocked fisheries.

4.2.3 Lake Whitefish

Lake Whitefish occur in over 100 lakes in the zone, but significant targeted fisheries only occur in a small number of lakes where high densities of Whitefish provide attractive catch rates. Populations in many lakes occur at a modest density and other lakes have poor recruitment, often due to impacts from introduced Rainbow Smelt. In most lakes exploitation rates are thought to be low. The current angling regulations for Whitefish in FMZ 15 follow the provincial standard and are very liberal (12(S) and 6(C)), a manifestation of their low profile as a sport fish in most areas of the province. Dip netting is currently permitted in 21 waterbodies during spawning season, and while little is known about the fisheries they provide, it is generally a niche opportunity and conflicts with the coldwater species and Lake Whitefish objectives for FMZ 15.

Management Issues and Challenges

- Impacts of introduced species, especially Rainbow Smelt, on abundance and recruitment in some lakes.
- Intense angling harvest on a small number of productive lakes.
- The current harvest number allowed for Lake Whitefish in FMZ 15 is very high and may exceed sustainability limits. A more modest harvest level would reflect the value of Lake Whitefish as a sport fish and indicate to anglers a more realistic measure of the productive capacity of most lakes in the zone.
- Rationalizing the existence of a dip netting fishery.
- Potential long-term impacts of climate change and introductions of non-native species.
- Addressing latent interest in fishing opportunities for whitefish.

Management Strategy

The Ministry with the advice of the Advisory Council developed goals, objectives, strategies and management actions to address the issues and challenges related to Lake Whitefish (Table 4.11, Table 4.12).

Table 4.11 Lake Whitefish management strategy.

Goal *Maintain Lake Whitefish populations*

Objectives	Indicator(s)	Benchmark(s)	Targets
Maintain the number of Lake Whitefish populations (O1)	**Primary – Short Term**		
	Number of lakes with Lake Whitefish populations	114 Lake Whitefish lakes in FMZ 15 from 2003 Atlas within FMZ 15 (OMNR 2003). Note: No populations documented to be lost or discovered since 2003	Number of Lake Whitefish lakes in FMZ 15 ≥ 114
	Supporting – Short Term		
	Average observed hypolimnetic volume in Lake Whitefish lakes (measured as proportion of lake volume below the thermocline)	Average hypolimnetic volume for BsM Cycle 1 = 0.49	Average hypolimnetic volume ≥ 0.49

Objectives	Indicator(s)	Benchmark(s)	Targets
Maintain the abundance of Lake Whitefish (O2)	**Primary - Short Term**		
	Recruit CUEW (recruits ≥400 mm) captured with large-mesh (NA_1) gill nets per BsM gang	Recruit CUEW (kg/gang) for BsM Cycle 1 = 0.42 kg/gang	Recruit CUEW (kg/gang) ≥ 0.42 kg/gang
	Supporting – Short Term		
	Average observed hypolimnetic volume in Lake Whitefish lakes (measured as proportion of lake volume below the thermocline)	Average hypolimnetic volume for BsM Cycle 1 = 0.49	Average hypolimnetic volume ≥ 0.49
	Primary – Long Term		
	Percentage of Zone 15 lakes in which Lake Whitefish occur where observed biomass of Lake Whitefish is 30% above biomass at maximum sustainable yield (biomass ≥ 1.3 B_{MSY})	Percentage of lakes in FMZ 15 in which Lake Whitefish were captured where the observed biomass values for Lake Whitefish are ≥ than the biomass reference point. Note: baseline values are to be determined in future BsM cycles when adequate Lake Whitefish sampling has been completed	Currently, it is not possible to determine target values for biomass due to small numbers of Lake Whitefish sampled in the first two cycles of BsM
	Percentage of FMZ 15 lakes in which Lake Whitefish occurs where fishing mortality is ≤ 75% of natural mortality (F ≤ 0.75 M)	Percentage of lakes in FMZ 15 in which Lake Whitefish were captured where fishing mortality is ≤ 75% of natural mortality (F ≤ 0.75 M). Note: baseline values to be determined in future BsM cycles when adequate Lake Whitefish sampling has been completed in FMZ 15	Currently, it is not possible to determine target values for fishing mortality due to small numbers of Lake Whitefish sampled in the first two cycles of BsM

Table 4.12 Lake Whitefish management actions. Values in brackets denote which objectives each action addresses.

Lake Whitefish Management Actions
• Distribute educational materials on impacts of introduced species and proper fish handling techniques. (O1, O2) • Reduce harvest of Lake Whitefish zone-wide to provide sustainable harvest opportunities and raise the social and ecological value of the species as a member of the coldwater fish community across the zone. (O1, O2) • Support Ministry science specialists to develop provincial Whitefish biological reference points to support broader context on the trends of Whitefish at a zone scale. (O1, O2) • Investigate the effectiveness of rehabilitative Lake Whitefish stocking efforts in Ontario and other jurisdictions and if possible, identify candidate populations for rehabilitation stocking and implement rehabilitation strategies where appropriate. (O1, O2) • Investigate the cause of population declines in historically productive populations and the current low recruitment in some populations. (O1, O2) • Eliminate recreational dip netting season across the zone to align with the coldwater fish community and Lake Whitefish objectives. Abolishing the harvest of Lake Whitefish during its spawning season will help raise the social and ecological value of the species as a member of the coldwater fish community. (O2)

Objectives and Rationale for Lake Whitefish

The Ministry, along with the Advisory Council, developed the following objectives for maintaining the Lake Whitefish populations in FMZ 15, using the best available science and research, local knowledge, and social considerations.

Objective 1: Maintain the number of Lake Whitefish populations

Lake Whitefish are a highly plastic species and perform complex roles in the food webs within which they exist, as both a top predator and prey base for other predators such as Lake Trout. Lake Whitefish occurrence in individual waterbodies is dependent on many factors, many of which are beyond our immediate control. The recreational fishing regulations should reflect the important values Lake Whitefish contribute to the coldwater fish community and provide more conservative harvest limits to support the long-term sustainability of populations.

Objective 2: Maintain the abundance of Lake Whitefish

Lake Whitefish will be managed conservatively across the zone to provide sustainable opportunities in the zone while concurrently raising the social and ecological value of the species as a key member of the coldwater fish community in FMZ 15.

Lake Whitefish Regulation Options

The current open season and catch limit for Lake Whitefish in FMZ 15 are:

- Season: Open All Year and
- Catch Limit: 12(S) and 6(C).

Fall dip-netting is permitted on 18 waterbodies.

Proposed Regulation Options and Rationale

It is proposed that the catch limit for Lake Whitefish be reduced considerably to recognize its value as a sport fish and to eliminate excessive harvest from a small number of lakes that have traditionally supported significant fisheries. The objective to maintain Lake Whitefish abundance requires a transition from the current liberal daily catch limit to a reduced catch limit in the realm of other coldwater fish species with similar life history traits (e.g., Lake Trout) to raise the social value of Lake Whitefish as a sport fish and member of the coldwater fish community. Three regulatory options for the daily catch limit are proposed below (Table 4.13). The number of options is a manifestation of the wide variation in the state of populations and fisheries in the zone and user perceptions.

Angler data from key fisheries indicate that a reduction to a limit of 4(2) would result in a modest reduction in harvest in the best fisheries and a minimal reduction of harvest in most fisheries but would establish a more realistic limit consistent with the overall goal for the species. A reduction to a limit of 2(1) would limit harvest in a more meaningful way and be consistent with limits for the other coldwater species such as Brook Trout and Lake Trout. It would also be the same as the limit in Lake Simcoe and would all but eliminate any diversion of effort from Lake Simcoe when the season is open and ice conditions are amenable. However, it may be perceived as too drastic from the current regulation given the limited amount of harvest outside of the handful of meaningful fisheries where the species persists. A limit of 6(3) would not limit harvest and is inconsistent but does reflect the low-profile status of Lake Whitefish in most lakes.

Table 4.13 Proposed Lake Whitefish regulation options.

Proposed Regulation Options	Advisory Council Advice
Season Open: • Open All Year Catch Limit: **Option 1** • 4(S) and 2(C) (preferred) **Option 2** • 2(S) and 1(C) **Option 3** • 6(S) and 3(C)	The Advisory Council unanimously agreed that the catch limit should be reduced from the current limit of 12(S) and 6(C) to exert some control of harvest. However, there was significant discussion on the impacts of implementing too conservative or too liberal of a daily catch limit. Considerations, such as the coldwater fish community objectives, best available information on harvest from well-established fisheries in the zone, economic impact on ice hut rentals and the tourism industry were discussed.

Cisco (Lake Herring) recreational fishing (angling) seasons and associated daily catch limits were not reviewed during this exercise given a lack of information and relatively low interest as a fishery across the zone.

Lake Whitefish and Cisco (Lake Herring) Dip Netting Regulation Options

Traditionally, there has been a zone-wide season for dip netting of Lake Whitefish and Cisco (Lake Herring) in FMZ 15 under the Ontario Fishery Regulations (2007) non-angling means of catching fish. In 2008, the fishery was constrained to 21 specific waterbodies (listed in Schedule D of Sport Fishing Variation orders for FMZ 15 at Sport fishing variation order for Fisheries Management Zone 15 | ontario.ca). Given dip netting opportunities target Lake Whitefish when they are vulnerable and the challenges observed with Lake Whitefish populations in the zone as described above, the relative use of this opportunity by dip netters was gauged with support from local enforcement and its risks were assessed.

The current Lake Whitefish and Cisco regulation for FMZ 15 has the following season and catch limit:

- Waterbodies: 21 waterbodies across the zone including:
  - Aylen Lake (45˚37'N., 77˚51'W.) – Dickens Township
  - Bonnechere River (45˚37'22"N., 77˚27'08"W.) – North Algona, Fraser and Hagarty Townships, between the Tramore Bridge and Golden Lake,
  - Bonnechere River (Richards Township) – between Jacks Chute and Round Lake,

  - Boshkung Lake (45°04'N., 78°44'W.) – Stanhope Township,
  - Canning Lake (44°56'27"N., 78°38'50"W.) – Minden and Snowden Townships,
  - Carson Lake - (45°30'50"N., 77°45'31"W.) – Jones and Sherwood Townships,
  - Dam Lake (45°25'18"N., 77°32'22"W.) – Radcliffe Township,
  - Diamond Lake (45°22'07"N., 77°32'13"W.) – Radcliffe Township,
  - Golden Lake (45°33'56"N., 77°19'29"W.) – North and South Algona Townships,
  - Greenan (Kulas) Lake (45°28'16"N., 77°44'03"W.) – Jones and Sherwood Townships,
  - Halfway Lake (45°24'43"N., 77°35'52"W.) – Radcliffe Township,
  - Haliburton Lake (45°11'34"N., 78°23'47"W.) – Harburn Township,
  - Kashagawigamog Lake (44°59'49"N., 78°35'22"W.) – Dysart and Minden Townships,
  - Mocassin Lake (45°14'14"N., 77°30'03"W.) - Raglan Township,
  - Narrows between Legrou and Chartier Lake (45°50'55"N., 79°53'00"W.) – Mills Township,
  - Oblong Lake (45°10'46"N., 78°25'58"W.) – Harburn Township,
  - Raglan (White) Lake (45°16'21"N., 77°30'42"W.) – Raglan Township,
  - Trout (Stubbs) Lake (45°29'31"N., 77°44'36"W.) – Jones and Sherwood Township,
  - Twelve Mile Lake (45°01'31"N., 78°42'22"W.) – Minden Township,
  - Victoria Lake (45°37'N., 78°01'W.) – Murchison and Clancy Townships,
  - Wadsworth Lake (45°26'22"N., 77°34'48"W.) – Radcliffe Township
- Season: October 1st – December 15th
- Method: Dip net day or night
- Gear: Dip net may not be more 183 cm (6 ft) on each side if square, or 183 cm (6 ft.) in diameter, if circular
- Catch Limit: 12(S) and 6(C) for Lake Whitefish; No limit for Cisco (Lake Herring)

Proposed Dip Netting Regulation for Lake Whitefish and Cisco (Lake Herring) Option and Rationale

Dip netting during vulnerable periods of spawning is inconsistent with the management objectives of Lake Whitefish as a valued coldwater sport fish species in FMZ 15. The prohibition of the capture of fish by means other than angling and during the spawning season when fish are concentrated and vulnerable to over-harvest are generally accepted approaches to recreational fisheries management for other important coldwater species in Ontario. Therefore, it is proposed that the practice of dip-netting for Lake Whitefish (day or night) and Cisco (at night for the purposes of consumption) be eliminated in the zone (Table 4.14).

Table 4.14 Proposed Lake Whitefish and Cisco (Lake Herring) dip netting regulation.

Proposed Regulation	Advisory Council Advice
Season Open: • No Season Method: • None Gear: • None Catch Limit: • None	The Advisory Council unanimously agreed that there no longer be a season by means other than angling (dip netting) for Lake Whitefish or Cisco (Lake Herring) in FMZ 15.

Alternate Dip Netting Regulation Option and Rationale

As the Advisory Council was unanimously supportive of the proposed dip netting regulation changes for Lake Whitefish and Cisco (Lake Herring), no alternative options were considered. However, it is acknowledged that identifying and consulting with active dip netters is challenging given the niche and relatively limited opportunity it provides. The public consultation process for this plan may provide feedback on this proposal from the dip netting community and it will be considered within the management objectives for Lake Whitefish.

Monitoring and Assessment

Zone-wide monitoring of Lake Whitefish populations will continue to occur through the provincial BsM program. Even though Lake Whitefish are not a target species for trend monitoring, many lakes that support Lake Whitefish also have either Lake Trout or Walleye, therefore a considerable part of the whitefish resource will be monitored.

Local targeted assessments of the major fisheries (including Lake Bernard, Lake of Bays, Twelve Mile Lake, Haliburton Lake) will be considered to supplement BsM data. Data collected during angler surveys proved particularly useful during plan development in the support of decisions regarding realistic daily catch limits.

4.2.4 Northern Pike

Northern Pike are not native to much of FMZ 15, based on historical (OMNR 1990) and contemporary inventory data. Their introductions have had profound effects on the native fish community and their continued expansion across the zone poses undesirable risks to the recreational fisheries where they become established. However, where already established, there exists a viable recreational fishing opportunity that may provide harvest opportunities and their interest from anglers as an angling opportunity is considerable in the zone (OMNRF 2015c).

Management Issues and Challenges

- Pike are not native to much of the zone; their range has drastically expanded and has affected native fish communities.
- Vulnerable to over-exploitation and/or reduction in fishing quality due to vulnerability to angling.
- Conflicting angler perspectives of the species which vary based on angling community and geographic location in the zone, on whether they are viewed as a trophy fish requiring conservation, or an under-utilized harvest opportunity where they are not native.

Management Strategy

The Ministry with the advice of the Advisory Council developed goals, objectives, strategies and management actions to address the issues and challenges related to Northern Pike (Table 4.15, Table 4.16).

Table 4.15 Northern Pike management strategy.

Goal *Maintain the Northern Pike fishery within FMZ 15*

Objectives	Indicator(s)	Benchmark(s)	Targets
Maintain the abundance of Northern Pike populations (O1)	**Primary – Short Term**		
	Recruit CUEW (recruits>500 mm) captured with large-mesh (NA1) gill nets	Recruit CUEW (kg/gang) for BsM Cycle 1 = 0.37 kg/gang	Maintain Recruit CUEW 0.37 kg/gang
	Primary – Long Term		
	Percentage of Zone 15 lakes in which Northern Pike occur where the observed biomass of Northern Pike is 30% above biomass at maximum sustainable yield (biomass ≥ 1.3 B_{MSY})	Percentage of lakes in FMZ 15 in which Northern Pike were captured where the observed biomass values for it are ≥ than the biomass reference point. Note: baseline values are to be determined in future BsM cycles when adequate Northern Pike sampling has been completed	Currently, it is not possible to determine target values for biomass due to small numbers of Northern Pike sampled in the first two cycles of BsM

Objectives	Indicator(s)	Benchmark(s)	Targets
	Percentage of FMZ 15 lakes in which Northern Pike occurs where fishing mortality is ≤ 75% of natural mortality (F ≤ 0.75 M)	Percentage of lakes in FMZ 15 in which Northern Pike were captured where fishing mortality is ≤ 75% of natural mortality (F ≤ 0.75 M). Note: baseline values to be determined in future BsM cycles when adequate Northern Pike sampling has been completed in FMZ 15	Currently, it is not possible to determine target values for fishing mortality due to small numbers of Northern Pike sampled in the first two cycles of BsM
Minimize further unauthorized introductions of Northern Pike into new waterbodies (O2)	**Primary - Short Term**		
	Average number of cohorts (age classes) captured with large-mesh (NA1) gill nets	Number of cohorts in BsM Cycle 1 = 3.9	Average number of cohorts > 3.9
	Number of lakes with Northern Pike populations	Number of Northern Pike lakes = 444 (ARA, 2017)	Maintain number of lakes containing Northern Pike at benchmark value = 444 lakes
	Supporting – Short Term		
	Proportion of all lakes sampled that have Northern Pike populations	Proportion of lakes having Northern Pike for BsM Cycle 1 = 0.54	Maintain the proportion of lakes containing Northern Pike at 0.54

Table 4.16 Northern Pike management actions. Values in brackets denote which objectives each action addresses.

Northern Pike Management Actions
• Maintain current zone-wide daily catch limit (6(S) and 2(C)) and season duration (Jan. 1st – Mar. 31st and 3rd Sat in May to Dec. 31st). (O1) • Educate the public on the negative impacts of Northern Pike illegal introductions and promote harvest of Northern Pike as an alternative species via the development and distribution of factsheets to Cottage Associations and FMZ 15 Onesite page at the zone-scale. Additional targeted outreach on the impacts of illegal introductions will occur for lakes or watersheds where significant native species fisheries exist which have not yet been impacted by Northern Pike introductions. (O2)

Objectives and Rationale for Northern Pike

The Ministry, along with the Advisory Council, developed the following objectives for maintaining the native Northern Pike fishery, using the best available science and research, local knowledge, and social considerations.

Objective 1: Maintain the abundance of Northern Pike populations

While the introduction of Northern Pike into waterbodies have had negative impacts on the native fish communities, it is recognized that they can also provide quality angling and harvest opportunities where established. This objective strives to balance the ecological and social influence of this species within the zone.

Objective 2: Minimize further unauthorized introductions of Northern Pike into new waterbodies.

Prevention of new introductions will be a key part to the management of Northern Pike in FMZ 15 given their influence on the abundance of other native species such as Lake Trout which are a management priority for the zone. To achieve this objective, education and awareness of the impacts of introductions will be a focused action for the zone.

Northern Pike Regulation Options

The current Northern Pike regulations for FMZ 15 include the following season and catch limits:

- Season: January 1st to March 31st and 3rd Saturday in May to December 31st and
- Catch Limit: 6(S) and 2(C).

Proposed Regulation Option and Rationale

Based on the limited available data on Northern Pike populations in FMZ 15, the Ministry along with the Advisory Council felt that there was insufficient management need or interest to warrant proposing a change to the current regulation at this time.

4.2.5 Muskellunge

Muskellunge is Canada's second largest freshwater fish and is a highly sought-after trophy sportfish in Ontario. Its native distribution was limited to the lower elevations of the Great Lakes-St. Lawrence system. It has a limited native range within FMZ 15, where it occurs naturally in a small number of lakes and rivers. Its range has increased through unauthorized introductions and migration via connected waters.

Muskellunge abundance is not well documented within FMZ 15. The species is not susceptible to BsM gear, and therefore, standardized abundance metrics are not available. The primary source of data available is the Muskies Canada Angler Diary program which is based on voluntary angler diary information including CUE and size information for a given waterbody where available.

It is unclear whether the distribution of Muskellunge is continuing to increase, or whether anglers and resource managers are just gaining a better understanding of their range, due to limited available data. The number of lakes with known Muskie populations continues to increase, but there are still many populations that are of unknown origin and status. Range expansion may occur naturally but may also be due to unauthorized introductions.

The Muskies Canada Angler Diary Program for FMZ 15, provides information from 26 waterbodies. This program is voluntary and represents the best available data for Muskellunge in the zone between 1995 – 2016.

While they are a prized sportfish species for a niche angler demographic, Muskellunge in FMZ 15 are generally of low interest to anglers in the zone compared to other sportfish species as the total effort for Muskellunge in the zone makes up a small proportion of the total angling effort, at 1% (OMNRF 2015c). Muskellunge are also not in the top 5 most preferred fish species in the zone. Where they are targeted, the fishery is almost exclusively premised upon catch-and-release.

Muskellunge management in the zone will be focused on maintaining existing populations, limiting unauthorized introductions, and trying to increase overall knowledge of the species.

Management Issues and Challenges

- There is an absence of standardized assessment information on Muskellunge across the zone; the species is not susceptible to BsM gear.
- All known information related to Muskellunge abundance and effort comes from Muskies Canada's Angler Diary program. Concurrently, the relationship between MCI angler CUE and true abundance is not well understood.
- The native distribution of Muskellunge is not definitively known. Muskellunge are thought to have been illegally introduced in some waters where they exist in the zone and expanded via migration, particularly higher elevation areas where post-glacial colonization would have been highly improbable. Where established as non-native species, they can negatively influence the existing food web as an additional top-predator.
- Angling interest for Muskellunge is low within the zone.
- Little is known on the timeline of species introductions across the zone, and which populations are native compared to introduced.
- Introduction of Northern Pike into waters containing Muskellunge poses both competition and genetic risks through hybridization.

Management Strategy

The Ministry, with the advice of the Advisory Council, developed goals, objectives, strategies and management actions to address the issues and challenges related to Muskellunge (Table 4.17, Table 4.18).

Table 4.17 Muskellunge management strategy.

Goal *Maintain the Muskellunge fishery within FMZ 15*

Objectives	Indicator(s)	Benchmark(s)	Targets
Maintain the abundance of Muskellunge populations (O1)	**Primary – Short Term**		
	Muskies Canada Inc. (MCI) angler diary CUE for FMZ 15	MCI angler diary CUE: 0.057 rod hour in Muskellunge waters within FMZ 15	Maintain MCI angler diary CUE in FMZ 15 at 0.057 rod hours
Maintain trophy angling opportunities in waterbodies with demonstrated growth potential (O2)	**Primary - Short Term**		
	Proportion of MCI angler diary waterbodies in FMZ 15 where ≥ 0.10 of all Muskellunge caught in a given waterbody are ≥ trophy size of 114 cm with a minimum sample size of 75 Muskellunge for that waterbody	0.04 (1 waterbody – Pickerel River) of MCI angler diary waterbodies with ≥ 0.10 of all Muskellunge caught ≥ trophy size of 114 cm	≥ 0.04 of MCI angler diary waterbodies with ≥ 0.10 of all Muskellunge caught ≥ trophy size of 114 cm
Minimize further unauthorized introductions of Muskellunge into new waterbodies (O3)	**Primary - Short Term**		
	Total number of waterbodies with confirmed Muskellunge populations	108 waterbodies confirmed to have Muskellunge populations in FMZ 15 (ARA 2021)	Maintain number of waterbodies at 108

Table 4.18 Muskellunge management actions. Values in brackets denote which objectives each action addresses.

Muskellunge Management Actions

• Maintain current zone-wide daily catch limit (1(S), 0(C)) and season duration (1st Sat. in June - December 15th). (O1)
• Identify spawning locations and consider the possibility of creating additional sanctuaries where needed. (O1)
• Work with MCI and science experts to examine the relationship between angler CUE and true abundance to better understand this indicator. (O1)
• Periodically review current MCI Angler Diary data for potential trophy fisheries across the zone (≥0.10 of all Muskellunge caught ≥114 cm with a minimum sample size of 75 Muskellunge for a given waterbody). (O2)
• Periodically review adjacent zones minimum size limits and consider alignment in connected waters where appropriate. (O1, O2)
• Improve the knowledge of Muskellunge distribution within the zone (O3):
  ◦ Partner with MCI to enhance angler education regarding species identification via "Know the Difference" signage opportunities at boat launches were Muskellunge and Northern Pike co-exist in the zone.
  ◦ Partner with MCI, Cottage Associations and marinas to review the current confirmed and presumed distribution of Muskellunge and refine based on best available knowledge and promote species reporting through Fish ON-Line.
  ◦ Promote the use of the MCI Angler Diary and Fish ON-Line angler reporting tools in outreach materials.

Defining Criteria for Consideration of a Trophy Muskellunge Minimum Size Regulation

Trophy angling opportunities for Muskellunge are managed through enhanced minimum size limits. Populations with a demonstrated growth potential which consistently exceed a standard size threshold can be considered as potential trophy fisheries in FMZ 15. The definition of a trophy size is subjective and varies depending on the jurisdiction. A long-term dataset analysis of trophy-sized fish caught in Ontario between 1917-2010 defined trophy-sized Muskellunge being greater than 114 cm (45 inches) (Kerr et al. 2011). At the time of the plan, there are a handful of waterbodies within FMZ 15 which have demonstrated the potential to produce Muskellunge more than 114 cm and so, for the purposes of this management plan, a trophy Muskellunge is defined as greater than or

equal to 114 cm. Hence, to maintain a level of rigour in the future consideration of waterbodies being considered for a trophy Muskellunge minimum size regulation shall meet the following criterion:

≥0.10 of all Muskellunge caught in a given waterbody are ≥ trophy size of 114 cm with a minimum sample size of 75 Muskellunge for that waterbody

At the time of this plan, the only waterbody which meets this criterion is the Pickerel River, which already has an enhanced minimum size limit of 122 cm and is proposed to align with the French River with a minimum 137 cm minimum size limit (Table 4.19). No time constraint on the recency of the 75 Muskellunge samples was formally applied to this criterion given the limited number of samples for most waterbodies to afford some level of discretion. Additionally, the MCI dataset upon which this criterion was developed was up to and including 2016, 6 years prior to the finalization of this management plan so it is acknowledged that additional sampling via the MCI angler diary program has occurred in the zone since the dataset was analyzed and does not necessarily reflect the fulsome sampling completed. However, fisheries managers should take recency of samples into account if a waterbody is being considered for a trophy regulation in the future as growth potential could change for a given waterbody with food web changes and/or climate change. For example, if it takes a fishery 20 years to reach 75 samples, the merits of a trophy fishery should be scrutinized given the limited angling effort or catch rates. The minimum sample size also promotes data gathering for this data-limited species.

There may be circumstances where waters within FMZ 15 which are directly connected to adjacent FMZ waters which have enhanced minimum size limits for trophy fisheries (e.g., tributaries of the Ottawa River within FMZ 15) that may be considered for enhanced minimum size limits that align with the adjacent FMZ's without meeting the above sampling criterion. In this situation, there would need to be clear evidence that Muskellunge can move freely across FMZ boundaries during the open season and the fishery within FMZ 15 is of sufficient size to warrant a regulation change.

Objectives and Rationale for Muskellunge

The Ministry along with the Advisory Council, developed the following objectives for Muskellunge using the best available science and research, local knowledge, and social considerations.

Objective 1: Maintain the abundance of Muskellunge populations

While the introduction of Muskellunge into waterbodies has had negative impacts on the native fish communities, it is recognized that they can also provide quality angling opportunities where established. This objective strives to balance the ecological and social influence of this species within the zone. It is recognized that further work needs to be done to examine the relationship between MCI angler diary and true population abundance.

Objective 2: Maintain trophy angling opportunities in waterbodies with demonstrated growth potential

While angling interest for Muskellunge is low compared to other sportfish in the zone, trophy angling opportunities can be a sustainable socio-economic driver at the local scale where implemented appropriately. The Ministry will work with MCI to periodically review angler diary information and will consider regulating trophy opportunities where angler diary data demonstrates a waterbody meets the criterion identified above for a trophy fishery and the trophy regulation aligns with the broader fish community objectives for that waterbody.

Objective 3: Minimize further unauthorized introductions of Muskellunge into new waterbodies

Muskellunge are not native to much of the zone and so any new introductions can pose significant risks to the existing fish community. Education and awareness of the ecological impacts of introductions will be a focused action for this objective.

Muskellunge Regulation Options

The current Muskellunge regulation for FMZ 15 has the following season, catch limit and size limit:

- Season: 1st Saturday in June to December 15th
- Catch Limit: 1(S) and 0(C)
- Size Limit: must be greater than 91 cm.

Exceptions

There is currently one exception in FMZ 15 for Muskellunge in the Pickerel River - from the first set of rapids downstream of the lake at 45°59'45" N., 80°21'W. downstream to Georgian Bay and including those parts of the Pickerel River known as Cantin Lake, Trestle Gully Lake, Deep Bay, Muskrat Bay and David's Bay. The minimum size limit is 122 cm (48 inches).

- Season: 1st Saturday in June to December 15th
- Catch Limit: 1(S) and 0(C)
- Size Limit: must be greater than 122 cm.

Proposed Regulation Option and Rationale

The Advisory Council advised that the Ministry would need strong justification and science to change the current regulation, and thus, no zone-wide regulation changes are proposed for Muskellunge at this time.

For consistency, the current exception for the Pickerel River is proposed to be changed including the season start date to align with the season start date for FMZ 11 and minimum size to align in coordination with the proposed exceptions for the French River in FMZ's 10 and 11 (Table 4.19). This would include delaying the season's start date by two weeks to open the 3rd Saturday in June and close December 15th. This would also include increasing the minimum size from 122 cm to 137 cm.

Table 4.19 Proposed regulation exception change for Muskellunge in the Pickerel River.

Proposed Regulation	Advisory Council Advice
Season Open: • 3rd Saturday in June – December 15th Size Limit • 137 cm (54 inches)	The FMZ 15 Advisory Council had no objections to aligning the season start date or minimum size limit with the French River in FMZ's 10 and 11. AOO supports keeping the current catch limit, season and size limit.

4.2.6 Walleye

Historically, Walleye had a limited natural distribution in FMZ 15; native populations occurred only in lower elevation areas in the western and eastern ends of the zone. Extensive stocking has increased the range dramatically and Walleye continue to colonize new waters, primarily through illegal stocking. Because of the expanding range, there are probably more Walleye in the zone now than at any time in the past.

However, on the provincial scale, the average density of Walleye in FMZ 15 lakes is relatively low. FMZ 15 Walleye density is similar to other zones in south and central Ontario. It is believed that the productivity of the Walleye resource is significantly constrained by factors over which we have little control. On average, Walleye lakes in FMZ 15 are relatively deep, clear and have low levels of nutrients, sub-optimal conditions for higher density populations. Some lakes have good habitat conditions, and Walleye populations tend to have higher density in these lakes.

In addition, most Walleye lakes support complex fish communities including several species of top predators, such as bass, and many have introduced species known to have negative impacts on Walleye (e.g., Rainbow Smelt, Black Crappie).

Over the long term, climate change is expected to negatively impact Walleye due to changes in habitat suitability, but also by providing more favourable conditions for competing warmwater species such as bass. Consequently, the potential to greatly increase the overall density of Walleye in FMZ 15 lakes is limited.

Management Issues and Challenges

- Very high angler expectation for Walleye fishery in the zone.
- Unrealistic angler expectations for the recovery of Walleye populations given habitat limitations.
- Establishing effective regulations is complicated by the considerable number and diverse nature of Walleye populations in the zone.
- Walleye lakes in the zone have a high diversity of other fish species that reduce the productive capacity of Walleye populations.
- Productivity is influenced by large-scale habitat factors such as nutrient availability, water clarity and temperature.
- Small-scale factors such as spawning and nursery habitat availability impact Walleye population productivity.
- Legacy of past partnerships promoting Walleye fry culture.
- Importance of needing increased, healthy Walleye populations in water systems that host native populations and are experiencing heavy pressures.
- Concern about current/potential increased harvest due to COVID and due to rising food prices.

Management Strategy

The Ministry, with the advice of the Advisory Council, developed goals, objectives, strategies and management actions to address the issues and challenges related to Walleye (Table 4.20, Table 4.21).

Table 4.20 Walleye management strategy.

Goal *Improve Walleye populations*

Objectives	Indicator(s)	Benchmark(s)	Targets
Maintain the number of Walleye populations (O1)	**Primary – Short Term**		
	Number of Walleye lakes in FMZ 15	Total number of Walleye lakes = 118 (ARA 2016) Note: see Background Information Report	Maintain number of Walleye lakes at 118
	Supporting – Short Term		
	Proportion of all lakes sampled in FMZ 15 that have Walleye populations	Proportion of all lakes sampled having Walleye present for BsM Cycle 1 = 0.54	Proportion of lakes having Walleye ≤ 0.54
Increase or maintain abundance of Walleye (O2)	**Primary - Short Term**		
	Average recruit CUEW (kg/gang) of Walleye (recruits > 350 mm) (area weighted value) captured with large-mesh ($NA_{1)}$ gill nets	Average recruit CUEW (≥350 mm) from BsM Cycle 1 = 0.58 kg/gang	Average recruit CUEW is ≥ 0.58 kg/gang
	Estimated total mortality rate for fish ≥ minimum age at recruitment (= 2.5 years)	Estimated total mortality rate for fish ≥ minimum age at recruitment for BsM Cycle 1 = 0.39	Estimated total mortality rate of fish ≥ minimum age at recruitment remains ≤ 0.39
	Number of Walleye cohorts (age classes) in BsM Cycle 1	Number of cohorts for BsM Cycle 1 = 7.19	Number of cohorts ≥ 7.19
	Average Reference Biomass (observed biomass) for all Walleye lakes from BsM Cycle 1	Average Reference Biomass value for Walleye lakes for BsM Cycles 1 & 2 = 0.39	Average Reference Biomass value (B_{obs}/B_{MSY}) is > 0.39

Objectives	Indicator(s)	Benchmark(s)	Targets
	Supporting – Short Term		
	Estimated summer and winter angling intensity (hrs/ha per year) for targeted Walleye lakes	BsM Aerial surveys of angling intensity (hrs/ha per year) on Walleye target lakes in Cycle 1: • Summer Intensity = 8.0 • Winter Intensity = 3.1 • Annual angling intensity = 11.1	≤ baseline values - angling intensity (hrs/ha per year)
	Primary – Long Term		
	Percentage of Zone 15 Walleye lakes where observed biomass of Walleye is 30% above biomass at maximum sustainable yield (biomass ≥ 1.3 B_{MSY})	Baseline BsM Cycle 1 = 0% of FMZ 15 Walleye lakes were at or higher than the biomass reference point	Increase the percentage of Walleye waters in FMZ 15 above the biomass reference point
	Percentage of FMZ 15 Walleye lakes where fishing mortality of Walleye is ≤ 75% of natural mortality (F ≤ 0.75 M)	Baseline BsM Cycle 1 = 50% of FMZ 15 Walleye lakes were at or below the mortality reference point	Increase the percentage of Walleye waters in FMZ 15 below the mortality reference point value
Minimize further unauthorized introductions of Walleye into new waterbodies in the zone (O3)	**Primary - Short Term**		
	Number of Walleye lakes in FMZ 15	Total number of Walleye lakes = 118 (ARA 2016) Note: see Background Information Report	Maintain number of Walleye lakes at 118
	Supporting – Short Term		
	Proportion of all lakes sampled in FMZ 15 that have Walleye populations	Proportion of all lakes sampled having Walleye present for BsM Cycle 1 = 0.54	Proportion of lakes having Walleye ≤ 0.54

Table 4.21 Walleye management actions. Values in brackets denote which objectives each action addresses.

Walleye Management Actions
• Educate and promote the negative impacts on coldwater species of illegally stocking Walleye (O1, O3) • Implement a regulation to reduce harvest. (O1, O2) • Develop educational and outreach material related to the rationale for regulations and the principles of Walleye life history requirements and provide them to partners, external agencies and members of the public. (O1, O2, O3) • Develop BMPs for harvest and catch and release to reduce angling impacts by distributing educational material through partners. (O1, O2) • Develop BMPs for diverting pressure from naturally reproducing Walleye populations with alternate species angling, distributed through partners. (O1, O2) • Identify spawning locations and consider the possibility of creating additional sanctuaries where needed. (O1, O2) • Establish partnerships to verify and/or identify actively used or potential spawning habitats while determining the level of spawning activity. (O1, O2) • Develop criteria to define candidate populations and implement lake-specific rehabilitation strategies where appropriate. (O1, O2) • Educate the public on the negative impacts of illegal Walleye introductions and promote harvest of Walleye as an alternative species. via the development and distribution of factsheets to Cottage Associations and FMZ 15 Onesite page at the zone-scale. Additional targeted outreach on the impacts of illegal introductions will occur for lakes or watersheds where significant native species fisheries exist which have not yet been impacted by Walleye introductions. (O1, O3) • Implement the stocking strategy for Walleye. (O1, O2, O3) (Section 4.3.4)

Objectives and Rationale for Walleye

The Ministry, along with the Advisory Council, developed the following objectives for Walleye, using the best available science and research, local knowledge, and social considerations.

Objective 1: Maintain the number of Walleye populations

Walleye are highly sought after by anglers. With a goal to improve Walleye populations in the zone Walleye are a highly plastic species and can play complex roles in the food webs with which they exist. Where they currently exist, the recreational fishing regulations should reflect their important value in the coolwater fish community with a balance on the protection of the populations that will provide fishing and harvest opportunities long-term.

Objective 2: Increase or maintain abundance of Walleye

This objective is to support and maintain healthy Walleye populations where they exist.

Objective 3: Minimize further unauthorized introductions of Walleye into new waterbodies of the zone

Illegal introduction of Walleye into lakes in FMZ 15 can pose significant risks to the existing fish community, particularly pristine natural Lake Trout Lakes. Education and awareness of the ecological impacts of introductions will be a focused action for this objective.

Walleye Regulation Options

The most recent review of fishing regulations for Walleye in Southern Region (including FMZ 15) was completed in the mid-2000's. In 2006 consultation was done on four options. The process concluded by implementing an interim regulation that would be reviewed during each FMZ's individual planning process.

The current Walleye regulations for FMZ 15 are:

- Season: January 1st to March 15th and 3rd Saturday in May to December 31st
- Catch Limit: 4(S) and 2(C)
- Size Limit: not more than 1 >46 cm.

There are a few lakes with Walleye exceptions in the zone that include:

- 2 lakes have a reduced season: 3rd Saturday in May to November 30th and 3rd Saturday in May to December 31st and
- 11 lakes have a size limit and reduced catch limit: >50 cm; 2(S) and 1(C).

Regulation options were developed with the assistance of the Fisheries Management Support System (FMSS) model. Many regulation scenarios were explored using a range of fishing effort levels to predict how different population and fishery parameters would react. Details of the model calibration and scenarios examined are found in the FMZ 15 Background Report.

Proposed Regulation Option and Rationale

The following Walleye regulation options were presented to the Advisory Council for their consideration (Table 4.22, Table 4.23, Table 4.24). Advisory Council members were asked to assess each option based on the risk of sustainability to the species, whether there was consideration for enhanced opportunities, and how the option contributed to the fish community objectives for the zone. More detailed information on regulation modeling for Walleye is provided in the FMZ 15 Background Report.

Table 4.22 Preferred zone-wide Walleye regulation option presented to the Advisory Council.

Proposed Regulation Option		Advisory Council Advice
Zone-Wide (Applies to all waters, unless listed as an exception)	Season Open: • January 1st to March 15th and 3rd Saturday in May to December 31st Catch Limit: • 4(S) and 2(C) Harvestable Slot: • 40-50cm	The Advisory Council unanimously agreed with this option. This option increases Walleye abundance even with higher angling effort, while not impacting Walleye when they are most vulnerable during the spawning season. There was unanimous agreement that there should be no changes made to the season, as there is variation in spawning times across the zone, and a lack of information. There was unanimous agreement in maintaining the current catch limit. Modelling results showed that there is insignificant impact in changing the catch limit, unless it is drastically reduced to 1 fish. Advisory Council had concerns about contaminants in larger fish and expressed the need to protect the mature females of the Walleye population.

Table 4.23 Preferred Walleye regulation Exception 1 presented to the Advisory Council.

Proposed Regulation Option		Current Regulation
Applies to: Black Donald Lake, Calabogie Lake, Centennial Lake, Wilson Lake, Lake Clear, Meadow Lake, Mud Lake, Little Lake Clear, Madawaska River – upstream of Mountain Chute and downstream of Highland Falls	Season Open: • January 1st to March 15th and 3rd Saturday in May to December 31st Catch Limit: • 2(S) and 1(C) Harvestable Slot: • 40-50cm	Season Open: • January 1st to March 15th and 3rd Saturday in May to December 31st Catch Limit: • 4(S) and 2(C) Size Limit: • Not more than 1 >46 cm

Table 4.24 Preferred Walleye regulation Exception 2 presented to the Advisory Council.

Proposed Regulation Option		Current Regulation
Applies to: Lake Muskoka	Season Open: • January 1st to March 15th and 3rd Saturday in May to December 31st Catch Limit: • 4(S) and 2(C) Harvestable Slot: • 40-55cm	Season Open: • January 1st to March 15th and 3rd Saturday in May to December 31st Catch Limit: • 4(S) and 2(C) Size Limit: • Not more than 1 >46 cm

The current regulation for Walleye in FMZ 15 was shown to be not sustainable and not presented as an option as it does not align with zone objective to improve Walleye abundance. The new proposed regulation will help to achieve both Objective 1 and Objective 2, as well as be socially acceptable to anglers. This option also aligns with the adjacent FMZ 18, where improvements in Walleye populations have been observed anecdotally.

Exception 1 may apply to a subset of lakes in Pembroke District. District staff reviewed the lakes and refined the list (as presented in Table 4.23). We would like to seek public comments on these lakes, still being an exception. The alternative is that they would be incorporated into the zone wide regulation.

Social considerations were brought up by the Advisory Council when discussing alternative regulation options. While a lower harvestable slot appears to perform better biologically, from a social perspective, anglers would be reluctant to accept a regulation where they can only keep fish that are smaller than the current regulation allows.

Sanctuaries

All existing sanctuaries will have no fishing March 1st to Friday before 3rd Saturday in May and due to late spawning populations an alternative with no fishing March 1st to June 15th .

Stocked Lakes

It is proposed that PGT stocking of Walleye will not occur in FMZ 15. Rehabilitation of Walleye may occur on a limited basis if it supports achieving Objective 1 and 2. Please refer to Section 4.3 for more information.

Monitoring and Assessment

Monitoring of Walleye abundance and population characteristics will continue to occur through the provincial BsM program.

Spawning areas, especially riverine locations, are critical habitat for Walleye. Their occurrence and use are not monitored by the BsM program. Identification of spawning areas through local initiatives is critical to ensuring these features are protected and considered in planning processes (e.g., water and forest management). Monitoring of spawning activity may be considered on a case-by-case basis to determine the need for, or measure the effectiveness of, habitat improvement activities. This plan also acknowledges the need for monitoring, either BsM or local monitoring, to identify the need for, and measure the success of, individual lake rehabilitation strategies that are connected to Objective 1 and 2.

4.2.7 Smallmouth and Largemouth Bass

Smallmouth and Largemouth Bass are warmwater species of the Centrarchid family; both are well-known sport fish species that provide excellent recreational fishing opportunities. Both species are native to Ontario and have become widely distributed across FMZ 15; Smallmouth Bass distribution was originally limited to the Great Lakes-St. Lawrence system and Largemouth Bass were limited to the lower Great Lakes system.

The range distribution of bass species is progressively increasing, spreading into inland lakes at a high rate. There are several factors that can be attributed to this range increase, including illegal introductions and climate change. There is a lack of education and communication surrounding the ecosystem effects of illegal introductions of a species

into a waterbody, or by dumping bait buckets. Additionally, with warming climate, increased water temperatures favour the expansion of bass habitat and will be a driving force of Bass movements into new waterbodies.

Smallmouth Bass abundance is well-documented in FMZ 15 through the BsM program; the catch rate within the zone for Cycle 1 of BsM was higher than the provincial average and was the third highest zone in the province with a CUE of 0.86 fish/gang, and a CUEW of 0.48 kg/gang. Smallmouth Bass were captured in 81% (42/ 52) and 96% (48/50) of lakes sampled in Cycle 1 and 2, respectively.

Information on Largemouth Bass abundance in the zone is limited as it is not as susceptible to BsM gear owing to its habitat preferences. In Cycle 1, the CUE (fish/gang) and CUEW (kg/gang) were 0.35 and 0.22, respectively. In Cycle 2, CUE and CUEW for Largemouth Bass were 0.30 fish/gang and 0.13 kg/gang. Largemouth Bass were captured in 40% (20/50) and 25% (13/52) of lakes sampled using large-mesh nets in Cycle 1 and 2, respectively.

Bass were the second-most preferred species by anglers in the zone and received the most fishing effort (42%) and comprised the greatest number of fish caught (37%, OMNRF 2015c).

The abundance of bass continues to increase throughout the zone, and they show signs of high juvenile success and low levels of mortality. Combining this and their increasing distribution within the zone, bass populations in FMZ 15 are healthy. With climate change predictions favouring the overall success of bass, management objectives will focus on maintaining current healthy populations, limiting unauthorized introductions and increasing awareness of fishing opportunities as well as encouraging the harvest and consumption of bass.

Management Issues and Challenges

- Increased distribution within FMZ 15 due to illegal introductions.
- Bass are not a target species of the BsM monitoring program and therefore bass lakes are not sufficiently sampled.
- Bass are not native to most of the zone and their presence can negatively impact native sportfish including coldwater species.
- There is a desire to have a higher quality size range of bass, rather than having higher abundance across the zone, and
- Concern over the effects of tournament fishing on bass populations.

Management Strategy

The Ministry, with the advice of the Advisory Council, developed goals, objectives, strategies and management actions to address the issues and challenges related to Smallmouth and Largemouth Bass (Table 4.25, Table 4.26).

Table 4.25 Smallmouth and Largemouth Bass management strategy.

Goal *Maintain the bass fishery within FMZ 15*

Objectives	Indicator(s)	Benchmark(s)	Targets
Minimize further unauthorized introductions of Smallmouth and Largemouth Bass into new waterbodies (O1)	**Primary – Short Term**		
	Number of lakes with Smallmouth and Largemouth Bass	Number of bass lakes (Aquatic Habitat Inventory) • Smallmouth Bass = 1173 • Largemouth Bass = 852	Number of lakes with bass populations remains stable relative to benchmark values for Smallmouth Bass and Largemouth Bass
	Number of outreach products/efforts produced to inform the public of negative impacts of bass introductions into new waterbodies in the zone	Number of MNRF outreach products/efforts distributed to public on ecological and social implications of unregulated introduction of bass into new waterbodies Currently for zone = 0 products.	Increase the number of MNRF information products distributed to public above the 2021 benchmark value.
	Supporting – Short Term		
	Proportion of lakes sampled in FMZ 15 that have Smallmouth Bass or Largemouth Bass populations	Proportion of lakes sampled in BsM Cycle 1 that were occupied by bass: • Smallmouth Bass = 0.81 • Largemouth Bass = 0.25	Proportion of lakes occupied by bass in FMZ 15 remains stable relative to benchmark value: • Smallmouth Bass = 0.81 • Largemouth Bass = 0.25

Objectives	Indicator(s)	Benchmark(s)	Targets
Maintain current abundance of Smallmouth and Largemouth Bass (O2)	**Primary - Short Term**		
	CUEW (kg/gang) of recruit-sized Smallmouth Bass and Largemouth Bass (recruits > 200 mm) captured with large-mesh (NA_1) gill nets during BsM Cycle 1	Average CUEW (fish/gang) for recruit-sized Smallmouth (≥ 200 mm) and Largemouth Bass (≥ 250 mm) captured with large-mesh (NA1) gill nets during BsM Cycle1: • Smallmouth Bass = 0.48 • Largemouth Bass = 0.22	Recruit CUEW for Smallmouth Bass and Largemouth Bass remains stable relative to benchmark values of 0.48, and 0.22, respectively
	Average number of cohorts (age classes) of Smallmouth Bass from all lakes sampled in BsM	Number of cohorts for BsM Cycle 1 = 6.53	Average number of age classes ≥ 6.53
	Primary – Long Term		
	Percentage of Zone 15 lakes in which Smallmouth Bass occur where the observed biomass of Smallmouth Bass is 30% above biomass at maximum sustainable yield (biomass ≥ 1.3 B_{MSY})	Percentage of lakes in FMZ 15 in which Smallmouth Bass were captured where the observed biomass values for it are ≥ than the biomass reference point. Note: baseline values to be determined in future BsM cycles when adequate Smallmouth Bass sampling has been completed	Currently, it is not possible to determine target values for biomass due to small numbers of Smallmouth Bass sampled in first two cycles of BsM

Objectives	Indicator(s)	Benchmark(s)	Targets
	Percentage of FMZ 15 lakes in which Smallmouth Bass occurs where fishing mortality is ≤ 75% of natural mortality (F ≤ 0.75 M)	Percentage of lakes in FMZ 15 in which Smallmouth Bass were captured where fishing mortality is ≤ 75% of natural mortality (F ≤ 0.75 M). Note: baseline values to be determined in future BsM cycles when adequate Smallmouth Bass sampling has been completed in FMZ 15	Currently, it is not possible to determine target values for fishing mortality due to small numbers of Smallmouth Bass sampled in first two cycles of BsM
Increase and promote fishing opportunities for Smallmouth and Largemouth Bass (O3)	**Primary - Short Term**		
	Length (days) of bass angling season in FMZ 15	Length of current (2020) bass angling season in FMZ 15 (4th Saturday in June to November 30th is about 159 days)	Length of proposed new bass angling season (3rd Saturday in June to December 15th is about 181 days)
	Number of outreach products/efforts produced to inform public of increased bass angling opportunities	Current number of outreach materials informing the public of the future change in the bass angling season: number of materials produced currently (2021) = 0 products	Increase current number of information products highlighting increased length of bass angling season

Table 4.26 Smallmouth and Largemouth Bass management actions. Values in brackets denote which objectives each action addresses.

Smallmouth and Largemouth Bass Management Actions
• Utilize the existing catch limit to ensure bass continues to be harvested at a sustainable level. (O1) • Through education and promotion, encourage the harvest of bass where there is conflict between multi-species objectives. (O1) • Promote the use of BMPs for harvest and catch and release methods for competitive sport fishing events to minimize impacts of stress and displacement on bass. (O1) • Utilize education and awareness to discourage the intentional and unintentional introductions of bass into waterbodies where they are not native. (O2) • Implement an extended bass season to provide additional angling opportunities. (O3) • Explore effectiveness of liberal bass regulations on stocked Trout waters. (O3)

Objectives and Rationale for Smallmouth and Largemouth Bass

The Ministry, along with the Advisory Council, developed the following objectives for maintaining the Smallmouth and Largemouth Bass fishery in FMZ 15, using the best available science and research, local knowledge, and social considerations.

Objective 1: Minimize further unauthorized introductions of Smallmouth and Largemouth Bass into new waterbodies of the zone

There are likely limited opportunities to have an impact on or decrease the inevitable natural range expansion of bass due to climate change. However, there are a sizable proportion of bass populations that have spread to inland lakes through unauthorized introductions, or illegally dumped bait buckets. For example, while it is illegal to transport live fish without a permit and to illegally introduce them into waterbodies, it continues to happen at an alarming rate. Some anglers, having had little success in catching Lake Trout, may decide to release bass into Lake Trout waters to enhance their chances of catching a fish.

Smallmouth and Largemouth Bass are not native to many inland lakes in FMZ 15. Increased public education and awareness of the impacts of non-native species introductions is imperative to working towards reducing unauthorized introductions.

The management actions outlined in Table 4.26 that are recommended to address this objective include utilizing education to discourage intentional and unintentional introductions of bass into new waters in the zone.

Objective 2: Maintain the current abundance of Smallmouth and Largemouth Bass

Climate change predictions favour increasing bass populations throughout the zone. In FMZ 15, with its high proportion of cold- and coolwater fisheries, bass are often considered to be an invasive species. Reducing bass populations would be a difficult objective to meet at the zone-scale; however, studies indicate that recruitment in bass populations can be reduced through removal efforts at the individual lake-level (Suski and Philipp, 2004; Sutter et al. 2012).

Maintaining or reducing current bass populations will require higher levels of angling effort and harvest of bass. The Advisory Council indicated to the Ministry that anglers can easily catch their daily limit of bass; however, anglers are not necessarily keeping their limits. It is therefore unknown whether increasing the catch limit for bass would have any implications for abundance. Achieving the FMZ 15 objectives for bass may require a Ministry communication initiative that informs the public of the risks and challenges in managing bass and provides the rationale for increased harvest while maintaining the sustainability of bass populations.

There are several competitive fishing tournaments targeting Smallmouth and Largemouth Bass within FMZ 15. There is a perception that these events place unnecessary stress on bass through handling and displacement of fish from their home ranges. Displacement effects Smallmouth and Largemouth Bass differently; return rates are higher for Smallmouth Bass, while Largemouth Bass takes longer to return to their home range (Ridgway 2002). Numerous studies have detailed the impacts of air exposure, handling methods, gear selection and return locations on Smallmouth and Largemouth Bass (Cooke et al. 2002) This information provides competitive tournament organizers with guidelines for implementing best management practices for conducting sustainable fishing tournaments.

The management actions outlined in Table 4.26 to address this objective focus on maintaining sustainable catch limits, educating and promoting the harvest of bass, and promoting safe methods of catch and release.

Objective 3: Increase and promote fishing opportunities for Smallmouth and Largemouth Bass

With a warming climate, lake ecosystems will likely shift in favour of bass, leading to increases in their abundance. This, along with the fact that many anglers do not harvest their catch limit for bass, should allow for increased angling effort at sustainable levels.

The zone-level management action described in Table 4.26 to address this objective focuses on implementing an extended bass season to provide additional angling opportunities. The effectiveness of the extended bass season on a subset of stocked trout lakes to mitigate the impacts of bass will also be investigated.

Bass Regulation Options

The current Smallmouth and Largemouth Bass regulations for FMZ 15 include an aggregate limit for the two species with the following season and catch limits:

- Season: 4th Saturday in June to November 30th
- Catch Limit: 6(S) and 2(C)

Proposed Regulation Option and Rationale

The following bass regulation options were presented to the Advisory Council for consideration (Table 4.27). Advisory Council members were asked to assess each option based on the risk to sustainability of the species, whether there was consideration for enhanced opportunities, and how the option contributed to the fish community objectives for the zone.

Table 4.27 Proposed Smallmouth and Largemouth Bass regulation options presented to the Advisory Council.

Proposed Regulation Option	Advisory Council Advice
Status Quo	The Advisory Council unanimously agreed that the current regulation does not have an impact on the sustainability of bass, but it does not provide for additional angling opportunities.

Proposed Regulation Option	Advisory Council Advice
Extend the current angling season for Smallmouth and Largemouth Bass to provide additional angling opportunities. Season Open: • 3rd Saturday in June to December 15th Catch Limit: • 6(S) and 2(C) Exception: Bass mitigation on stocked Trout waters pilot project proposal in principle Season Open: • Year-round Catch Limit: • 6(S) and 2(C) Waterbodies: • Subset of stocked Brook Trout and Lake Trout stocked Lakes in FMZ 15 where bass are known to exist (specific lakes to be determined)	The Advisory Council unanimously agreed with the zone-wide portion of this option as it increases the length of the angling season by approximately 3 weeks, and poses low sustainability risk to the species, through minimal impacts during the spawning season. This regulation option also aligns with existing regulations in adjacent southern FMZ's (17 and 18). The exception proposal for the bass mitigation on stocked Trout waters pilot project proposal in principle was strongly supported by the Advisory Council. The intent of this exception is to support a research study on the potential to mitigate impacts of bass on stocked Trout fisheries through a liberally regulated bass fishery.

The current season opening is the 4th Saturday of June. It was previously put in place to protect bass during the spawning season, when guarding males are vulnerable to angling. There is a clear gradient in spawning data across the zone, particularly moving between bodies of water in the southern and northern parts of the zone. For that reason, the current spawning season opening date was an attempt to protect 50% of the spawning population. There is also variability in spawning times between large males and small males in a population. Climate change modelling in Algonquin Provincial Park shows that ice out is occurring earlier, and the median spawning day for Smallmouth Bass is occurring about 10 days earlier (Ridgway et al. 2018b). As a management action to achieve Objective 2, extending the season for bass was proposed. If bass are spawning earlier, then changing the season opening date to the 3rd Saturday in June should still provide critical protection to large, vulnerable bass, while increasing angling opportunities. By moving the season closing date to December 15th, more angling opportunities are provided, yet protection is still available to overwintering bass.

The proposed catch limit is the same as the current catch limit. The Advisory Council felt that while most anglers would catch the current limit of bass, they certainly are not keeping the limit, and therefore an increase in the limit may not increase harvest. If anglers were to begin keeping their limit of bass, the current harvest limit may need to be re-evaluated to ensure the sustainability of bass populations.

The exception proposal for a bass mitigation pilot project to apply a year-round open bass season on a subset of stocked Brook Trout and Lake Trout lakes is intended to support a research study to evaluate the potential to mitigate the impacts of bass on stocked trout fisheries through the liberal regulation of bass. There are increasing numbers of stocked lakes with bass being documented across the zone and limited opportunities for new stocked Trout fisheries exist where bass are not already present. This regulation would help address a significant fisheries management challenge in the zone by providing insight into the effectiveness of harvest-based population control rather than traditional and cost-prohibitive bass population control methods such as active removals which are unrealistic (Lepak et al. 2006, Weidel et al. 2007). Lakes identified for this exception would need to meet specific criteria (e.g., bass confirmed, year-round public access close to road network, etc.) and have an assessment mechanism in place to evaluate the effectiveness of this regulation. Applying this regulation to a subset of lakes may concentrate effort and harvest of bass sufficiently to illicit a positive response in the stocked trout population and fishery. Consultation for this proposal in principle will gauge public support on this approach. Should the project proceed, and effectiveness monitoring reveals a positive response of stocked Lake Trout populations to the application of the liberal bass exception, such a regulation will be considered more broadly on a broader set of stocked trout waters where bass are known to exist in FMZ 15.

Additionally, if public consultation affirms broad public support for liberal management of bass in stocked Trout lakes, future management applications of a liberal bass management framework may also be considered on natural Trout waters in FMZ 15 where bass are known to exist. However, there would be specific internal and public consultation required on such a proposal given the additional potential management implications (e.g., post-release mortality of trout) on natural Trout waters.

Alternate Regulation Options and Rationale

More regulation changes were discussed by the Ministry and the Advisory Council, including maintaining the current regulations, alternative seasons, and early season size limits (Table 4.28). However, it was decided that all other alternative regulation options pose sustainability risks to naturally reproducing bass populations

Table 4.28 Alternate bass regulation options.

Proposed Regulation Option	Advisory Council Advice
Status Quo	The Advisory Council unanimously agreed that the current regulation does not have an impact on the sustainability of bass, but it does not provide for additional angling opportunities.

4.2.8 Panfish

Panfish is used to describe several smaller-bodied fish species of the sunfish family including Pumpkinseed and Bluegill. For the purposes of this management plan, Black Crappie and Yellow Perch will also be considered as Panfish. This grouping of species differs from the way Panfish are defined in the Recreational Fishing Survey. While Pumpkinseed and Yellow Perch are native to the zone, Black Crappie and Bluegill are not, but have been widely introduced into many lakes across the zone.

Panfish are not target species for the BsM program but are sampled opportunistically when captured. The population estimate data from BsM is therefore not a full representation of Panfish within FMZ 15.

Pumpkinseed

Using large-mesh gill nets, Pumpkinseed were captured in 29 lakes in Cycle 1 and 28 lakes in Cycle 2. The catch rate (CUE; fish/gang) increased from 0.29 to 0.43 between BsM Cycles 1 and 2. These values were well below the provincial average and less than other FMZ's in Southern Region. Comparatively, using small-mesh gill nets, Pumpkinseed were captured in 41 and 42 lakes in BsM Cycles 1 and 2, respectively. Both the CUE's and the number of lakes in which Pumpkinseed were captured were very consistent between cycles. All the lakes in which Pumpkinseed were captured in large-mesh nets in both cycles were also captured in small-mesh nets.

Bluegill

Bluegill were captured in 2 lakes in Cycle 1 and 1 lake in Cycle 2. Therefore, there is not enough data to accurately calculate their abundance within the zone.

Black Crappie

The popularity of Black Crappie as a targeted species is increasing in the zone. Concurrently, the distribution of Black Crappie is expanding rapidly in the zone. Black Crappie were captured in 4 lakes in Cycle 1 and 6 lakes in Cycle 2. While this may not accurately reflect its distribution across the zone, abundance estimates are available from BsM. Black Crappie

were captured in more lakes in Cycle 2, compared to Cycle 1 and the relative abundance increased significantly from 0.23 fish/gang to 0.63 fish/gang in Cycle 2.

Yellow Perch

The number of lakes in which Yellow Perch were caught decreased from 45 to 40 lakes between Cycles 1 and 2. The relative abundance of Yellow Perch in FMZ 15 was higher than the provincial average for both Cycle 1 and 2, at 1.13 fish/gang and 1.24 fish/gang, respectively.

The 2010 Recreational Fishing Survey shows that a small proportion of angling effort in FMZ 15 is directed at Panfish species, with 3%, 1%, and 0% directed at Yellow Perch, Black Crappie and Panfish, respectively. However, they are often caught and make up a sizable proportion of the catch (Yellow Perch; 11%, Panfish: 32%) and harvest (Yellow Perch; 11%, Panfish: 24%) (OMNRF 2015c).

As a group, Panfish make up a sizable part of the overall catch and harvest within FMZ 15, despite not being targeted by recreational anglers. The increased distribution of Panfish in lakes across the zone as well as the increase in abundance within lakes between Cycles 1 and 2 of BsM suggests Panfish populations are doing well in the zone. Like bass, climate change predictions will likely favour the success of Panfish species. Consequently, the focus of management will be on maintaining healthy populations, decreasing unauthorized introductions, maintaining current range distribution and raising awareness of Panfish angling and harvest. The winter angling opportunities provided by Panfish do divert effort from Walleye and Trout.

Management Issues and Challenges

- Increased distribution within FMZ 15 due to natural and illegal introductions.
- Impact of Black Crappie on Walleye and Trout populations.
- Panfish species are not targeted in the BsM program; so, the information reflecting the distribution and abundance of Panfish species may not be accurately reflected by the BsM data.
- Panfish are increasing in abundance; there is opportunity to promote the fishery to increase harvest.

Management Strategy

The Ministry, with the advice of the Advisory Council, developed goals, objectives, strategies and management actions to address the issues and challenges related to Panfish (Table 4.29, Table 4.30).

Table 4.29 Panfish management strategy.

Goal *Maintain the Panfish fishery with FMZ 15*

Objectives	Indicator(s)	Benchmark(s)	Targets
Maintain Panfish populations at current levels (O1)	**Primary – Short Term**		
	CUEW (kg/gang) for large mesh (NA_1) gill nets (O1)	Average CUEW (kg/gang) for large mesh gill nets (NA_1) from BsM Cycle 1 • Yellow Perch = 0.10 • Black Crappie = 0.07 • Bluegill = 0.07 • Pumpkinseed = 0.04	Maintain CUEW (kg/gang) for large mesh (NA_1) nets for Panfish species relative to benchmark value: • Yellow Perch = 0.10 • Black Crappie = 0.07 • Bluegill = 0.07 • Pumpkinseed = 0.04
	CUE (fish/gang) for small mesh (ON_2) gill nets (O1)	Average CUE (fish/gang) for small (ON_2) mesh gill nets from BsM Cycle 1 (O1): • Yellow Perch = 10.72 • Black Crappie = 0.20 • Bluegill = 0.75 • Pumpkinseed = 1.66	Maintain CUE for small (ON_2) mesh gill nets for Panfish species compared to benchmark value: • Yellow Perch = 10.72 • Black Crappie = 0.20 • Bluegill = 0.75 • Pumpkinseed = 1.66
Minimize further unauthorized introductions and range increase of Panfish species into new waters of the zone (O2)	**Primary - Short Term**		
	Number of lakes in FMZ 15 with populations specific Panfish species	Number of lakes with populations of Panfish species (Aquatic Habitat Inventory, 2021): • Black Crappie = 83 • Bluegill = 25	Maintain the number of lakes occupied by specific Panfish species at benchmark values: • Black Crappie = 83 • Bluegill = 25
	Supporting – Short Term		

Objectives	Indicator(s)	Benchmark(s)	Targets
	Percentage of sampled lakes having Panfish populations	Percentage of all lakes sampled using BsM in Cycle 1 that were occupied by specific Panfish species: • Black Crappie = 7.7% • Bluegill = 3.8%	Maintain percentage of lakes occupied by specific Panfish species at levels near to benchmark values: • Black Crappie = 7.7% • Bluegill = 3.8%
Increase awareness of angling opportunities and effort for Panfish to maintain current abundance (O3)	**Primary - Short Term**		
	Number of outreach products produced to inform the public of negative impacts of Panfish introductions into new waterbodies	Number of Ministry products distributed to public explaining ecological and social implications of introduction of Panfish species in new waterbodies (Number of products distributed by the Ministry in 2021 = 0)	Increase the number of information products distributed to public by the Ministry above the benchmark number distributed in 2021

Table 4.30 Panfish management actions. Values in brackets denote which objectives each action addresses.

Panfish Management Actions
• Utilize the existing catch limit to ensure Panfish continue to be harvested at a sustainable level. (O1) • Utilize education and awareness to discourage the intentional and unintentional introductions of Black Crappie and Bluegill into waterbodies where they are not native. (O2) • Promote the quality of the existing Panfish fishery, with emphasis on increasing the profile of Panfish species as valued sportfish species in FMZ 15. (O3) • Increase angler awareness of the Panfish fishery; use education and awareness to recruit new Panfish anglers to divert effort from other depressed species such as Walleye. (O3) • Through education and promotion, encourage the harvest of Panfish where there is conflict between multi-species objectives. (O3)

Objectives and Rationale for Panfish

The Ministry, along with the Advisory Council, developed the following objectives for Panfish using the best available science and research, local knowledge, and social considerations.

Objective 1: Maintain Panfish populations at current levels

Black Crappie and Bluegill are the two Panfish species not native to FMZ 15 but are becoming established in inland lakes throughout the zone. While not native, many of these introduced populations are now considered to be naturalized in these systems. These species continue to be introduced to lakes, whether intentionally through unauthorized introductions, or unintentionally through the dumping of bait buckets. It is unrealistic to expect a significant reduction in populations with the current level of effort and harvest.

Objective 2: Minimize further unauthorized introductions and range increase of Panfish species into new waterbodies of the zone

Public education and awareness of the impacts of unauthorized introductions will be necessary in reducing this trend. Additionally, these new populations do provide additional angling and harvest opportunities as described in Table 4.29.

The management actions outlined in Table 4.30 to address this objective include utilizing education and awareness to discourage the intentional and unintentional introduction of Black Crappie and Bluegill into new waterbodies.

Objective 3: Increase awareness of angling opportunities and effort for Panfish to maintain current abundance

In adjacent FMZ's in Southern Region, as well as the northern United States, the Panfish fishery is extremely popular. However, in FMZ 15, Panfish quality and angling experience is often disregarded, as Panfish are seen as being a fishery primarily for children. In the predicted climate change scenario, Panfish populations are expected to do well. Warmer water temperatures will allow them to thrive and dominate warm water habitats. Increased angler effort and harvest will be necessary to maintain current population levels.

One of the goals of Ontario's Provincial Fish Strategy is to have sustainable fisheries that provide benefits to Ontarians. The abundance of Panfish, and the species diversity can support a high level of effort and harvest. The current Panfish fishery in FMZ 15 is being underutilized on most waterbodies in the zone.

The management actions outlined in Table 4.30 to address this objective include streamlining regulation to provide additional angling opportunities, promoting the quality of the Panfish fishery to bring awareness to the value of Panfish as a sportfish, increase the use of the fishery through education and awareness.

Panfish Regulation Options

The current Sunfish regulation for FMZ 15 has the following season and catch limits:

- Season: Open all year
- Catch Limit: 50(S) and 25(C)

The current Black Crappie regulation for FMZ 15 has the following season and catch limits:

- Season: Open all year
- Catch Limit: 30(S) and 10(C)

The current Yellow Perch regulation for FMZ 15 has the following season and catch limits:

- Season: Open all year
- Catch Limit: 50(S) and 25(C)

Proposed Regulation Option and Rationale

There are no proposed changes to the Crappie, Sunfish and Yellow Perch regulations.

In early discussions with the Advisory Council, an alternative Black Crappie regulation option of 50(S) and 25(C) was recommended and supported by the Advisory Council to the Ministry. The option was rationalized that it would streamline regulations with other Panfish species within the zone and would help control the spread of Crappie across the zone. Upon further deliberation, this proposal was not endorsed by the Ministry as it may unintentionally create further regulatory complexity by creating unintentional compliance issues with anglers who target Black Crappie in waters in proximity to adjacent zones that would then differ in daily catch limits. The increased catch limits would not align with any other adjacent FMZ's and would require an OFR amendment. An increased daily catch limit may also unintentionally incentivize further illegal introductions as existing fisheries would be further exploited and their quality subsequently diminished. Thus, the current daily catch limit of 30(s) and 10(C) is being kept.

The Advisory Council recommended that no changes be made to Panfish (Pumpkinseed and Bluegill) or Yellow Perch regulations. The season for all Panfish species is Open All Year; there are no sustainability or fishing quality concerns that call for a change in season.

No additional regulation changes for Panfish species were discussed with the Advisory Council.

4.2.9 Naturalized Rainbow Trout and Kokanee Salmon

Naturalized, self-sustaining populations of Rainbow Trout and Kokanee Salmon, a non-migratory form of Sockeye Salmon, occur in several lakes in the zone:

- Bernard Lake – Rainbow Trout
- Sand Lake – Rainbow Trout
- Boulter Lake - Kokanee Salmon

Their occurrence is very unusual at the zone and provincial scale; the Planning Team was not aware of any other self-sustaining inland populations in the province. Apart from their original introductions none have received management attention other than establishment of fish sanctuaries to protect fish during the spawning season; otherwise, fishing is permitted all year. The current status of the populations and the fisheries based on them have not been assessed.

Management Issues and Challenges

- Limited information available on status of populations or fishery.
- Limited capacity to undertake lake-specific management actions.

Management Strategy

The Ministry, with the advice of the Advisory Council, developed goals, objectives, strategies and management actions to address the issues and challenges related to naturalized Rainbow Trout and Kokanee Salmon (Table 4.31, Table 4.32).

Table 4.31. Naturalized Rainbow Trout and Kokanee Salmon management strategy.

Goal *Maintain the naturalized Rainbow Trout and Kokanee Salmon fishery with FMZ 15*

Objectives	Indicator(s)	Benchmark(s)	Targets
Maintain the current population occurrences (O1)	Number of known populations	Current known populations: Bernard Lake, Sand Lake, Boulter Lake	Maintain number of populations: Bernard Lake, Sand Lake, Boulter Lake

Table 4.32 Naturalized Rainbow Trout and Kokanee Salmon management actions. Values in brackets denote which objectives each action addresses.

Naturalized Rainbow Trout and Kokanee Salmon Management Actions
• Maintain existing fish sanctuaries to protect fish during vulnerable periods. (O1) • Improve knowledge of populations, habitats and the fishery. (O1) • Implement stocking strategy (O1). (see Section 4.3)

Objectives and Rationale

The Ministry, along with the Advisory Council, developed the following objectives for maintaining the Naturalized Rainbow Trout and Kokanee Salmon populations in FMZ 15, using the best available science and research, local knowledge, and social considerations.

Objective 1: Maintain the current population occurrences

Given the unique nature of these populations, the management goal will be to maintain their presence on the landscape. The existing waterbody-specific regulations will be kept protecting the populations when they are most vulnerable to over-exploitation. Stocking will not occur to minimize the risk of genetic or other effects of stocking on population viability. It is expected that limited lake-specific management will be possible, but if opportunities arise priority will be to improve our understanding of the parameters that allow the populations to exist and identify further measures to protect or improve them. It is understood that this stocking is a past action that should not be undertaken in the future.

4.3 Fish Stocking

The Ministry commits significant resources to the stocking program in FMZ 15. The program in FMZ 15 is the largest of any inland zone in the province in terms of numbers of fish stocked. From 2001 to 2015, the Ministry stocked about 500 different waterbodies; approximately 300 waterbodies and almost half a million fish were stocked annually. Partners and private groups contributed a substantial number of resources annually, stocking about 150 different waterbodies in total and about 50 per year.

The planning, implementation, monitoring and communicating of stocking require major investments of capital and operational funding and Ministry staff time. Stocking supports a diverse recreational fishery and contributes to fisheries management and fish community goals and objectives. Stakeholder interest in the fish stocking program is extremely high.

Despite the large investment and level of angler interest in fish stocking, the contribution of stocked fish to the overall fishery of the zone is relatively minor. In 2010, it was estimated that Lake Trout, Brook Trout, Rainbow Trout and Splake, the four primary stocked species, comprised 18% of targeted effort, 4% of fish caught and 14% of fish harvested, by number, in the zone, including Algonquin Provincial Park (OMNRF 2015c). If natural-reproduced Trout and fish from Algonquin Provincial Park are excluded, it is likely the stocked fish comprised less than 2% of the catch and 5% of the harvest, by number. Even though the overall contribution is small, stocked lakes provide a sizable proportion of the trout fishery, serving to divert effort from natural waters and provide additional opportunities for species of fish, in locations and at times of years that would not otherwise be available.

Given the relatively high demand for recreational fishing opportunities within FMZ 15, most of the stocking effort is aimed to create artificial fisheries through PGT stocking while potentially diverting angling pressure from natural populations. Additionally, a small number of waterbodies are stocked for rehabilitation purposes for a limited period, in situations where natural reproduction or survival is depressed with the intent to promote natural reproduction, offset angler harvest, and/or maintain unique genetic strains. Stocking to introduce new self-sustaining populations to waters where they did not naturally occur is done occasionally as well, following the completion of the required Environmental Assessment.

Stocking is generally considered to be a management action or tool used to achieve objectives for species, fisheries or waterbodies, not a management objective or goal itself. As such, most direction for stocking originates in the preceding individual species sections. However, to provide a complete encapsulation of the stocking program in FMZ 15, this section combines the direction from the individual species sections, with objectives related to the overall functioning of the stocking program and operational guidance.

4.3.1 Guidance for Fish Stocking in Ontario

Strategic direction for fish stocking in Ontario is provided by several documents including:

- Naturally Resourceful (OMNRF 2020c)
- Ontario's Provincial Fish Strategy, Fish for the Future (OMNRF 2015b)
- Guidelines for Stocking Fish in Inland Waters of Ontario (OMNR 2002)

All five of the goals of Ontario's Provincial Fish Strategy have relevance to the fish stocking program and the Strategy has several specific references to fish stocking. Most importantly, stocking must be considered in the context of the primary goal of maintaining self-supporting populations:

- **Objective 1.2 Protect the composition of native fish communities:** Stocking of artificially propagated fish and the transfer of wild fish have played a significant role in fisheries management in Ontario. While sometimes necessary to achieve

fisheries management goals, stocking carries ecological risks, including the potential for loss of genetic integrity in native fish stocks and changes to community structure, such as the predator/prey balance.

Secondly, it describes that stocking is a tool available to achieve specific objectives, not an objective itself:

- **Fisheries Management Tools**: Fish stocking is an important fisheries management tool. Fish that are raised at the Ministry's nine fish culture stations and in community hatcheries are stocked to create PGT fisheries that provide additional angling opportunities. In certain situations, stocked fish may help to restore degraded fish populations. The Ministry is currently developing strategies for culturing and stocking aquatic species at risk, in support of recovery efforts for those species.
- **Major drivers affecting Ontario's fish, fisheries, and supporting ecosystems:** The opportunity for PGT stocking of ponds and small lakes (often near urban centres) with sport fish creates local fishing opportunities where none exist, deflecting fishing pressure from more sensitive ecosystems and native fish species.
- **Objective 2.3: Increase economic, social and cultural benefits derived from fish resources**: Stocking is an important management tool to create fishing opportunities where they do not exist, or where native fish populations cannot support sustainable fishing pressure. For example, PGT fisheries create new fishing opportunities, especially near urban areas, while alleviating fishing pressure on more sensitive species and locations. In PGT operations, small fish are stocked with the sole purpose of growing them for later catch and consumption.

Finally, the Provincial Fish Strategy states the importance of monitoring as part of an effective fish stocking program:

- **Goal 4 Objectives**: Fisheries managers require good, up-to-date data to assess risk, and to effectively plan and implement actions such as fish stocking and harvesting regulations.

Operational guidance is provided through a suite of policies, guidelines, procedures and literature including:

- Guidelines for Stocking Fish in Inland Waters of Ontario (OMNR 2002)
- Fish Culture Section production planning procedures
- Guidelines for Stocking Surplus/Retired Brood Stock from Provincial Fish Culture Stations
- Stocks Catalogue
- Numerous technical reports, literature reviews and jurisdictional scans available through the Ministry corporate library.

4.3.2 Annual Fish Stocking Cycle

The planning, production and distribution of fish, communication to anglers and monitoring of fish stocking are undertaken in an annual cycle that involves a diverse range of staff in several Ministry organizational units:

Planning

- Annually, District stocking coordinators prepare a 4-year requirement plan which lists the species, life stage, genetic strain, number and marking requirements.
- District coordinators work with Community Hatchery partners to develop plans for individual facilities.
- FMZ plans, the stocking guidelines, results of monitoring, angler feedback and local knowledge/expert opinion including Indigenous Knowledge are the primary inputs that inform the local plans.
- Stocking has occurred for many years and the stocking program has evolved; accordingly, generally slight changes are made from one year to the next as information becomes available.

Production

- Fish Culture Section collates needs from the Districts and Great Lakes units and assigns production targets to individual Fish Culture Stations and in partnership with Community Hatcheries.
- Ministry Fish Culture Stations and Community Hatcheries support brood stock development, collect eggs and rear fish to meet assigned production targets.
- Community Hatcheries may collect eggs directly or receive them from the Ministry to meet their local production targets.

Distribution

- Districts lead the distribution of fish into planned waterbodies with support from Fish Culture Section, Aviation Services and external partners including Community Hatcheries.

Communication and Reporting

- Stocking information is stored in the Fish Stocking Information System (FSIS) database. Records are created by staff at the Fish Culture Stations that provided the fish and are then approved by District coordinators.
- Approved records are extracted from FSIS for the Fish ON-line public application and production of local stocking lists and other local queries (District coordinators)

- Stocking lists for individual lakes or Ministry Districts are available through Fish ON-line as well as local District offices.

Monitoring

- Concurrent with the planning, production and distribution cycle, Districts prepare annual Work Plans which may include activities to monitor aspects of the stocking program, including angling activity, fish community and population assessments and access. Periodically, assessment and EA processes are undertaken to consider new waters for stocking.

4.3.3 Stocking Purpose

There are two fundamental reasons for stocking fish (OMNR 2002):

1) Establish or enhance natural reproduction:

Stocking is aimed at establishing or re-establishing naturally reproducing fish populations and the provision of related ecological and socio-economic benefits. This would include rehabilitation and introduction as well as the maintenance of some native genetic stocks. Generally stocking is conducted for a finite period and stopped when the objective of establishing reproduction is met or determined to be infeasible.

2) Provide hatchery dependent fisheries:

Stocking is aimed at providing artificial fisheries for public use. These are practices associated with put-and-take and/or put-grow-and-take fisheries. Generally, stocking is continued on an ongoing basis if waters stay suitable and the objective of creating opportunities stays.

Supplemental Stocking

Supplemental stocking is often cited as a third type of stocking wherein the receiving waters already support a reproducing population of the species being stocked but reproduction is observed or perceived to be 'inadequate'. The message or perception is that stocking 'improves' the existing population. In practice, stocked fish seldom contribute to natural reproduction and there is a considerable amount of evidence to show that supplemental stocking can have significant negative impacts on the self-sustaining part of the population, is inefficient and seldom cost-effective. In essence, supplemental stocking is identical to put-grow-take stocking and is generally incompatible with managing populations for natural reproduction.

4.3.4 Stocking Strategies and Actions

Management direction for the stocking program has been compiled from the individual species sections. The reader should refer to the individual sections to understand the broader context of stocking within the rest of the management strategy for each species. Management objectives in the following species tables are listed in order of management priority which will be reflected in decisions where current or future stocking strategies or actions may conflict in each waterbody.

Brook Trout

The management goal for Brook Trout is to conserve natural populations. To this end, the stocking strategies for Brook Trout are prioritized to support maintaining or increasing natural populations. Therefore, waters that support natural populations will not be stocked to avoid the genetic, fish community and fishery affects that stocking can cause (Table 4.33). It can be challenging to determine what constitutes a viable natural population, so assessment and development of criteria to define natural populations may be needed. Where populations have been lost or collapsed, stocking on a short-term basis to re-introduce or rehabilitate natural populations will be considered if supported by a lake-specific re-introduction/rehabilitation strategy and where it has been identified that stocking can play a role in the successful recovery of that population. Such strategies may prescribe that lake-specific regulations be applied to lakes undergoing rehabilitation to minimize harvest of stocked fish during the rehabilitation process. Community hatcheries can be well suited to producing the unique products required (small number of local strains) and will be used where possible to provide production support.

Brook Trout are currently stocked extensively in FMZ 15 to provide PGT opportunities or divert angling effort from naturally reproducing populations and this practice will continue. The importance and public expectations of the Brook Trout stocking program are expected to increase due to the conservative approach to managing natural populations being proposed within this plan. To address this anticipated interest from the angling community, the Ministry will seek input on the stocking program on a variety of topic areas such as species composition, accessibility and specialty fisheries during implementation of this management plan. The Ministry will conduct operational reviews to optimize the benefits provided by the stocking program. It is proposed that fishing be permitted all year on all PGT Brook Trout lakes and a more liberal catch limit than is proposed for natural waters be applied to encourage use of the resource.

Marking of stocked Brook Trout should also occur to detect the presence of natural reproduction, determine age, growth and other life history metrics.

Table 4.33 Summary of stocking strategies and actions for Brook Trout and their linkage to zone management objectives in FMZ 15.

Management Objective	Stocking Strategies
Maintain the number and distribution of natural Brook Trout populations	Supplemental stocking of waterbodies where viable natural populations are known to be present will not be done. (S1) Conduct rehabilitation and re-introduction stocking of Brook Trout populations where appropriate, using local genetic strains (e.g. Dickson strain). (S2)
Improve the status of natural Brook Trout populations and fishing opportunities	Continue to stock and manage Brook Trout to divert angling effort from natural Brook Trout lakes. (S3)
Enhance angling opportunities for *stocked* Brook Trout	Continue to stock Brook Trout to create additional Brook Trout angling and harvest opportunities and look to improve effectiveness where possible. (S4)
Actions	
• Develop criteria and/or obtain advice from science specialists for what constitutes a viable natural, self-sustaining Brook Trout population. (S1) • Develop rehabilitation criteria for Brook Trout populations to support the identification of candidate rehabilitation waterbodies across the zone which may be considered for rehabilitative stocking and/or regulatory restrictions on harvest. (S1, S2) • Identify or confirm status of natural Brook Trout populations where uncertainty exists using BsM and local targeted assessments. (S1, S2) • Implement stocking actions associated with lake-specific rehabilitation/re-introduction strategies. (S2) • Align regulations with management objectives on waterbodies where stocking occurs; refer to Brook Trout section for details. (S1, S2) • Develop a FMZ 15 stocking public communication strategy to educate the angling community on the stocked opportunities and purpose to stocking. (S1, S2, S3, S4) • Engage with the Advisory Council and angling community on the desired spectrum of opportunities that the stocking program can provide (S1, S2, S3, S4): ◦ Accessibility	

  - Size at stocking (put-grow-take or put and take)
  - Stocking frequency
  - Specialty stocked Brook Trout fisheries (e.g., catch and release and/or trophy lakes) and
  - Species composition (Splake, etc.).
- Dependent on available funding and staffing resources, consider developing a stocking monitoring and assessment plan for PGT Brook Trout lakes. (S1, S2, S3, S4)
- Inform and adjust stocking operational practices (lake access, habitat and fish community suitability, stock, strain, stocking rate, exploitation rate).
- Periodically review current stocked lakes and operational practices in relation to stocking guidelines, best available science, Indigenous knowledge and local monitoring and adapt stocking plans accordingly. (S1, S2, S3, S4)
- Maintain or improve access to existing or potential stocked waters.

Lake Trout

The management goal for Lake Trout is to conserve natural populations. To help achieve the goal, waters that support natural populations will not be stocked to avoid the genetic, fish community and fishery affects that stocking can cause (Table 4.34). It can be challenging and subjective to determine what constitutes a viable natural population so assessment and development of criteria to define natural populations may be needed. Where populations have been lost or collapsed, stocking on a short-term basis to re-introduce or rehabilitate natural populations will be considered if supported by a lake-specific re-introduction/rehabilitation strategy. Such strategies may prescribe that lake-specific regulations be applied to lakes undergoing rehabilitation to minimize harvest of stocked fish during the rehabilitation process. Community hatcheries can be well suited to producing the unique products required (small number of local strains) and will be used where possible to provide production support.

Supplemental stocking of Lake Trout will be considered in exceptional circumstances where it has been rationalized in support of other objectives such as management priority for other species and where it would support significant socially and economically important fisheries within FMZ 15. Such stocking will be supported by a lake-specific stocking strategy. Strategies have been drafted for two lakes that are currently stocked on a supplemental basis: Lake Bernard and Lake Muskoka (Appendix D, Appendix E).

Lake Trout is currently stocked extensively in FMZ 15 to provide PGT opportunities or divert angling effort from naturally reproducing populations and this practice will continue. The importance and public expectations of the stocking program are expected

to increase due to the proposed more conservative approach to managing natural populations. To address that, the Ministry will seek input from users on the desired spectrum of opportunities that the stocking program can provide such as species composition, accessibility and specialty fisheries and conduct operational reviews to optimize the benefits provided by the stocking program. It is proposed that fishing be permitted all year on PGT Lake Trout lakes, as is currently the case.

Marking of stocked Lake Trout should also occur to detect the presence of natural reproduction, determine age, growth and other life history metrics.

Table 4.34 Summary of stocking strategies and actions for Lake Trout and their linkage to zone management objectives in FMZ 15.

Management Objective	Stocking Strategies
Maintain the number and distribution of natural Lake Trout populations	Stocking of waterbodies where viable natural populations are known to be present will not be done. (S1) Conduct rehabilitation and re-introduction stocking of Lake Trout populations where appropriate, using local genetic strains. (S2)
Improve the status of natural Lake Trout populations and fishing opportunities	Continue to stock and manage Lake Trout to divert angling effort from natural Lake Trout lakes. (S3)
Enhance angling opportunities for stocked Lake Trout	Continue to stock Lake Trout to create Lake Trout additional angling and harvest opportunities and look to improve effectiveness where possible. (S4)
Actions	
• Develop criteria and/or obtain advice from science specialists for what constitutes a viable natural, self-sustaining Lake Trout population. (S1) • Develop rehabilitation criteria for Lake Trout populations to support the identification of candidate rehabilitation waterbodies across the zone which may be considered for rehabilitative stocking and/or regulatory restrictions on harvest. (S1, S2) • Identify or confirm status of natural Lake Trout populations where uncertainty exists using BsM and local targeted assessments. (S1, S2) • Implement stocking actions associated with lake-specific rehabilitation/re-introduction strategies. (S2) • Develop supplemental stocking rationalization strategies for candidate waters. (S5)	

- Align regulations with management objectives on waterbodies where stocking occurs (refer to Lake Trout chapter for details. (S1, S2)
- Develop a FMZ 15 stocking public communication strategy to educate the angling community on the stocked opportunities and purpose to stocking. (S1, S2, S3, S4)
- Engage with the Advisory Council and angling community on the desired spectrum of opportunities that the stocking program can provide (S1, S2, S3, S4):
  - Accessibility
  - Priority areas for Winter fisheries
  - Size at stocking (PGT or put, take)
  - Stocking frequency
  - Specialty stocked Lake Trout fisheries (e.g., catch and release and/or trophy lakes)
  - Species composition (Splake, etc.)
- Dependent on available funding and staffing resources, consider developing a stocking monitoring and assessment plan for PGT Lake Trout lakes. (S1, S2, S3, S4)
  - Inform and adjust stocking operational practices (lake access, habitat and fish community suitability, stock, strain, stocking rate, exploitation rate)
- Periodically review current stocked lakes and operational practices in relation to stocking guidelines, best available science, Indigenous Knowledge and local monitoring and adapt stocking plans accordingly. (S1, S2, S3, S4).
- Maintain or improve access to existing or potential stocked waters.

Rainbow Trout, Brown Trout and Splake and Other Salmonids

Rainbow Trout, Brown Trout and Splake have historically been stocked to provide put-grow-take opportunities and divert angling effort from naturally reproducing Brook Trout and Lake Trout populations and this practice will continue in FMZ 15 (Table 4.35). In general, Rainbow Trout, Brown Trout or Splake will not be stocked into waterbodies with naturally reproducing populations of Brook Trout or Lake Trout to avoid negative impacts, in support of the management goals of those species.

Stocking of Rainbow Trout, Brown Trout or Splake into lakes that support natural Brook and Lake Trout populations may be considered in exceptional circumstances and only where it has been rationalized in support of broader objectives in support of other species and to support large socially and economically important fisheries. Such stocking will be supported by a lake-specific stocking strategy and will be undertaken with the utmost of caution.

The importance and public expectations of the stocking program are likely to increase due to pressures on coldwater fisheries.

Table 4.35 Summary of stocking strategies and actions for Rainbow Trout, Brown Trout and Splake and their linkage to zone management objectives in FMZ 15.

Management Objectives	Stocking Strategies
Maintain the number and distribution of natural Brook Trout populations Maintain the number and distribution of natural Lake Trout populations	Do not stock Rainbow Trout, Brown Trout or Splake into lakes that are managed as natural Lake Trout or Brook Trout populations. (S1) Consider stocking on a PGT basis in specific waterbodies to address fish community objectives and support local economies where management priority is not for natural reproduction. (S2). Stock Splake in other waterbodies to divert effort from natural Brook and Lake Trout lakes. (S3)
Maintain or enhance angling opportunities for *stocked* Splake	Continue to stock Splake to create additional angling opportunities. and look to improve effectiveness where possible. (S4)
Actions	

• Develop a targeted FMZ 15 stocking public communication strategy to educate the angling community on the stocked opportunities and purpose to stocking. (S1, S2, S3, S4)
• Engage with the Advisory Council and angling community on the desired spectrum of opportunities that the stocking program can provide (S1, S2, S3, S4):
  ◦ Accessibility
  ◦ Size at stocking (PGT or put, take)
  ◦ Stocking frequency
  ◦ Specialty stocked fisheries (e.g., catch and release and/or trophy lakes) and
  ◦ Species composition (Splake, etc.).
• Dependent on available funding and staffing resources, consider developing a stocking monitoring and assessment plan for PGT Rainbow Trout, Brown Trout and Splake lakes (S1, S2, S3, S4):
  ◦ Inform and adjust stocking operational practices (lake access, habitat and fish community suitability, stock, strain, stocking rate, exploitation rate)
• Periodically review current stocked lakes and operational practices in relation to stocking guidelines, best available science, Indigenous Knowledge and local monitoring and adapt stocking plans accordingly. (S1, S2, S3, S4)
• Maintain or improve access to existing or potential stocked waters.	

Lake Whitefish

Lake Whitefish are currently not stocked in the zone. The potential need of Lake Whitefish stocking in FMZ 15 for rehabilitation purposes has been identified in the management planning process as a strategy to support maintaining natural Lake Whitefish populations (Table 4.36). Where populations have been lost or collapsed, stocking on a short-term basis to re-introduce or rehabilitate natural populations will be considered if supported by a lake-specific re-introduction/rehabilitation strategy. Such strategies may prescribe that lake-specific regulations be applied to lakes undergoing rehabilitation to minimize harvest of stocked fish during the rehabilitation process. Generally, rehabilitative stocking will be limited to situations where over-harvest appears to be the main contributing factor to the decline. However, rehabilitative stocking may also be one action in a suite of actions for a holistic whitefish rehabilitation plan for a given lake where multiple issues beyond overharvest need to be addressed, such as Aquatic Invasive Species (AIS).

Additionally, it was identified during the planning process that there may be latent interest within the angling community for Lake Whitefish PGT fishing opportunities particularly in response to the proposed more conservative approach to managing natural coldwater species populations of Lake Whitefish, Brook and Lake Trout. Engaging the Advisory Council and angling community will support determining if and where localized Lake Whitefish angling interests exist within the zone to maximize the potential for alternate and diversionary put-grow-take Lake Whitefish fishing opportunities.

Marking of stocked Lake Whitefish should also occur to detect the presence of natural reproduction, determine age, growth and other life history metrics.

Table 4.36 Summary of stocking strategies and actions for Lake Whitefish and their linkage to zone management objectives in FMZ 15.

Management Objective	Stocking Strategies
Maintain the number of natural Lake Whitefish populations.	Conduct rehabilitation and re-introduction stocking of Lake Whitefish populations where opportunities are identified. (S1) Stock Lake Whitefish to divert angling effort from natural Lake Whitefish lakes if it can be established that demand for additional Lake Whitefish fishing opportunities exists. (S2)

Management Objective	Stocking Strategies
Maintain the abundance of Lake Whitefish	Stock Lake Whitefish on a PGT basis if it can be established that demand for additional Lake Whitefish fishing opportunities exists. (S3)
Actions	

• Develop criteria and/or obtain advice from science specialists for what constitutes a natural population if needed. (S1, S2 S3)
• Implement stocking actions associated with lake-specific rehabilitation/re-introduction/PGT strategies. (S1, S2, S3)
• Engage with the Advisory Council and angling community on the desired spectrum of opportunities that the stocking program can provide (S1, S2, S3):
  ◦ Accessibility
  ◦ Size at stocking (PGT or put,take)
  ◦ Stocking frequency
  ◦ Species composition (Lake Whitefish)
• Maintain or improve access to existing or potential stocked waters.	

If demand for additional Lake Whitefish fishing opportunities exists, stocking may be considered on a PGT basis. Depending on the stocking need identified, a selection process to identify candidate lakes may be required. It is proposed that the selection of potential lakes for PGT stocking will be a two-stage process:

- Determination of eligibility
- Prioritization of waterbodies

To be eligible for PGT stocking all the following criteria must be met:

- Public access is available (Ministry stocking only)
- Not a managed (natural or stocked) Brook Trout Lake, or in a connected watershed if emigration may occur
- Not a lake that supports a viable self-sustaining Lake Whitefish population (native or introduced). Criteria for what constitutes 'viable' may have to be developed, with the primary indicators being:
  - CUE in standard NA_1 gill net survey or Summer Profundal Index Netting Survey

    - Age composition
- No species of conservation concern present
- For introductions, successful completion of Resource Stewardship and Facility Development (RSFD) Class Environmental Assessment (EA)

Based on the preceding, many lakes would be eligible for stocking of Lake Whitefish on a PGT basis. However, it is likely that only a small number of eligible lakes will be stocked. The selection of lakes from those that are eligible would then be done following a process of prioritization based on criteria such as:

- Geographic distribution on landscape relative to other PGT lakes and other fisheries in general
- Proximity to urban centres
- Habitat suitability
- Prey availability
- Fish community composition
- Demonstrated effectiveness, through a monitoring program.

Criteria have not been developed yet because it is uncertain whether PGT stocking of Lake Whitefish will ever occur.

Walleye

Walleye are not native to most lakes in FMZ 15. They occurred naturally only in low elevation areas close to the Ottawa River on the east side of the zone and the lower reaches of tributaries of Georgian Bay on the west and northwest side of the zone. However, past Ministry stocking and ongoing illegal stocking have substantially increased the distribution of Walleye in the zone. The objectives for future management of Walleye are to limit future range expansion while improving existing populations. To support these objectives, introductions of new populations will generally not be done and only if supported by the completion of the required Environmental Assessment process (Table 4.37).

Stocking of waterbodies where natural populations are present will not occur to avoid the genetic, fish community and fishery impacts stocking can cause.

PGT stocking of Walleye will not occur; based on science and experience this type of stocking is unlikely to create quality fisheries. The priority for stocking Walleye will be on rehabilitation of existing populations, and, supported by a lake-specific rehabilitation strategy.

Table 4.37 Summary of stocking strategies and actions for Walleye and their linkage to zone management objectives in FMZ 15.

Management Objective	Stocking Strategies
Maintain the number of Walleye populations.	Do not introduce Walleye into new waters in the zone. (S1) Do not stock waterbodies where viable natural populations are present. (S2)
Increase or maintain abundance of Walleye	Conduct rehabilitation stocking of Walleye populations using local genetic strains. (S3)
Minimize further unauthorized introductions of Walleye in new waters in the zone.	PGT stocking of Walleye will not occur. (S4)
Actions	
• Develop criteria and/or obtain advice from science specialists for what constitutes a viable natural, self-sustaining Walleye population. (S1, S2, S3) • Develop rehabilitation criteria for Walleye populations to support the identification of candidate rehabilitation waterbodies across the zone which may be considered for rehabilitative stocking and/or regulatory restrictions on harvest. (S1, S2, S3) • Implement stocking actions associated with lake-specific rehabilitation/re-introduction strategies. (S2) • Develop educational materials for public dissemination which show the biological limitations of Walleye stocking in FMZ 15 and offers alternative actions to support naturally reproducing Walleye populations in the zone.	

Marking of stocked Walleye may be desirable to detect the presence of natural reproduction and determine age and growth and survival rates of stocked and natural Walleye. Currently only fall fingerling Walleye can be marked (fin clipped). If no other system of marking is available, fall fingerling Walleye will be assigned to lakes scheduled for assessment on a rotational basis to maximize the value derived from marked fish.

Walleye stocks in FMZ 15 have a varied genetic ancestry based on post-glacial colonization and subsequent stocking (Wilson 2012). For new population rehabilitation, donors from the most locally available watershed will be used. At a minimum, Lake Manitou strain will be used for watersheds that flow into Georgian Bay and Bay of Quinte strain will be used for the remaining, south and east portions of the zone.

Other Coolwater and Warmwater Recreational Species

Management objectives for other cool and warm water species including Northern Pike,

Smallmouth and Largemouth Bass, Black Crappie and Panfish support limiting further range expansion of these species because of the potential negative impacts they have on other species. Consequently, introductions of new populations will not be done (Table 4.38).

Stocking, as a management tool, is seldom applied to most cool and warm water species in FMZ 15. These fisheries are usually supported through natural reproduction and stocking has minimal benefit. Real or perceived concern with populations of these species is generally associated with stresses that stocking cannot alleviate such as habitat limitations and fish community interactions. Therefore, supplemental or PGT stocking of these species will not occur.

Table 4.38 Summary of stocking strategies and actions for other cool and warm water fish species and their linkage to zone management objectives in FMZ 15.

Management Objective	Stocking Strategies
Northern Pike • Maintain the abundance of Northern Pike populations. • Minimize further unauthorized introductions of Northern Pike into new waters in the zone. **Muskellunge** • Maintain the abundance of Muskellunge populations. • Minimize further unauthorized introductions of Muskellunge into new waters in the zone. **Bass** • No increase in current abundance of bass. • Minimize further unauthorized introductions of bass into new waters in the zone. **Panfish** • Maintain Panfish populations at current levels. • Minimize further unauthorized introductions and range increase of Panfish into new waters in the zone. • Increase awareness of angling opportunities and effort for Panfish to maintain the current abundance.	PGT or supplemental stocking of these species will not be done. (S1)
Actions	
• Educate anglers on stocking science and practices and effects of unauthorized introductions. (S1)	

4.3.5 Spectrum of Opportunities Provided by PGT Stocking Program

An action common to the stocking strategies of most species is to consult with the Advisory Council and public on the spectrum of fishing opportunities that they wish. A review by the Ministry, after seeking input from the Advisory Council, has identified preliminary priorities to the program and are summarized in Table 4.39. In general, Advisory Council members expressed a diverse range of perspectives and preferences with regard to the Ministry stocking program. The Advisory Council generally supported Ministry-identified areas where improvements and efficiencies might be realized through technical developments such as the size of fish stocked and genetic strains.

Table 4.39 Preliminary priorities for changes to the spectrum of fishing opportunities provided by the stocking program.

Species	Priorities
Brook Trout	• Priority over other species where reasonable returns possible (if habitat and fish community are suitable, stock Brook Trout and only consider other species if reasonable Brook Trout fishery is not created). • Develop criteria to identify diversionary lakes. • Stocking strategies may differ between lakes (e.g., more accessible lakes may be stocked more often than less accessible ones). • Evaluate performance of different strains to improve effectiveness. • Create small number of more accessible, Put, Take/Put, Delayed, Take fisheries. • Create small number of special regulation Brook Trout fisheries.
Lake Trout	• Priority over other species where reasonable returns possible (if habitat and fish community are suitable, stock Lake Trout and only consider other species if reasonable Lake Trout fishery is not created). • Develop criteria to identify diversionary lakes. • Stocking strategies may differ between lakes (e.g., more accessible lakes may be stocked more often than less accessible ones). • Investigate effectiveness of stocking advanced-sized Lake Trout in lakes with marginal juvenile habitat to improve the quality of the fishery
Lake Whitefish	• Development of a PGT program for Lake Whitefish is a low priority and will be pursued only if demand/opportunity presents itself.

Species	Priorities

Other Salmonids	• Maintain the current mix of Splake for PGT purposes.
	  ◦ Eliminate and reduce proportion of Brown Trout fisheries.
	  ◦ More emphasis on destination fisheries supported by higher stocking density for purposes of PGT.
	• Increase emphasis on stocking larger sub-catchable fish in lakes with complex fish communities for PGT.

Walleye	• Development of PGT fisheries for Walleye will be a low priority and where pursued, will be considered trials until success and efficiency can be demonstrated.

4.3.6 Role of Community Hatcheries

Community hatcheries play a key role in fisheries management in FMZ 15 by engaging local stakeholders in Ministry-approved stocking actions which support species objectives and strategies (Figure 4.3). The production of fish raised at individual community hatcheries is enabled through Aquaculture Licence's issued by the Ministry. The collection and stocking of fish may also require a Licence to Collect Fish for Aquaculture and/or Licence to Stock Fish in Ontario Waters. The application and issuance of required licenses are done through an integrated planning process. Annual production plans for each community hatchery include species-specific rearing targets which will align with the species-specific objectives and strategies within this chapter and will support District stocking targets.

Community hatcheries offer several unique characteristics that make them valuable partners in FMZ 15 stocking implementation. Most notably, they offer opportunities for stakeholder engagement in actions which directly support species objectives within the FMZ 15 management plan. Additionally, they are well-suited to fish production of local or regional species and strains given their local interests, small-scale of production and ability to adapt to local needs quickly. Relative to the Ministry fish culture system, the community hatcheries short production cycle minimizes the risks of disease within their facilities and offers enhanced flexibility which is conducive to the requirements for production of fish for local rehabilitation purposes.

Recognizing the unique advantages of community hatcheries, the annual production capacity within each community hatchery will be prioritized as follows:

1) Native coldwater species (Brook Trout and/or Lake Trout) (local strains) rehabilitation stocking production targets identified in the District production plans to support those native fish species objectives

2) Any remaining production capacity for Salmonid PGT to support Brook Trout and Lake Trout species objectives as well as Rainbow Trout, Brown Trout and Splake species objectives.

Ministry staff will engage annually with Community Hatcheries to ensure their production targets align with FMZ species objectives and District production plans and to share information at the FMZ, District and waterbody-scales.

It is important to note that there are currently no community hatcheries in FMZ 15 that participate in private fish production and stocking.

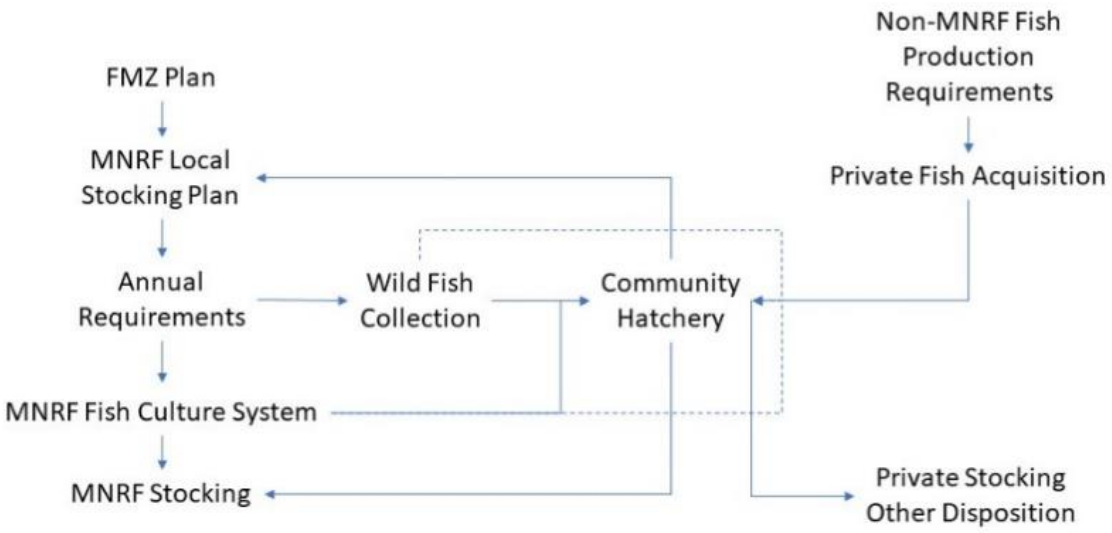

Figure 4.3 Role of community hatcheries in Ministry fish stocking cycle and, potentially, private fish production and stocking.

4.3.7 Private Stocking

Private individuals and groups can apply for approval to stock fish under the authority of a Licence to Stock Fish. Common examples of private stocking include waters that lack public access and cottage associations wishing to enhance opportunities in their local lake. The cost of the fish is borne by the licencee. Third party stocking is not subject to Environmental Assessment unless the fish are from the Ministry.

Applications will be reviewed to ensure that the stocking does not conflict with the direction of this plan.

4.3.8 Species at Risk Stocking

The responsibility for management of Species at Risk (SAR) was transferred to MECP in 2019. Any Ministry role in SAR management, including stocking, will be done under the leadership of MECP.

4.3.9 Stocking Monitoring and Science Needs

Currently, there is no organized system of monitoring and assessing the stocking program at the provincial, regional or FMZ scale. The provincial BsM program explicitly excludes lakes which are stocked on a PGT basis from being selected for trend lake monitoring, though lakes may be chosen for state-lake monitoring. The relatively small number of stocked to natural small-sized lakes in FMZ 15 means that the chance of a PGT lake being selected as a state lake is low. Assessments are currently done primarily at the local (District) scale with waterbodies being selected to meet local priorities.

The need for post-stocking effectiveness assessments should be carefully considered and guided by the stocking objectives and strategies described in this management plan. Stocking assessments should be based on quantifiable benchmarks when objectives are established prior to stocking (OMNR 2002). Effectiveness assessments are critical for measuring the long-term benefits of stocking and identifying factors contributing to stocking success (Cowx 1999). Additionally, effectiveness information can inform economic evaluations, identify gaps and issues in fish stocking across the zone and support decision-making during the FMZ planning process).

Periodic assessments can be undertaken within an adaptive management framework that allow for adjustment of stocking objectives as new information is gathered. For instance, management options may include discontinuation of stocking when self-sustaining populations have recovered or when habitat conditions have become unsuitable for the species being stocked. Standardized methodologies for data collection will ensure consistency in data reporting and may include, BsM, Local Targeted Monitoring and Assessments, or other species-specific netting protocols developed by MNRF.

To that end, the FMZ 15 Planning and Implementation Teams will:

Priorities to be addressed by the stocking program include:

- Ensure efficiency of the stocking program by engaging Ministry science and monitoring units to obtain advice and support for a zone-wide monitoring approach to maximize the utility of assessment efforts,
- Identify zone assessment priorities, and support Science and Research Branch's initiatives under the Integrated Monitoring Framework to include local assessment data into provincial monitoring archiving databases to ensure stocking assessment data is accommodated.

Dependant on available funding and staffing resources, priorities to be considered by the stocking program are: General

- Examine how to determine success of diversionary stocked lakes.
- Use adaptive management approach to inform and make adjustments to stocking decisions.

- Determine the status of public access.
- Undertake fish community and/or habitat assessments to verify the ongoing suitability of lakes for stocking or identify new lakes for stocking.
- Work with science staff to identify the best genetic strain for lake-specific applications, including need to develop regional Lake Trout strain(s), and
- Describe the fishery created by the stocking program.

Brook Trout

- Assessment to determine the presence of natural reproduction.
- Develop criteria to define candidate populations and implement lake-specific rehabilitation or re-introduction strategies where appropriate
- Fish community assessment to determine presence of incompatible competitor species.

Lake Trout

- Assessment to determine the presence of natural reproduction.
- Develop criteria to define candidate populations and implement lake-specific rehabilitation or re-introduction strategies where appropriate
- Measurement of late summer deep water habitat quality (hypolimnetic dissolved oxygen).

Walleye

- Assessment to determine the presence of natural reproduction.
- Develop criteria to define candidate populations and implement lake-specific rehabilitation where appropriate

4.4 Commercial Fisheries

Ontario's commercial food fishery is part of our heritage and culture and is the largest freshwater fishery in North America. Most commercial food fishing takes place on the Great Lakes, where Rainbow Smelt, Yellow Perch, Walleye and Lake Whitefish make up most of the harvest. Lake Erie accounts for most of the commercial harvest. Commercial fisheries also exist on several large inland lakes, such as Lake of the Woods, Lake Nipigon and Lake Nipissing, with less significant fisheries on some of the smaller inland lakes in northwestern and eastern Ontario. Most commercial fishing licences are in northwestern Ontario, where fisheries mainly target Lake Whitefish, with smaller harvests of other species. Approximately 10% of the commercial fish harvest is sold in Canada and 90% is exported primarily to the United States, with a small proportion exported to Europe.

In Ontario, there are over 500 active commercial fishing licences. In 2011, commercial licence holders caught nearly 12,000 metric tonnes (about 12 million kg) of fish. The dockside value of that harvest in 2011 was more than $33 million and, including processing, packaging, and shipping, contributed approximately 1,000 jobs and $234 million to Ontario's economy. Commercial fishing and its industries are significant employers in many smaller Great Lakes communities and are an important economic development initiative for many Aboriginal communities across the province (OMNRF 2015b).

4.4.1 Commercial Food Fish

There are no commercial food fisheries in FMZ 15.

4.4.2 Commercial Baitfish

Ontario's commercial bait industry, the largest in Canada, has a lengthy history, with approximately 1,100 commercial bait licences issued annually. The retail value of the bait industry is estimated at $23 million (2005) and additionally supports the multi-million-dollar fishing and tourism industries (OMNRF 2020b).

The harvest, use, and movement of bait comes with ecological risks that include the spread of fish-based disease and invasive species (e.g., Round Goby) and incidental movement of native species (e.g., Yellow Perch, bass) to waters outside of their native range. This can disrupt fish community dynamics in the receiving waterbody, including the loss of native species (e.g., Brook Trout) (OMNRF 2020b).

As of 2020, Ontario's Sustainable Bait Management Strategy (OMNRF 2020b) provides policy direction for the sustainable use and harvest of bait (e.g., baitfish and leeches). The direction in the policy balances four goals:

1. Protect the health of aquatic ecosystems.
2. Enhance the quality of life for Ontarians by providing recreational, social and economic benefits.
3. Conserve the resource and maintain a viable bait industry; and
4. Create policies that are adaptable, effective, consistent across the province, and simple to implement.

To implement the strategy, new regulations or amendments to existing regulations will be needed and may take from one to three years to complete.

The strategy includes actions to minimize the risk around baitfish use including limiting the permitted baitfish species, ensuring possession limits are sustainable, controlling the movement of baitfish through Bait Management Zones (BMZ's), ensuring proper receipts and documentation for compliance purposes, requiring conditions around storage, and limiting the use of bait in native Brook Trout lakes. Additionally, the Ministry will continue to

licence Commercial Bait Operators and minimize risks associated with bait use by requiring operators to undertake standardized training, limiting the type of equipment that can be used, strengthening the requiring annual reporting and through regular compliance.

Efforts to mitigate the risks of spreading invasive species and disease through the use and movement of bait is a shared responsibility amongst all of those involved in the bait pathway, including harvesters, dealers and anglers. Education and awareness of the risks of invasive species, disease and the movement of non-native species is critical to help ensure the effectiveness of the strategy.

The management of baitfish in FMZ 15 will be carried out through the policies outlined in Ontario's Sustainable Bait Management Strategy. These policies will help to ensure the sustainable use and harvest of Ontario's bait resources while reducing the ecological risks.

4.5 Species at Risk (SAR)

As of April 1, 2019, the responsibility of SAR and their habitat under the *Endangered Species Act* (2007) was transferred to MECP. In FMZ 15, there are 10 known aquatic species at risk: 7 species of fish, 2 species of aquatic plants and 1 species of freshwater mussel (Table 4.40).

Table 4.40 Aquatic species at risk known in FMZ 15, not including Algonquin Provincial Park.

English Name	Scientific Name	Provincial Status	Federal Status
American Eel	*Anguilla rostrate*	Endangered	No status
Engelmann's Quillwort	*Isoetes engelmannii*	Endangered	Endangered
Grass Pickerel	*Esox americanus vermiculatus*	Special Concern	Special Concern
Hickorynut (historical record)	*Obovaria olivaria*	Endangered	No status
Lake Sturgeon (Great Lakes-Upper St. Lawrence population)	*Acipenser fulvescens*	Endangered	No status
Northern Brook Lamprey	*Ichthyomyzon fossor*	Special Concern	Special Concern
Ogden's Pondweed	*Potamogeton ogdenii*	Endangered	Endangered
River Redhorse	*Moxostoma carinatum*	Special Concern	Special Concern
Shortjaw Cisco	*Coregonus zenithicus*	Threatened	Threatened

4.6 Invasive Species

Alien species are plants, animals, and micro-organisms introduced by human action outside their natural past or present distribution. Invasive species are defined as harmful alien species whose introduction or spread threatens the environment, the economy, or society, including human health (OMNR 2012). Ontario's definition of an invasive species may include species native to Ontario, that have been introduced to a new geographic region due to human activity. Species may also be considered invasive if their introduction or spread can be linked to our changing climate. The international movement of people and goods facilitating the introduction of invasive species and pathogens is identified as one of the major drivers affecting Ontario's fish, fisheries and supporting ecosystems (OMNRF 2015b). Invasive species, including invasive fish, pathogens, invertebrates, algae, and plants which alter aquatic ecosystem composition, structure, and function are identified as the primary threat to Ontario's aquatic environment. Furthermore, climate change and other environmental disturbances increase vulnerability to invasive species and pathogens, extend the range of aquatic invasive species, and exacerbate shifts in community and food web composition.

When invasive species are discussed, high profile, non-native, species such as Asian carps, gobies and zebra mussels are often identified as threats to our fisheries. Of similar concern, however, are aquatic species that are native to some parts of Ontario but that have been introduced to a new geographic region due to human activity. Examples of native species considered to be "invasive" within FMZ 15 include Black Crappie, Rainbow Smelt, Rock Bass and other species known to have detrimental effects on pristine coldwater fish communities (e.g., Yellow Perch and Smallmouth Bass introductions to Brook Trout waters). Species that are native to parts of Ontario, but historically absent from most lakes in FMZ 15, continue to be the greatest threat to our native biodiversity and to the productivity of important game fish species. Paradoxically, some of the species of most concern are highly desired species themselves (Black Crappie and Northern Pike for example), which presents a challenge to how they should be managed.

A list of invasive species known to occur in FMZ 15 and a summary of their impacts is included in the FMZ 15 Background Information Report (Section 3.7). Invasive species are currently tracked through the Early Detection and Distribution Mapping System (EDDMapS Ontario) that is based on public and government reporting. As an alternative, iNaturalist may be utilized to report the detection of invasive species and the distribution of other fish species (especially for fishes which are native to other regions of Ontario). Many new invasive species threats have also been identified and have the potential to spread into Ontario and or into waterbodies within FMZ 15. The potential for introduction of invasive fish species including Invasive Carps, Northern Snakehead, Eurasian Ruffe, or of aquatic invasive plants (Fanwort, Water Chestnut, Water Soldier, etc.) all pose significant threats to native biodiversity and aquatic ecosystems in FMZ 15. Once unwanted species or diseases are established, they are nearly impossible to eradicate.

Governments are actively working to minimize the threat of invasive species at both the provincial and the national level. The Canadian Council of Fisheries and Aquaculture Ministers formed the Aquatic Invasive Species Task Group which developed the Canadian Action Plan to Address the Threat of Aquatic Invasive Species (CCFAM 2004), an action plan under An Invasive Alien Species Strategy for Canada (Environment Canada 2004). The Invasive Alien Species Strategy for Canada identifies many pathways for the introduction or spread of aquatic invasive species and diseases that are relevant to FMZ 15. Each pathway presents unique challenges in preventing the introduction and spread of species within the zone. The pathways identified include:

- Recreational boating
- Use of live bait
- Aquarium and water garden trade
- Live food fish
- Unauthorized introductions
- Canals and water diversions

Since 2004, a variety of complementary strategies focusing on specific sectors or jurisdictions have been developed in support of the national strategy.

At the provincial level, The Ontario Invasive Species Strategic Plan (OMNR 2012) provides details on how Ontario will meet the goals set out in the national Strategy and national action plans. Ontario's Invasive Species Strategic Plan (OMNR 2012) currently provides provincial direction for addressing invasive species introductions. The ecological effects of invasive species are often irreversible and, once established, are extremely difficult and costly to control and eradicate. Significant threats are now posed by invasive species, and it is critical that Ontario take measures to address them. The goals included in Ontario's Invasive Species Strategic Plan include:

- Prevent harmful introductions before they occur.
- Detect and identify invasive species before or immediately after they become established.
- Respond rapidly to invasive species before they become established or spread.
- Implement innovative management actions and take practical steps to protect against impacts of invasive species.

In addition to collaborating with federal government agencies and working with binational committees and forums, Ontario continues to support the work of a variety of key partners including the Invasive Species Centre (ISC) and the OFAH to implement the OISSP.

In response to some of the key actions set out in the OISSP, Ontario has also enacted the Invasive Species Act, 2015 (ISA)—the first stand-alone invasive species legislation in Canada. The Act provides an enabling framework to support the prevention, early detection, response, and eradication of invasive species in Ontario, including giving Ontario the tools to:

- Regulate activities such as possessing and transporting certain high-risk invasive species.
- Enable response actions to address urgent threats.
- Ensure compliance through modernized inspection and enforcement measures.
- Promote partnerships and shared accountability for managing invasive species.
- Complement the role of other governments in managing invasive species.

Using a science-based risk assessment process, the Ministry considers a species' biological characteristics, impacts, dispersal ability, and economic risks when considering regulations under the ISA.

Preventing invasive species from arriving and becoming established in Ontario is the primary objective of the Act. In 2016 the ISA, along with its first suite of regulations, came into force. At that time, 20 species were listed as either prohibited or restricted, including the first 16 species identified on the Great Lakes and St. Lawrence Governors and Premiers' aquatic invasive species "Least Wanted List".

On January 1, 2022, Ontario regulated 13 additional invasive species under the ISA including three aquatic invertebrates, three aquatic plants, and two invasive fishes. This includes the five additional invasive species added to the Great Lakes and St. Lawrence Governors and Premiers' aquatic invasive species "Least Wanted List" in 2018.

The province also regulated watercraft and watercraft equipment as a carrier under the Act. The regulation requires boaters to take reasonable precautions to remove aquatic organisms and drain water from watercraft and equipment prior to transporting overland. The regulation also requires watercraft and watercraft equipment to be free of aquatic organisms prior to arriving at a boat launch or launching into any waterbody. The goal of the new regulatory requirements is to significantly reduce the risk of spreading aquatic species via the movement of watercraft.

Further, the province has developed Prevention and Response Plans (PRP) for water soldier and European water chestnut to support implementation of the ISA. PRP's are a tool in the ISA that allows for positive and low risk actions to be undertaken on regulated species which would otherwise be prohibited in regulations when undertaking actions to monitor, manage, control, or eradicate the species. The PRP identifies the persons or groups of persons who are authorized to implement the plan, sets out the types of activities that the plan applies to and describes conditions that these persons must follow to lawfully possess, transport, and deposit Water Soldier and European Water Chestnut in Ontario.

Another provincial-level policy which helps to address invasive species is Ontario's Provincial Fish Strategy (OMNRF 2015b), includes the following objective and tactics under the goal of "healthy ecosystems that support self-sustaining native fish communities":

Prevent unauthorized introductions and slow the spread of invasive fish and other aquatic species, including pathogens

Implement actions related to the prevention, early detection, rapid response and effective management of aquatic invasive species (AIS), including supporting the regulation of species under the proposed Invasive Species Act or other regulatory tools as appropriate

Work with other agencies, academia, stakeholders, First Nations and Métis communities, and the private sector on fish disease surveillance, control, prevention and research, and define roles and responsibilities for managing fish health and

Develop and implement best management practices to mitigate the risk of spreading alien species and pathogens through fisheries management actions.

Operationally, the Ministry has developed a Response Framework for New Invasive Species which provides internal guidance to Ministry staff supporting response decisions for newly detected invasive species in the province. The Response Framework also includes a description of roles and responsibilities for the various jurisdictions and Ministry divisions and branches. At the FMZ plan scale, a similar approach can be used to address introductions of species that would not be actioned at the provincial level but may be present local threats.

The role of partnerships in the fight against invasive species in the province cannot be understated. In the early 1990's, the Ontario Federation of Anglers and Hunters (OFAH) and the Ministry established the Invading Species Awareness Program. The program has established the following objectives:

- Raise public awareness of invasive species and encourage their participation in preventing their spread
- Monitor and track the spread of invading species in Ontario waters through citizen reports to the Invading Species Hotline and the Invading Species Watch Program

Since its inception in 2011, the Ministry has worked with the Invasive Species Centre (ISC) to support invasive species management efforts in Ontario. The ISC helps to connect stakeholders, knowledge and technology to prevent and reduce the spread of invasive species that harm Canada's environment, economy and society. The ISC supports the Ministry in policy implementation through the development of risk assessments for species and pathways and helps to support on-the-ground management of invasive species, research, and knowledge transfer.

Other partners that have worked to deliver programs related to invasive species over the years include the Ontario Invasive Plant Council, the Federation of Ontario Cottagers' Associations, and Boating Ontario.

The movement of boats, bait and gear are likely the main pathways of introduction and spread of invasive species and disease within FMZ 15. The use and transport of crayfish, baitfish and leeches and live fish have been regulated within Ontario to slow the spread of invasive species and diseases. In response to ongoing threats of invasive species and disease, Quebec and most other provinces in Canada have restricted the use of live baitfish. The Ministry also has the legislative authority to determine rules associated with the bait industry and the use of bait by anglers under the Ontario Fishery Regulations (OFR). As stated earlier in the plan, the Ontario's Sustainable Bait Management Strategy was completed in July 2020.

Management Strategy

Within FMZ 15, the following goals, objectives and management strategies were developed by the Ministry and endorsed by the Advisory Council (Table 4.41, Table 4.42). They are based primarily on provincial strategies as listed above. The goal for FMZ 15 is to protect the fish and fisheries of FMZ 15 from the impacts of invasive species with the objective of preventing new introductions, containing and controlling to minimize impacts and eradicating where feasible. The actions for achieving this objective link to the provincial Response Framework and individual species sections of this plan.

Table 4.41 Invasive species management strategy

Goal *Prevent unauthorized introductions and slow the spread of invasive fish and other aquatic species across waterbodies within FMZ 15*

Objectives	Indicator(s)	Benchmark(s)	Targets
Minimize the risk of the introduction and spread of invasive species through each of the identified pathways (O1)	Total number of invasive fish species present in zone and the number of occurrences for spiny water flea and zebra mussels and number of species detected (all sources, EDDmaps, BsM and ROM database)	Current rate of total number of species every 20 years (1976 – 1995 total of 7 invasive species and 1996 – 2015 total of 17 species) which is rate of spread of 2.4 (more than doubled) (see Background Report) FMZ 15 currently has the following occurrences: Spiny Water Flea: • Cycle 1 = 13 • Cycle 2 = 19 Zebra Mussel: • Cycle 1 = 5 • Cycle 2 = 19 18 total known invasive species (5 invasive fish, 6 aquatic invertebrates, 7 aquatic and semi-aquatic plants present in 2017 (see Background Report)	Reduce current rate of total number of species every 20 years (1976 – 1995 total of 7 invasive species and 1996 – 2015 total of 17 species) which is rate of spread of 2.4 (more than doubled) Reduce the current rate of occurrences between Cycle 1 and 2 for both spiny water flea and zebra mussels between BsM cycles (all sources, EDDmaps, BsM and ROM database) Evaluate total species every 20 years and occurrences each BsM cycle

Table 4.42 Invasive species management actions. Values in brackets denote which objectives each action addresses.

Invasive Species Management Actions
• Utilize the provincial Response Framework for New Invasive Species (O1) • Utilize education and awareness to minimize the risk of intentional and unintentional introductions of new species into the zone or individual waterbodies where they are not native (O1) • Work with partners to implement low key/routine response measures which focus on education and outreach but may also include simple containment/control measures (O1) • Implement liberal fishing regulations to promote the harvest of introduced species, while considering other species objectives (O1) • Prohibit the use of live baitfish as bait on high value and high-risk natural trout waters and waters that flow into Algonquin Provincial Park (O1) • Respond effectively to large-scale die-offs by implementing the provincial Fish Die-off Response Protocol. Investigate fish die offs and assist with disease testing as needed (O1) • Continue to work with bait harvesters and dealers to ensure their Hazard Analysis and Critical Control Point (HACCP) plans are effective and implemented correctly (O1) • Monitor the presence of aquatic invasive species and pathogens as a part of the BsM program and promote detection monitoring in all lakes within the zone (through FOCA and OFAH) (O1) • Increase public awareness and use of preventative measures by supporting the OFAH Invading Species Awareness Program and use of the EDDMaps Ontario website (O1) • Identify priority areas for: signage, education/awareness and boat washing (O1) • With assistance of partners produce and send communication materials to promote prevention, eradication and control efforts for new introductions (O1).

Protection of Waters in Algonquin Provincial Park

Fisheries management within Algonquin Provincial Park will be addressed in a separate management plan. However, stresses and actions originating outside of the park have the potential to impact park fisheries. Probably the most notable is the introduction of non-native species indirectly by movement through watersheds that cross the park boundary. Watersheds that flow into the park pose the greatest risk to park fisheries, though upstream movement of fish in waters that flow out of the park is possible as well.

Ridgway et al. (2018a) conducted an analysis of potential pathways of invasion of aquatic species into and within the park. The FMZ 15 Planning Team used this information to identify waters outside of the park that were at a high risk of being invaded by new species and their watershed position was such that introduced species would likely be able to invade waters in the park. The risk of a lake outside the park being a vector for invasions into the park was based on accessibility, lakeshore development (e.g., cottages) and the existing fish community (lakes that already had introduced species such as Bass, were considered to pose relatively less additional risk to park lakes).

The proposed management direction to protect fisheries in Algonquin Provincial Park from introduced species are shown in Table 4.43 and displayed in Figure 4.4 Location of proposed management direction to protect waters in Algonquin Provincial Park from introduced species. This direction is in addition to actions proposed for individual species that would benefit the park as well. For example, bans on the use of live baitfish are proposed on some natural Brook Trout and Lake Trout lakes, but the lakes are also in watersheds connected to Algonquin Provincial Park. Eleven lakes were identified as having a high potential for having new species introduced and were in watersheds connected to the park. It is proposed that the use and possession of live baitfish be prohibited in these lakes. An alternate approach discussed was to prohibit the use and possession of live baitfish within all waters in watersheds that flow into the park. This option was not advanced due to the complexities of regulating, enforcing and educating anglers. A further option that was examined and discarded was to prohibit fishing for species that have an elevated risk of being illegally introduced. The intent would be that if there were no open season anglers would be less likely to stock fish illegally. The same approach is being proposed for several high-quality natural Brook Trout lakes. The approach was not pursued for the eleven lakes identified below because they all have at least one species already and the Advisory Council unanimously did not support the proposal. Instead, a public education and information approach is proposed.

Table 4.43 Proposed management direction to protect waters in Algonquin Provincial Park from introduced species

Lake Name	Township	Proposed Management Direction	Advisory Council Input
Corkery Lake	Ballantyne	Live baitfish may not be used as bait or possessed for use as bait.	Advisory Council strongly supported (90%) though it was recognized that since many of these lakes already have at least one introduced species present, the benefits may be limited. Regulation would be consistent with regulation within the park.
Crown Lake	Livingstone		
Galeairy Lake	Airy		
Island Lake	Burns		
Kawawaymog Lake	Ballantyne		
Kuwasda Lake	Ballantyne		
Little Tyne Lake	Ballantyne		
Murphys Lake	Burns		
Tyne Lake	Ballantyne		
Waterloo Lake	Clara		
Wendigo Lake	Clara		

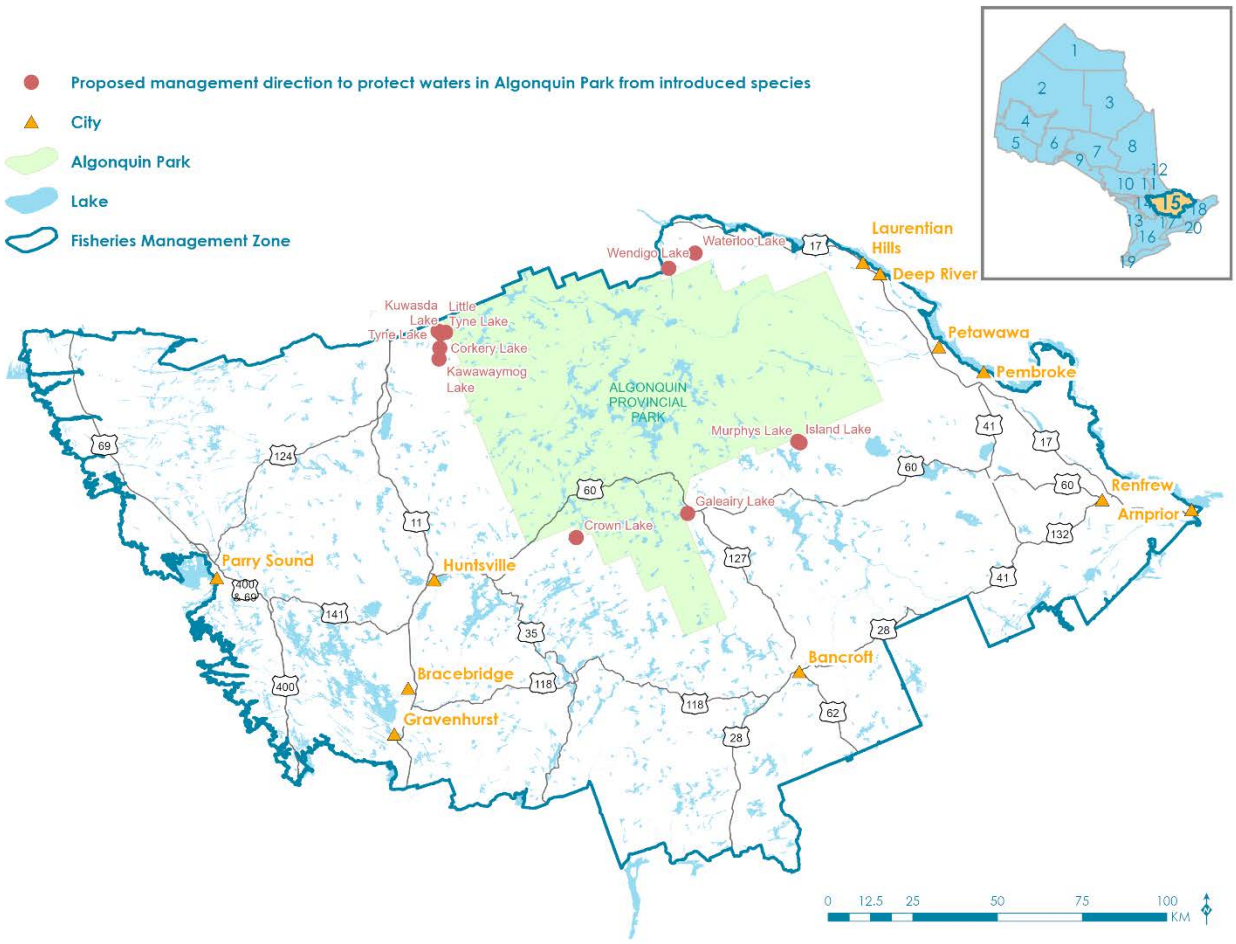

Figure 4.4 Location of proposed management direction to protect waters in Algonquin Provincial Park from introduced species.

4.7 Fish Diseases

Many fish diseases are caused by parasites, viruses and/or bacteria that can be considered within the context of invasive species. The goals, objectives and actions included in the invasive species section also pertain to fish diseases and pathogens. Throughout the summer of 2007 and 2008, tens of thousands of Common Carp died within the Trent-Severn Waterway, in adjacent FMZ 17. In addition to bacterial infections, koi herpes virus (KHV) was identified in many of the samples tested. The detection in 2007 represented the first confirmed case of KHV in Ontario. KHV is believed to have moved throughout the world via the ornamental fish industry. It is not known how or when KHV arrived in Ontario waters.

In addition to KHV, there are a few other fish pathogens that have been discovered in Ontario, in the recent past. Viral Hemorrhagic Septicemia (VHS) was first identified in 2005 after a die-off of Freshwater Drum (sheepshead) in the Bay of Quinte in FMZ 20. The virus has now been found in at least 28 species of fish in the Great Lakes including: Walleye, Yellow Perch, Muskellunge, Smallmouth Bass, Rock Bass, Black Crappie, Round Goby, Emerald Shiner, Bluntnose Minnow and Spottail Shiner. VHS has been linked to significant die-offs of Muskellunge in the St. Lawrence River and Lake St. Clair. Largemouth Bass virus (LMBV) is another potential fish pathogen threatening FMZ 15. To date, LMBV or VHS have not been found in the inland waters of FMZ 15. Within the Ministry, a Fish Die-off Response Protocol has also been developed. The main purpose for the protocol is to guide the response of the Ministry and agency partners if a large-scale fish die-off occurs. Where die-offs are associated with the mandate of either MECP (e.g., chemical spills) or the DFO (e.g., sedimentation or blasting event), their approved protocols will be followed. Another possible emerging concern for FMZ 15 may be Asian fish tapeworm.

Once a disease becomes established, the focus switches to measures to control or slow down the spread of the disease. The government's approach in dealing with viral hemorrhagic septicemia (VHS) is an example.

In 2007, the Minister of Natural Resources established interim measures to control the harvest and transport of baitfish. These measures were necessary to address immediate risks involving the potential spread of VHS into inland waters, but they also had a significant impact on baitfish harvesters.

Examples of these Measures:

- Implementing the Bait Management Zones to help prevent VHS-positive waters in an area bounded by the provincial road network. The VHS-positive waters include lakes Ontario, Erie and Huron (including Georgian Bay) and their connecting waterways and tributaries up to the first impassable barrier, excluding fishways.
- Allowing Walleye spawn collections from the previous VHS Management Zone areas only if the fish are stocked into the zone and the receiving fish culture facility is located in the zone, and
- Allowing baitfish harvesters and dealers in the previous VHS Management Zone areas to harvest baitfish but restrict movement of live baitfish out of the zone.

The new Provincial Baitfish Strategy replaces VHS Management Zones with Bait Management Zones (OMNRF 2020b).

4.8 Education and Outreach

At the provincial level, Ontario's Provincial Fish Strategy (2015) provides strategic direction to improve the management and conservation of the fisheries. There are several goals related to this strategy, however, the most relevant for the purposes of outreach, engagement and education is Goal 5: Informed and engaged stakeholders, partners, First Nations and Métis communities and public (OMNR 2015b).

The Ministry works in partnership with others to deliver its full mandate, emphasizing partnerships and collaboration with all interested parties. Key partners include First Nations and Métis communities, municipal, provincial, and federal agencies (especially DFO), Conservation Authorities, Ontario Federation of Hunters and Anglers (OFAH), academia, and stakeholder groups representing the commercial, recreational and baitfish industries, the tourism industry, NGO's, conservation groups, cottage and lake associations, as well as many local fishing clubs. Guardian programs should be effectively engaged primarily in consideration of Education and Outreach actions.

Partnerships are especially important in protecting the aquatic ecosystems on which fish populations depend. These partnerships take a variety of forms, including informal, short-term cooperative arrangements, and more formal long-term collaborations. Encouraging industries that benefit from Ontario's natural resources to participate in the protection and restoration of fisheries, through sponsorships and/or partnerships can be an effective way to manage and conserve the resource.

Stakeholders directly contribute resources and human capital to the successful management and conservation of fish resources. Resource users understand the importance of sustaining water quantity and quality, and protecting riparian and aquatic habitats, as requirements for supporting sustainable healthy fisheries. These groups and individuals are important stewards of aquatic resources. They offer resources and many volunteer hours to conserve and rehabilitate fish populations, support monitoring activities, advocate for the protection of fish habitat, and play a lead role in habitat rehabilitation projects, often aimed specifically at improving fishing.

Protection and conservation efforts are embedded in a complex social, cultural, political and economic context, making public awareness and engagement key factors for success. Communication and education about fisheries, their benefits, and the stresses affecting them can have a strong impact on conservation success and sustainability. The Ministry's staff are knowledgeable about fisheries resources and play a key role in achieving this objective by providing fisheries information and expertise to the public and stakeholders. These activities occur in many ways, including participation in public and stakeholder meetings, involvement in fishing events and tradeshows, and collaboration with other agencies and organizations in public education and outreach.

Management Strategy

Within FMZ 15, the following goals, objectives, performance measures and management strategies were developed by the Ministry (Table 4.44 and Table 4.44 Table 4.45). Education and outreach management actions, in addition to the ones listed in Table 4.45 can be found in other sections of the plan and some species-specific education and outreach actions will be found within their respective chapters.

Table 4.44 Education and outreach management strategy for FMZ 15.

Goal *Develop and implement effective community-based outreach and education programs and tools, in partnership with others, to raise public interest and generate awareness about issues affecting fisheries resources and their management within FMZ*

Objectives	Performance Measures
The Ministry, in partnership with key stakeholders and First Nations and Métis communities, will increase public awareness and understanding of fisheries management in FMZ 15, through a variety of education and outreach programs and tools, to further the goals and objectives of the plan. (O1)	Outreach and educational products generated and circulated (e.g., Ministry website, status reports, newsletters, social media, meetings, tradeshows, etc.): • Number of education and outreach resources developed e.g., Fact sheets, literature, reports, signage, etc. • Number of partnerships / partners • Number of people reached, number of shares, "hits", etc. on social media and website posts (Instagram, Twitter, Facebook, Ontario.ca website, via Cottage Associations etc.) and • Number of education and outreach events completed/attended (lake association meetings, presentations, tradeshows, etc.).
Encourage stewardship of fisheries, fish communities, fish habitat and supporting ecosystems, develop effective partnerships, and inform and engage others to assist in delivering specific actions identified in the plan. (O2)	
Seek strategic partnerships to create and deliver new products. (O3)	

Table 4.45 Education and outreach management actions. Values in brackets denote which objectives each action addresses.

Education and Outreach Management Actions
• Educate the public (through the development of educational and outreach materials) and increase awareness of the rationale for regulation changes and the principles species life history requirements, with a focus on cold water species. (O1) • Educate the public, and create and distribute educational materials, on the negative impact of introduced species (e.g., Largemouth and Smallmouth Bass, Northern Pike, Panfish, Baitfish, etc.) on coldwater species populations, and promote the protection of lakes from introduced species into where they are not native. (O1, O2) • Promote appreciation and protection of natural coldwater species (including use of the term "wild" in educational and promotional materials) through education. (O1, O2) • Actively promote the harvest of under-utilized competitor species (e.g., cool and warmwater species) to divert pressure from more sensitive species (e.g., coldwater species) through various methods (e.g., Factsheets, FMZ 15 Ontario.ca webpage, social media, etc.). (O1, O2) • Post education signs on roads and access points to cold water species lakes, particularly Brook Trout lakes. (O1, O2) • Further development of online and social media tools to enhance educational and outreach communication frequency, engage new stakeholders, and respond to emerging communication on fisheries and FMZ 15. (O1, O2) • Produce and distribute outreach materials on fish stocking in FMZ 15, with emphasis on communicating the role that stocking plays in coldwater species management (e.g., diverting angling pressure away from vulnerable fish communities) and advertising quality fisheries to help divert pressure from more sensitive coldwater species. (O1, O2) • Develop and promote the use of BMPs on the impacts of fishing practices on mortality and means of reducing it through promotion of proper fish handling and catch and release techniques for all species, with a focus on impacts of deep-water angling particularly in the fall and winter (Lake Trout). (O1, O2) • Prepare and distribute educational materials to raise awareness of the importance of protecting fish habitat which includes not only spawning habitat, but also nursery, rearing, staging, foraging and dispersal areas, deep water habitat (cold clean highly oxygenated deep zones) for Lake Trout, groundwater discharge and recharge areas for Brook Trout, forested riparian habitat. (O1, O2)

- When opportunities allow, work with partners to engage in outreach activities (e.g., media, workshops, meetings, tradeshows, compliance events, lake association meetings etc.) and increase communication with the public and stakeholder groups on fisheries management in FMZ 15. (O1, O2)
- Work with key partners, to raise public awareness and public participation in shoreline stewardship that promotes the protection, restoration and rehabilitation of fisheries and their supporting ecosystems, and the long-term sustainability of fish habitat and water quality in FMZ 15. (O1, O2, O3)
- When funding and staffing resources allow, the Ministry, in collaboration with key partners, to undertake, promote and assist with projects and surveys on high priority areas (e.g., spawning surveys, habitat and shoreline restoration, monitor

4.9 Climate Change

Climate plays a key role in determining the structure and function of aquatic ecosystems. Therefore, as Ontario's climate changes, the aquatic ecosystems in the zone will change as well. Anglers and fisheries managers will have to adapt to these changes.

Management Issues and Challenges

- Inability to directly manage climate change itself; as such, the focus is on managing impacts, adapting and building resilience.
- Reductions in the amount and quality of habitat for cold water species resulting in loss of populations and minimized abundance and productivity.
- Increases in the amount and quality of habitat for warm water species resulting in range expansion and population increases.
- Greater potential for introduction and expansion of new and existing invasive species.
- Changes to temperature and hydrology impacting life history chronology of fish species (spawning, emergence).
- Change in duration and quality of ice cover season impacting winter fisheries.
- Fisheries managers who employ reduced seasons should be aware that the relationship between season length, effort and harvest will not necessarily be linear.

The following potential management strategies and actions related to climate change were considered when formulating species specific management strategies:

- Harvest coldwater species conservatively to increase resiliency.
- Adjust the timing of regulated fishing seasons, sanctuaries and size limits so they continue to align with spawning and/or overwintering periods as needed for each fish species.
- Provide additional opportunities and promote the use of species expected to benefit from climate change (e.g., warmwater species).
- Identify and protect critical habitat (e.g., thermal refugia, groundwater and shorelines). Riparian vegetation is critical to moderate water temperature (for Brook Trout); and to limit nutrient inputs for Brook Trout and Lake Trout (maintain oligotrophic, high oxygen environment).
- Educate users to explain observed and expected impacts and to manage expectations about species abundances experienced under a changing climate.
- Work with relevant agencies to regulate waterbodies and conserve water flows for fish.
- Minimize the risk of introduction and spread of invasive species.

Fisheries management within FMZ 15 will consider the desired versus realistic future state of fish communities and human interactions with those communities. Incorporating uncertainty into fisheries management will be a challenge (e.g., setting targets below a maximum sustainable yield is one way to help manage uncertainty) (Allen and Hightower 2010). Controlling other factors that may confound and interact with climate change impacts (e.g., introduction of invasive and spread of non-native species) will become even more important in the future. Science and monitoring have and will play a key role in informing the development of realistic expectations for fisheries across FMZ 15 in the future.

Fish habitats would be altered in some aquatic ecosystems as water warms, stream flows change, and oxygen levels decrease (Dove-Thompson et al. 2011). Over time, warming temperatures will minimize the availability of thermal habitat for some cool and cold-water fish species, while creating more habitat for warm-water fish. For example, Brook Trout may experience a 49% decline in available habitat in Canada by 2050, while Walleye habitat may increase by up to 54% (Naturally Resilient, OMNRF's Natural Resource Climate Change Adaptation Strategy 2017-2021). Smallmouth Bass may continue to move northward as more warm-water habitat becomes available, expanding their range by up to 300% and competing with native species (Van Zuiden et al. 2016). To address climate change impacts on natural resources, the ministry instituted *Naturally*

Resilient: OMNRF's Natural Resource Climate Adaptation Strategy (2017–2021) (OMNRF 2017), which supports the vision, goals, and objectives set out in Ontario's Biodiversity Strategy, 2011 and the commitments in *Biodiversity: It's In our Nature*, Ontario Government Plan to Conserve Biodiversity 2012-2020.This plan also addresses the fisheries-specific goals described in the Provincial Fish Strategy. By planning and managing for resilience of fisheries and other natural resources, the Ministry can improve the ability of Ontario's natural environment to withstand climate change impacts and continue providing ecosystem services that communities rely on for social, economic and health benefits.

We can monitor the effects on parameters that are important to fish (e.g., water temperature, dissolved oxygen), observe how fish communities and fish populations change, and adjust our management approaches. The following management strategies have been recommended to address the challenges of managing for climate change.

There are many different agencies collecting and tracking various aspects of climate change. It will be necessary to compile or collect the climatic information needed for establishing baseline values for climatic indicators important to fish. Efforts should be made to seek opportunities to work with others (government, NGO's, academia, stakeholders, etc.) to strategically manage, monitor and react to climate change.

Climatic-related monitoring parameters important to fish can include:

- Onset, duration and end of ice cover season
- Timing, magnitude, and duration of spring freshet flow conditions
- Amount of groundwater discharge
- Length of open water season and mean annual growing degree days
- Spring/summer seasonal temperature patterns (e.g., el Niño and la Niña years)

Monitoring the effects of climate change in FMZ 15 fisheries could include tracking:

- Fish diversity and community compositions of cold, cool and warm water fish
- Timing and duration of spawning periods, and the resulting
- Abundance and population structures of key fish species
- Water temperature/dissolved oxygen profiles and thermal stratification

When BsM does not provide enough information on these parameters additional monitoring actions may be pursued.

As fisheries change, the following climate adaptation measures are being incorporated into recreational fisheries management strategies:

- Adjust timing of regulated fishing seasons, sanctuaries and size limits so they continue to align with spawning or overwintering periods as needed for each fish species. For example, the proposed Lake Trout regulation management action of a reduced season and a minimum size limit should help ensure that the goal "to conserve natural Lake Trout populations" is achieved. FMZ 15 is taking an active role in trying to build resilient natural Lake Trout populations in their southern range of Ontario.
- Consider more liberal regulations for abundant fish species and restrictions for those in decline. For example, the season for bass is also proposed to open one week earlier which aligns with Algonquin Provincial Park bass science supporting this change with ice out dates (Ridgeway communication).
- Avoid loss of species in habitats vulnerable to climate change where possible and feasible, while appropriately investing in emerging, unexploited fisheries that may be successful with a changing climate. Avoid loss, unsustainable use or investment in fisheries that will decline while taking advantage of emerging unexploited fisheries.

Management Strategy

Within FMZ 15, the following goals, performance measures and management strategies were developed by the Ministry (Table 4.46 and Table 4.47).

Table 4.46 Climate change management strategy for FMZ 15.

Goal *Take an adaptive approach to fisheries management that allows us to maintain, enhance and restore the resiliency of fisheries populations within FMZ 15*

Performance Measures
Brook Trout, Lake Trout, Whitefish and bass regulation changes all reflect climate change considerations by implementing a precautionary approach with coldwater species and lengthening seasons for underutilized species (e.g., bass season lengthening based on Algonquin Provincial Park bass science with ice out dates)
Regulation changes for Lake Trout, Brook Trout and Whitefish within FMZ 15
Lengthen the season on bass
Stocking plan will be implemented in implementation stage.

Table 4.47 Climate change management actions.

Climate Change Management Actions
• FMZ 15 management plan reflects consideration of climate change adaptation and best available science • FMZ 15 coldwater fisheries actions improve species resilience to climate change • Actively promote the use of under-utilized species (e.g., warmwater species) • Develop strategic stocking plan to minimize angling pressure on vulnerable coldwater fish communities.

5. Monitoring

Fisheries Management Zones are the primary units for managing Ontario's recreational fisheries. Monitoring is critical to fisheries management in several ways. Monitoring allows for the estimation of the current status and trends of fish populations as well as allowing for evaluation of the success of management actions. Furthermore, under an adaptive management framework, monitoring is essential for adjusting current management actions and guiding implementation plans.

BsM is the primary fisheries monitoring program used for FMZ planning in Ontario. The success of BsM has made it a model for the Ministry's shift toward landscape level resource management. The broad objectives of the program are to describe the geographic distribution and characteristics of aquatic resources, estimate the current status and trends in selected indicators of fisheries, identify stressors affecting aquatic resources and provide periodic reports on the state of aquatic resources in the province.

In most cases, the BsM program is sufficient for informing and detecting responses to management actions. The Integrated Monitoring Framework (OMNRF 2015e) recommends that the Ministry adopt BsM data collection as a minimum requirement across all Ministry inland lake inventory and monitoring activities, including targeted monitoring conducted at local scales. However, the spatial scale of the BsM program is predetermined and not necessarily focused on specific management needs. For example, stocked lakes are not monitored through the BsM program and lakes with exceptions to zone wide regulations may not be well represented by the BsM program. To successfully address some lake-specific management objectives and actions in this plan (stocking and spawning assessments) local targeted data collection conducted by the Ministry, or in conjunction with partners, may need to be undertaken.

FMZ 15 objectives and the associated actions have been built in partnership with FMZ 15 Advisory Council and in close collaboration with Science and Research.

A prioritized assessment implementation plan will be developed as planning transitions to implementation and the Ministry core team will present to Steering Committee for endorsement.

6. Implementation and Review of Plan

The FMZ 15 Advisory Council will have an ongoing role in the implementation of the fisheries management plan. The Advisory Council will meet at a minimum of twice a year to review the progress of implementing management actions, to review the results of monitoring efforts, and to discuss any fisheries management issues. Should issues arise that call for more immediate Advisory Council input, other meetings may be requested by Ministry District Managers.

7. Reporting, Review, and Amendment Process

FMZ Management Plans do not have a "sunset" date; rather they are reviewed in response to resource issues and changes in status based on monitoring and assessment. Once the plan has been completed, a FMZ 15 Action Plan will be developed. Using the prioritized list of plan actions, the FMZ Fisheries Team will lay out a schedule describing the timelines appropriate to complete the actions. The timelines for each action will vary and depend on the nature of the objectives. Actions will be assigned to the appropriate staff by year allowing for potential coordination of action delivery. The action plan will quantify the degree to which some actions are implemented (e.g., timing of reporting and review, the number of surveys completed, or the number of educational materials completed each year).

Reporting

The current BsM program monitors waters on a five-year schedule. Once data from BsM is summarized, zone reports will be posted online on the FMZ 15 section of the Ontario website. Status updates will be prepared, based on BsM, and will describe the trajectory of the resource towards objective achievement.

Review

The purpose of review will be to assess the level of achievement of the management objectives, confirm the validity of goals and objectives included in the plan, and to identify sections of the management plan requiring updates. As per the timelines identified in the zone Action Plan, results of the review will be reported back to the FMZ 15 Advisory Council.

Amendment of the plan can occur prior to a comprehensive review being conducted. Depending upon the nature of any changes that are needed, public consultation may or may not be needed. It is expected that amendments to the plan would only occur if there was a significant management issue (e.g., stemming from monitoring and assessment results) that would have an immediate effect on fisheries across the zone.

8. References

Allen, M.S. and J.E. Hightower. 2010. Fish population dynamics: mortality, growth and recruitment. Pp. 43-79 *in* Hubert, W., M. Quist (eds). Inland Fisheries Management in North America, 3rd Edition. American Fisheries Society, Bethedesa, Maryland. 36 pp.

Brown, M.C. and Walmsley, A.L.E. 2017. Statistics Teacher: What is Power? Available online at https://www.statisticsteacher.org/2017/09/15/What%20is%20Power/ [accessed December 22, 2021].

Canadian Council of Fisheries and Aquaculture Ministers Aquatic Invasive Species Task Group (CCFAM). 2004. A Canadian action plan to address the threat of Aquatic Invasive Species. 26pp.

Cooke, S.J., J. F. Schreer, D.H. Wahl and D.P. Philipp. 2002. Physiological Impacts of Catch and Release Angling Practices on Largemouth Bass and Smallmouth Bass. American Fisheries Society Symposium 31: 489-512.

Cowx, I.G. 1999. An appraisal of stocking strategies in the light of developing country constraints. Fisheries Management and Ecology 6: 21-34.

Crins, W. J., P. A. Gray, P.W.C. Uhlig, and M. C. Wester. 2009.The Ecosystems of Ontario, Part I: Ecozones and Ecoregions. Ontario Ministry of Natural Resources, Peterborough Ontario, Inventory, Monitoring and Assessment, SIB TER IMA TR- 01, 71pp.

Crown Indigenous Relations and Northern Affairs Canada. 2018. Statement of Apology for the impacts of 1923 Williams Treaties. Available online at https://www.rcaanc-cirnac.gc.ca/eng/1542393580430/1542393607484 [accessed June 7, 2022].

Dove-Thompson, D., C. Lewis, P.A. Gray, C. Chu, and W.I. Dunlop. 2011. A summary of the effects of climate change on Ontario's aquatic ecosystems. Ontario Ministry of Natural Resources. Ontario, Canada. 68 p.

EDDMaps. 2021. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org/ [accessed July 9, 2021].

Environment Canada. 2004. An Invasive Alien Species Strategy for Canada, Ottawa, ON.

Hogg, S.E., N.P. Lester, and H. Ball. 2010. The Effectiveness of the 2005 Recreational Fishing Survey to Deliver Spatially Explicit Estimates of Fishing Effort and Harvest: Analysis for Selected Ontario Lakes. Applied Research and Development Branch. Ontario Ministry of Natural Resources. Peterborough, Ontario. 23pp + appendices.

Kerr, S.J., A. Kirkpatrick, and T.J. Haxton. 2011. Characteristics of trophy-sized Muskellunge (*Esox masquinongy*) angled from Ontario Waters, 1917-2010. Fisheries Policy Section, Biodiversity Branch. Ontario Ministry of Natural Resources. Peterborough, Ontario. 7 p. + appendices.

Lepak, J.M., C.E. Kraft, and B.C. Weidel. 2006. Rapid food web recovery in response to removal of an introduced apex predator. Canadian Journal of Fisheries and Aquatic Sciences. 63: 569-575.

Lester, N.P., S. Sandstrom, D. de Kerckhove, K. Armstrong, H. Ball. T. Dunkley, J. Amos, M. Rawson, P. Addison, A. Dextrase, D. Taillon, B. Wasylenko, P. Lennox, H. Corrêa Giacomini and C. Chu. 2020. Standardized broad-scale management and monitoring of inland lake fisheries: an overview of the Ontario Experience. Fisheries 46: 107-118.

Ontario Ministry of Natural Resources (OMNR). 1990. Atlas of Northern Pike Lakes in Ontario. Fisheries Section, Fish and Wildlife Branch, Ontario Ministry of Natural Resources, Peterborough, Ontario.

Ontario Ministry of Natural Resources (OMNR). 2002. Guidelines for stocking fish in inland waters of Ontario. Fisheries Section, Fish and Wildlife Branch, Ontario Ministry of Natural Resources, Peterborough, Ontario. 44 p.

Ontario Ministry of Natural Resources (OMNR). 2003. Atlas of Lake Whitefish waters in Ontario. Fish and Wildlife Branch, Queen's Printer for Ontario, Toronto, Ontario.

Ontario Ministry of Natural Resources (OMNR). 2005. A New Ecological Framework for Recreational Fisheries Management in Ontario. Fisheries Section, Fish and Wildlife Branch.18 p.

Ontario Ministry of Natural Resources (OMNR). 2010. Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005. Second Edition. Toronto: Queen's Printer for Ontario. 248 pp.

Ontario Ministry of the Environment (OMOE). 2010. Lakeshore Capacity Assessment Handbook: Protecting Water Quality in Inland Lakes on Ontario's Precambrian Shield. In partnership with Ontario Ministry of Natural Resources and Ontario Ministry of Municipal Affairs and Housing. Toronto: Queen's Printer for Ontario. 47 pp.

Ontario Ministry of Natural Resources (OMNR). 2011. Our Sustainable Future: A Renewed Call to Action. Toronto: Queen's Printer for Ontario. 24 pp.

Ontario Ministry of Natural Resources (OMNR). July 2012. Ontario Invasive Species Strategic Plan. Toronto: Queen's Printer for Ontario. 58 pp.

Ontario Ministry of Natural Resources and Forestry (OMNRF). 2015a. Inland Ontario Lakes Designated for Lake Trout Management. Fisheries Section. Species Conservation Policy Branch. Peterborough, ON. 54 p.

Ontario Ministry of Natural Resources and Forestry (OMNRF). 2015b. Ontario's Provincial Fish Strategy: Fish for the Future. Fisheries Policy Section, Species Conservation Branch. 66 pp.

Ontario Ministry of Natural Resources and Forestry (OMNRF). 2015c. 2010 Survey of Recreational Fishing in Canada: Results for Fisheries Management Zones of Ontario. Peterborough, Ontario. 38 pp.

Ontario Ministry of Natural Resources and Forestry (OMNRF). 2015d. Horizons 2020. Queen's Printer for Ontario. Toronto, Ontario. 10 pp.

Ontario Ministry of Natural Resources and Forestry (OMNRF). 2015e. Integrated Monitoring Framework: A Framework for Monitoring Natural Resources. Science and Research Branch. Peterborough, Ontario. 17 pp.

Ontario Ministry of Natural Resources and Forestry (OMNRF). 2015f. Ontario's Inland Lakes Designated for Lake Trout Management. Fisheries Policy Section. Species Conservation Policy Branch. 54 pp.

Ontario Ministry of Natural Resources and Forestry (OMNRF). 2017. Naturally Resilient: MNRF's Natural Resource Climate Adaptation Strategy (2017–2021). Peterborough, ON. 28p. https://apps.mnr.gov.on.ca/public/files/er/mnrf-17-313-climate-change.pdf [accessed July 9, 2021].

Ontario Ministry of Natural Resources and Forestry (OMNRF). 2020a. 2015 Survey of Recreational Fishing in Canada: Results for Fisheries Management Zones of Ontario. Fish and Wildlife Policy Branch. Ontario Ministry of Natural Resources and Forestry. Peterborough, Ontario. 61pp.

Ontario Ministry of Natural Resource and Forestry (OMNRF). 2020b. Ontario's Sustainable Bait Management Strategy. Peterborough, Ontario. Queen's Printer for Ontario. Fisheries Section, Fish and Wildlife Policy Branch. 21 pp.

Ontario Ministry of Natural Resources and Forestry (OMNRF). 2020c. Ministry of Natural Resources and Forestry Strategic Plan 2020 – 2025: Naturally Resourceful. Queen's Printer for Ontario, Toronto, Ontario. 13 p.

Persons, S.E., and S.A. Hirsch. 1994. Hooking mortality of Lake Trout angled through the ice by jigging and set-lining. North American Journal of Fisheries Management 14(3):664-668.

Ridgway, M.S. 2002. Movements, home range, and survival estimation of Largemouth Bass following displacement. American Fisheries Society Symposium. 31:525-533.

Ridgway, M., T. Middel and L. Wensink. 2018a. Aquatic connectivity, fish introductions, and risk assessment for lakes in Algonquin Provincial Park. Ontario Ministry of Natural Resources and Forestry, Science and Research Branch, Peterborough, ON. Science and Research Information Report IR-13. 64 p.+ append.

Ridgway, M., D. Smith, and T. Middell. 2018b. Climate warming projections for Algonquin Provincial Park. Ontario Ministry of Natural Resources and Forestry, Science and Research Branch, Peterborough, ON. Science and Research Information Report IR-14. 23 p + append.

Suski, C.D. and D.P. Philipp. 2004. Factors affecting the vulnerability to angling of nesting male Largemouth and Smallmouth Bass. Transactions of the American Fisheries Society. 133:1100-1106.

Sutter, D.A.H., Suski, C.D., Philipp, D.P., Klefoth, T., Wahl, D.H., Kersten, P., Cooke, S.J., and R. Arlginhaus. 2012. Recreational fishing selectively captures individuals with the highest fitness potential. Proceedings of the national Academy of Sciences of the United States of America. 109(51):20960-20965.

Van Zuiden, T. M. & S. Sharma. 2016. Examining the effects of climate change and species invasions on Ontario Walleye populations: can Walleye beat the heat? *Diversity and Distributions* 22: 1069–1079.

Weidel, B.C., Josephson, D.C., and C.E. Kraft. 2007. Littoral fish community response to Smallmouth Bass removal from an Adirondack Lake. Transactions of the American Fisheries Society. 136: 778-789.

Williams Treaties First Nations. 2022. The Williams Treaties First Nations Harvesting Guide. https://williamstreatiesfirstnations.ca/all-about-harvesting/ [accessed June 7, 2022].

Williams Treaties First Nations. 2022. The Williams Treaties First Nations Main Webpage. https://williamstreatiesfirstnations.ca/ [accessed June 7, 2022].

Wilson, C. 2012. Genetics of Walleye in Southern Ontario. Unpublished Microsoft PowerPoint presentation. Aquatic Research and Development Section, Ontario Ministry of Natural Resources, Peterborough, Ontario.

9. Appendices

Appendix A Power to Detect Change in BsM Metrics

Statistical power refers to the likelihood of detecting an effect when there is an effect to be detected. In other words, power is the probability of rejecting a null hypothesis when one should (avoiding a type II error) (Brown and Walmsley 2017). With respect to this management plan, power refers to the likelihood of detecting differences in the BsM indicators (e.g., CUEW) between cycles when, in fact, there is a real difference to be detected.

When statistical power is high, the probability of making a Type II error goes down. The values of power range between 0 and 1. When power is close to 1, the hypothesis test is very good at detecting a false null hypothesis (type II error). Power is influenced by several key factors including sample size. Power increases as sample size increases (Brown and Walmsley 2017). Thus, the increase in sample sizes acquired through future BsM cycles will increase the power to detect change in the various indicators supported in the FMZ 15 management plan.

Values in brackets denote which species objective each addresses.

Power to Detect Change for Brook Trout
Short-term Indicators Primary Indicators • N/A for number of lakes with natural populations (O1) • N/A for recruit CUEW - due to low sample size; continue to monitor (O2) • N/A (O3) Supporting Indicator • N/A - angling intensity - not able to estimate (O2) **Long-term Indicators** Primary Indicators • Not yet possible to determine biomass and mortality indicators (O2)

Power to Detect Change for Lake Trout

Short-term Indicators

Primary Indicators

- N/A - number of natural lakes (O1)
- To be determined – recruit CUEW (O2)
- 0.14 - number of cohorts (O2)
- N/A - number of lakes and fish stocked (O3)

Supporting Indicators

- N/A - hypolimnetic volume (O1, O2)
- NA - oxygen concentration – BsM (O1, O2)
- NA - oxygen concentration - OMOE (O1, O2)
- N/A - angling intensity - not able to estimate (O2)

Long-term Indicators

Primary Indicators

- Not yet possible to determine biomass and mortality indicators (O2)

Power to Detect Change for Lake Whitefish

Short-term Indicators

Primary Indicators

- N/A - lakes having Lake Whitefish (O1)
- 0.10 - recruit CUEW (O2)

Supporting Indicators

- N/A - average hypolimnetic volume (O1, O2)

Long-term Indicators

Primary Indicators

- Not yet possible to determine biomass and mortality indicators (O2)

Power to Detect Change for Northern Pike

Short-term Indicators

Primary Indicators

- 0.43 - recruit CUEW (O1)
- 0.51 - number of cohorts (01)
- N/A - number of lakes having Northern Pike present (O2)

Supporting Indicators

- N/A - proportion of lakes with Northern Pike present (O2)

Long-term Indicators

Primary Indicators

- Not yet possible to determine biomass and mortality indicators (O1)

Power to Detect Change for Muskellunge

- None of the Muskellunge indicators are available for estimation

Power to Detect Change for Walleye

Short-term Indicators

Primary Indicators

- N/A for both Primary and Support Indicators (O1, O3)
- Primary Indicators
  - 0.53 - recruit CUEW (O2)
  - 0.15 - estimated total mortality (O2)
  - 0.53 - number of cohorts (02)
  - 0.49 - average reference biomass (O2)

Supporting Indicators

- N/A - ARA - not available for estimation (O1, O3)
- N/A - proportion of lakes having Walleye - not available for estimation (O1, O3)
- N/A - angling intensity - not available for estimation (O2)

Long-term Indicators

Primary Indicators

- biomass and mortality; not possible to determine power to detect change (O2)

Power to Detect Change for Smallmouth and Largemouth Bass

Short-term Indicators

Primary Indicators

- N/A for both indicators (O1)
- CUEW (kg/gang) of recruit-sized Bass; Smallmouth Bass = 0.37; Largemouth Bass = N/A; unable to estimate currently (O2)
- Number of cohorts; Smallmouth Bass = 0.99; Largemouth Bass = N/A unable to estimate currently (O2)
- N/A for both indicators (O3)

Supporting Indicators

- N/A - proportion of lakes with Bass present (O1)

Long-term Indicators

Primary Indicators

- biomass and mortality; not possible to determine power to detect change (O2)

Power to Detect Change for Panfish

Primary Indicators

- CUEW – not able to determine currently for all four Panfish species (O1)
- CUE – not able to determine currently for all four Panfish species (O1)
- Number of lakes with Panfish species – not able to determine (O2)

Supporting Indicator

- percentage of sampled (BsM) lakes with Panfish species - Not able to estimate (O1)

Appendix B Draft Proposed List of Prime Brook Trout Lakes

Lake Name	WBY_LID	Township	Ministry District	Ban on Fishing for Species Other than Brook Trout
Arbuckle L.	17-6707-50264	McClintock	Parry Sound	
Baldcoot L.	18-2911-50218	Bangor	Bancroft	
Blairs L.	18-2718-50184	Wicklow	Bancroft	
Buchanan L.	17-6704-50216	McClintock	Parry Sound	
Butterfield L.	17-6383-50753	Joly	Parry Sound	Yes
Carmichael L.	17-6455-50731	Paxton	Parry Sound	Maybe
Crystalline L.	17-6763-50341	Livingstone	Parry Sound	Yes
Dead Horse L.	17-6400-50781	Joly	Parry Sound	
Dividing L.	17-6878-50318	Livingstone	Parry Sound	Yes
East L.	17-7175-50004	Harcourt	Bancroft	
Eastell L.	17-6547-50288	Sinclair	Parry Sound	Yes
Echo L.	18-2888-50223	Bangor	Bancroft	Yes
Evans L.	18-2701-50240	Wicklow	Bancroft	
Fisher L.	17-6725-50276	McClintock	Parry Sound	Yes
Fox L.	17-6812-50152	Havelock	Bancroft	
Graphite L.	17-6485-50660	Butt	Parry Sound	Yes
Greenbark L.	17-7352-50140	McClure	Bancroft	
Hawk L.	18-2704-50247	Wicklow	Bancroft	
Hound L.	17-7356-50030	Herschel	Bancroft	Yes
Ingrams L.	17-6808-50234	Livingstone	Parry Sound	
Island L.	17-6461-50697	Paxton	Parry Sound	
Jerry L.	17-6474-50270	Sinclair	Parry Sound	
Larson L.	17-6332-50541	Armour	Parry Sound	
Little Butt L.	17-6527-50558	Butt	Parry Sound	
Little Meach L.	17-7258-50190	McClure	Bancroft	Yes
Little Trout L.	17-6513-50596	Butt	Parry Sound	
Little Troutspawn L.	17-6750-50277	Livingstone	Parry Sound	
Little Whetstone L.	17-6447-50618	Proudfoot	Parry Sound	
Lower Raft L.	17-6462-50358	Sinclair	Parry Sound	

Lake Name	WBY_LID	Township	Ministry District	Ban on Fishing for Species Other than Brook Trout
Mag L.	17-7292-51111	Maria	Pembroke	No
Major L.	17-7261-50553	Murchison	Bancroft	Yes
McGuire L.	17-6496-50655	Butt	Parry Sound	
Meach L.	17-7249-50200	McClure	Bancroft	Yes
Minkey L.	17-6872-50306	Livingstone	Parry Sound	Yes
Mitchell L.	18-2652-50147	McClure	Bancroft	
Mud L.	17-6442-50745	Paxton	Parry Sound	Maybe
Nelson L.	17-6595-50395	Finlayson	Parry Sound	Yes
NL (Saunders L.)		Paxton	Parry Sound	Yes
North L.	17-6403-50645	Proudfoot	Parry Sound	
Peyton L.	17-6436-50702	Joly	Parry Sound	Maybe
Poorhouse L.	17-6758-50257	Livingstone	Parry Sound	Yes
Ridout L. 24	17-6659-50099	Ridout	Parry Sound	
Rocky L.		Mayo	Bancroft	
Roger L.	17-6764-50335	Livingstone	Parry Sound	Yes
Royal L.	17-6451-50757	Paxton	Parry Sound	Maybe
Scheil L.	17-6295-50836	Laurier	Parry Sound	
Slipper L.	17-6809-50176	Havelock	Bancroft	
Stocking L.	17-6818-50162	Havelock	Bancroft	
Stoney L.	17-6445-50730	Paxton	Parry Sound	Maybe
Sunrise L.	17-6757-50326	Livingstone	Parry Sound	Yes
Surprise L.	17-6440-50354	Sinclair	Parry Sound	
Trout L.	17-6440-50737	Paxton	Parry Sound	Maybe
Upper Raft L.	17-6459-50381	Sinclair	Parry Sound	
Windigo L.	17-6325-50834	Laurier	Parry Sound	
Wendigo L.	17-7092-51120	Clara	Pembroke	

Lake Name	WBY_LID	Township	Ministry District	Ban on Fishing for Species Other than Brook Trout
Wet L.	17-6443-50857	Ballantyne	Parry Sound	
Windfall L.	17-6479-50683	Butt	Parry Sound	Yes
Yearleys P. 3	17-6221-50254	Stisted	Parry Sound	

Appendix C Draft Proposed Lake Trout Regulations

Lake Name	WBY_LID	Township	Ministry District
3rd Sat. in May - Labour Day		**Minimum 40 cm**	
Allen L.	17-7159-49996	Harcourt	Bancroft
Balfour L.	18-2721-50571	Dickens	Bancroft
Basshaunt L.	17-6994-49995	Guilford	Bancroft
Beaver L.	17-7149-49577	Cavendish	Bancroft
Big Hawk L.	17-6779-50032	Sherborne	Bancroft
Bob L.	17-6745-49756	Anson	Bancroft
Bottle Lake	17-7154-49597	Cavendish	Bancroft
Bow L.	17-6926-49688	Snowdon	Bancroft
Buck L.	18-2851-50189	Bangor	Bancroft
Buzzard L.	17-7216-49499	Burleigh	Bancroft
Cavendish L.	17-7152-49568	Cavendish	Bancroft
Clean L.	17-6940-50133	Havelock	Bancroft
Crotchet L.	17-6623-49804	Longford	Bancroft
Deer L.	17-7288-49909	Cardiff	Bancroft
Eyre L.	17-6962-50147	Eyre	Bancroft
Esson L.	17-7149-49887	Monmouth	Bancroft
Farquhar L.	17-7196-49958	Harcourt	Bancroft
Fishtail L.	17-7203-50025	Harcourt	Bancroft
Glamor L.	17-7075-49817	Glamorgan	Bancroft
Gliskning L.	17-7180-50452	Airy	Bancroft
Gold L.	17-7162-49553	Cavendish	Bancroft
Goodwin L.	17-6844-50137	Havelock	Bancroft
Grace L.	17-7178-49945	Harcourt	Bancroft
Havelock L.	17-6857-50178	Havelock	Bancroft
Holland L.	18-2806-49968	Dungannon	Bancroft
John L.	18-2816-49795	Limerick	Bancroft
Johnson L.	17-6865-50150	Havelock	Bancroft
Kelly L.	17-6868-50133	Havelock	Bancroft
LAmable L.	18-2783-49885	Faraday	Bancroft
Little Black L.	17-6952-50140	Eyre	Bancroft
Little Hawk L.	17-6802-50021	Stanhope	Bancroft
Little Kennisis L.	17-6890-50140	Havelock	Bancroft
Little Redstone L.	17-6910-50096	Guilford	Bancroft
Lobster L.	17-7190-50465	Airy	Bancroft
Long L.	17-7242-49521	Burleigh	Bancroft

Lake Name	WBY_LID	Township	Ministry District
Long L.	17-7076-49910	Dudley	Bancroft
Loucks L.	17-7202-49511	Burleigh	Bancroft
Macdonald L.	17-6916-50119	Havelock	Bancroft
Margaret L.	17-6666-50011	Ridout	Bancroft
Marsden L.	17-6961-50115	Guilford	Bancroft
McCauley L.	17-7254-50470	Murchison	Bancroft
Mephisto L.	18-2966-49782	Cashel	Bancroft
Miskwabi L.	17-7109-49919	Dudley	Bancroft
Pine L.	17-7180-49960	Harcourt	Bancroft
Red Pine Lake	17-6806-50080	Sherborne	Bancroft
Slipper L.	17-6809-50176	Havelock	Bancroft
Spruce L.	17-7007-49926	Dysart	Bancroft
St. Peter, L.	17-7333-50217	McClure	Bancroft
Stocking L.	17-6818-50162	Havelock	Bancroft
Stormy L.	17-7043-49833	Glamorgan	Bancroft
Two Islands L.	17-7067-49934	Dudley	Bancroft
Wollaston Lake	18-2756-49689	Wollaston	Bancroft
Bear L.	17-6796-50231	Livingstone	Parry Sound
Blue Chalk L.	17-6620-50068	Ridout	Parry Sound
Bonnie L.	17-6367-49998	Macauley	Parry Sound
Buck L.	17-6427-50610	Proudfoot	Parry Sound
Buck L.	17-6573-50283	Sinclair	Parry Sound
Camp L.	17-6637-50337	Finlayson	Parry Sound
Clear L.	17-6561-49891	Oakley	Parry Sound
Clearwater L.	17-6389-49628	Morrison	Parry Sound
Eighteen Mile L.	17-6595-50273	McClintock	Parry Sound
Fifteen Mile L.	17-6596-50236	Franklin	Parry Sound
Flaxman L.	17-5920-50206	Christie	Parry Sound
Fox L.	17-6483-50456	Bethune	Parry Sound
Graphite Lake	17-6485-50660	Butt	Parry Sound
Grass L.	17-6400-50597	Proudfoot	Parry Sound
Island L.	17-6372-50605	Proudfoot	Parry Sound
Jerry L.	17-6474-50270	Sinclair	Parry Sound
Kimball L.	17-6818-50232	Livingstone	Parry Sound
Livingstone L.	17-6786-50252	Livingstone	Parry Sound
Long L.	17-6412-50632	Proudfoot	Parry Sound
Loon L.	17-6387-50586	Proudfoot	Parry Sound
Louie L.	17-6785-50286	Livingstone	Parry Sound

Lake Name	WBY_LID	Township	Ministry District
McFadden L.	17-6685-50221	McClintock	Parry Sound
Miskokway L.	17-5602-50551	Burton	Parry Sound
North L.	17-6403-50645	Proudfoot	Parry Sound
Pine L.	17-6521-49919	Oakley	Parry Sound
Red Chalk L.	17-6612-50058	Ridout	Parry Sound
Solitaire L.	17-6558-50282	Sinclair	Parry Sound
South Tasso L.	17-6622-50326	Finlayson	Parry Sound
Tasso L.	17-6615-50354	Finlayson	Parry Sound
Three Legged L.	17-5769-50127	Foley	Parry Sound
Trout L.	17-5651-50482	East Burpee	Parry Sound
Carson L.	18-2845-50435	Jones	Pembroke
Diamond L.	18-3013-50268	Radcliffe	Pembroke
Murphys L.	18-2810-50600	Burns	Pembroke
3rd Sat in May - Labour Day		**Minimum 50 cm**	
Baptiste L.	18-2642-49981	Herschel	Bancroft
Big Trout L.	17-6635-49768	Longford	Bancroft
Cashel L.	18-2987-49765	Cashel	Bancroft
Clear L.	17-6797-50055	Sherborne	Bancroft
Cross L.	18-2697-50311	Lyell	Bancroft
Davis L.	17-6812-49620	Lutterworth	Bancroft
Delphis L.	17-7066-49983	Dudley	Bancroft
Dixon L.	18-2939-49797	Limerick	Bancroft
Eagle L.	17-6973-50011	Guilford	Bancroft
Eels Lake	17-7269-49741	Anstruther	Bancroft
Faraday L.	18-2699-49935	Faraday	Bancroft
Hudson L.	17-7255-49943	Cardiff	Bancroft
Jack Lake	17-7358-49530	Methuen	Bancroft
Jamieson L.	18-2885-49933	Dungannon	Bancroft
Jeffrey L.	18-2733-49889	Faraday	Bancroft
Koshlong L.	17-6983-49826	Galmorgan	Bancroft
Lavallee L.	18-2687-49805	Faraday	Bancroft
Limestone L.	18-2974-49942	Mayo	Bancroft
Little Boshkung L.	17-6795-49895	Minden	Bancroft
Lower Hay Lake	17-7188-50317	Sabine	Bancroft
McKenzie L.	17-7331-50275	Sabine	Bancroft
Moose L.	17-6995-50027	Guilford	Bancroft
Mountain L.	18-2646-49772	Cardiff	Bancroft
Mountain L.	17-6807-49834	Minden	Bancroft

Lake Name	WBY_LID	Township	Ministry District
North L.	17-7033-50133	Harburn	Bancroft
Nunikani L.	17-6779-50074	Sherborne	Bancroft
Oblong L.	17-7017-50059	Harburn	Bancroft
Purdy L.	18-2858-50244	Bangor	Bancroft
Pusey L.	17-7193-49920	Cardiff	Bancroft
Salmon L.	17-7019-49656	Cavendish	Bancroft
Sherborne Lake	17-6737-50047	Sherborne	Bancroft
Silent L.	17-7321-49771	Cardiff	Bancroft
South Wildcat L.	17-6894-50214	Havelock	Bancroft
Stoplog L.	17-7195-49479	Burleigh	Bancroft
Sucker L.	17-7171-49602	Anstruther	Bancroft
Tallan L.	17-7329-49698	Chandos	Bancroft
Clear L.	17-5943-50124	Humphrey	Parry Sound
Clinto L.	17-6671-50198	McClintock	Parry Sound
Emsdale L.	17-6408-50417	Bethune	Parry Sound
Horn L.	17-6179-50580	Chapman	Parry Sound
Oxtongue L.	17-6628-50250	McClintock	Parry Sound
Spider Lake	17-5733-50114	Cowper	Parry Sound
Spring L.	17-6023-50734	Lount	Parry Sound
Whitefish Lake	17-5960-50159	Humphrey	Parry Sound
Burns L.	18-3360-50201	Griffith	Pembroke
Charlotte L.	18-3098-50298	Brundenell&Lyndoch	Pembroke
Clear, L.	18-3287-50341	Sebastpool	Pembroke
Waterloo L.	17-7166-51172	Clara	Pembroke
Wendigo L.	17-7092-51120	Clara	Pembroke
Sat. of Family Day Weekend - 3rd Sun. in March and 3rd Sat. in May - Labour Day Minimum 40 cm			
Anstruther L.	17-7210-49580	Anstruther	Bancroft
Catchacoma Lake	17-7116-49585	Cavendish	Bancroft
Drag L.	17-7042-49937	Dudley	Bancroft
Gull Lake	17-6755-49685	Lutterworth	Bancroft
Halls L.	17-6774-49973	Stanhope	Bancroft
Kennisis L.	17-6858-50095	Havelock	Bancroft
Mississauga L.	17-7123-49536	Cavendish	Bancroft
Percy L.	17-7080-50094	Harburn	Bancroft
Raven L.	17-6686-50085	Sherborne	Bancroft
Redstone L.	17-6934-50060	Sherborne	Bancroft
Kawagama L.	17-6767-50182	Sherborne	Parry Sound

Lake Name	WBY_LID	Township	Ministry District
Sat. of Family Day Weekend - 3rd Sun. in March and 3rd Sat in May - Labour Day Minimum 50 cm			
Aylen L.	18-2779-50548	Dickens	Bancroft
Boshkung L.	17-6789-49924	Stanhope	Bancroft
Chandos L.	18-2645-49676	Chandos	Bancroft
Crystal L.	17-6995-49588	Galway	Bancroft
Galeairy Lake	17-7110-50392	Airy	Bancroft
Haliburton L.	17-7045-50074	Harburn	Bancroft
Kashagawigamog L.	17-6900-49852	Minden	Bancroft
Kushog L.	17-6741-49945	Stanhope	Bancroft
Limerick Lake	18-2934-49742	Limerick	Bancroft
Papineau L.	18-2795-50249	Bangor	Bancroft
Paudash L.	17-7323-49829	Cardiff	Bancroft
Soyers L.	17-6883-49881	Minden	Bancroft
St. Nora L.	17-6706-50023	Sherborne	Bancroft
Twelve Mile L.	17-6807-49881	Minden	Bancroft
Victoria L.	17-7326-50560	Murchison	Bancroft
Bella L.	17-6539-50341	Sinclair	Parry Sound
Bernard L.	17-6257-50660	Strong	Parry Sound
Lake Joseph	17-5998-50031	Medora	Parry Sound
Lake of Bays	17-6567-50131	Franklin	Parry Sound
Muskoka, L.	17-6201-49898	Monck	Parry Sound
Otter L.	17-5810-50147	Foley	Parry Sound
Rosseau, L.	17-6112-50030	Medora	Parry Sound
Sand L.	17-6425-50540	Proudfoot	Parry Sound
Skeleton L.	17-6216-50117	Watt	Parry Sound
Wahwashkesh L.	17-5747-50629	McKenzie	Parry Sound
Kamaniskeg L.	18-2891-50334	Sherwood	Pembroke
Muskrat L.	18-3511-50603	Westmeath	Pembroke
Paugh L.	18-2894-50519	Burns	Pembroke
Round L.	18-3030-50572	Richards	Pembroke

Appendix D Rationalization of Lake Trout Supplemental Stocking in Lake Bernard

The stocking strategy of the Fisheries Management Plan for FMZ 15 specifies that rehabilitation or supplemental stocking of Lake Trout be supported by an approved lake-specific stocking strategy. For lakes where supplemental stocking was already occurring, the strategy is included as an Appendix to the plan.

Lake Bernard is one of the largest Lake Trout lakes in FMZ 15, with a surface area of 2089 ha. The bathymetry is quite simple, consisting of a single deep basin, with maximum and mean depths of 48 and 15 m, respectively.

The lake supports the largest and most important cold-water fishery in the northwest part of FMZ 15; primarily for Lake Whitefish and Lake Trout, but including Burbot, Rainbow Smelt and small numbers of Brook Trout and Rainbow Trout. Good year-round access and proximity to Highway 11 ease use by local and non-local anglers.

The fish community and fishery have been relatively well studied; local netting assessments, Broad-scale Monitoring (FMZ 15 trend lake), and several winter creels surveys have been conducted.

Lake Trout are thought to be native to the lake, but Lake Trout stocking and non-native species introductions began before the earliest population assessments so we can only speculate as to the original characteristics of the Lake Trout population. Genetic analysis has shown that the Lake Trout currently in the lake have a signature of Lake Manitou fish (C. Wilson pers. Comm.), showing that if there was a native population, it has been supplanted at least partly by a non-native genotype.

Lake Trout stocking began in 1922 and occurred regularly until 1996. At that time, it was recognized that naturally reproduced trout composed a small part of the population (13%, 1995 SLIN) and supplemental stocking was suspended to allow the naturally reproduced part of the population to reach its full potential. In the absence of stocking, the overall abundance of Lake Trout declined but the abundance and harvest of natural trout increased, though not in direct proportion. In the absence of supplemental stocking, the natural Lake Trout population was being sustained and the decision to suspend stocking in 1996 appeared to be justified.

However, the cold-water fishery in the lake is not limited to Lake Trout. The lake has always been known to support a high-density Lake Whitefish population, but the fishery was relatively minor while Lake Trout stocking was occurring. After 1996, the importance of the whitefish fishery increased as Lake Trout abundance declined. By 2011, winter fishing effort for Lake Whitefish far exceeded that for Lake Trout and it is now the largest fishery for the species in the zone.

Rainbow Smelt is an introduced species in Bernard Lake; they were first documented in the lake in 1968. They can play a dual role in a lake ecosystem, being both prey for larger sport fish species and a predator of the young of those species. How they affect other species varies from lake to lake depending on factors such as abundance and habitat quantity and quality for the various species. Where smelt is abundant and habitat for other coldwater species is limited, recruitment failure has been documented. For example, the decline of Lake Whitefish in Lake Simcoe was associated with the introduction of smelt and reproduction of Lake Trout, Lake Whitefish and Cisco failed in Mary, Fairy, Vernon and Peninsula Lakes, near Huntsville, after smelt were introduced. By contrast, the species co-exist in many lakes. Water clarity appears to be a crucial factor in defining this relationship, with lakes with lower clarity being most vulnerable to negative interactions.

Smelt is extremely abundant in Bernard Lake. The small-mesh CUE was, by far, the highest of any lake sampled in the BsM program in FMZ 15. The high abundance suggests there is potential for impacts to recruitment of trout and whitefish. SLIN surveys in 2014-15 documented much lower proportions of small (<350mm) whitefish compared to surveys in 1995 and 2000. In the absence of Lake Trout stocking, it has been speculated that smelt abundance has increased (smelt was not sampled effectively in surveys prior the BsM program) and may be resulting in poorer recruitment of whitefish.

It is difficult to show a causative relationship between smelt abundance and whitefish reproduction but based on case studies on other lakes, it appears to be a real risk.

Lake Bernard is supporting a self-sustaining Lake Trout population and supplemental stocking risks affecting it but, conversely, not supplemental stocking to increase predator abundance may be putting the Lake Whitefish population at risk through predation by an over-abundant non-native Rainbow Smelt population. So, the question becomes one of which species should be given management priority.

Stocking Options

Do Not Supplemental Stock Lake Trout

This option would return to the policy of not stocking Lake Trout. Based on experience, the Lake Trout population would be sustainable at a low level of abundance (pending regulation change may not help population greatly due to the large average size of fish (e.g., most fish caught are over the proposed minimum size limit). Even though the Lake Whitefish population is relatively abundant at this time, the low proportion of small fish observed in the 2014-15 SLIN appears to show there is a risk of a population decline. There is uncertainty around whether or how much smelt is responsible for the lower recruitment, or whether stocking of Lake Trout to minimize smelt abundance would correct it. The observation of higher representation of small Lake Whitefish when Lake Trout stocking was occurring suggests there is a relationship. The risk of not stocking may be a collapse of the Lake Whitefish population that would be difficult to recover.

Supplemental Stock Lake Trout

This option would continue the ongoing stocking of Lake Trout that was re-started in 2015. This strategy would risk affecting the naturally reproducing part of the population but may minimize the risk of a collapse of the Lake Whitefish population. Unlike the first option, stocking will create an important social and economic benefit. Past experience from when heavy stocking was occurring in the 1990's was that a high-quality Lake Trout fishery was created, supplying recreational and economic opportunities in a part of the zone that has limited economic opportunities. Also, under proposed regulations, all other natural Lake Trout lakes in the area will continue to be closed to winter fishing; stocking Lake Bernard will provide a location to fish for Lake Trout through the winter.

Preferred Option

Continued supplemental stocking of Lake Trout is recommended to address the risk of over-abundant non-native smelt on the cold-water community and create angling opportunities in a regionally important fishery. Some of the potential impact of stocking on the natural Lake Trout could be minimized by applying lake-specific regulations that favour the harvest of stocked fish over natural fish.

Appendix E Rationalization of Lake Trout Supplemental Stocking Strategy in Lake Muskoka

The stocking strategy of the Fisheries Management Plan for FMZ 15 specifies that rehabilitation or supplemental stocking of Lake Trout be supported by an approved lake-specific stocking strategy. For lakes where supplemental stocking is already occurring, the strategy is included as an Appendix to the plan.

Lake Muskoka is the largest lake in FMZ 15, with a surface area of 12,036ha. It is deep (depth max/mean: 66/15m) and has a complex bathymetry including many bays and basins of varying degrees of isolation and differing water quality. It has an exceptionally large watershed, resulting in a borderline mesotrophic nutrient status (T.P.: 7.5ug/l) and modest water clarity (Secchi depth: 3.5m). It is one of the three 'Muskoka Lakes', the other two being Lake Joseph and Lake Rosseau, both of which are large (~6,000ha), deep, oligotrophic and support high quality native Lake Trout populations.

The status of the Lake Trout population prior to regular assessment is not well understood. It is known that the population went through a recruitment bottleneck in the 1970s because of DDT poisoning. Whether or how much more reproduction occurred prior to that event than occurs today is not known. That is, we do not know what the potential abundance of Lake Trout is, even under ideal circumstances.

Like most lakes in the zone, the Lake Trout population is subject to multiple stresses known to affect Lake Trout. Water level management prioritized for recreation and electricity generation, introduced species, especially Rainbow Smelt, angling exploitation, intense shoreline development and supplemental stocking may prevent the Lake Trout population from ever reaching pre-development levels.

Lake Trout is native to Lake Muskoka, but stocking began early. In fact, it was one of the first lakes in the province to be stocked with Lake Trout, in 1919. It has been stocked essentially continuously ever since. The early stocking suggests that the lake never had an abundant native population due to its' natural physical and chemical characteristics or possibly, that stresses such as water level fluctuations and exploitation had already affected it at that time.

Naturally reproduced Lake Trout is currently present in the lake, but their occurrence is primarily limited to basins in the northwest part of the lake, namely East Bay, North Bay and the north end of the main basin.

Since 2006, stocking has been confined to the south part of the main basin, at minimized numbers to try to limit the impact of stocked fish on the reproducing stock and to determine whether natural recruitment would increase in the absence of stocked juveniles at the north end of the lake. In three projects completed by the BsM program, a total of 46 Lake Trout were caught of which 24 (52%) were not fin clipped, showing they were of

natural origin. Of the 24 natural fish, 16 (66%) were captured in the west basin while only one clipped fish was caught in that basin, showing natural fish comprised over 90% of the fish there. In contrast, in the rest of the lake, 21 of 29 fish were stocked (72%). From this we can conclude that the current stocking strategy (stocking at a low density only in the south basin) results in stocked fish occurring only in small numbers in the west basin where most natural fish occur, suggesting the continued stocking is compatible with maintaining natural reproduction in the west basin. However, the current stocking strategy does not appear to have eased an expansion of the occurrence of natural fish into other areas of the lake to date. It is possible that stocking, even at low densities, is preventing expansion from occurring or that other factors unrelated to stocking are at play.

Stocking Options

Discontinue Supplemental Stocking

In general, if a self-sustaining population is present, supplemental stocking is discouraged due to evidence of negative impacts (reference guidelines). As natural reproduction occurs in the lake, discontinuing stocking is the first option for consideration and should be implemented unless stocking can be rationalized. Eliminating stocking would allow the natural part of the population to reach its potential. But that potential may be greatly reduced from its pre-settlement state due to stresses on the lake. The virtual absence of natural fish in the main basin, despite low stocking densities, suggests that there are other constraints. Cessation of stocking would result in loss of the social and economic benefits that it brings. Unfortunately, it is difficult to quantity the value of those benefits or how they may change under different stocking scenarios. Currently, the importance of the Lake Trout fishery is relatively minor due to the re-emergence of the Walleye population and fishery for other cool/warm water species, the relatively low Lake Trout stocking density and the presence of other, higher quality fisheries nearby.

Continue Supplemental Stocking

Supplemental stocking can be considered to support objectives that are not strictly related to conservation of natural populations. In this regard there is an argument to be made to continue supplemental stocking Lake Muskoka. In the context of surrounding lakes, Lake Muskoka has less and lower quality habitat than the other Muskoka Lakes. Protecting the native populations of Lakes Joseph and Rosseau should be given management priority. Given the proposed changes to regulations for natural lakes, having an alternate fishing destination of similar size may be desirable to absorb fishing effort and perhaps deflect requests to stock those lakes. Given the size of the lake, the social and economic value of continuing to stock Lake Muskoka could be considerable, particularly if use increases following the regulation changes and if stocking were to be increased. Currently the Lake Trout fishery is not heavily used, due to the shift in effort to the recently rehabilitated Walleye fishery and the currently low stocking density.

If supplemental stocking is continued, optimum protection to the natural part of the population could be afforded by applying a lake-specific regulation that would favour harvest of stocked fish.

Preferred Option

It is proposed that the current approach of a low level of stocking, confined to the south basin of the lake, be discontinued. Removal of stocking as a factor that may influence natural reproduction in the lake will provide the opportunity for the natural population to achieve its potential. Changes to regulations applied to natural Lake Trout lakes are impending and it is uncertain if and how much fishing effort may change or be redistributed. It would be premature to assume that demand for fishing opportunities in the lake will be intense enough to be able to justify ongoing stocking at the expense of the natural population. The decision should be re-visited once it is known how the regional fishery reacts to proposed regulation changes.

Appendix F Large Natural Lake Trout Lakes Proposed with No Winter Season

Eels Lake – Anstruther Township

Eels Lake is a natural Lake Trout lake with a surface area of 942 ha. This population has been managed for natural reproduction since supplemental stocking ceased in the early 1990s. Concurrently, the lake has had a winter sanctuary (no fishing for any species from January 1st to Friday before the 3rd Saturday in May and December 1st to December 31st) since the 1990s as the Lake Trout population faced excessive harvest rates. Despite these management actions, the natural Lake Trout population remained depressed and in 2011, a rehabilitation plan was developed and rehabilitative stocking of 3000 Manitou-strain Lake Trout was initiated in alternating years. These rehabilitative efforts continue today.

Given a key management action in implementation for natural Lake Trout within the management plan is to define criteria for future candidate rehabilitation populations in FMZ 15, the management direction is to continue managing Eels Lake for rehabilitation until a zone-wide review of existing and potential candidate rehabilitation lakes can be conducted. As discussed in the Lake Trout chapter above, the winter sanctuary will be removed on Eels as with most winter sanctuaries in the zone, thereby enabling angling of other competitor species (e.g., Walleye, Black Crappie, etc.) in the lake following their respective legal seasons. The Lake Trout season on Eels is proposed to be the 3rd Saturday in May – Labour Day, aligning with the proposed season on other natural Lake Trout lakes <500 ha in surface area.

Baptiste Lake – Herschel Township

Baptiste Lake is a natural Lake Trout lake with a surface area of 2233 ha. The lake has been recognized and managed for natural Lake Trout since the late 1980's when a viable, albeit limited population of natural Lake Trout was documented. Notably, the majority of Baptiste Lake is not suitable for summer volumetric habitat. There is one main basin and two secondary basins which have the adequate depth to provide appropriate thermal habitat and dissolved oxygen to support summer Lake Trout volumetric habitat. The cumulative surface area of these three basins is approximately 300 ha, significantly less than the 500 hectares threshold for total surface area of natural Lake Trout lakes to be considered for a limited winter fishing season. Limited habitat combined with the complex fish community, are the main reasons for the limited Lake Trout population and the limited existing shortened season regulation for Lake Trout in Baptiste Lake, which goes from the 3rd Saturday in May – September 30th.

Given this limited Lake Trout habitat availability, the proposed season for Lake Trout in Baptiste Lake is proposed to be the 3rd Saturday in May – Labour Day, aligning with the proposed season on other natural Lake Trout lakes <500 ha in surface area.

Figure F1: Baptiste Lake bathymetry (white lines are 3 m intervals) and suitable Lake Trout volumetric habitat surface area (light blue outline).

Appendix G Glossary

Abundance – A measure of how many fish is in a population or a fishing ground.

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

Aquatic biodiversity Habitat Inventory (AHI) – A database of lake survey information for lakes surveyed from the sixties to the late eighties including physical data, water chemistry and species information.

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 each 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).

Catch per unit Effort (CUE) – 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 CUE shows a declining population, while an unchanging CUE shows a sustained abundance.

Climate Change – Any change in climate over time due to natural variability or because of human activity.

Cohort – Group of fish born in the same year within a population or stock.

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

Creel Surveys – 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 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 the Ministry.

Depletion – Reducing the abundance of a fish stock through fishing.

Diversionary lakes – Additional opportunity or put-grow-take stock lakes that have the same regulations as natural lakes.

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.

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

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

Environmental Registry (ER) – The Environmental Registry has "public notices" about environmental matters being proposed by all government ministries covered by the Environmental Bill of Rights. The public notices may have 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 the Ministry.

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 fishing and 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.

Habitat – The place where an organism lives.

Harvest – The number or weight of fish caught and kept from a given area over a given period.

Hatchery – The process of cultivating and breeding many fish in an enclosed environment. The fish are then released into lakes, rivers or fish farm enclosures.

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 during 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 the Ministry.

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

LESWPP - Lady Evelyn Smoothwater Wilderness Provincial Park.

Mark and recapture – Marking or attaching a tag to a fish so that it can be found 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 generally 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 minimize 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.

Muskellunge Canada Sport Fishing and Research Incorporated or Muskies Canada (MCI) – Angling club whose interests and programs are in the preservation of the target species.

NA1 – North American net gear described by Bonar et al. (2009). Also called "Large mesh" gillnet that target fish larger than 20 cm in length (the size range of interest to anglers).

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.

ON2 – Ontario small mesh gear described in Sandstrom et al. (2015). Also called "Small mesh" gillnet that target smaller fish (size range of interest to large fish).

Ontario Biodiversity Strategy (OBS) – Ministry strategic direction document.

Our Sustainable Future: A Renewed Call to Action (OSF) – Ministry 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.

Phosphate – A chemical compound having 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 part of the fish population being studied (e.g., spawning adult part of a Walleye population may be referred to as "spawning stock"). Often referred to as a fish stock.

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.

Public Lands Act **(PLA)** – Crown land resource use legislation mandated by the Ministry.

Put-Grow-Take (PGT) – A form of fish stocking where small fish (either fry or yearlings) are stocked into a lake or stream with the intent that they grow to larger size and are caught by anglers. There is no intent to create a self-sustaining population with this approach.

Recruitment – The number of new young fish that enter a population each year. More pragmatically, it can be defined as the number of young fish that reach 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 is not generally sold or otherwise traded on export or domestic markets.

Remote – Situated far from the main centers of population.

Relative abundance – An index of fish population abundance used to compare fish populations from year to year. This does not measure the actual numbers of fish but shows changes in the population over time.

Sample – A part 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.

Secchi disk – Used to gauge the transparency of water by measuring the depth at which the disk (black and white) ceases to be visible from the surface. As a general guideline, typical Secchi depth readings for low productivity lakes are greater than 5m, medium-productivity lakes range between 2m and 5m depths, and highly productive lakes are generally less than 2m in depth.

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 stress.

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

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

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 who is affected by the project.

Statement of Environmental Values (SEVs) – The Ministry's statement of environmental values and guiding principles to be considered as part of the resource management decision making process.

Stock – A specific part of the fish population being studied (e.g., spawning adult part of a Walleye population may be referred to as "spawning stock"); Often referred to as population.

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 can fluctuate in response to changes in abundance.

Thermocline – The narrow zone of rapid temperature change that separates the warm surface layer of water from the cold, deeper layer. During the summer, this separates the coolwater habitat of the lake (known as the epilimnion) from the coldwater habitat (known as the hypolimnion).

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.

Viral Hemorrhagic Septicemia (VHS) – VHS is a highly contagious disease in fish. The VHS virus is shed in the urine and reproductive fluids of infected fish. Fish can be exposed by direct contact, objects (e.g., nets, bait buckets), orally (predation) or vectors (preying birds or mammals). The Great Lakes strain of the virus affects or is carried by many species of fish including game fish and baitfish (e.g., 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.

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

Year Class – The production from a fishery in terms of numbers or weight.