



INDICATOR: ALIEN SPECIES IN INLAND LAKES

STRATEGIC DIRECTION: Reduce Threats

TARGET: N/A

THEME: Pressures on Ontario's Biodiversity – Invasive Alien Species

Background Information:

Invasive species are one of the main threats to biodiversity at the global level and are a growing environmental and economic threat to Ontario (MEA 2005; OMNR 2012). Invasive species often act together with threats such as habitat loss and climate change to accelerate the loss of Ontario's biodiversity. Ontario's aquatic ecosystems have been particularly impacted by invasive species. Well-known examples of aquatic invasive species in Ontario include Round Goby, Zebra Mussel, Purple Loosestrife, and the European sub-species of Common Reed (*Phragmites*).

The State of Ontario's Biodiversity 2010 report (Ontario Biodiversity Council 2010) included an indicator on aquatic alien species in the Great Lakes ([updated for 2015](#)) as an index of pressure related to invasive species, but there were no comprehensive data to develop an alien species indicator for inland lakes. A Broad-Scale Monitoring Program of lakes was established in 2008 to assess the current state of fishes and other aquatic resources, identify stresses on these resources, and report on changes over time. The program monitors a subset of lakes across the province on 5-year cycles to provide information critical to effective fisheries management.

This indicator uses information on alien species detected in the Broad-Scale Monitoring Program as an index of the number and distribution of alien species in inland lakes in Ontario. Not all of these species are considered invasive – invasive species are those harmful alien species whose introduction or spread threatens the environment, the economy or society, including human health (OMNR 2012). Risk assessments to determine which species are invasive have not been completed, so this indicator uses the number of alien species as an index of risks related to invasive species. The current assessment is the first time this indicator has been assessed. Future assessments will allow an analysis of trends as the Broad-Scale Monitoring cycle is repeated every 5 years. Further details regarding the development of this indicator are available in a separate technical report (Dextrase et al. 2016).

Data Analysis:

The first 5-year cycle of the Broad-scale Monitoring program (2008-2012) provided information on the fish and invertebrate communities for 720 Ontario inland lakes (21-90,484 ha in area). Sampling included the use of small mesh and large mesh gillnets to capture fishes and hauls with plankton tow nets to capture pelagic zooplankton including invasive invertebrates such as larval Zebra Mussel and Spiny Water Flea (OMNR 2012). Zooplankton sampling was not fully implemented until the second year of sampling (2009) so there were no zooplankton hauls in 96 of the 720 sampled lakes (13%).

Lists of species caught in each lake were examined to determine if alien species were detected and the number of alien species detected in each lake. Alien species included species not native to Ontario (e.g., Round Goby, Zebra Mussel) and species native to Ontario that have been introduced beyond their



natural range limits (e.g., Smallmouth Bass, Rainbow Smelt). Natural ranges of species native to Ontario were determined by examining range maps in *The ROM Field Guide to Freshwater Fishes in Ontario* (Holm et al. 2009) supplemented with Fisheries Management Zone Plans and background documents (OMNRF 2014). For each Fisheries Management Zone, the percentage of sampled lakes where alien species were detected and the mean number of alien species per sampled lake were calculated and mapped (Figure 1).

- [download alien species summary data by Fisheries Management Zone](#)

Results:

Trend: Baseline **Data Confidence:** High **Geographic Extent:** Provincial

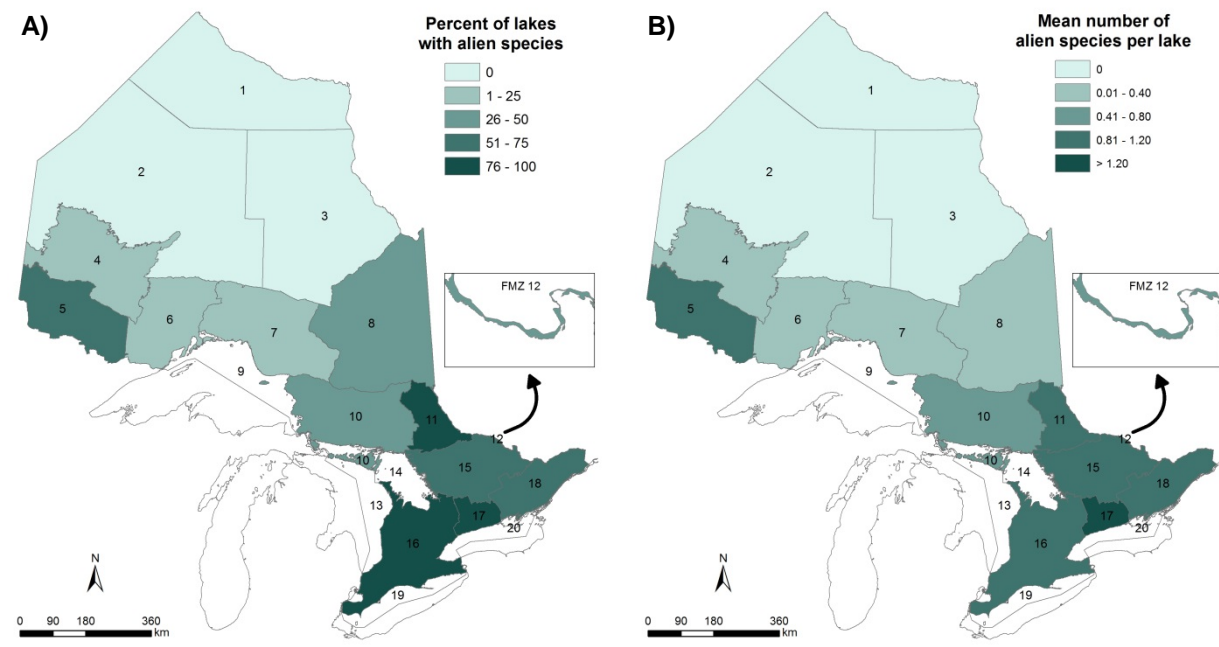


Figure 1. A) Percent of sampled lakes with alien species detections in each Fisheries Management Zone, 2008-2012; B) Mean number of alien species detected per sampled lake in each Fisheries Management Zone, 2008-2012 (total number of lakes = 720; source: Broad-scale Monitoring of lakes; Dextrase et al. 2016).

Status:

- Alien species were detected in 330 of the 720 lakes sampled (46%) in the first 5-year cycle of the Broad-scale Monitoring program.
- Twelve alien fish species were detected – Smallmouth Bass (198 lakes) and Rainbow Smelt (60 lakes) were the most commonly encountered. Four alien invertebrate species were detected – Zebra Mussel (58 lakes) and Spiny Water Flea (54 lakes) and were found in the most lakes.
- Fisheries Management Zones 16 and 17 in the Mixedwood Plains Ecozone and Fisheries Management Zone 11 had the highest proportion of lakes with alien species (> 75%). No alien



species were detected in the 19 lakes sampled in Fisheries Management Zones 1-3 in the northern part of the province.

- The mean number of detected alien species per lake in each Fisheries Management Zone ranged from 0 to 2.3 species per lake (average of 0.66 species per lake) and increased from north to south.

Links:

Related Targets: 7. By 2015, strategic plans are in place to reduce threats posed to biodiversity by invasive species.

Related Themes: N/A

Web Links:

Fish Ontario – Broad-scale Monitoring of lakes program <https://www.ontario.ca/environment-and-energy/methods-monitoring-fish-populations>

References:

Holm, E., N.E. Mandrak, and M.E. Burridge. 2009. The ROM field guide to freshwater fishes of Ontario. Royal Ontario Museum, Toronto, ON.

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Dextrase, A.J., C. Chu, N.P. Lester, H.E. Ball and K.B. Armstrong. 2016. An assessment of alien species in Ontario's inland lakes based on the Broad-scale Monitoring Program, 2008-2012. State of Ontario's Biodiversity Technical Report Series, Report #SOBTR-05. Ontario Biodiversity Council, Peterborough, ON.

Ontario Biodiversity Council (OBC). 2010. State of Ontario's biodiversity 2010. A report of the Ontario Biodiversity Council, Peterborough, ON. [Available at <http://ontariobiodiversitycouncil.ca/reports-introduction/>]

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Ontario Biodiversity Council. 2015. State of Ontario's Biodiversity [web application]. Ontario Biodiversity Council, Peterborough, Ontario. [Available at: <http://ontariobiodiversitycouncil.ca/sobr> (Date Accessed: July 22, 2016)].