

Aquatic Invasive Species: in a changing climate

In most aquatic organisms, growth and reproduction are strongly influenced by water temperature.¹ As a result of climate change, the Great Lakes are expected to see an increase in water temperature between 1°C and 7°C within the next century.²

This increase in water temperature could make some rivers and lakes more favourable for invading species.

What are Aquatic Invasive Species?

Aquatic invasive species are non-native species that have few predators, reproduce quickly, thrive in disturbed systems, are adaptable, and out-compete for food and habitat.³

Invasive species can either come from other countries or regions (e.g. the zebra mussel) or be native to the area (e.g. the small mouth bass).

Climate Change in Ontario

Between 1948 and 2008, the average annual temperature in Ontario increased by 1.4°C and scientists project that by 2050, the average annual temperature in Ontario could increase by 2.5°C to 3.7°C.⁴

Apart from increasing water temperature, this warming trend may also affect aquatic ecosystems by:

- Increasing evaporation leading to lower water levels;
- Increasing extreme weather events;
- Decreasing water quality;
- Altering stream flow patterns; and
- Shortening the duration of ice cover.⁵

These changes may allow non-native fish species to thrive in Ontario lakes and rivers and prey on or compete for food resources with native fishes, leading to the decline or loss of native fish populations.⁵

With thousands of rivers, lakes and streams in Ontario, aquatic invasive species pose a significant threat to our environment, economy, society, and health.⁶



Invasive species are a threat to Ontario's biodiversity because they can:

- Move into ecosystems and take over, killing some native species; and
- Disrupt food webs, degrade habitat, introduce parasites and disease, and lead to species at risk.⁷

Nearly 200 non-native invasive species are present in the Great Lakes Basin. These include:

- Sea Lamprey;
- Zebra Mussel;
- Round Goby;
- Northern Snakehead;
- Spiny Water Flea; and
- Purple Loosestrife.⁶

The key pathways for introduction or spread of invasive species include:

- Shipping;
- Recreational and commercial boating;
- Use of live bait;
- Aquarium and water garden trade;
- Live foodfish;
- Unauthorized introductions; and
- Canal and water diversions.⁸



Northern Snakehead



Zebra Mussels



Water Soldier

Aquatic Invasive Species

In the Great Lakes Basin, invasive species foul water intakes, reduce the value of commercial and recreational fisheries, and reduce property values.⁶ In the Great Lakes, damage associated with zebra mussels has cost between **\$3 and \$7.5 billion**, which highlights the magnitude of potential costs of preventing and combating invasive species.⁷

That's why the most effective approach to dealing with invasive species involves **managing the pathways** through which invasive species enter and spread through water systems.⁷

Adaptation measures to fight aquatic invasive species can include: i) outreach and education, ii) monitoring and research, iii) prevention, management and control, and iv) policies and regulations.⁹

Examples of adaptation include:

- Develop policy to limit smallmouth bass introductions to the region;
- Strengthen aquaculture regulations to prevent the introduction of new invasive species;
- Protect and rehabilitate critical habitats for highly vulnerable fish species; and
- Focus prevention and control methods, and rapid response protocols, in areas at high risk of invasive species.¹⁰

Here is how you can help!

1. **Thoroughly wash** your boat and gear, including waders, after use;
2. **Remove all** aquatic plants and animals from boats and gear;
3. **Drain water** from your boat, trailer, tackle and gear before leaving an area;
4. **Do not release** aquarium pets, plants or live bait into aquatic ecosystems; and
5. **Do not move** live fish and other aquatic organisms from one body of water to another.¹¹



Round Goby



Sea Lamprey



Purple Loosestrife



Zebra Mussel

References

1. OMNR. (2012). Climate Change Impacts on Natural Resources. Accessed from: http://www.mnr.gov.on.ca/en/Business/ClimateChange/2ColumnSubPage/STDPROD_090063.html#Water
2. Kling, G. W. et. al. (2003). *Confronting Climate Change in the Great Lakes Region: Impacts on Our Communities and Ecosystems*. Accessed from: <http://www.davidsuzuki.org/publications/downloads/2003/GLReportFinal.pdf>
3. MacDonald, F. (2010). *Invasive Species and Climate Change*. Ontario Federation of Anglers and Hunters. Accessed from: http://www.helpourfisheries.com/Annual_Workshop/2010/OFAH_Francine_MacDonald.pdf
4. MOE. (2011). *Climate Ready: Ontario's Adaptation Strategy and Action Plan*. Accessed from: http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/stdprod_085423.pdf
5. Rahel, F. J. et. al. (2007). Assessing the Effects of Climate Change on Aquatic Invasive Species. *Conservation Biology*. Vol. 22, No. 3, 521-53
6. OMNR. (2012). *Aquatic Invasive Species*. Accessed from: http://www.mnr.gov.on.ca/en/Business/Biodiversity/2ColumnSubPage/STDPROD_068689.html
7. OMNR. (2012). *How Invasive Species Threaten Ontario's Biodiversity*. Accessed from: http://www.mnr.gov.on.ca/en/Business/Biodiversity/2ColumnSubPage/STDPROD_068681.html
8. Fisheries and Oceans Canada. (2012). *Aquatic Invasive Species*. Accessed from: <http://www.dfo-po.gc.ca/science/enviro/ais-eae/plan/plan-eng.htm>
9. OMNR. (2012). *Fighting Invasive Species*. Accessed from: http://www.mnr.gov.on.ca/en/Business/Biodiversity/2ColumnSubPage/STDPROD_068686.html
10. OMNR. *Northern Ontario Boreal Climate Change Adaptation Options Portfolio*. Accessed from: http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@climatechange/documents/document/stdprod_093446.pdf
11. Fisheries and Oceans Canada. (2012). *Stop the Spread of Aquatic Invasive Species*. Accessed from: <http://www.pac.dfo-po.gc.ca/publications/pdfs/invasivesenvhassantes-eng.pdf>

Ontario Centre for Climate Impacts and Adaptation Resources

OCCAR

OCCAR specializes in communication of climate change impacts and supports adaptation planning to a wide range of stakeholders throughout the province of Ontario.

MIRARCO/Laurentian University, 935 Ramsey Lake Road, Sudbury, ON P3E 2C6

P: 705 675 1151

www.climateontario.ca