INDICATOR: Alien Species in the Great Lakes

Startegic Direction: Enhanced Resilience

Target: N/A

Theme: State of Ecosystems and Species

Previous version: http://sobr.ca/_biosite/wp-content/uploads/Indicator-Alien-Species-in-the-Great-Lakes_Sept2017-Update_FINAL1.pdf

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 co-occur 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 alien species in Ontario include Round Goby, Zebra Mussel and the European sub-species of Common Reed (Phragmites). The Great Lakes have a long and well-documented history of aquatic alien species invasions (Mills et al. 1993, Ricciardi 2006) with more than 180 established alien species. The Great Lakes are also the entry point for many alien species that subsequently invade Ontario's inland lakes and streams.

This indicator summarizes the cumulative number of established alien species detected in the Great Lakes and the rate at which new introductions have occurred. Not all alien species are considered invasive – invasive species are those species for which the 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 for all alien species in the Great Lakes, so this indicator uses the number of alien species as an index of risks related to invasive species.

A companion report that provides an index of alien species in Ontario's inland lakes has also been developed. Comparable, comprehensive information on the distribution of terrestrial alien species and their introduction dates is not currently available but is being assembled for the possible development of a terrestrial indicator.

Data Analysis

The current list of nonindigenous species in the Great Lakes was downloaded from the Great Lakes Aquatic Nonindigenous Species Information System (GLANSIS - NOAA 2020). Species included are not native to any part of the Great Lakes basin but are established in the Great Lakes and connecting waters. The database includes information on the origin of species and the year that they were first collected. Species were grouped into five taxonomic categories (bacteria/ viruses, protists, plants, invertebrates and fishes) and the cumulative number and number of invasions per decade were graphed (Figures 1, 2).

There are some important caveats with respect to the information used for this indicator: some species established in U.S. waters of the Great Lakes and not yet found in Ontario waters are included; species native to one part of the Great Lakes basin that have been introduced to a new part of the basin are not included; and potential alien species whose origins are not clearly known are not included. Additional alien species are likely present and have not yet been found or established. There has also been no overall assessment to determine which species have been harmful some, such as intentionally introduced Pacific Salmon species have had positive economic and social impacts. However, this database is the best available information and is a good indicator of the risk to Ontario's biodiversity posed by alien species in the Great Lakes Ecozone.

Access GLANSIS database

Results

Trend: Improvement **Data Confidence:** High **Geographic Extent:** Great Lakes

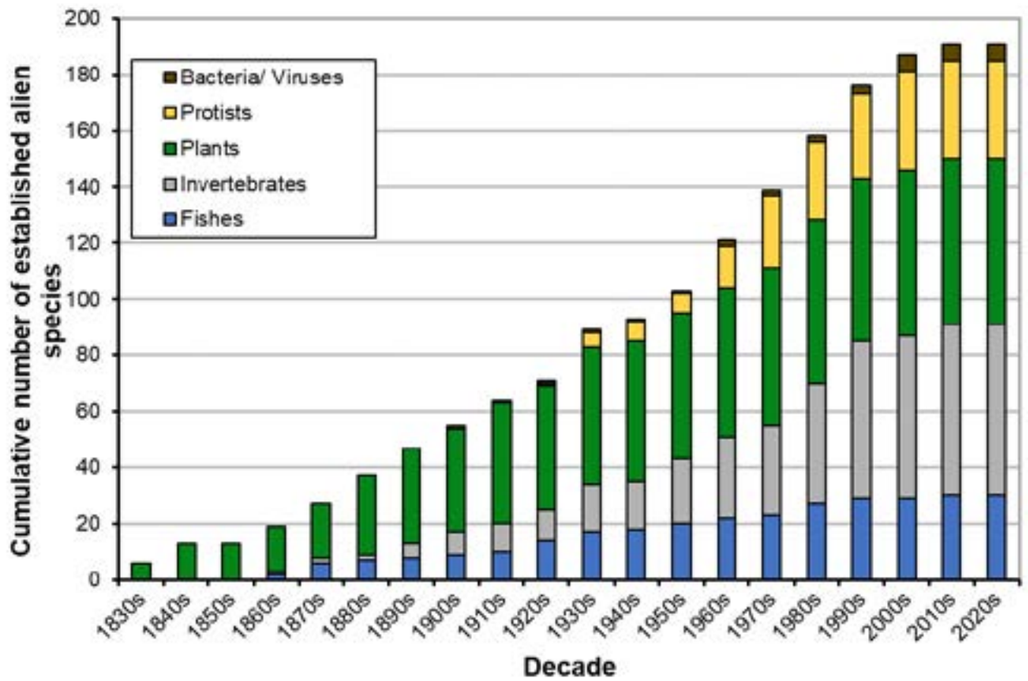

Figure 1. Cumulative number of established aquatic alien species, by taxonomic group, in the Great Lakes by decade (note: protists include algae, diatoms and protozoans; invertebrates include annelids, bryozoans, coelenterates, crustaceans, insects, mollusks and platyhelminthes).

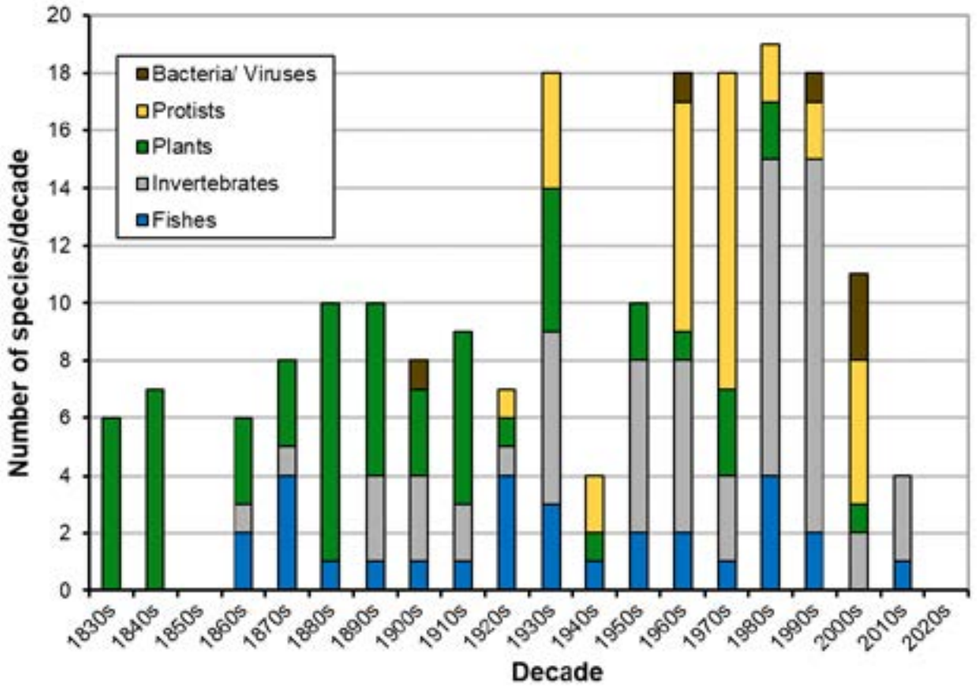

Figure 2. Number of established aquatic alien species, categorized by taxonomic group, discovered in the Great Lakes per decade.

Status

- The number of aquatic alien species in the Great Lakes basin has steadily increased since the first species was documented in the 1830s. As of December 2020, 191 alien species were established.
- Between 1839 and 1950, an average of 8.5 new species were established per decade. Between 1950 and 1999, the average rate of new alien species establishment increased to nearly 17 species per decade. This increased rate of establishment coincides with the opening of the St. Lawrence Seaway in 1959. The higher rate during this period may also be a result of increased detection efforts.
- The rate of newly established species appears to have declined dramatically in the current decade. Only four newly established alien species have been discovered in the Great Lakes since 2010. This includes three species of planktonic crustaceans and one species of fish—Grass Carp (Ctenopharyngodon idella).
- Although sterile (triploid) Grass Carp have been caught previously in the Great Lakes, diploid Grass Carp were first detected in the Great Lakes basin in 2011. Natural reproduction has recently been documented in the Sandusky River in Ohio. However, there is not yet any

evidence of an established population in Canadian waters, and surveillance continues (DFO 2019).

- The fact that only four new alien species have been established since 2010 may reflect increased awareness of invasive species issues, enhanced monitoring efforts and/or heightened prevention and control efforts, specifically, more comprehensive ballast water regulations introduced by Transport Canada in 2006.

Links

Related Targets

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

Related Themes

Pressures on Biodiversity – Invasive Species

Glossary

Established species- population that is self-sustaining and does not require re-introduction to maintain a population base

Web links

Great Lakes Aquatic Nonindigenous Species Information System http://www.glerl.noaa.gov/res/Programs/glansis/glansis.html

Ontario Ministry of Natural Resources and Forestry – Invasive Species https://www.ontario.ca/environment-and-energy/how-government-combats-invasive-species#section-8

Ontario Federation of Anglers and Hunters – Invading Species Awareness Program http://www.invadingspecies.com/

Ontario Invasive Plant Council http://www.ontarioinvasiveplants.ca/

Invasive Species Centre http://www.invasivespeciescentre.ca

References

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Pressures on Biodivesity

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