

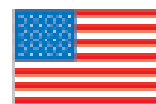
Great Lakes Water Quality Agreement Annex 6: Aquatic Invasive Species

Gavin Christie, Fisheries and Oceans Canada

Aaron Woldt / Mike Weimer, U.S. Fish and
Wildlife Service

Great Lakes Panel - Fall 2021 Meeting

October 26, 2021

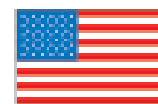


Canada 

Annex 6 Purpose

Address the threat posed by aquatic invasive species to Great Lakes water quality, including support for actions to prevent the related impacts to the function, health, and sustainability of native aquatic ecosystems.

- **Promoting action through bi-national collaboration:** State and provincial governments, tribal governments, First Nations, Métis, municipal governments, other local public agencies, and the public, to address the threat posed by AIS in the GLB.
- **Supporting comprehensive strategies for prevention:** Priorities include preventing introduction of new AIS into the GLB, controlling the spread; and eradicating, where feasible.



Annex 6 2020-2022

Science and Action Priorities

SCIENCE

- Test technology that prevents the spread of AIS while allowing the movement of other ecosystem components through canals and waterways
 - *Large-scale field evaluations of a fish barrier technologies underway.*
 - *Technologies include underwater sound, bubbles, lights and carbon dioxide.*
 - *FishPass – Collaborative research passage research facility on the Boardman River, Traverse City, MI*

ACTION

- U.S.-Canada Great Lakes Federal Agency Mutual Aid Agreement for Early Detection and Response
 - *USFWS and DFO coordinating development of a US/Canada federal interagency mutual aid framework.*
 - *Binational federal framework to complement State and Provincial CGLSLGP Mutual Aid Agreement.*
- Prevent introductions of new invasive species into the Great Lakes, including Silver Carp, Bighead Carp, and Black Carp
 - *Binational, interagency partnerships support coordination to prevent invasive carp introduction and establishment (e.g., Illinois Waterway, Lake Erie)*
 - *Comprehensive strategies guide priority detection, prevention, and control projects in defense of the Great Lakes basin.*
 - *Early Detection and Response by FWS, DFO, with NMDMNRF and others*

Annex 6 2020-2022

Science and Action Priorities

ACTION

- Conduct response actions, including continuing efforts to prevent the establishment of Grass Carp in the Great Lakes
 - *GLB agencies maintain AIS response coordination and capacity.*
 - *Recent actions include Grass Carp in Lake Erie and Lake Ontario.*
 - *GLSLGP agencies maintain agreements and conduct virtual response exercises focusing on “least wanted” AIS species.*
- Implement control projects for invasive species already in the Great Lakes basin, including red swamp crayfish, monocious hydrilla, water soldier, water chestnut, and phragmites
 - *GLB collaboratives support data-informed action to control zebra mussels, quagga mussels, and Phragmites.*
 - *Phragmites Collaborative/Invasive Mussel Collaborative coordinate best-practices and effective control methodologies.*
 - *State and provincial agencies conduct targeted control of “Watch List” species (e.g., red swamp crayfish).*
 - *NMDNRF, Parks Canada, OFAH, ISC, and others responses to Water Soldier and Water Chestnut*
- Identify gaps in AIS policies and regulations to support the development of coordinated and comprehensive policy or regulatory solutions to reduce the risk of pathways into and within the Great Lakes basin
 - *GLP and GLFC Law Enforcement Committee coordinate with AIS managers to identify gaps in regulations and improve efficiency in detecting AIS moving through OIT pathways.*
 - *Ontario pending species listings*
 - *Transport Canada Ballast Water Regulations – Annex 5 – Ships discharge.*

Current Focus

GLWQA 2020 – 2022 Progress Report of the Parties

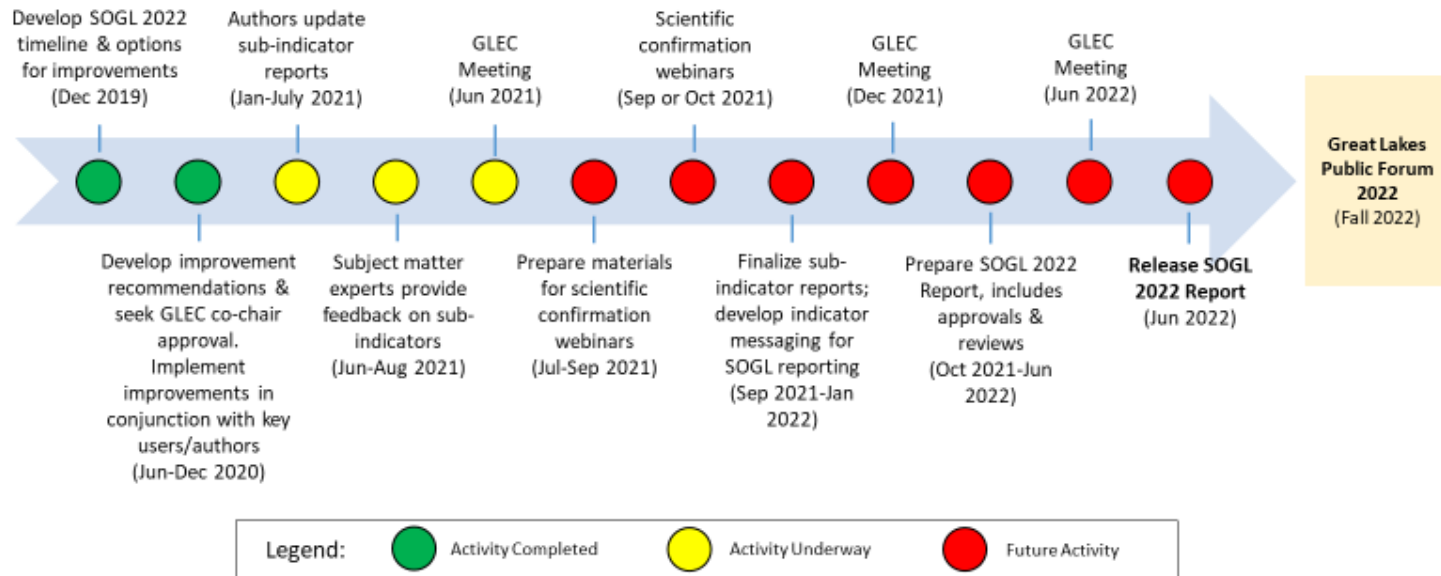
- 2022 – 50th anniversary of the signing of the original GLWQA
- Draft report under development; public release in Fall 2022
- Summarizes agency achievements under the 2020-2022 Science and Action Priorities.
- Thanks to many of you for providing content for the Annex 6 chapter



Current Focus

State of the Great Lakes Sub-indicators for Aquatic Invasive Species

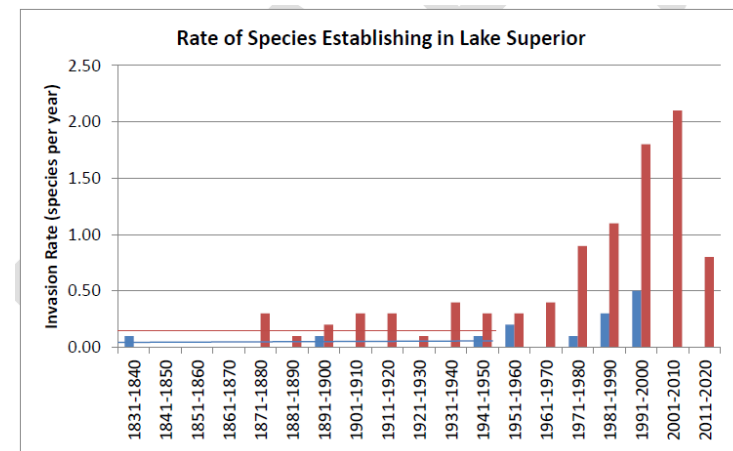
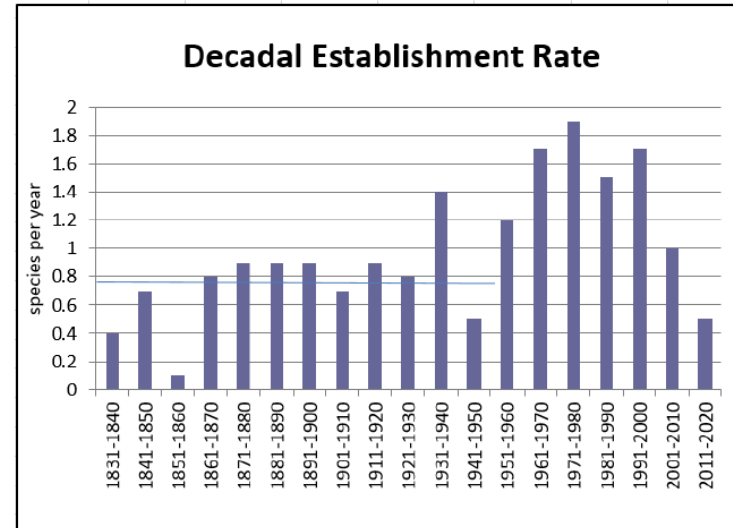
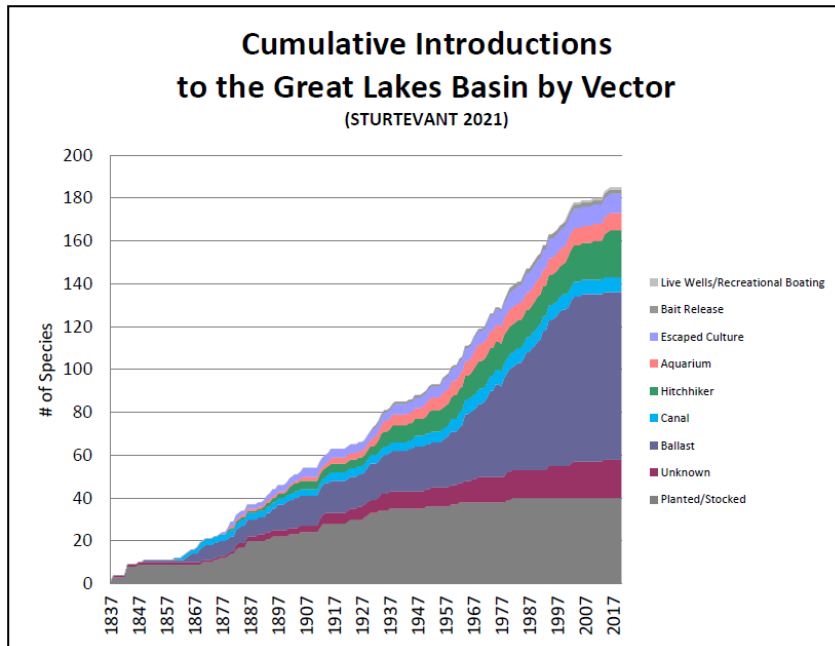
State of the Great Lakes 2022 Timeline



Current Focus

State of the Great Lakes Sub-indicators for AIS

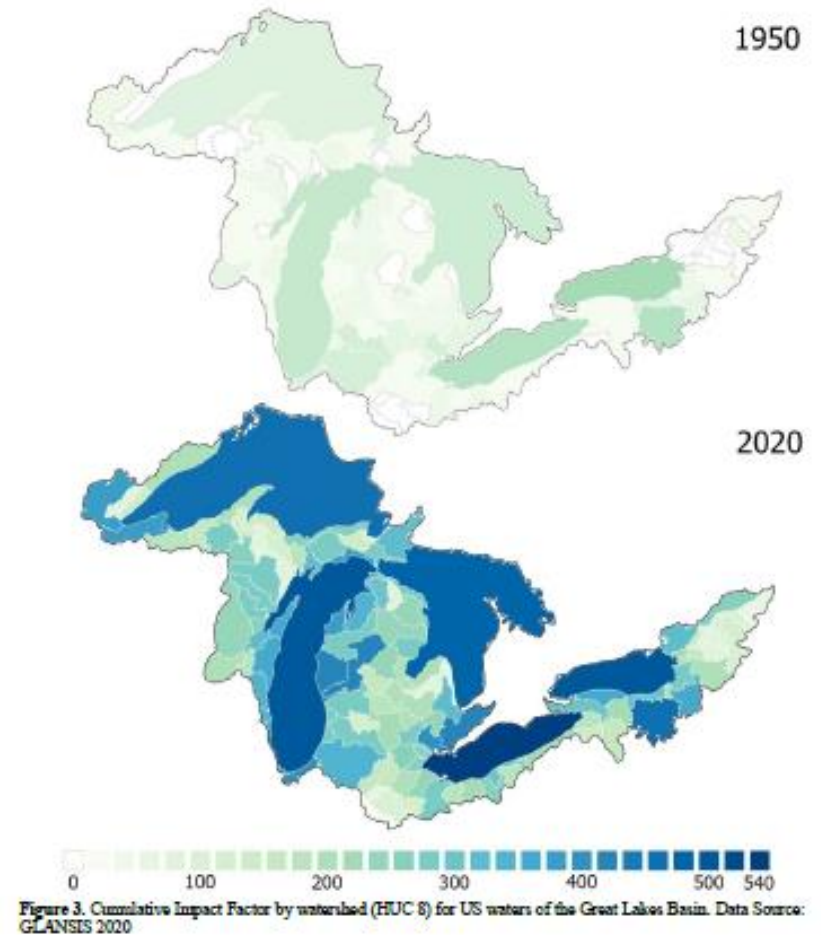
- Rate of invasion including secondary rate of invasion among lakes



Current Focus

State of the Great Lakes Sub-indicators for AIS

- Assessing impacts from various taxa (fish, invertebrates, etc.)



Current Focus

State of the Great Lakes Sub-indicators for AIS

- Opportunity to provide input:
 - State of the Great Lakes Draft Messaging and Highlights Summary Webinar – November 1 - 2:00-3:30 PM EST Registration link: <https://attendee.gotowebinar.com/register/5869680569386800655>
 - Register and access all the Science Confirmation Webinars and Indicator Reports

STATE OF THE GREAT LAKES 2022 - DRAFT

Sub-Indicator: Terrestrial Invasive Species

Overall Assessment
Status: Undetermined
Trend:
10-Year Trend: Long-term Trend (L)
Rationale: This sub-indicator is being added to this replacing *Phragmites* (Rate of Invasion) been removed for parts of species was unable to be assessed in the at lake-by-lake assessment and

Status Assessment:
Good: TBD
Fair: TBD
Poor: TBD
Undetermined: D
Trend Assessment:
Improving: TB
Unchanging: TB
Deteriorating: TB
Undetermined: B
Endpoints and TBD

Sub-Indicator P
• To assess
Landscape
ecology
• Aid in d
function
• This sub
Great L

Executive Obj
To reduce and fu
aid sub-bas
gen
cause of their ne
terrestrial and eq

This sub-indicator
assess species
quality of the W

Status Assessment I
Good: Adult Sea Lamp
Fair: Adult Sea Lamp
Poor: Adult Sea Lamp
Undetermined: S
Trend Assessment I
Improving: Adult S
Unchanging: Adult S

Lake Michigan
Status: Poor
10-Year Trend (2005-
Long-term Trend (19
Rationale: Results for
and homes. All are

STATE OF THE GREAT LAKES 2022 - DRAFT

Sub-Indicator: Sea Lamprey

Overall Assessment
Status: Fair
10-Year Trend: Improving
Long-term Trend (L)
Rationale: Annual 50
populations from level
an average target in
basin-wide 10-year a
being Sea Lamprey p

Lake-by-Lake Assess
Lake Superior
Status: Poor
10-Year Trend: Don
Long-term Trend (L)
Rationale: Adult Sea

Lake Michigan
Status: Good
10-Year Trend: Imp
Long-term Trend (L)
Rationale: Adult Sea
Lake Huron (inclu
Status: Fair
10-Year Trend: Imp
Long-term Trend (L)
Rationale: Adult Sea

Lake Erie (includin
Status: Good
10-Year Trend: Imp
Long-term Trend (L)
Rationale: Adult Sea

Lake Ontario (incl
Status: Good
10-Year Trend: Imp
Long-term Trend (L)
Rationale: Adult Sea

Lake-by-Lake Assess
Lake Superior
Status: Good
10-Year Trend (200
Long-term Trend (19
Rationale: Zebra mus
equally found in the
both dreissenid spec
to be largely absent (

Lake Michigan
Status: Poor
10-Year Trend (2005-
Long-term Trend (19
Rationale: Results for
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Lake Superior
Status: Fair
10-Year Trend: Unde
Long-term Trend (16
Rationale: The LCRI is
1950 baseline (309 vs.
to 64 in 2020) (short
collecting Lake Michi
established population
one-lake-by-lake report
from the other lake bas

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STATE OF THE GREAT LAKES 2022 - DRAFT

Sub-Indicator: Dreissenid Mussels

Overall Assessment

Status: Poor
Trend:
10-Year Trend: Don
Long-term Trend (L)
Rationale: The current
overall (CI-GI) is 155
decrease in part from the
in 2005, an increase of
also continues to incre
Nonably, within the last
established population
increase in impacts has
impacts added to the

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Long-term Trend (16
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STATE OF THE GREAT LAKES 2022 - DRAFT

Sub-Indicator: Impacts of Aquatic Invasive Species (AIS)

Overall Assessment

Status: Poor
Trend:
10-Year Trend (2011-
Long-term Trend (16
Rationale: The current
overall (CI-GI) is 155
decrease in part from the
in 2005, an increase of
also continues to incre
Nonably, within the last
established population
increase in impacts has
impacts added to the

Lake-by-Lake Assess
Lake Superior
Status: Good
10-Year Trend (200
Long-term Trend (19
Rationale: Zebra mus
equally found in the
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Lake Michigan
Status: Poor
10-Year Trend (2005-
Long-term Trend (19
Rationale: Results for
and homes. All are

Lake Superior
Status: Fair
10-Year Trend: Unde
Long-term Trend (16
Rationale: The LCRI is
1950 baseline (309 vs.
to 64 in 2020) (short
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established population
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10-Year Trend: Unde
Long-term Trend (16
Rationale: The LCRI is
1950 baseline (309 vs.
to 64 in 2020) (short
collecting Lake Michi
established population
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Lake Superior
Status: Fair
10-Year Trend: Unde
Long-term Trend (16
Rationale: The LCRI is
1950 baseline (309 vs.
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established population
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10-Year Trend: Unde
Long-term Trend (16
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10-Year Trend: Unde
Long-term Trend (16
Rationale: The LCRI is
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10-Year Trend: Unde
Long-term Trend (16
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Long-term Trend (16
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Long-term Trend (16
Rationale: The LCRI is
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STATE OF THE GREAT LAKES 2022 - DRAFT

Sub-Indicator: Rate of New Aquatic Non-indigenous Species Establishment in the Great Lakes

Overall Assessment

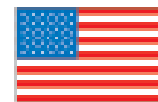
Status: Good
Trend:
10-Year Trend: Unchanging
Long-term Trend (1991-2020): Improving
Rationale: In the past decade (2011-2020), five new aquatic non-indigenous species (ANS) have established overwintering and reproducing populations in the Great Lakes (Figures 1). *Chironomus riparius* (diploid grass carp - introduced 2011) was most likely introduced as a contaminant with shell support trucks. *Therapsyllus crassus* (2014) is currently assigned as a unknown vector while *Daphnia retrocurva* (2015) and *Mesocyclops polyphemus* (2016) are assigned as "hitchhiker" with organisms in trade as both are associated with aquatic plants and were previously established in the southern U.S. *Salvelinus collipinnatus* (2016) is assigned as a hitchhiker with stocked fish. This results in a rate of 0.5 new species per year (Figure 2). This rate is significantly lower than the previous two decades and is also significantly lower than the pre-1950 (1837-1949) average rate (Figure 3). The long-term trend reflects a dramatic improvement with the implementation of the regulations for NODIS (No Ballast on Board) vessels in 2006 given no new species associated with ballast water have been introduced since 2006.

Lake-by-Lake Assessment
Note: The Overall assessment is solely based on new establishments of aquatic non-indigenous species from outside the Great Lakes basin. The Lake-by-Lake assessment below includes both introductions from outside the Great Lakes AND lake-basin spread (new establishments in the particular lake basin from populations and/or established in other parts of the Great Lakes basin). These sub-components – introductions from outside the Great Lakes and interbasin spread are provided separately for context.

Lake Superior
Status: Poor
(New Establishment of Species from Outside of the Great Lakes Basin: Good; Inter-Basin Spread into the Lake Superior Basin: Poor)
10-Year Trend: Improving
Long-term Trend (1991-2020): Improving
Rationale: No new species have been introduced directly to the Lake Superior basin from outside the Great Lakes basin since 2001; with the current decade rate of new introductions (zero) significantly below the pre-1950 average. All new introductions to Lake Superior during the past decade have been due to spread from the lower lakes with 8 species becoming established in the Lake Superior basin (Figure 4). Within the last decade (2011-2020) the rate of introduction to Lake Superior (including spread from the lower lakes) has undergone a steady decline (Figure 5); however, the rate of establishment remains more than twice the pre-1950 average of 0.17 species per year (Figure 6).

Lake Michigan
Status: Fair
(New Establishment of Species from Outside of the Great Lakes Basin: Fair; Inter-Basin Spread into the Lake Michigan Basin: Fair)
10-Year Trend: Improving
Long-term Trend (1991-2020): Improving
Rationale: The first report of confirmed diploid grass carp (*Chironomus riparius* diploid) in the Great Lakes was in Lake Michigan in 2011, making the current rate of new introductions not significantly below the pre-1950 average). Three additional species have spread into Lake Michigan from the other Great Lakes (Figure 7), which is also not significantly different from the pre-1950 average. Within the last decade (2011-2020) the rate of introduction to

*We look forward to continuing
to work with you!*



Canada 