Bait and aquarium fish and live fish sold for human consumption, intentionally or accidentally released into the resource; yet many aspects of this complex problem remain unaddressed. Indeed, since the mid-1980's, seventeen new species have invaded the Great Lakes ecosystem. The concern of AIS introductions from ballast water discharge was the focus of the GLFC and IJC, which alerted the governments of the United States and Canada to take immediate action to reduce the introduction of aquatic invasive species into the Great Lakes.

### Then and Now

- **1990**: The US passed the National Aquatic Invasive Species Act (NAISA).
- **1988**: The Great Lakes Fishery Commission (GLFC) and the International Joint Commission (IJC) recognized a unique opportunity for the two governments to work together to address the AIS issue.
- **2003**: A ballast water test facility was established in Florida to support the US EPA's Environmental Technology Verification program to develop protocols for ballast water treatment.
- **2003**: Canada created an Invasive Species Research Chair to provide additional funding for research to validate the effectiveness of ballast water exchange and technology verification programs.
- **2004**: Another order was signed in 2004 and formed the Great Lakes Interagency Task Force to better coordinate all Great Lakes activities across federal agencies.

### Legislation and Regulations

- The GLFC and IJC introduced voluntary ballast water exchange guidelines for the Great Lakes and St. Lawrence Seaway. The guidelines required ships to exchange ballast before entering the St. Lawrence Seaway. Refusal to provide information or to knowingly provide false information was punishable under the Canadian Shipping Act.
- The US Coast Guard developed measures for the automated detection of AIS in ballast water, and ships were required to submit an initial NOBOB (Notice of Ballast Operations and Biological Observations) report before entering U.S. waters of the Great Lakes. The NOBOB report included information about the vessel's operations and the species present in the ballast water and sediment.

### Applied Research and Development

- The US National Aquatic Invasive Species Task Force (ANSTF) also was established and provides national leadership and coordination for the AIS issue in the United States. The ANSTF includes representatives from 26 U.S. and Canadian agencies and organizations representing both governments, industries, non-profits, universities, and environmental groups.
- The ANSTF has worked to develop and implement ballast water treatment technologies and procedures to reduce the introduction of AIS into the Great Lakes. The ANSTF has also worked to develop and implement ballast water treatment technologies and procedures to reduce the introduction of AIS into the Great Lakes.
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### International, Intercontinental, and Global Considerations

- The GLFC and IJC, along with representatives from the United States, Canada, and Mexico, have worked to develop and implement ballast water treatment technologies and procedures to reduce the introduction of AIS into the Great Lakes.
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Aquatic Alien Invasive Species
In the Great Lakes – St. Lawrence Ecosystem

Then and Now

1830's
Sea lamprey observed in the lower Great Lakes.

In 1921 sea lamprey spread to all of the Great Lakes via the Welland Canal.

1987
Great Lakes Water Quality Agreement calls for U.S. and Canadian Coast Guards to study ballast discharge problem.

1988
Zebra mussel reported in Lake St. Clair and western Lake Erie.

Introduction of ruffe reported to Lake Superior Committee, which asks GLFC to work to see that AIS discharge in ballast water ceases.

Canadian Ballast Exchange Guidelines published. They were voluntary, however there is a penalty provision under the Canadian Shipping Act for nondisclosure.

1990
GLFC and IJC publish Exotic Species and the Shipping Industry, a joint report urging the governments of the U.S. and Canada to take immediate action on ballast water discharges and develop a strategy to address the threat of AIS to the Great Lakes.

The U.S. enacted the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA), the first comprehensive AIS legislation for the Great Lakes. NANPCA was reauthorized and strengthened in 1996 with passage of National Invasive Species Act (NISA).

1993
U.S. Office of Technology Assessment issues the report, Harmful Non-Indigenous Species in the United States, which estimates $3.1 billion in costs for zebra mussel remediation.

U.S. Coast Guard issues mandatory regulations for controlling ballast water in the Great Lakes.

1995
Round Goby first discovered in Lake Superior.

2003
Great Lakes authorities initiate actions to prohibit the sale/transport of live Asian carp.

2004
IMO adopts Convention on Ballast Water and Sediments

Progress and Future Needs

A review of progress since the joint report, Exotic Species and the Shipping Industry: The Great Lakes – St. Lawrence Ecosystem at Risk, September 1990

International Joint Commission

1992
Ontario Federation of Anglers and Hunters develop the Species Awareness Program for Ontario, noting accidental or intentional release of bait fish is also a vector that needs to be addressed in the control and management of AIS.

2002
IJC issues its 11th Biennial report recommending the governments issue a reference to the IJC to coordinate and harmonize binational efforts for action to stop the ongoing threat to the economy and to the biological integrity of the Great Lakes.

2002
Canadian Auditor General and the U.S. General Accounting Office issue concurrent reports noting the slow pace of progress in addressing aquatic AIS in the Great Lakes. In 2003 the Canadian Standing Committee on Fisheries and Oceans reinforces the auditors’ conclusions and recommends several actions including better coordination of federal AIS activities, an AIS reference to the IJC, and more funds for sea lamprey control.

1959
Opening of the St. Lawrence Seaway: “mixing water from the Seven Seas.”

1984
Spiny water flea discovered in Lake Ontario.