

Great Lakes Panel AIS Priorities Crosswalk

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Overview and Purpose

This document provides an overview of regional priorities for aquatic invasive species (AIS) prevention, management and control in the Great Lakes region. This crosswalk collates the regional priorities of the standing committees of the Great Lakes Panel on Aquatic Nuisance Species (GLP) and is organized around common themes within those priorities. GLP staff have also collated and included the goals, objectives and priorities of nine major regional initiatives: Great Lakes Water Quality Agreement Annex 6, Great Lakes Restoration Initiative Action Plans I and II, Great Lakes and St. Lawrence Governors and Premiers, Lakewide Action and Management Plans (Lake Ontario, Lake Erie, Lake Huron, Lake Michigan, and Lake Superior), and the Canada-Ontario Agreement on Great Lakes. Under each theme, GLP standing committee priorities are presented first, in bulleted format, and regional initiative priorities are presented second, in tabular format. A regional priority is included under a theme if it directly includes/addresses that theme; in instances where a priority may address multiple themes, it is repeated in each theme. The exceptions are outreach and education priorities: given that outreach and education cross-cuts every priority, broad priorities are included at the end of this document in the Information Coordination/Communication section. Otherwise, outreach and education priorities are included under specific themes where appropriate.

The document is intended to inform and guide GLP discussion and development of recommended activities to support regional initiatives and priorities for AIS prevention and control.

Prevention

General Prevention Priorities

Other Regional Initiatives:

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Great Lakes Water Quality Agreement Annex 6 (2012)	<ul style="list-style-type: none"> Establish a binational strategy to prevent the introduction of AIS. 	<ul style="list-style-type: none"> Implement programs to prevent the introduction and spread of AIS. Undertake ecological assessments of AIS prevention programs. 	<ul style="list-style-type: none"> Determination of potential AIS habitat requirements and additional factors that would affect the establishment and spread of AIS.
Great Lakes Restoration Initiative Action Plan I 2010-2014	<ul style="list-style-type: none"> The introduction of new invasive species to the Great Lakes basin ecosystem is eliminated, reflecting a “zero tolerance policy” toward invasives. The risk of introduction of species, which are imported for various uses, into the Great Lakes is minimized. The spread of invasive species, by means of recreational activities, connecting waterways, and other vectors, beyond their current range is prevented. 	<ul style="list-style-type: none"> By 2014, a 40% reduction in the yearly average rate of invasive species newly detected in the Great Lakes ecosystem will be achieved, compared to the period 2000-2009. Six technologies that prevent the introduction of invasive species will be developed or refined and piloted by 2011. Ten technologies that prevent the introduction of invasive species will be developed or refined and piloted by 2014. 	<ul style="list-style-type: none"> Rate of nonnative species newly detected in the Great Lakes ecosystem.
Great Lakes Restoration Initiative Action Plan II 2015-2019	<ul style="list-style-type: none"> Prevent new introductions of invasive species. 	<ul style="list-style-type: none"> Block pathways through which aquatic invasive species can be introduced to the Great Lakes ecosystem. 	<ul style="list-style-type: none"> Number of GLRI-funded projects that block pathways through which aquatic invasive species can be introduced to the Great Lakes ecosystem.

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Great Lakes and St. Lawrence Governors and Premiers	<ul style="list-style-type: none"> • 2017 Resolution to “better coordinate AIS investigations” and harmonize AIS regulations “to strengthen the Basin-wide approach to AIS prevention and enforcement.” 	<ul style="list-style-type: none"> • Expanding the deployment of technologies and training to assist State and Provincial personnel in identifying and tracking AIS and offenders. • Enhancing administrative and enforcement capacity such as through the development of AIS-specific enforcement units or specialists in each jurisdiction. 	
Lake Ontario Lakewide Action and Management Plan (2006)		<ul style="list-style-type: none"> • Track emerging issues such as introduction/spread of new invasive species. 	<ul style="list-style-type: none"> • All LaMP parties will continue to liase with appropriate agencies in working on the management & prevention of new invasive species.
Lake Erie Lakewide Action and Management Plan (2008)	<ul style="list-style-type: none"> • Prevent further invasions of non-native invasive species. 	<ul style="list-style-type: none"> • Work toward prevention of future introductions of non-native invasive species in the Lake Erie Basin. 	<ul style="list-style-type: none"> • Publicize need for prevention of further non-native invasive species introductions by holding workshops and information sessions at key forums.
Lake Michigan Lakewide Action and Management Plan (2008)	<ul style="list-style-type: none"> • Prevent the introduction of aquatic nuisance species. 	<ul style="list-style-type: none"> • Identify and control the major pathways for invasive species. 	

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Lake Superior Lakewide Action and Management Plan (2015)	<ul style="list-style-type: none"> • Prevent introduction of new species, and limit expansion of previously-established aquatic invasive species. 	<ul style="list-style-type: none"> • Undertake additional aquatic invasive species prevention outreach and education. • Use regulations, policies and best management practices to reduce the risk of introduction of AIS through all possible pathways. • Identify AIS introduction issues and establish best management practices and restrictions for shore-land work. • Undertake outreach, education, enforcement and research on preventing and managing AIS. • Alert inspection and border control agencies to new invasive threats due to climate changes, and re-assess inspection priorities. 	<ul style="list-style-type: none"> • Encourage all agencies who issue permits for research and assessment in Lake Superior to include AIS precautions in the permit conditions.

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
<p>Canada-Ontario Agreement on Great Lakes (2014)</p>	<ul style="list-style-type: none"> • Implement programs to prevent the introduction, establishment, and spread of AIS and to control existing AIS where possible. • Engage the Great Lakes community regarding ways to prevent, detect, respond and manage AIS. 	<ul style="list-style-type: none"> • Regulations and/or management strategies, informed by risk assessments, to help prevent new and potential invaders, such as Asian carp, and to reduce the spread of AIS. • Appropriate consideration of the potential to spread AIS during any transfer or use of water. • Increased awareness and education to assist in preventing the spread of AIS and reporting new occurrences. 	<ul style="list-style-type: none"> • Assess and, where necessary, take steps to update applicable federal and/or provincial legislation, regulations and policies to prevent the introduction and establishment of new AIS and ensure clear accountability of agencies. • Continue to develop binational, national and provincial plans for prevention, early detection and rapid response to AIS on basin-wide scales or at smaller scales as appropriate (e.g., Lake Superior Aquatic Invasive Species Complete Prevention Plan). • Continue joint enforcement efforts of existing regulations to prevent the introduction of AIS, such as Asian carp, to the Great Lakes basin through the live food-fish pathway and other pathways. • Consider and mitigate the risk of spreading AIS when evaluating any transfer or use of water. • Expand collaborative communications and outreach and continue to engage the Great Lakes community to prevent the introduction and spread of AIS via high risk pathways.

Aquaculture and Bait

Policy Coordination Committee:

Goal: A consistent and comprehensive framework for aquaculture management to prevent the introduction and spread of AIS in the Great Lakes basin through aquaculture activities

- Implement an improved screening process based on species-specific risk models that seek to minimize the risk of ecological damage resulting from the escapement of fish from aquaculture facilities
- Support the use of detailed procedures such as HACCP (Hazard Analysis and Critical Control Point) to develop a uniform system of prevention throughout the diverse range of facilities across the region

Information/Education Committee:

- Provide commercial enterprises (e.g. aquaculture, horticulture, aquarium, bait, and chemical applicators), natural resource managers, researchers and field personnel with information about programs and training concerning interrupting pathways of introduction and spread (e.g. Hazard Analysis and Critical Control Point (HACCP) training) and provide enforcement agencies with information and training to effectively enforce AIS laws
- Develop educational tools (fact sheets, websites, locally-based forums, watercraft inspector education/training programs) to disseminate prevention messages and best management practices to stakeholders concerning pathways of AIS introduction and spread. Outreach efforts should include incentive-based information in an attempt to encourage the widespread practice of these measures on a long-term basis
- Establish active partnerships between resource management agencies and the commercial sector (e.g. organisms in trade businesses, commercial pesticide applicators and lake management companies) to raise awareness and advance regional policies, state/provincial management plans, and information dissemination
- Engage industry through state/provincial agencies in the design and delivery of educational materials for consumers and industry members using the Habitattitude™ as a model (refer to www.habitattitude.net)
- Build upon existing outreach programs at a local, state, provincial and regional level to ensure that all pathways of AIS introduction and spread are addressed, targeting appropriate stakeholders
- Implement training programs to address specific aspects of AIS prevention and control codes of best practices such as watercraft inspection, use of native species for horticulture, HACCP training, and the Clean Marinas Program
- Conduct surveys of stakeholder groups to determine level of awareness, assess behaviors and identify types of I/E activities and materials that are considered most effective in promoting practices that advance AIS prevention and control

Other Regional Initiatives:

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Lake Michigan Lakewide Action and Management Plan (2008)	<ul style="list-style-type: none"> • Prevent the introduction of aquatic nuisance species. 	<ul style="list-style-type: none"> • Take immediate steps at the federal and state government level to prevent the introduction and spread of AIS through the trade and potential release of live organisms. 	
Lake Superior Lakewide Action and Management Plan (2015)	<ul style="list-style-type: none"> • Prevent introduction of new species, and limit expansion of previously-established aquatic invasive species. 		<ul style="list-style-type: none"> • Apply AIS-HACCP protocols to all applicable operations.

Ballast Water/Maritime Shipping

Policy Coordination Committee:

Goal: Regional agreement on policies that protect the Great Lakes from AIS introduced via ballast water and increase regulatory certainty and consistency for the shipping industry.

- Develop a more formal process to coordinate state ballast water policies, including considering development of an interstate agreement
- Support continued formal coordination between the states as part of the U.S. EPA VGP process for ballast water discharge and facilitate coordination in future VGP iterations
- Continue to use the Great Lakes Ballast Water Collaborative and other mechanisms to increase coordination between the U.S. and Canada on ballast water policy that addresses ocean-going vessels, and “no ballast on board” (NOBOB) vessels
- Facilitate and review research on technical and logistical aspects of ballast water treatment methods with the potential for greater efficacy within the Great Lakes freshwater ecosystem to support policy decisions

Research Coordination Committee:

- Develop and evaluate, for possible immediate implementation, interim ballast water management technologies or practices for reducing the risk of inter/intra-lake transfer of AIS by Lakers.
- Conduct full-scale testing of ballast water treatment technologies on shore or ship over the range of environmental conditions (e.g., temperature, transparency, salinity) typical for the Great Lakes ballast discharges during the shipping season, considering physical and operational limitations of saltwater and domestic vessels, in order to prevent new AIS introductions from foreign or domestic freshwater or estuarine ports and/or prevent secondary spread of AIS between Great Lakes ports by all vessels.
- Advance the understanding of aquatic invasion biology, particularly numeric thresholds for successful/unsuccessful invasions, which can be used to refine ballast water discharge standards.
- Develop physical/chemical methodology to enable compliance monitoring with regulatory ballast water discharge standards.
- Evaluate the risk of introduction and/or secondary spread of AIS by small vessels, including small commercial vessels not subject to federal ballast management regulations and larger recreational vessels that cannot be trailered.
- Develop a research program to identify, assess, and address potential high-risk AIS present in foreign fresh and brackish water systems associated with shipping vectors. This should include the development of rapid screening methods, such as genomics or eDNA, to quickly detect these high-risk species

Information/Education Committee:

- Develop educational tools (fact sheets, websites, locally-based forums, watercraft inspector education/training programs) to disseminate prevention messages and best management practices to stakeholders concerning pathways of AIS introduction and spread. Outreach efforts should include incentive-based information in an attempt to encourage the widespread practice of these measures on a long-term basis
- Develop a specific campaign to approach and educate the industry supporting maritime commerce in the Great Lakes including ports, carriers, shippers, mariners, resource users, and users of goods produced from cargo transported to and from Great Lakes ships about the importance of their role to reduce AIS introduction and spread and the direct benefits to the industry
- Build upon existing outreach programs at a local, state, provincial and regional level to ensure that all pathways of AIS introduction and spread are addressed, targeting appropriate stakeholders
- Conduct surveys of stakeholder groups to determine level of awareness, assess behaviors and identify types of I/E activities and materials that are considered most effective in promoting practices that advance AIS prevention and control

Other Regional Initiatives:

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Great Lakes Water Quality Agreement Annex 6 (2012)	<ul style="list-style-type: none"> Establish a binational strategy to prevent the introduction of AIS. 	<ul style="list-style-type: none"> Implement ballast water discharge programs that protect the Great Lakes basin ecosystem. 	
Great Lakes Restoration Initiative Action Plan I 2010-2014	<ul style="list-style-type: none"> The introduction of new invasive species to the Great Lakes basin ecosystem is eliminated, reflecting a “zero tolerance policy” toward invasives. The risk of introduction of species, which are imported for various uses, into the Great Lakes is minimized. The spread of invasive species, by means of recreational activities, connecting waterways, and other vectors, beyond their current range is prevented. 	<ul style="list-style-type: none"> Develop a coordinated approach to the development of ballast water treatment suitable for freshwater ecosystems, though the use of laboratory, land-based and/or ship-board testing, and verification of treatment technologies in coordination with the maritime industry. Support work to reduce ship-mediated introductions through hull and anchor chain fouling. 	<ul style="list-style-type: none"> Rate of nonnative species newly detected in the Great Lakes ecosystem.
Lake Huron Lakewide Action and Management Plan (2018)	<ul style="list-style-type: none"> Prevent introductions from ballast water. 	<ul style="list-style-type: none"> Establish and implement programs and measures that protect the Great Lakes basin ecosystem from the discharge of AIS in ballast water, consistent with commitments made by the Parties through Annex 5 of the GLWQA. 	
Lake Michigan Lakewide Action and Management Plan (2008)	<ul style="list-style-type: none"> Prevent the introduction of aquatic nuisance species. 	<ul style="list-style-type: none"> Eliminate ship and barge-mediated introductions and spread of AIS in the Great Lakes. 	

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Lake Superior Lakewide Action and Management Plan (2015)	<ul style="list-style-type: none"> • Prevent introduction of new species, and limit expansion of previously-established aquatic invasive species. 	<ul style="list-style-type: none"> • Support development, testing and implementation of effective ballast treatment systems. • Implement compatible, federal regulatory regimes for ballast water discharge that are protective of the Great Lakes for both the U.S. and Canada. • Work with appropriate federal agencies and the Great Ships Initiative to support development, testing and implementation of effective ballast treatment systems for the Great Lakes. 	<ul style="list-style-type: none"> • Implement compatible, federal regulatory regimes for ballast water discharge that are protective of the U.S. and Canadian Great Lakes. • Provide incentives for proving ballast technology effective in freshwater environments.

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
<p>Canada-Ontario Agreement on Great Lakes (2014)</p>	<ul style="list-style-type: none"> • Implement Canadian ballast water requirements to protect the Great Lakes from AIS. • Respect Canada’s international obligations by advancing additional treatment technologies and control measures to further reduce the risk of introduction into or spread of AIS in the Great Lakes. • Implement controls on ballast water to protect Great Lakes ecosystems from AIS. 	<ul style="list-style-type: none"> • Continued implementation of the Ballast Water Control and Management Regulations under the Canada Shipping Act, 2001. • Reduction of the risk of introduction of AIS discharged by ships into the Great Lakes. • Continued implementation of Ballast Water Control and Management Regulations under the Canada Shipping Act, 2001 and the development of additional cost effective control measures to further reduce risk of introductions or intra-basin spread of AIS. 	<ul style="list-style-type: none"> • Continue to enforce the Ballast Water Control and Management Regulations to promote 100 percent compliance from vessels arriving in the Great Lakes from outside the Canadian exclusive economic zone. • Implement the requirements of the International Convention for the Control and Management of Ship’s Ballast Water and Sediments, 2004. • Research and develop additional practicable measures to further reduce the risk of introduction into or spread of AIS via ships within the Great Lakes. • Continue enforcement of Ballast Water Control and Management Regulations to promote 100 percent compliance and meet international standards as described in Annex 5 of the Canada-United States Great Lakes Water Quality Agreement. • Research and develop additional practicable measures to further reduce the risk of introduction into or spread of AIS via ships within the Great Lakes. • Carry out ecological assessments of the effectiveness of ballast water control efforts.

Canals and Connectivity

Policy Coordination Committee:

Goal: Management of hydrologic connections (e.g., canals) between watersheds to prevent AIS movement across basin boundaries and prevention of AIS movement within the Great Lakes basin as infrastructure is removed or replaced.

- Implement actions to prevent AIS movement in the Chicago Area Waterway System, while addressing other problems such as water quality and flooding, drawing on studies such as *Restoring the Natural Divide* and *Evaluation of Physical Separation Alternatives for the Great Lakes and Mississippi River Basins in the Chicago Area Waterway System*
- Identify and fully assess potential AIS risks associated with other canal systems linking the Great Lakes and other basins, including the costs and benefits of efforts to mitigate risks
- Close or modify canals that have fallen into disuse or disrepair; incorporate AIS prevention measures in cases of canals subject to repair; fully consider benefits to native species and impacts from AIS when evaluating cost-benefits of proposed dam removal and/or fish passage projects
- Advance policies that fully consider risk of AIS transfer if new inter-basin hydrologic connections in the Great Lakes basin are proposed
- Support the development of fish passage policies that incorporate risk analysis into decision-making and seek to prevent the range expansion of AIS.
- Advance efforts to close “other pathways” identified between the Great Lakes and Mississippi River basins, including intermittent flood-related connections, building on work underway through the U.S. Army Corps of Engineers (Corps) through the Great Lakes Mississippi River Interbasin Study (GLMRIS)

Research Coordination Committee:

- Identify and assess the risk of AIS transfer from canals and rivers to the Great Lakes from basins other than the Mississippi River.
- Evaluate and reduce the risks of creating new and unintentional AIS habitat and spread pathways as a result of barriers removal. Specifically,
 - What AIS species are likely to spread upstream of barriers to be removed
 - Socio-economic cost/benefit analysis of barriers removals factoring in the increased threat of AIS spread and establishment
 - Develop or refine constructed fish passageways to selectively prevent the movement of AIS while enabling the passage of native or sport fishes
- Develop effective lock or approach channel treatment technologies that enable vessel movement and prevent AIS transfer through lock structures.
 - Evaluate the effectiveness and ecological and structural impacts of lock or approach channel treatment methods and technologies.
 - Conduct scale testing of the effectiveness of artificial canals that would be used to treat barges and other vessels for AIS (e.g., heat, CO₂, water guns, acoustics, vacuum system).
 - Test and evaluate the effectiveness of technologies designed to repel or deter organism from entering locks or channels (e.g. fish deterrents like acoustic barriers, heat, CO₂).
 - Develop tools for trapping/attracting fish in locks/canals.
- Examine health and human safety issues surrounding both barriers and locks and dams treatment methods
- Identify ways to mitigate the risk of AIS transfer when barges move through electric barriers not in single file (e.g., four barge configuration creating a “duck pond”).

Information/Education Committee:

- Develop educational tools (fact sheets, websites, locally-based forums, watercraft inspector education/training programs) to disseminate prevention messages and best management practices to stakeholders concerning pathways of AIS introduction and spread. Outreach efforts should include incentive-based information in an attempt to encourage the widespread practice of these measures on a long-term basis

- Build upon existing outreach programs at a local, state, provincial and regional level to ensure that all pathways of AIS introduction and spread are addressed, targeting appropriate stakeholders
- Conduct surveys of stakeholder groups to determine level of awareness, assess behaviors and identify types of I/E activities and materials that are considered most effective in promoting practices that advance AIS prevention and control

Other Regional Initiatives:

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Great Lakes Water Quality Agreement Annex 6 (2012)	<ul style="list-style-type: none"> • Establish a binational strategy to prevent the introduction of AIS. 	<ul style="list-style-type: none"> • Establish effective barriers that prevent the spread of AIS while allowing the movement of other ecosystem components (such as water and native species), as informed by Risk Assessments and where economically feasible. • Ensure that any inter-basin transfer of water includes the appropriate consideration of the potential to introduce AIS. 	<ul style="list-style-type: none"> • Develop and evaluate technology and methods that improve the ability to achieve effective barriers that prevent the spread of AIS while allowing the movement of other ecosystem components through canals and waterways.
Great Lakes Restoration Initiative Action Plan I 2010-2014	<ul style="list-style-type: none"> • The introduction of new invasive species to the Great Lakes basin ecosystem is eliminated, reflecting a “zero tolerance policy” toward invasives. • The spread of invasive species, by means of recreational activities, connecting waterways, and other vectors, beyond their current range is prevented. 	<ul style="list-style-type: none"> • Identify key waterways that could introduce ANS to the Great Lakes and implement actions such as ecological separation to reduce this risk. 	<ul style="list-style-type: none"> • Rate of nonnative species newly detected in the Great Lakes ecosystem.
Lake Huron Lakewide Action and Management Plan (2018)	<ul style="list-style-type: none"> • Stop the establishment of Bighead and Silver Asian Carp in the Great Lakes. 	<ul style="list-style-type: none"> • Through the Asian Carp Regional Coordinating Committee, prevent the establishment and spread of Bighead and Silver Carp in the Great Lakes. 	
Lake Michigan Lakewide Action and Management Plan (2008)	<ul style="list-style-type: none"> • Prevent the introduction of aquatic nuisance species. 	<ul style="list-style-type: none"> • Enact federal, state, and/or local governments measures that ensure the region’s canals and waterways are not a vector for AIS. 	

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Lake Superior Lakewide Action and Management Plan (2015)	<ul style="list-style-type: none"> • Prevent introduction of new species, and limit expansion of previously-established aquatic invasive species. 		<ul style="list-style-type: none"> • Undertake actions that reduce the risk of AIS being transferred between Lake Superior and the lower Great Lakes, the Mississippi River Basin, or other inland waters. • Undertake best management practices to prevent AIS introductions during dredging operations, lock operations, construction, and other maintenance activities. • Protect exposed or seasonally-exposed wetland environments from off-road vehicular use that may be a vector for invasive plants.

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
<p>Canada-Ontario Agreement on Great Lakes (2014)</p>	<ul style="list-style-type: none"> • Ensure that vectors other than vessels associated with navigation and shipping, such as canals and waterways, are considered in the prevention or spread of AIS. • Implement programs to prevent the introduction, establishment, and spread of AIS and to control existing AIS where possible. 	<ul style="list-style-type: none"> • Binational risk assessment of pathways and vectors of AIS. • Existing dams and new barriers are in place to effectively and economically prevent the spread of AIS while considering the needs of the broader ecosystem. 	<ul style="list-style-type: none"> • Assist other departments as required in their research into other vectors of introduction of AIS involving navigation and shipping. • Develop improved understanding of the potential for movement of AIS through canals and waterways and implement programs to prevent the introduction and spread of AIS through intra-basin connections. • Identify existing dams and barriers in need of maintenance or being considered for removal that would slow the spread of AIS. Evaluate positive and negative effects of these dams and where appropriate, use the best information and decision tools available to develop plans to reduce the spread of AIS. • Identify potential new locations for dams and barriers that could be used to slow the spread of invasive species and consider the potential for the spread of AIS in the design of new dams and associated fishways. • Continue research and development of fishways that block sea lamprey and/or other AIS but allow movement of non-invasive fish and other organisms.

Organisms in Trade

Policy Coordination Committee:

Goal: Regionally consistent policies to prevent the introduction and spread of invasive species through the high-volume trade in non-native plants and animals, including programs for screening imported species for their potential to become invasive.

- Develop management practices and policies to address the mechanisms of AIS introduction and spread associated with known OIT pathways
- Develop model legislation as part of a framework for regional consistency on laws and regulations needed for the OIT vector
- Develop and implement a regionally consistent pre-import risk assessment process

Research Coordination Committee:

- Quantify species, trade volume, economic values, and the cost/benefits of organisms in trade.
- Research the behavior of the end user and the motivation behind releasing organisms in trade into the wild, quantifying release rates, and identifying areas where releases are most likely to occur.
- Expand the development and application of genetic tools to identify relationships among source communities and newly established AIS populations to identify high risk trade pathways and routes and activities.

Information/Education Committee:

- Develop educational tools (fact sheets, websites, locally-based forums, watercraft inspector education/training programs) to disseminate prevention messages and best management practices to stakeholders concerning pathways of AIS introduction and spread. Outreach efforts should include incentive-based information in an attempt to encourage the widespread practice of these measures on a long-term basis
- Establish active partnerships between resource management agencies and the commercial sector (e.g. organisms in trade businesses, commercial pesticide applicators and lake management companies) to raise awareness and advance regional policies, state/provincial management plans, and information dissemination
- Engage industry through state/provincial agencies in the design and delivery of educational materials for consumers and industry members using the Habitattitude™ as a model (refer to www.habitattitude.net)
- Implement national AIS public awareness campaigns including Habitattitude™ and the national ANS Task Force's Stop Aquatic Hitchhikers!
- Develop a new AIS Organism in Trade campaign modeled after the AIS HACCP and Habitattitude™, focused on associated pathways and species of concern for the Great Lakes region. Awareness materials should be made available in appropriate languages to inform of the dangers and consequences of releasing live aquatic organisms into the wild
- Build upon existing outreach programs at a local, state, provincial and regional level to ensure that all pathways of AIS introduction and spread are addressed, targeting appropriate stakeholders
- Implement training programs to address specific aspects of AIS prevention and control codes of best practices such as watercraft inspection, use of native species for horticulture, HACCP training, and the Clean Marinas Program
- Conduct surveys of stakeholder groups to determine level of awareness, assess behaviors and identify types of I/E activities and materials that are considered most effective in promoting practices that advance AIS prevention and control

Other Regional Initiatives:

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Great Lakes and St. Lawrence Governors and Premiers	<ul style="list-style-type: none"> • 2013 resolution to “prevent the introduction of new aquatic invasive species ... and minimize the harmful effects of aquatic invasive species already present in the region and to prevent their spread to inland waters.” 	<ul style="list-style-type: none"> • 2013 release of a “least wanted” AIS list “for priority action that may include prohibitions or restrictions on the transfer of these species to and within the States and Provinces, early detection/rapid response initiatives, education/outreach, and seek their inclusion in similar federal lists.” • 2018 addition of five more species to the “least wanted” AIS list for priority action. • 2015 letter to the U.S. Fish and Wildlife Service in support of their proposal to list four of the “least wanted” AIS as injurious species under the Lacey Act. 	
Lake Michigan Lakewide Action and Management Plan (2008)	<ul style="list-style-type: none"> • Prevent the introduction of aquatic nuisance species. 	<ul style="list-style-type: none"> • Take immediate steps at the federal and state government level to prevent the introduction and spread of AIS through the trade and potential release of live organisms. 	
Lake Superior Lakewide Action and Management Plan (2015)	<ul style="list-style-type: none"> • Prevent introduction of new species, and limit expansion of previously-established aquatic invasive species. 		<ul style="list-style-type: none"> • Continue screening processes to classify species proposed for trade into three lists: prohibited, permitted, and conditionally prohibited/permitted. • Establish an immediate moratorium on the trade of prohibited species.

Recreational Activities

Policy Coordination Committee:

Goal: A robust framework that provides consistent guidance for preventing the introduction and spread of AIS through recreational activities, including programs that promote widespread action by recreational users.

- Support partnerships and provide adequate funding and staff resources to key entities with the capacity to reach the maximum number of recreationalists through education and outreach work, including the aforementioned campaigns and other programs
- Develop consistent regulations and policies among the states and provinces, including concerning personal watercraft, bait fish, and other avenues of potential AIS transfer
- Conduct assessments of the effectiveness of both mandatory and voluntary AIS prevention and control measures covering recreational activities

Research Coordination Committee:

- Investigating the efficacy of strategies to reduce the risk of AIS contamination within key boat and trailer niche areas.
- Examine the physical, social and economic feasibility of mandatory AIS prevention regulations for recreational boaters, especially for outbound trips from high-risk source regions.
- Determine the temperatures and associated contact times required to induce mortality on various post settlement life stages/sizes of dreissenid mussels that may be found on boat surfaces and in compartments. Determine the physical effects of pressure washing and the pressures required to induce mortality and removal of various life stages of dreissenid mussels on boat surfaces.
- Quantify per-vessel estimates of propagule abundance in relation to key niche on the vessel and trailer
- Quantify the relationship between propagule pressure and invasion risk, especially at the levels of propagule introduction anticipated through various types and lengths of recreational boating trips

Information/Education Committee:

- Publicize and distribute on a jurisdictional basis AIS legislation and regulations, listings of prohibited and regulated species, and lists of infested waters in recreational safety and regulation publications, as well as through a variety of outreach activities and materials, targeting stakeholders
- Develop educational tools (fact sheets, websites, locally-based forums, watercraft inspector education/training programs) to disseminate prevention messages and best management practices to stakeholders concerning pathways of AIS introduction and spread. Outreach efforts should include incentive-based information in an attempt to encourage the widespread practice of these measures on a long-term basis
- Engage industry through state/provincial agencies in the design and delivery of educational materials for consumers and industry members using the Habitattitude™ as a model (refer to www.habitattitude.net)
- Implement national AIS public awareness campaigns including Habitattitude™ and the national ANS Task Force's Stop Aquatic Hitchhikers!
- Develop public service announcements and advertisements in recreation-oriented media
- Build upon existing outreach programs at a local, state, provincial and regional level to ensure that all pathways of AIS introduction and spread are addressed, targeting appropriate stakeholders
- Implement training programs to address specific aspects of AIS prevention and control codes of best practices such as watercraft inspection, use of native species for horticulture, HACCP training, and the Clean Marinas Program
- Develop and routinely update standard guidance for recreational user groups
- Conduct surveys of stakeholder groups to determine level of awareness, assess behaviors and identify types of I/E activities and materials that are considered most effective in promoting practices that advance AIS prevention and control

Other Regional Initiatives:

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Great Lakes Restoration Initiative Action Plan I 2010-2014	<ul style="list-style-type: none"> The spread of invasive species, by means of recreational activities, connecting waterways, and other vectors, beyond their current range is prevented. 	<ul style="list-style-type: none"> By 2014, approximately 10 million recreation and resource users will be educated on best practices that prevent the introduction and spread of invasive species. Promote actions, including coordinated education and outreach, which will prevent the introduction and spread of invasive species through recreational uses such as hunting, fishing and recreational boating. 	<ul style="list-style-type: none"> Rate of nonnative species newly detected in the Great Lakes ecosystem. Number of recreation and resource users contacted on best practices that prevent the introduction and spread of invasive species (<i>cumulative</i>).
Lake Superior Lakewide Action and Management Plan (2015)	<ul style="list-style-type: none"> Prevent introduction of new species, and limit expansion of previously-established aquatic invasive species. 	<ul style="list-style-type: none"> Make decontamination regulations consistent basinwide. 	<ul style="list-style-type: none"> Protect exposed or seasonally-exposed wetland environments from off-road vehicular use that may be a vector for invasive plants.

Risk Assessment

Policy Coordination Committee:

Goal: Consistent AIS risk assessments across the Great Lakes region.

- Support scientifically robust risk assessments for individual AIS and AIS vectors, with particular attention to live organisms in trade to determine if they are safe for importation and/or commercial use and related transport
- Create a clearinghouse for existing AIS risk assessments that have been conducted for the Great Lakes region, with fully integrated results (e.g., indicating species identified in more than one assessment)
- Coordinate risk assessment findings among relevant agencies, facilitating the flow of this information to decision makers for consideration in establishing programs and coordinating strategies for addressing high-risk vectors and species

Research Coordination Committee:

- Develop a suite of risk assessment tools for fishes, plants, mollusks, amphibians, reptiles and crustaceans to identify a list of high and low risk species. This includes:
 - Supporting research to advance the understanding of aquatic invasion biology, particularly characteristics of successful/unsuccessful invasions and invaders.
 - Quantifying the life history characteristics that lead to successful invasions (e.g., propagule pressure and trophic disruption).
 - Researching species attributes to complement the development of risk assessment tools.
 - Develop future models that account for changes associated with climate change and variability.
 - Continue to review the state of risk assessment globally to identify the most accurate and cost-effective methods.
- Quantify the invasion risk of least well-known aspects of the movement or trades in live organisms
 - Fish and bait haulers
 - Biological supplies
 - Live fish
 - Internet trade

Other Regional Initiatives:

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Great Lakes Water Quality Agreement Annex 6 (2012)	<ul style="list-style-type: none"> • Establish a binational strategy to prevent the introduction of AIS. 	<ul style="list-style-type: none"> • Implement and evaluate risk assessments of species, pathways, and vectors of AIS. • Develop regulations or management strategies informed by Risk Assessments. 	<ul style="list-style-type: none"> • Share risk assessment/analyses processes being used, and conduct one pathway risk assessment/analysis. • Share species risk assessment processes being used by regulatory authorities and others, and coordinate risk assessments for a list of priority species. • Conduct proactive, binationally coordinated Risk Assessments on various pathways.
Great Lakes and St. Lawrence Governors and Premiers	<ul style="list-style-type: none"> • 2013 resolution to “prevent the introduction of new aquatic invasive species ... and minimize the harmful effects of aquatic invasive species already present in the region and to prevent their spread to inland waters.” 	<ul style="list-style-type: none"> • 2015 Resolution to harmonize approaches in Michigan, Ohio, and Ontario to address aquatic invasive species through risk assessment. 	
Canada-Ontario Agreement on Great Lakes (2014)	<ul style="list-style-type: none"> • Ensure that vectors other than vessels associated with navigation and shipping, such as canals and waterways, are considered in the prevention or spread of AIS. • Implement programs to prevent the introduction, establishment, and spread of AIS and to control existing AIS where possible. • Improve understanding and tools to respond to AIS. 	<ul style="list-style-type: none"> • Binational risk assessment of pathways and vectors of AIS. • Binationally-coordinated risk assessments of potential new AIS and AIS pathways to inform prevention, monitoring, and control measures. • Improved understanding of the ecosystem impacts of new and established high risk AIS to support decision making about possible rapid response or control actions and, where control is not feasible, to support decisions about adaptation of resource and environmental management. 	<ul style="list-style-type: none"> • Assist other departments as required in their research into other vectors of introduction of AIS involving navigation and shipping. • Undertake biological and socio-economic risk assessments for potential new AIS, pathways and vectors identified as potential routes of entry. These risk assessments will be coordinated with management agencies from other Canadian or foreign jurisdictions where appropriate. Risk assessments of pathways of introduction may include: trade and/or importation of live organisms for live food markets, aquariums and gardens; use of bait;

			<p>biological supply houses; recreation activities; and connecting waterways.</p> <ul style="list-style-type: none">• Identify new AIS that pose the greatest threat and conduct research to assess the risks to Great Lakes basin ecosystems, food webs and native species from possible new invasions.• Continue to develop and implement biological and socio-economic risk assessment tools to determine pathways and relative risks associated with new and existing AIS.
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EDRR

Policy Coordination Committee:

Goal: A consistent framework, with associated protocols, that delineates a system for early detection of – and rapid response to – new AIS and the spread of existing AIS to new areas within the Great Lakes basin.

- Establish and implement a consistent, coordinated framework for early detection and monitoring for new invaders across the Great Lakes region
- Expand efforts to incorporate non-professional efforts (e.g., citizen monitoring programs, recreational user reporting systems) into agency-led early detection and monitoring systems
- Establish a memorandum of understanding among key jurisdictions (including states, provinces and federal governments) that facilitates the development and implementation of a coordinated rapid response protocol among the jurisdictions involved
- Conduct a series of rapid response workshops that include mock tabletop exercises featuring species-specific examples from different taxonomic groups to develop options for jurisdictional coordination
- Assess the status of jurisdictional requirements and develop permitting procedures to facilitate a rapid response to newly detected invasions in each of the Great Lakes states and provinces (e.g., for treatment methods and protocols, consistent with laws such as the Endangered Species Act, Clean Water Act, and Federal Insecticide, Fungicide and Rodenticide Act)

Research Coordination Committee:

- Identify policy and management barriers to effective assessment or response and developing better ways to optimize informed management decisions following the discovery of new AIS
- Review and develop standardized surveillance monitoring techniques for high risk invasive species (see below), quantifying detection limits, sources or errors, result interpretation and appropriate sampling periodicity.
- Establish coordinated monitoring programs focusing on the identification and prioritization of high risk sites for surveillance (early detection) for new introductions.
- Expand development of genetic markers for high risk invasive species predicted to invade the Great Lakes including by vectors other than ballast water
- Establish relative detection sensitivity of next generation genomic tools
- Review availability (legal, specificity, toxicity) and effectiveness of existing control tools for the range of taxonomic groups and species that may invade the Great Lakes
- Develop environmentally acceptable chemical (e.g. selective biocides) and physical control and eradication tools for localized rapid response for those taxonomic groups (e.g., crustacean) for which no tools exist.
- Spatially quantify the risk of introduction by all invasion pathways across the Great Lakes to identify priority sites for surveillance to detect new AIS introductions
- Verify and expand the "hot list" of high risk species, potential source locations, and probable impacts
- Establish eDNA production and degradation rates, collection methods, detection limits and error rates of molecular (genetic) methods; including research to improve the ability of these methods to detect rare, non-native species within large assemblages of abundant native species
- Improve and apply ecological forecast methods that identify areas vulnerable to newly introduced species and predict likely dispersal pathways and potential natural barriers that might impede or slow dispersal
- Pilot small-scale sampling/surveillance projects to optimize sampling design and to help decide what species, where, how and how often monitoring should occur.

Information/Education Committee:

- Disseminate fact sheets, identification cards and other educational materials to inform established citizen groups and build community-based capacity (e.g. lake associations, volunteer water quality monitoring groups, conservation and other water use groups) to advance prevention, early detection, monitoring and rapid response
- Establish a communication network between scientists, resource managers, and policy makers to facilitate effective information exchange in AIS-related areas such as research; detection and sightings of AIS; and policy and legislative developments
- Create an efficient communication mechanism (e.g., Memorandum of Understanding) identifying leadership that is authorized to facilitate a collaborative rapid response effort to new invasions
- Build all-inclusive communication networks between researchers, Sea Grant and extension agents, state/provincial natural resource managers, AIS monitoring personnel and policy makers to implement early detection, monitoring, and rapid response activities
- Develop an accessible, integrated and centralized program for stakeholders to report AIS sightings and new infestations
- Develop a comprehensive public relations (PR) program (i.e. awareness weeks, public meetings, video, and brochures) to capture the attention of the public and policy makers (e.g. Congressman outside of the Great Lakes region) to generate support for AIS prevention and control. Of particular importance is the development of PR initiatives addressing high risk invasive species such as the Asian carp, hydrilla, round goby, ruffe, zebra mussel, and water fleas (*Bythotrephes* and *Cercopagis*)
- Motivate public and political action by profiling prevention, control and outreach success stories such as rapid response, containment, and eradication efforts and incorporate these messages into a PR campaign

Other Regional Initiatives

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Great Lakes Water Quality Agreement Annex 6 (2012)	<ul style="list-style-type: none"> • By 2015, develop and implement an early detection and rapid response initiative that coordinates effective domestic and, when necessary, binational response to prevent AIS from becoming established in the Great Lakes. • By 2015, identify priority surveillance locations and develop a comprehensive early detection and monitoring strategy for the Great Lakes. 	<ul style="list-style-type: none"> • Develop and evaluate early AIS detection technologies and methods. • Coordinate effective and timely domestic and, when necessary, binational response actions to prevent the establishment of newly detected AIS. • Develop a comprehensive response plan to be implemented in the event of any newly detected aquatic invasive species. • Assess the ecosystem impacts of both established and high-risk aquatic invasive species to support rapid response and control programs. 	<ul style="list-style-type: none"> • Develop species watch lists. • Identify priority locations for surveillance. • Develop monitoring protocols for surveillance. • Establish protocols for sharing information. • Identify new AIS. • Develop and evaluate technology and methods, including genetic techniques, that improve the ability to detect potential AIS at low levels of abundance.

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Great Lakes Restoration Initiative Action Plan I 2010-2014	<ul style="list-style-type: none"> • A comprehensive program for detection and tracking newly identified invasive species in the Great Lakes is developed and provides up-to-date critical information needed by decision makers for evaluating potential rapid response actions. 	<ul style="list-style-type: none"> • By 2011, eight state ANS management plans will be established or revised to include rapid response capabilities. • By 2014, eight state-based, multi-agency rapid response plans will be implemented and 22 mock exercises to practice responses carried out under those plans and/or actual response actions will be completed. • By 2011, methodology and protocols will be piloted for the coordinated monitoring methodology and shared protocols for basinwide invasive species surveillance. • By 2014, a basinwide surveillance program with shared sampling protocols and methodologies to provide early detection of non-native species will be operational. • Work with government agencies to initiate surveillance activities to detect new ANS and establish the capacity, methods and contingency plans for a rapid response. 	<ul style="list-style-type: none"> • Number of multiagency plans established, mock exercises to practice rapid responses carried out under those plans, and/or actual rapid response actions (<i>cumulative</i>).
Great Lakes Restoration Initiative Action Plan II 2015-2019	<ul style="list-style-type: none"> • Prevent new introductions of invasive species. 	<ul style="list-style-type: none"> • Conduct early detection monitoring activities. • Work with Great Lakes states to conduct rapid response actions or exercises. • Develop/enhance invasive species-specific collaboratives to support rapid responses and communicate the latest control and management techniques. 	<ul style="list-style-type: none"> • Number of GLRI-funded early detection monitoring activities conducted. • Number of GLRI-funded Great Lakes rapid responses or exercises conducted. • Number of collaboratives developed/enhanced with GLRI funding.

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Great Lakes and St. Lawrence Governors and Premiers	<ul style="list-style-type: none"> • 2013 Resolution to develop a Mutual Aid agreement to “facilitate cooperative response actions and the sharing of staff, expertise and resources between jurisdictions in the event of detection of a new aquatic invasive species that threatens the region.” • 2013 Resolution to “facilitate coordinated detection and response actions.” 	<ul style="list-style-type: none"> • Development of a Mutual Aid Agreement to take action in the event of detection of a new aquatic invasive species that threatens the region. 	
Lake Huron Lakewide Action and Management Plan (2018)	<ul style="list-style-type: none"> • Detect and respond to new introductions. 	<ul style="list-style-type: none"> • Through the Annex 6 subcommittee, implement an ‘early detection and rapid response initiative’ with the goal of finding new invaders and preventing them from establishing self-sustaining populations. 	<ul style="list-style-type: none"> • Maintain and enhance early detection and monitoring of non-native species (e.g. Asian Carp) through the Annex 6 Early Detection and Rapid Response Initiative.
Lake Michigan Lakewide Action and Management Plan (2008)			<ul style="list-style-type: none"> • Establish a Great Lakes Aquatic Invasive Species Integrated Management Program to implement rapid response programs and assess the effectiveness of those programs.
Lake Superior Lakewide Action and Management Plan (2015)	<ul style="list-style-type: none"> • Monitor AIS movement and establishment in the Lake Superior basin. 		<ul style="list-style-type: none"> • Establish first-response control protocols, where not already in place, in anticipation of newly-discovered aquatic invasive species. • Add additional locations to the lakewide aquatic invasive species early detection/rapid response surveillance projects. • Maintain a list of the AIS that are most likely to reach the Lake Superior basin, and monitor appropriately.

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
<p>Canada-Ontario Agreement on Great Lakes (2014)</p>	<ul style="list-style-type: none"> • Develop coordinated plans for early detection and rapid response initiatives. • Improve understanding and tools to respond to AIS. 	<ul style="list-style-type: none"> • Development of early detection and rapid response initiatives for Canadian waters, coordinated and complementary with United States domestic planning to create a basin-wide response framework. • Expanded use of new techniques in the early detection of high risk AIS at low levels of abundance in the Great Lakes and in potential pathways. 	<ul style="list-style-type: none"> • Within two years, jointly develop an early detection and rapid response framework for Canadian waters that is guided by risk assessments, involves all required jurisdictions and agencies, and includes the development and implementation of watch lists, detection programs, reporting protocols and coordinated institutional, science, and management responses for AIS. • Coordinate these domestic early detection and rapid response frameworks with United States response plans to create a binational, basin-wide response framework to prevent the establishment of newly detected AIS. • Work with United States federal and state agencies through key mechanisms, such as the United States Asian Carp Regional Coordinating Committee, to coordinate prevention, surveillance and response actions for Asian carp. • Work with United States agencies to explore and expand the use of new techniques, including genetic techniques and rapid assessment technologies, to detect high risk AIS at low abundances in the Great Lakes and in other potential pathways including trade, commerce, and recreation.

Control

Policy Coordination Committee:

Goal: Prevent further spread of VHS, in particular to unexposed Great Lakes water bodies.

- Incorporate the phased-in analysis of VHS as part of routine fish or water monitoring programs (or both) in the Great Lakes
- Conduct an assessment of bait fish VHS screening and transfer policies in the states and provinces, with consideration of efforts to harmonize screening approaches and regulations governing transfer

Goal: Permanent measures to prevent Asian Carp from entering the Great Lakes, along with monitoring and rapid response

- Consistent with action items under Canals and Waterways above, implement actions that prevent the movement of Asian carp into the Great Lakes via the CAWS, including potentially through hydrological separation as described in the GLC/GLSLCI study
- Consistent with action items under Canals and Waterways above, implement more permanent measures to prevent Asian carp movement into the Great Lakes via other hydrologic pathways, including priority areas (such as the Eagle Marsh wetlands area near Fort Wayne, IN) identified through GLMRIS and from other basins
- Assess the risk of Asian carp introduction and establishment in the Great Lakes that may be posed by other vectors, such as organisms in trade (e.g., live bait and live food fish)
- Increase monitoring, including environmental DNA monitoring, of priority water bodies in the region
- Consistent with action items under Early Detection and Rapid Response above, expand early detection and rapid response capacity specifically for Asian carps, and increase coordination between state, provincial, federal and tribal agencies in the region

Research Coordination Committee:

- Develop environmentally acceptable chemical and physical control and eradication tools for priority established invasive species
- Develop and refine containment systems for established but localized invasive species to slow or prevent ongoing spread and anthropogenic dispersal
- Conduct life history and basic biology studies of established invasive species to identify behaviors, life history traits or physiologies that might make them responsive to management
 - Include studies across native and introduced ranges (within and outside Great Lakes basin) to both identify potential species-specific biological control agents (predators, pathogens or parasites) and quantify non-target risks
- Develop decision support tools to quantify the efficacy of different eradication, control or containment approaches to identify strategies that have greatest impact on rates of spread and establishment to minimize economic and ecological impacts
- Develop tools to measure the effectiveness and/or difference that AIS management strategies are making

Information/Education Committee:

- Establish a communication network between scientists, resource managers, and policy makers to facilitate effective information exchange in AIS-related areas such as research; prevention and control technology; resource management needs; and policy and legislative developments
- Maintain and circulate contact information among the Great Lakes AIS network involved with AIS prevention and control initiatives
- Develop a comprehensive public relations (PR) program (i.e. awareness weeks, public meetings, video, and brochures) to capture the attention of the public and policy makers (e.g. Congressman outside of the Great Lakes region) to generate support for AIS prevention and control. Of particular importance is the development of PR initiatives addressing high risk invasive species such as the Asian carp, hydrilla, round goby, ruffe, zebra mussel, and water fleas (*Bythotrephes* and *Cercopagis*)

Other Regional Initiatives

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Great Lakes Water Quality Agreement Annex 6 (2012)	<ul style="list-style-type: none"> Establish a binational strategy to control or reduce the spread of existing AIS, and to eradicate, where feasible, existing AIS within the Great Lakes Basin Ecosystem. 	<ul style="list-style-type: none"> Research and develop technologies and methods for control and eradication of AIS. 	<ul style="list-style-type: none"> Develop and evaluate technology and methods that increase the effectiveness of control and eradication efforts.
Great Lakes Restoration Initiative Action Plan I 2010-2014	<ul style="list-style-type: none"> An effective, efficient and environmentally sound program of integrated pest management for invasive species is developed and implemented, including program functions of containment, eradication, control and mitigation. 	<ul style="list-style-type: none"> Four technologies that either contain or control invasive species will be developed or refined and piloted by 2011. Five technologies that either contain or control invasive species will be developed or refined and piloted by 2014. By 2014, invasive species populations within the Great Lakes Ecosystem will have been controlled and reduced, as measured in populations controlled to a target level in 6,500 acres of managed area and by removing 5,000 pounds of invasive species from the Great Lakes ecosystem. Promote the development and use of new control technologies, including biological control methods, which will significantly reduce the cost and/or increase the effectiveness of invasive species control measures. Develop a better understanding and models of ecosystem interactions and management options for minimizing the impact of ANS, including new treatment or control methods. 	<ul style="list-style-type: none"> Acres managed for populations of invasive species controlled to a target level (<i>cumulative</i>). Number of pounds of invasive species removed from the Great Lakes ecosystem.

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Great Lakes Restoration Initiative Action Plan II 2015-2019	<ul style="list-style-type: none"> Control established invasive species. Develop invasive species control technologies and refine management techniques. 	<ul style="list-style-type: none"> Implement control projects for GLRI-targeted invasive species. Develop/enhance technologies and methods to prevent the introduction and to control the spread of invasive species. Develop/enhance invasive species-specific collaboratives to support rapid responses and communicate the latest control and management techniques. 	<ul style="list-style-type: none"> Number of acres controlled by GLRI-funded projects. Number of tributary miles protected by GLRI-funded projects. Number of technologies and methods field tested by GLRI-funded projects. Number of collaboratives developed/enhanced with GLRI funding.
Lake Erie Lakewide Action and Management Plan (2008)	<ul style="list-style-type: none"> Control existing invasive non-native species where possible. 	<ul style="list-style-type: none"> Control or eliminate established non-native invasive species wherever possible. 	
Lake Huron Lakewide Action and Management Plan (2018)	<ul style="list-style-type: none"> Reduce the impacts of invasive species, including Phragmites. 	<ul style="list-style-type: none"> Maintain coastal and nearshore aquatic habitat diversity and function through appropriate control of Phragmites and other detrimental invasive species (e.g. Glossy Buckthorn, European Frog-bit, Purple Loosestrife, Japanese Knotweed) including monitoring, mapping, and control efforts guided by BMPs. 	<ul style="list-style-type: none"> Control the larval Sea Lamprey population in the St. Marys River with selective lampricides. Continue operation and maintenance of existing barriers and the design of new barriers where appropriate. Design and construct Au Gres Sea Lamprey Trap in Arenac County, Michigan. Design and construct Au Sable Sea Lamprey Trap in Losco County, Michigan. Maintain an index time series that shows the impact of Sea Lamprey control on Lake Trout population status. Coordinate Phragmites control efforts and share BMPs through the Ontario Phragmites Working Group and Great Lakes Phragmites Collaborative.

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Lake Michigan Lakewide Action and Management Plan (2008)	<ul style="list-style-type: none"> Control aquatic nuisance species. 	<ul style="list-style-type: none"> Develop effective control actions. 	<ul style="list-style-type: none"> Establish a Great Lakes Aquatic Invasive Species Integrated Management Program to implement control and management programs and assess the effectiveness of those programs.
Lake Superior Lakewide Action and Management Plan (2015)	<ul style="list-style-type: none"> Implement control and/or eradication plans, where feasible, at appropriate geographic scales for priority aquatic invasive species. 	<ul style="list-style-type: none"> Maintain and improve effectiveness of Sea Lamprey control. 	<ul style="list-style-type: none"> Maintain Sea Lamprey at population levels that do not cause significant mortality for adult Lake Trout. Contribute to the elimination of European Common Reed (i.e., <i>Phragmites australis</i>, subsp. <i>australis</i>) from the Lake Superior basin by undertaking or supporting lakewide distribution mapping, early detection efforts, and control efforts.

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
<p>Canada-Ontario Agreement on Great Lakes (2014)</p>	<ul style="list-style-type: none"> • Implement programs to prevent the introduction, establishment, and spread of AIS and to control existing AIS where possible. • Improve understanding and tools to respond to AIS. 	<ul style="list-style-type: none"> • Effective control of sea lamprey resulting in suppression of their populations to target levels that support fish community objectives in all Great Lakes. • Improved understanding of the ecosystem impacts of new and established high risk AIS to support decision making about possible rapid response or control actions and, where control is not feasible, to support decisions about adaptation of resource and environmental management. 	<ul style="list-style-type: none"> • Implement the sea lamprey control program in cooperation with the United States as coordinated through the Great Lakes Fishery Commission to reduce sea lamprey abundance to target levels that support fish community objectives in all Great Lakes. • Carry out research about sea lamprey control methods and population assessments to optimize decisions that target control efforts, select control methods, and evaluate program effectiveness. • Carry out research and development of alternatives to lampricides to deliver effective, integrated management of sea lamprey. • Where AIS are established, and eradication is not feasible, develop mitigation and/or management actions for priority invasive species based on risk analyses that forecast the effectiveness and efficiency of such measures.

Socio-economics

Policy Coordination Committee:

Goal: A better understanding of the economic consequences of AIS and decision support tools based on this information to help identify cost-effective strategies for addressing AIS

- Clarify the costs and benefits of AIS policy options through better estimates of the value of sectors that may be impacted, e.g., the size and characteristics on the sport fishing sector
- Develop a clearinghouse for economic tools to assist resource managers and other stakeholders in evaluating the impacts associated with invasive species prevention and control

Research Coordination Committee:

- Develop and validate approaches for assessing economic impacts of AIS within the Great Lakes ecosystem. Conduct cost-benefit analyses of various management scenarios including control and eradication of individual species.
- Evaluate current and historical costs (e.g., physical, biological, chemical, economic, recreational, societal) to the Great Lakes ecosystem caused by AIS.
- Conduct cost/benefit studies on all potential vectors for AIS introduction and spread, including hydrologic and ecological separation of canals and waterways.
- Examine the motivations of stakeholders relating to AIS movement and release in order to better focus outreach, regulatory, and legislative efforts

Information/Education Committee:

- Develop a PR strategy targeting policy makers on the economic and social impacts caused by Great Lakes aquatic invasions. A strong case should be made for the establishment of legislative mandates and funding authorizations to implement AIS prevention and control programs
- Design marketing strategies that identify and utilize information on economic and societal impacts to effectively influence the public's values and perceptions concerning AIS issues. As part of these strategies, AIS prevention and control messages should target groups associated with identified pathways

Climate Change

Policy Coordination Committee:

Goal: Management efforts that respond to climate change in order to prevent invasive species from gaining a competitive advantage over native species.

- Consider species with increased risk of introduction/movement into the Great Lakes based on climate change projections when implementing early detection and monitoring programs
- Establish best management practices for addressing the specific aspects of AIS prevention and control relevant to changing climatic conditions and incorporate them into state AIS management plans
- Implement habitat restoration activities that strengthen ecosystem resiliency and help prevent establishment of new AIS that may be facilitated by climate change

Other Regional Initiatives

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Great Lakes Water Quality Agreement Annex 6 (2012)	<ul style="list-style-type: none"> • Determine the effects of habitat and climate change on risks of AIS establishment. 	<ul style="list-style-type: none"> • Undertake ecological assessments of AIS prevention programs. 	<ul style="list-style-type: none"> • Determination of potential AIS habitat requirements and additional factors that would affect the establishment and spread of AIS. • Assess the potential impact of climate change on the introduction, survival, establishment, and spread of AIS.
Lake Superior Lakewide Action and Management Plan (2015)	<ul style="list-style-type: none"> • Prevent introduction of new species, and limit expansion of previously-established aquatic invasive species. 	<ul style="list-style-type: none"> • Alert inspection and border control agencies to new invasive threats due to climate changes, and re assess inspection priorities. • Identify ecosystems that may be more vulnerable to new AIS under changing environmental conditions. 	
Canada-Ontario Agreement on Great Lakes (2014)	<ul style="list-style-type: none"> • Improve understanding and tools to respond to AIS. 	<ul style="list-style-type: none"> • Understanding the potential for new or expanded ranges of AIS in the Great Lakes as a result of climate change. 	<ul style="list-style-type: none"> • Undertake research to identify potential changes in species distributions and risks of new AIS due to the effects of climate change in the Great Lakes basin and incorporate findings in risk analyses of new AIS and pathways.

Threats and Impacts to Ecosystems/Human Health

Research Coordination Committee:

- Quantify community and species patterns at high risk invasion sites to provide baseline reference measurements that will (1) enable ecological change to be measured if new AIS become established; (2) aid identification of new invasive species; and (3) help quantify differences resulting from management efforts
- Determine biological impacts of AIS on native species and aquatic biodiversity, including the prevalence of cumulative impacts involving AIS to aquatic ecosystems
- Expand food web disruption studies to include a broader array of invasive species, mechanistic processes and impacts at all trophic levels
- Examine potential human health and ecosystem issues from pathogens and parasites (e.g., Type E botulism, VHSV)

Information/Education Committee:

- Develop a PR strategy targeting policy makers on the ecological and health impacts caused by Great Lakes aquatic invasions. A strong case should be made for the establishment of legislative mandates and funding authorizations to implement AIS prevention and control programs
- Design marketing strategies that identify and utilize information on environmental and human health impacts to effectively influence the public's values and perceptions concerning AIS issues. As part of these strategies, AIS prevention and control messages should target groups associated with identified pathways

Other Regional Initiatives

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Great Lakes Water Quality Agreement Annex 6 (2012)		<ul style="list-style-type: none"> • Coordinate the implementation of management strategies as appropriate. 	
Lake Ontario Lakewide Action and Management Plan (2006)	<ul style="list-style-type: none"> • LaMP to update available information and research on invasive species and recommend appropriate management options and strategies where necessary. 	<ul style="list-style-type: none"> • Update LaMP Status report to include information on round goby as well as potential new invasive species such as ruffe and Asian carp. Report on activities of the USFWS, OMNR, DFO. • Evaluate available information about AIS to complete assessment of beneficial use impairments. 	<ul style="list-style-type: none"> • Share findings of a food web study, detailing the impacts from AIS, with agencies charged with invasive species management.

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Lake Erie Lakewide Action and Management Plan (2008)	<ul style="list-style-type: none"> • Continue to promote the recognition that non-native invasive species have negative impacts on habitats in the Lake Erie ecosystem. 	<ul style="list-style-type: none"> • Identify initiatives, policy/legislation, and remedial options available for aquatic and terrestrial non-native invasive species in the Lake Erie basin. • Actively work toward development and implementation of legislation and policies protecting Lake Erie from further invasions. 	<ul style="list-style-type: none"> • Facilitate preparation of educational materials for the public and politicians. • Develop 4-6 page summary of broad-scale impacts of non-native invasive species on habitats in the Lake Erie basin.
Lake Huron Lakewide Action and Management Plan (2018)			<ul style="list-style-type: none"> • Enhance assessment methods and technology to better understand Round Goby population density and distribution. • Improve understanding of links between mussels, Round Goby, and Botulism outbreaks in waterfowl. • Work through the Annex 4 subcommittee to support the creation of Lake Huron sentinel Cladophora monitoring sites to determine the role of mussels in nearshore algae growth and possible mitigation efforts.
Canada-Ontario Agreement on Great Lakes (2014)	<ul style="list-style-type: none"> • Improve understanding and tools to respond to AIS. 	<ul style="list-style-type: none"> • Improved understanding of the ecosystem impacts of new and established high risk AIS to support decision making about possible rapid response or control actions and, where control is not feasible, to support decisions about adaptation of resource and environmental management. 	<ul style="list-style-type: none"> • Monitor and report on the status of established AIS and their impacts on Great Lakes food webs. • Develop adaptation strategies and tactics for established AIS to guide fisheries, resource, and environmental management in situations where eradication or management options are not feasible.

Funding for AIS Programs

Policy Coordination Committee:

Goal: Adequate funding to support the activities of the ANSTF and other federal AIS programs, and thus the activities of regional, state and local programs, to ensure sustained progress on AIS issues in the Great Lakes region and nationwide.

- Support Congressional authorization of adequate funding to the U.S. FWS, NOAA and other agencies, under NANPCA/NISA to fully implement activities of the ANSTF, regional AIS panels and state management plans
- Encourage the ANSTF to provide formal consultation opportunities to regional panels during interagency AIS budget development discussions between U.S. FWS and NOAA
- Educate and inform stakeholder groups regarding the funding needed to sustain AIS prevention and control programs in efforts to effectively reach Congressional decisionmakers
- Support funding for important AIS work and initiatives, including activities such as risk assessments for species in trade, research on AIS prevention and control measures (including advanced ballast water treatment technologies), and education and outreach to user groups and the public
- Support continued and/or enhanced funding of regional programs such as the Great Lakes Restoration Initiative (GLRI) (including its invasive species component) that can fund a diverse array of efforts

Information/Education Committee:

- Establish guidelines for publicly funded I/E programs that require the integration of evaluation components to assess programmatic effectiveness

Other Regional Initiatives

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Great Lakes Restoration Initiative Action Plan I 2010-2014		<ul style="list-style-type: none"> • Support the development and on-the ground implementation of ANS Management Plans for each of the Great Lakes states. 	

Information Coordination/Communication

Information/Education Committee:

Goal: Strengthening regional communication, long-term partnerships and institutional and community-based capacity will increase program effectiveness and avoid duplication of efforts

- Utilize the Great Lakes Panel as a forum to ensure regional coordination of outreach programs on AIS prevention and control
- Promote collaboration and communication between the regional ANS Panels serving under the national ANS Task Force through forums such as: annual meetings, a shared email list-serve, and linkages to each Panel's website
- Evaluate regional coordination of I/E programming to improve development and dissemination of materials on a regional basis
- Align educational initiatives, such as the Great Lakes Panel documents: Information and Education Strategy for Aquatic Nuisance Prevention and Control and the AIS Information and Education Priorities for the Great Lakes with established state/provincial AIS management plans, to ensure program coordination and efficient use of funds
- Develop and implement, as feasible, information management tools, such as the Great Lakes-St. Lawrence Research Inventory (searchable database developed by the Council of Great Lakes Researchers serving under the International Joint Commission) to maximize effective use of existing information on AIS prevention and control
- Provide a variety of forums to disseminate information on AIS issues and related challenges, progress in AIS prevention and control and associated funding needs to keep Great Lakes organizations, abreast of current news and events
- Develop an information network that informs the Great Lakes community about AIS issues and organizational responsibilities. Highlight the Great Lakes Panel membership and committee priority documents on information and education, research coordination, and policy and legislation
- Establish linkages between existing web sites of organizations with AIS responsibilities or interests, to offer comprehensive information on AIS prevention and control efforts including case studies
- Identify and utilize programs that serve in a regional clearinghouse capacity to advance information management in the following areas: 1) comprehensive inventory of I/E materials on AIS prevention and control in the Great Lakes region; 2) a reference service to respond to general inquiries and requests for materials; 3) agency contact information; 4) internet services that provide extensive linkages to relevant web sites within and beyond the Great Lakes region; and 5) updated GIS maps/data describing current species-specific distribution trends in North America
- Ensure wider distribution of AIS information through cost-effective mechanisms (existing forms of media: press releases, news articles, internet)
- Ensure accessibility of information on invasive species from other countries, including the translation of foreign research
- Utilize consistent and understandable language/messages in efforts to market solutions to AIS problems on a regional basis
- Use marketing strategies to enhance distribution of new and existing AIS programs to schools and learning centers and provide teacher training
- Incorporate as part of K-12 curriculum and youth group programs (e.g., boy scouts, girl scouts, 4-H, etc.), the biology of AIS, ecological and economic impacts, prevention and control strategies, and the importance of protecting the Great Lakes as a regional resource
- Develop "invasion biology" academic programs at higher level institutions for researchers, resource managers, and scientists
- Conduct workshops on a local, state, provincial and regional level, targeting educators, on current AIS issues to raise awareness, increase partnerships, and share resources to address AIS and associated impacts. Curriculum development on AIS topics should be coordinated with existing public school curriculum to meet state or provincial standards
- Develop a web-based clearinghouse for AIS public outreach, training and formal education opportunities in the Great Lakes region

Other Regional Initiatives

Regional Initiative	Goals (what are we trying to achieve?)	Objectives/Commitments (what are we doing?)	Measures (what are we doing and how do we measure progress/success?)
Great Lakes Water Quality Agreement Annex 6 (2012)		<ul style="list-style-type: none"> • Coordinate the implementation of management strategies as appropriate. 	
Great Lakes and St. Lawrence Governors and Premiers	<ul style="list-style-type: none"> • 2015 Resolution to harmonize messaging approaches in Michigan, Ohio, and Ontario to address aquatic invasive species. • 2013 Resolution to renew commitment to work together. 	<ul style="list-style-type: none"> • Improving information sharing among the jurisdictions, including development of consistent and routine reporting processes. 	
Lake Huron Lakewide Action and Management Plan (2018)			<ul style="list-style-type: none"> • Undertake additional aquatic invasive species prevention outreach and education, including discussions with recreational boaters and lake access site signage.
Lake Michigan Lakewide Action and Management Plan (2008)			<ul style="list-style-type: none"> • Conduct education and outreach on aquatic invasive species.
Canada-Ontario Agreement on Great Lakes (2014)	<ul style="list-style-type: none"> • Engage the Great Lakes community regarding ways to prevent, detect, respond and manage AIS. 	<ul style="list-style-type: none"> • Increased awareness and education to assist in preventing the spread of AIS and reporting new occurrences. 	<ul style="list-style-type: none"> • Collaborate with research forums such as the Invasive Species Centre, Canadian Aquatic Invasive Species Network, the Great Lakes Fishery Commission, and Great Lakes Commission to communicate new and emerging science regarding AIS.