Great Lakes Panel on Aquatic Nuisance Species
Priorities for Aquatic Invasive Species Prevention and Control
Draft: November 11, 2019

1. Prevention

a. 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
b. 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)
c. 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
d. 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.
e. 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)
f. Examine the motivations of stakeholders relating to AIS movement and release in order to better focus outreach, regulatory, and legislative efforts.
g. 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; detection and sightings of AIS; and policy and legislative developments.
h. 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.
i. 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.
j. 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.
k. 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.
l. 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.
m. 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.
n. 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.

1.1 Shipping Pathway

a. 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.
b. 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.
c. 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.
d. 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.
e. Advance the understanding of aquatic invasion biology, particularly numeric thresholds for successful/unsuccessful invasions, which can be used to refine ballast water discharge standards.
f. Develop physical/chemical methodology to enable compliance monitoring with regulatory ballast water discharge standards.
g. Develop a more formal process to coordinate state ballast water policies, including considering development of an interstate agreement
h. 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
i. 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, lakers, and "no ballast on board" (NOBOB) vessels
j. 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
k. 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.

1.2 Organisms in Trade Pathway

a. Conduct more risk assessments
b. Increase communication/awareness about low risk species available in trade, including tropical species
c. Obtain data from industry to know species are in trade and then assess the risk of those
d. species
e. Harmonize regulated species lists
f. Recommend more species for the GSGP Least Wanted list
g. Update the Take AIM database more frequently to accurately reflect a nationwide view of AIS policy and regulations
h. Identify which, if any, species that have been assessed as high risk are allowed in trade for each jurisdiction
i. Identify choke points in the pathway(s) for concentrated effort and attention from CLO
j. Develop identification tools for CLO and conduct regional trainings to connect officers and informing them about species identification issues that may encounter on a day-today basis

**Blue text indicates a priority action identified during break-out sessions at the fall 2018 GLP meeting*

k. Support developing a list of on-call ID experts across various taxa
l. Develop more clear and defined procedures and protocols for disposal of seized species when a fish biologist or state staff aren't available to provide direction
m. Identify other tools may be valuable for CLO outside of working hours that are particularly important when seizing large and/or valuable shipments. A specific meeting/workshop to identify these gaps would be beneficial
n. Educate prosecutors to inform them about why it is important to take AIS violation cases to court
o. Outreach (e.g. grass carp letter?) from a higher level than a single individual to wholesalers
p. GLP host an OIT-focused symposium/meeting to invite industry to participate in the Panel and learn more about regional work Develop a clearinghouse for BMPs, HACCP training program links, links to other OIT resources
q. Distribute the model for takeback events presented at the GL BIOTIC II Symposium
r. Research end user motivations for aquarium dumping
s. Commission a social science study to better understand motivations and behaviors around cultural release
t. Contact religious leaders, and people who are doing cultural releases
u. Develop targeted outreach strategy and materials for both aquaculture consumers and suppliers
v. Research end user motivations and behaviors for releasing
w. Engaging industry to secure their buy-in to prevent injurious species from moving through trade
x. Engage directly with commercial suppliers to understand what type of alternative species or solutions work for them in order to maintain economic feasibility but promote responsible sales of species Developing a pet shop "certification" program or models to ensure that only low risk or native species that are sold, targeted specifically to shop owners
y. Incorporating an OIT-specific industry representative on the Panel
z. Try to work with corporations like REI or Patagonia to spread awareness to their customer base (e.g. information in catalogues)
aa. Outdoor outfitting stores that have a stake in conservation/preservation (e.g.
bb. Cabela's, Bass Pro Shops) would also make good partners for this work
cc. Define what species are moving through trade
dd. Develop an expert network or other support for stores to assist in accurate species identification
ee. Develop voluntary best management practices with industry for industry
ff. HACCP:
    - Standardize the implementation and tracking of HACCP across the Great Lakes basin by: knowing who is utilizing it (who is the responsible agency), improving record keeping and information sharing, and implementing a verification program (decide who will front the cost of the verification implementation)
    - Incentivize HACCP
    - Identify specific impediments to HACCP implementation and methods to overcome those barriers
    - Determine the best way to implement HACCP or show the value to interested parties by standardizing BMPs across the basin
    - Develop training workshops to ensure high quality implementation
    - Begin a HACCP certification program for participants
gg. Standardizing risk assessment for new aquaculture (bait) species for in the basin.
hh. Education for private individuals capturing bait across the basin and gaining a better understanding how knowledge translates to action
ii. Quantify species, trade volume, economic values, and the cost/benefits of organisms in trade.
jj. 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.

kk. 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.

ll. 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.

mm. 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

nn. Develop management practices and policies to address the mechanisms of AIS introduction and spread associated with known OIT pathways

oo. Develop model legislation as part of a framework for regional consistency on laws and regulations needed for the OIT vector

pp. Develop and implement a regionally consistent pre-import risk assessment process

qq. 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.

rr. 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

ss. 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.

tt. 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).

uu. Implement national AIS public awareness campaigns including Habitattitude™ and the national ANS Task Force's Stop Aquatic Hitchhikers!

vv. Develop a new AIS Organism in Trade campaign modeled after the AIS HACCP and Habitattitude TM, 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.

<u>1.3 Recreational Activities Pathway</u>

a. Interstate consistency across regulations
b. Institutionalize mandatory inspections on-site
c. Harmonize regulations and risk assessments
d. Identify recreational user groups that have not been targeted; e.g. sailboat and seaplane operators
    i. How do you prioritize funding to address these groups?
e. Establish a searchable and contact-based index of outreach/educational/messaging materials for use by jurisdictions and other groups to provide consistency across materials

    i. Pre-approved materials to use and modify
    ii. Tailored messaging for specialty vessels, e.g. wakeboard boats
f. Identify and prioritize locations for establishing outreach and inspections
g. Identify the information/advocacy gap between the panel and the states
h. Create a BMPs document/guide for states at varying levels of investment by jurisdictions
i. Produce training materials for law enforcement on a region-wide basis
j. Cost/benefit analysis for inspection/decontamination stations
k. Methods for modeling boat movement
l. Evaluate effectiveness of messaging, outreach, and educational material
m. Quantify per-vessel estimates of propagule abundance in relation to key niche on the vessel and trailer.
n. Investigating the efficacy of strategies to reduce the risk of AIS contamination within key boat and trailer niche areas.
o. 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.
p. Examine the physical, social and economic feasibility of mandatory AIS prevention regulations for recreational boaters, especially for outbound trips from high-risk source regions.
q. Develop an easy to dose, environmentally-friendly treatment for bilge and live well waters to prevent the spread of AIS via recreational boaters and anglers.
r. 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.
s. 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 [existing] campaigns and other programs
t. Develop consistent regulations and policies among the states and provinces, including concerning personal watercraft, bait fish, and other avenues of potential AIS transfer
u. Conduct assessments of the effectiveness of both mandatory and voluntary AIS prevention and control measures covering recreational activities
v. Develop and routinely update standard guidance for recreational user groups.
w. Develop public service announcements and advertisements in recreation-oriented media.

<u>1.4 Canals and Waterways Pathway</u>

a. Develop effective lock or approach channel treatment technologies that enable vessel movement and prevent AIS transfer through lock structures.
    i. Evaluate the effectiveness and ecological and structural impacts of lock or approach channel treatment methods and technologies.
    ii. 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).
    iii. 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).
    iv. Develop tools for trapping/attracting fish in locks/canals.
b. Evaluate and reduce the risks of creating new and unintentional AIS habitat and spread pathways as a result of barriers removal. Specifically,
    i. What AIS species are likely to spread upstream of barriers to be removed
    ii. Socio-economic cost/benefit analysis of barriers removals factoring in the increased threat of AIS spread and establishment
c. Examine health and human safety issues surrounding both barriers and locks and dams treatment methods.

d. Identify and assess the risk of AIS transfer from canals and rivers to the Great Lakes from basins other than the Mississippi River.
e. 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").
f. 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 (www.glc.org/caws)
g. 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
h. 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
i. Advance polices that fully consider risk of AIS transfer if new inter-basin hydrologic connections in the Great Lakes basin are proposed
j. Support the development of fish passage policies that incorporate risk analysis into decision-making and seek to prevent the range expansion of AIS.
k. 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)
l. 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
m. 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

2. Detection and Response

a. Consider species with increased risk of introduction/movement into the Great Lakes based on climate change projections when implementing early detection and monitoring programs
b. 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.
c. Develop an accessible, integrated and centralized program for stakeholders to report AIS sightings and new infestations.
d. Expand early detection and rapid response capacity specifically for Asian carps, and increase coordination between state, provincial, federal and tribal agencies in the region

<u>2.1 Detection</u>

a. 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.
b. Expand development of genetic markers for high risk invasive species predicted to invade the Great Lakes including by vectors other than ballast water.
c. Establish relative detection sensitivity of next generation genomic tools.
d. Establish coordinated monitoring programs focusing on the identification and prioritization of high risk sites for surveillance (early detection) for new introductions.
e. 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.

f. Verify and expand the "hot list" of high risk species, potential source locations, and probable impacts.
g. 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.
h. 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.
i. Pilot small-scale sampling/surveillance projects to optimize sampling design and to help decide what species, where, how and how often monitoring should occur.
j. Establish and implement a consistent, coordinated framework for early detection and monitoring for new invaders across the Great Lakes region
k. Expand efforts to incorporate non-professional efforts (e.g., citizen monitoring programs, recreational user reporting systems) into agency-led early detection and monitoring systems
l. Increase monitoring, including environmental DNA monitoring, of priority water bodies in the region
m. Incorporate the phased-in analysis of VHS as part of routine fish or water monitoring programs (or both) in the Great Lakes

2.2 Response

a. 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.
b. 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
c. 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
d. 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
e. 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)

3. Management and Control

a. The Panel should identify priority species for control
b. Conduct a gap analysis which includes pathways and recommendations for new control strategies
c. Develop a process through which we can determine who can do the BMP work if there isn't an existing collaborative, and create a subcommittee if needed
d. Reach out to other panels and learn how they are acting to assist in the development and/or implementation of new control strategies
e. Improve communication – list all control options on website, act as a clearinghouse of existing control methodologies
f. Where collaboratives have not yet been developed; identify people who could be good contacts to collaborate and share knowledge
g. Conduct risk analysis and gap analysis – first step would be to refine list of criteria including permitting and limitations that are imposed through permitting process; evaluate the benefits of action, create criteria for orgs to work through determining potential control strategies, benefits, gaps in info, life history

h. 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.
i. 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.
j. Develop environmentally acceptable chemical and physical control and eradication tools for priority established invasive species.
k. Develop and refine containment systems for established but localized invasive species to slow or prevent ongoing spread and anthropogenic dispersal.
l. 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.
m. 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.
n. 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.
o. Develop tools to measure the effectiveness and/or difference that AIS management strategies are making.

4. Other

a. 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
b. Implement habitat restoration activities that strengthen ecosystem resiliency and help prevent establishment of new AIS that may be facilitated by climate change
c. Assess I/E projects and programs on AIS prevention and control, targeting stakeholders to identify successful elements, as well as gaps and unmet needs.
d. To facilitate evaluation, incorporate measurable objectives into I/E projects and programs.
e. As part of the evaluation process, assess how this document, Information and Education Priorities for the Great Lakes, is being utilized and its effectiveness in advancing AIS I/E priorities.
f. Utilize consistent and understandable language/messages in efforts to market solutions to AIS problems on a regional basis.
g. 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.

<u>4.1 Research</u>

a. 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.
b. Determine biological impacts of AIS on native species and aquatic biodiversity, including the prevalence of cumulative impacts involving AIS to aquatic ecosystems. A priority list of established species or predicted imminent invaders where data on impacts is lacking or inconclusive.
c. Expand food web disruption studies to include a broader array of invasive species, mechanistic processes and impacts at all trophic levels.
d. Examine potential human health and ecosystem issues from pathogens and parasites (e.g., Type E botulism, VHSv).

4.2 Economic Impacts

a. 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.
b. Evaluate current and historical costs (e.g., physical, biological, chemical, economic, recreational, societal) to the Great Lakes ecosystem caused by AIS.
c. Conduct cost/benefit studies on all potential vectors for AIS introduction and spread, including hydrologic and ecological separation of canals and waterways.
d. 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
e. Develop a clearinghouse for economic tools to assist resource managers and other stakeholders in evaluating the impacts associated with invasive species prevention and control
f. Develop informational materials on the economic and ecological risks regarding AIS invasions, including benefit-cost assessment to raise awareness among stakeholders, especially policy makers, on the value of preventing new introductions.
g. Design marketing strategies that identify and utilize information on economic, environmental, human health 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.

4.3 Funding

a. 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
b. Encourage the ANSTF to provide formal consultation opportunities to regional panels during interagency AIS budget development discussions between U.S. FWS and NOAA
c. Educate and inform stakeholder groups regarding the funding needed to sustain AIS prevention and control programs in efforts to effectively reach Congressional decisionmakers
d. 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
e. 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
f. 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.
g. Develop a PR strategy targeting policy makers on the economic, ecological, health, 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.
h. Establish guidelines for publicly funded I/E programs that require the integration of evaluation components to assess programmatic effectiveness.
i. 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).

4.4 Information-Sharing

a. Utilize the Great Lakes Panel as a forum to ensure regional coordination of outreach programs on AIS prevention and control.
b. Promote collaboration and communication between the regional ANS Panels serving under the national ANS Task Force through forums such as: annual meetings, a shared e-mail list-serve, and linkages to each Panel's website.
c. Evaluate regional coordination of I/E programming to improve development and dissemination of materials on a regional basis.
d. 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.
e. Maintain and circulate contact information among the Great Lakes AIS network involved with AIS prevention and control initiatives.
f. 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.
g. 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.
h. 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.
i. 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 inquires 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.
j. Ensure wider distribution of AIS information through cost-effective mechanisms (existing forms of media: press releases, news articles, internet).
k. Ensure accessibility of information on invasive species from other countries, including the translation of foreign research.

4.5 Education

a. 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.
b. Develop "invasion biology" academic programs at higher level institutions for researchers, resource managers, and scientists.
c. 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.
d. Develop a web-based clearinghouse for AIS public outreach, training and formal education opportunities in the Great Lakes region.
e. Use marketing strategies to enhance distribution of new and existing AIS programs to schools and learning centers and provide teacher training.