

Great Lakes Shipping, Trade, and Aquatic Invasive Species

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National Research Council Committee on the
St. Lawrence Seaway, Phase 2

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Aquatic Invasive Species in the Great Lakes



- **180+ aquatic invasive species (AIS) reported in Great Lakes**
- **Many ways in which AIS can enter the Lakes**
 - shipping
 - aquaculture (intentional or otherwise)
 - canals
 - bait/pets/human foods
 - watergardens
 - natural dispersal
- **Since opening of St. Lawrence Seaway in 1959, ships' ballast water has accounted for 55 – 70% of reported introductions**

Project Scope

- **Identify and explore options for the Great Lakes region that would meet two criteria:**
 - **Enhance the region's potential for global trade; and**
 - **Eliminate further introductions of AIS into the Great Lakes by vessels transiting the St. Lawrence Seaway**
- ***Sponsor: Great Lakes Protection Fund***

Committee Membership

- Jerry Schubel, Aquarium of the Pacific, *chair*
- Richard Anderson, Duke University
- Stephen Fuller, Texas A&M University
- Trevor Heaver, University of British Columbia
- Geoffrey Hewings, University of Illinois, Urbana-Champaign
- Philip Jenkins, Philip T. Jenkins and Associates, Ltd.
- Hugh MacIsaac, University of Windsor
- Steven Popper, RAND Corporation
- Frank Quinn, Consultant
- Thomas Waite, Florida Institute of Technology
- Gordon (Reds) Wolman, Johns Hopkins University
- Joy Zedler, University of Wisconsin, Madison
- Ann Zimmerman, University of Toronto

Backgrounds in: marine transportation; transportation and logistics; economics; invasion ecology; ballast water treatment; Great Lakes ecology and environmental management; public policy; decision analysis.

Committee's Approach

- Held information gathering meetings in Washington, DC and Toronto, Ontario
 - consultation with economists, rail, trucking, shipping representatives, ecologists.
- Visited Welland Canal and Port of Hamilton
- Commissioned 8 white papers authored by technical experts
- Held public meeting in Toronto, May 2007
- Reviewed technical literature, press reports, etc.

An inclusive process involving experts and stakeholders


Great Lakes St. Lawrence Seaway System



Vessels Transiting the Seaway

- **Transoceanic vessels** (“salties”) come from outside Canadian and U.S. waters
 - ballasted vessels
 - no ballast on board (loaded with cargo)
 - those ‘with ballast’ – some tanks carry water
- **Inland vessels** operate exclusively within the Great Lakes St. Lawrence Seaway system
- **Coastal vessels** operate within continental EEZ (200 nautical mile limit) before entering GLSLS system
- NOTE: Majority of U.S.-flagged domestic lakers are too large to transit Welland Canal

Possible Solutions to Meet Two Criteria


- *Eliminate further AIS introductions by ships*
 - Close the Seaway to ALL traffic
 - Close the Seaway to the riskiest component of traffic (transoceanic vessels engaged in international trade)
 - Use ballast water management technologies to kill or remove organisms in ballast water
 - *Enhance potential for global trade*
 - Remove regulatory uncertainty
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Closure to All Traffic

- Eliminating a trade route would not enhance potential for global trade
- Impractical from a political perspective



Closure to Transoceanic Vessels

- **Could not be implemented in a timely fashion**
 - **Possible adverse environmental impacts**
 - **Possible reprisals by U.S. and Canada's trading partners**
 - **Would increase cost of moving goods – not trade-enhancing, although effect difficult to quantify**
 - **Long-term viability of Seaway?**
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Recommended Option

- Trade should continue on the St. Lawrence Seaway but with a more effective suite of prevention measures that evolves over time in response to lessons learned and new technologies.



Proven Ballast Water Management Techniques

➤ **Make best use of proven ballast water management techniques (ballast water exchange and saltwater flushing)**

- Dilution and salinity shock effective in killing/removing organisms
- Apply to ALL categories of vessel known to pose a risk; i.e., transoceanic and coastal vessels
- Strict enforcement, and remediation options for arriving vessels that do not meet standards for entry
 - add rock salt/brine to noncompliant tanks?
- Optimize designs and construction methods for new vessels to facilitate ballast water management
- Explore use of “black box” technologies for remote monitoring to verify compliance
 - technology added to new vessels and retrofit that would continuously monitor, securely store, and transmit information of conditions of each ballast tank

Shipboard Ballast Water Treatment

- **Explore use of shipboard ballast water treatment using International Maritime Organization ballast water discharge standard (D-2) as a starting point**
 - Efficacy of D-2 not yet demonstrated in practice
 - Lack scientific evidence to support more stringent standard
 - lower inoculum load is better
 - Need to get up “learning curve”
 - Monitoring (technology effectiveness, compliance) is a challenge
 - A single standard for Great Lakes -- Canada has already adopted IMO standards
 - Action NOW would remove uncertainties and could encourage investment by equipment manufacturers and shipowners

Surveillance of Great Lakes Ecosystem

- **Establish binational science-based surveillance program**
 - “Smart surveillance” targeting hot species and hot spots
 - -based upon previous experiences and ballast discharge patterns
 - Leverage ongoing monitoring efforts
 - Useful in preventing *all* AIS introductions, not just those by ships transiting Seaway
 - victims should not pay: fund by small tax on shippers



Containment, Control, and Eradication

- **Develop capabilities for containment, control, and possible subsequent eradication of new invaders**
 - Prevention is preferred approach to managing AIS, but cannot guarantee total elimination
 - Example of sea lamprey program
 - Link efforts to surveillance program
 - Potential for eradication depends on biological and institutional factors
 - **black striped mussel in Australia**
 - ***Caulerpa taxifolia* in San Diego**
 - **who will run these collaborative initiatives?**
 - **GLFC example**
 - **How will efforts be organized?**
 - **precedents developing in both USA (e.g. Penn.), Canada (Ont)**

Adaptive Management Process

- **Establish adaptive process to ensure policy measures are updated to reflect**
 - Practical experience
 - Knowledge gained through research
 - Technology development
 - Changes in sources of AIS, in vectors and pathways of introduction, and in Great Lakes ecosystem (e.g., due to climate change)
 - Who will conduct reviews of progress?
 - GLC, IJC examples

Managing AIS will be an ongoing challenge

AIS Control Program

- **Urgent need for ACTION to prevent further AIS introductions into Great Lakes**
- **Many of recommended actions could be launched within 2 – 3 years, given sufficient political will**
 - **St. Lawrence Seaway Management Corp. has initiated one step in process with harmonized standards during spring 2008**
- **So as not to lose time, start with existing organizations, with expanded mandates as necessary**

URGENT ACTIONS

- **Implement prevention measures for all ships that pose a risk**
- **Create uniform standards**
- **Improve monitoring for AIS**
- **Establish feedback mechanisms for improving the suite of prevention measures**



Potential for Global Trade

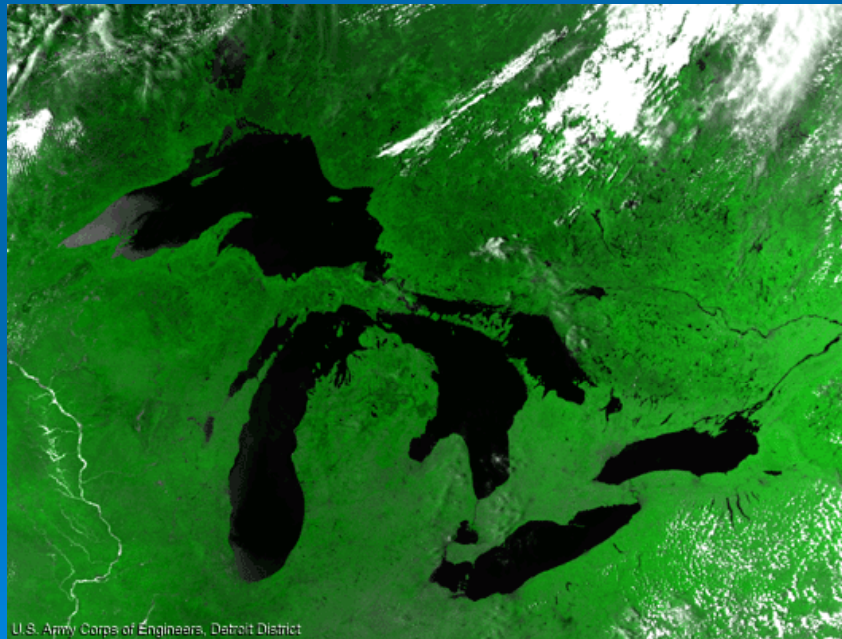


Committee was unanimous in its assessment –

Recommended actions for ballast water management and associated standards would reduce regulatory uncertainties and associated barriers to development of trade-enhancing infrastructure and services.

Conclusion

- **Recommended suite of actions comes closer to achieving the two project criteria than any other options identified.**



U.S. Army Corps of Engineers, Detroit District

QUESTIONS?

