



BALLAST WATER COLLABORATIVE
PROPOSAL

**TRANSFER RISK MITIGATION
WORKING GROUP**

JANUARY 19, 2011 ~ TORONTO, ONTARIO



OUTLINE

- Recap working group proposal objectives
- Review of activities since last BWC meeting
- Overview of preliminary risk assessment (RA) model and status of development
- Review results of preliminary model



INTRODUCTION

- CSA developed a proposal for a working group to advance solutions to the challenges facing existing vessels (presented to the BWC, July 2010)
- Working Group objectives:
 1. Improve shared knowledge on transfer risk
 2. Prioritize the risk and impacts
 3. Identify measures to address these risks
 4. Undertake pilot projects
- ***Timely alternative solutions are needed***



ACTIVITIES INITIATED

- In consultation with AIS researchers, the CSA & US carriers initiated a number of activities to support the proposal:
 1. Developed an aggregated inventory of ballast water movements (2009; only CSA fleet to date)
 2. Further developing the preliminary RA model
 3. Identifying and assessing existing ballast water best management practices and potential for risk mitigation
 4. Developed preliminary results and a proposed work plan for the Ballast Water Collaborative



AIS RISK ASSESSMENT

Risk assessment concept:

$$\text{Risk} = P(\text{Introduction}) \times \text{Impact}$$

where

$$P(\text{Introduction}) = P(\text{Arrival}) \times P(\text{Survival}) \times P(\text{Establishment}) \times P(\text{Spread})$$



AIS RISK ASSESSMENT

After applying risk mitigation measures:

$$\underline{\text{Mitigated Risk}} = \text{Potential Risk} - \text{Mitigation Results}$$



ASSESSING PROBABILITY OF ARRIVAL

- Method:
 - Cross-reference ballast water movements to presence / non-presence of an AIS in a donor/receiver port / body of water → binary potential for arrival
- Ballast water movements:
 - Compile port to port movements
 - Aggregate body of water to body of water movements
 - Completed for CSA fleet/2009
 - U.S. data collection in process



ASSESSING PROBABILITY OF ARRIVAL

(...continued)

- Presence of species:
 - Compile list of known AIS in the Great Lakes and St. Lawrence River
 - Focus on body of water to body of water trade routes
 - Great Lakes: NOAA GLANSIS database
 - St. Lawrence River: Identified a potential species database (de Lafontaine)
- Next steps
 - Identification of potential vs probability?
 - Seek advice of a panel of AIS experts



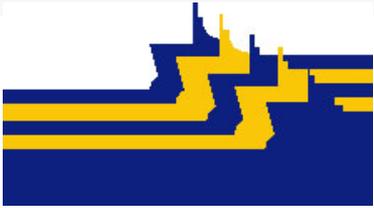
ASSESSING PROBABILITY OF SURVIVAL & ESTABLISHMENT

- Proposed method:
 - Predict species survival and establishment by analysis of environmental similarity of donor and receiver ports / bodies of water
 - Combine this with input from a panel of AIS experts
- Environmental similarity analysis:
 - Inventory environmental characteristics (i.e. pH, temperature, salinity) of donor and receiver ports / bodies of water (GLENDa data set)
 - Potential to incorporate temporal consideration (i.e. seasonal variations)
- Species requirements:
 - Inventory environmental requirements for survival for each species
 - Compare to characteristics at receiver port and predict survival
- Next steps:
 - Seek advice of a panel of AIS experts



ASSESSING IMPACT

- The impact of the transferred species must be evaluated
- Assumes successful introduction
- Assessment method:
 - If species is present in donor and recipient port, the risk assessment model currently assumes that there is no potential impact (requires validation)
 - NOAA GLANSIS species fact sheets are being updated to provide impact information in a standardized format.
- Next steps:
 - Incorporate the assignment of impact.
 - Seek advice of a panel of AIS experts



EXPLORING RISK MITIGATION OPTIONS - STATUS

Risk mitigation options:

1. Ballasting protocols and best practices
 - Assess current practices and contribution to risk mitigation?
 - Can enhancements/changes be made to address identified risks?

2. Vessel modification or technological measures that can practicably be employed to mitigate the identified risks
 - Assessment of cost-effective and feasible technologies or ballast system modifications appropriate for domestic vessels
 - Preliminary identification of potential technology / vessel modification options: raise intakes, finer screens, filtration system
 - Method(s) not yet defined

Next steps:

- Seek advice of a panel of experts including AIS researchers, ship owners, technology developments, environmental experts



PRELIMINARY RESULTS

- The preliminary ballast water movement inventory (for CSA fleet):
 - Great Lakes and St. Lawrence River:
 - 1812 voyages
 - 299 unique trade routes
 - 23,040,270 tonnes of ballast water
- Of these movements:
 - 47.5% between ports in the same body of water
 - 24% within the St. Lawrence River
 - 8% within Lake Erie
 - 7% within Lake Ontario
 - 6% within Lake Huron
 - Over 70% within the Great Lakes
 - 7% between ports from St. Lawrence River to Great Lakes



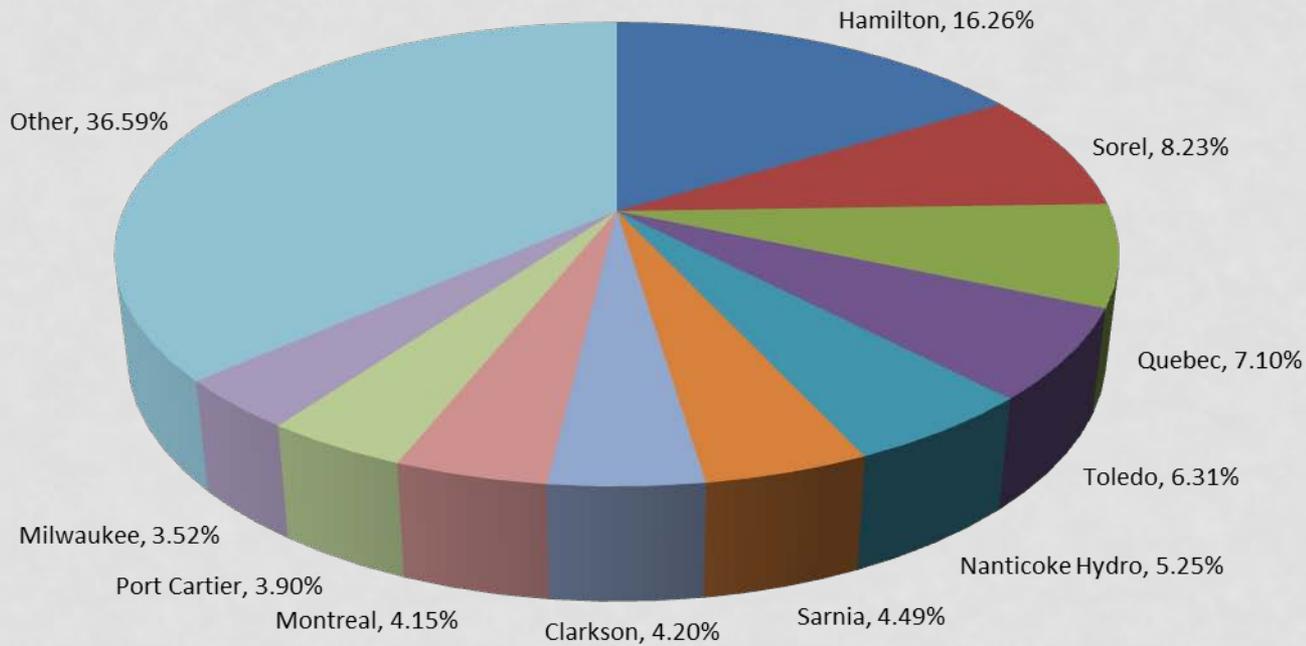
PRELIMINARY RESULTS: MOVEMENTS BETWEEN BOWS

Donor	Receiver	Total Ballast Water Moved (tonnes)	Number of Trips	% Total BW
St. Lawrence River	St. Lawrence River	5,504,848	438	23.89
Ontario	Erie	2,711,845	160	11.77
Erie	Huron	1,907,917	180	8.28
Erie	Erie	1,788,057	110	7.76
Ontario	Ontario	1,576,707	185	6.84
Huron	Huron	1,251,149	106	5.43
Erie	Superior	1,176,074	73	5.1
Ontario	Superior	1,116,825	64	4.85
Michigan	Huron	819,506	67	3.56
Huron	Superior	765,166	45	3.32
Ontario	Huron	713,763	52	3.1
Michigan	Superior	640,330	39	2.78
Michigan	Michigan	535,317	31	2.32
St. Lawrence River	Superior	501,294	30	2.18
St. Lawrence River	Erie	493,015	35	2.14
St. Lawrence River	Ontario	329,477	75	1.43
St. Lawrence River	Huron	305,927	22	1.33
Superior	Superior	283,978	17	1.23
Erie	Michigan	174,872	11	0.76
Erie	Ontario	106,848	19	0.46
Huron	Erie	102,016	10	0.44
Superior	Huron	62,295	14	0.27
St. Lawrence River	Michigan	61,431	9	0.27
Ontario	St. Lawrence River	47,344	6	0.21
Huron	St. Lawrence River	28,873	9	0.13
Michigan	Erie	16,642	2	0.07
Erie	St. Lawrence River	14,759	3	0.06
Michigan	St. Lawrence River	4,001	1	0.02
		23,040,271	1813	100



PRELIMINARY RESULTS: TOP DONOR PORTS

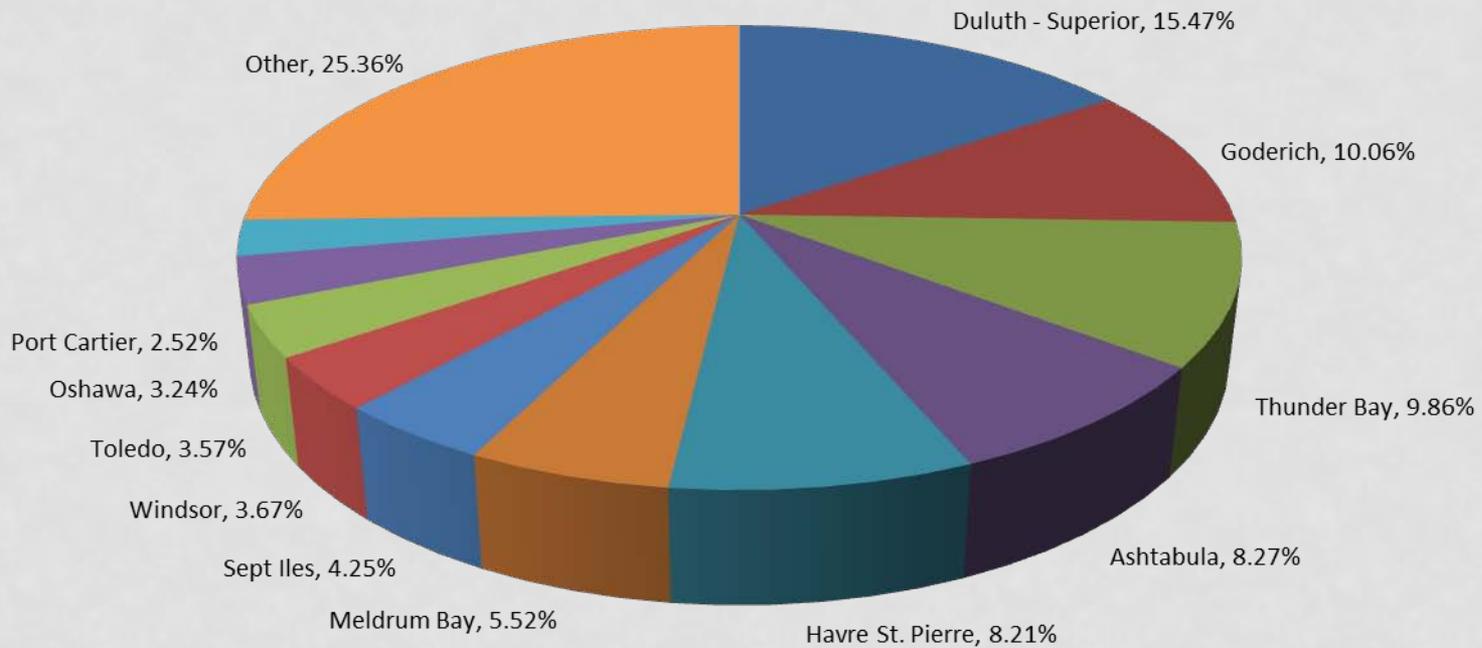
CSA Ballast Water Movements, Top Donor Ports 2009

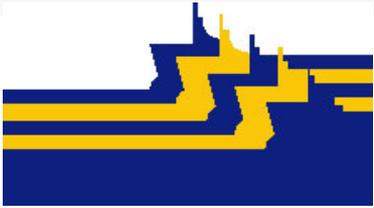




PRELIMINARY RESULTS: TOP RECEIVER PORTS

CSA Ballast Water Movements, Top Receiver Ports 2009





PRELIMINARY RESULTS - SPECIES

- Preliminary model indicates
 - 85% of species with potential to transfer between bodies of water could be captured using filtering system
- The preliminary model does not yet consider
 - Probability of survival or establishment
 - Impact
 - Existing or future possible mitigation efforts



FURTHER WORK

- Potential to contribute to developing a Made in the Great Lakes solution to addressing AIS transfer risk for existing vessels?
 - Incorporate a finalized AIS cross-referenced model with expanded Best Management Practices
 - Utilize to pursue technology / vessel modification (ex. Raise intakes, filtering or strainer systems) developed for Lakers and Canada Coast trading vessels (which do not leave the GLSLS or Gulf), in addition to, or in combination with other efforts



SUMMARY

- The objectives proposed for the Working Group are a unique initiative
 - Proposes a bi-national, multi-stakeholder effort
 - Exploring risk mitigation efforts to address the risk of spread potential posed by domestic carriers
- Marine carriers initiating efforts to support the working group including identifying areas for further development
 - Compiling an aggregated ballast water movement inventory
 - Exploring methodology and sources of data for risk assessment and identifying action to further develop and undertake risk assessment
 - Proposing a risk assessment concept that incorporates risk mitigation efforts
 - Initiating exploration of possible risk mitigation practices and technologies for further evaluation
- Collaboration necessary to advance this initiative
 - Proposed work plan identifies key tasks and roles of broad cross section of stakeholders in the Ballast Water Collaborative



THANK YOU