

## **Report to BOTE on Concerns Relating to the Expansion of the Saint Lawrence Seaway and Connecting Channels.**

**Prepared by: Ora Johannsson, Member of BOTE, April 2003**

The US Army Corps of Engineers was asked by the US Federal Government to Review the Great Lakes Navigation System. Their reconnaissance report came out in June 2002 ([http://www.lre.usace.army.mil/index.cfm?chn\\_id=1483](http://www.lre.usace.army.mil/index.cfm?chn_id=1483)). The report has raised concerns amongst many stakeholders in the Great Lakes basin due to its limited or focused assessment solely of the navigational problems and economic costs/ benefits.

At the moment a full feasibility study needs to be funded. However, prior to initiation of a feasibility study, supplemental information is now required to support a Federal decision on whether to proceed with feasibility studies. This supplement to the reconnaissance report will include an assessment of baseline without-project conditions for the environment, engineering features, and economic conditions of the Great Lakes/St. Lawrence Seaway navigation system. The supplemental effort will begin this Fiscal Year and require approximately thirty months to complete.

In general, people acknowledge that the time is appropriate for a review of the Seaway Navigational System. The structures are now 50 years old and in need of repairs/overhauling. However, over the past 50 years, the Great Lakes community, along with other regions, has come to realize that one should not tamper with components of the ecosystem in isolation. An ecosystem approach, preferably a sustainable ecosystem approach, is the more productive way to proceed, both biologically and economically.

Dr. J. Manno, Executive Director of the Great Lakes Research Consortium, kindly forwarded a letter he had written to the US Army Corp of Engineers which makes this distinction clear. In his letter, he puts forward a framework for discussion which asks how we should develop sustainable economies with respect to shipping and the Seaway in a future with an energy and resource conservation-based economy. Shipping would be "an important element of an energy efficient transportation system in the future economy" where the energy savings of water-based transport are valued. The feasibility study should be based on concepts of sustainable development and "it would consider the federal interest in a Great Lakes restoration plan which, like the Everglades plan, would move toward restoring as closely as possible the natural flows and fluctuations of water levels in the system. It would defer to the current Lake Ontario-St. Lawrence River study (another study the Corps personnel is leading) that promises to consider and hopefully remediate the negative environmental impacts of water level controls.... The objective of such a plan would be to capture the economic and environmental benefits of water transport's energy savings while minimizing or eliminating the environmental disruption. In other words, the *first* feasibility study should be one that broadly looks at alternatives to physical expansion."

Dr. Cowan (Ontario Federation of Agriculture) agrees with Dr. Manno's framework to restore the Great Lakes but suggests that we should not think of the present as the

baseline. Rather, we should be trying to restore the water levels and hydrological cycle to the pre-Seaway state in order to protect against the potential impacts of climate change.

Dr. Manno goes on to point out that other non-destructive economic opportunities are out there for the future if we care to pursue them; such as, the revitalization and modernization of the steel industry which would increase traffic and profitability of shipping on the Great Lakes. Other opportunities for shippers might include bulk commodities such as paper, metal and plastics for recycling.

The GLFC could take the initiative and start to address several questions within this framework through providing fora for broad open discussion of the questions and subsequent development of white papers of research priorities. The first is the exploration of transportation alternatives, and one question under that umbrella is the importance of physically allowing saltwater ships to enter the Great Lakes. Many scientists working on the problems of exotic invasions feel strongly that salt-water ships should be banned and their cargo either switched to "lakers" at Montreal or onto railroads from the eastern ports. As Mr. Charlton, National Water Research Branch, Environment Canada, pointed out, we need an open discussion of the benefits and costs of allowing them access to the Great Lakes. The second is a clear understanding of long-term water balance for as much of the continent as is affected by hydrological processes associated with the Great Lakes: rain fall, ground water, climate change etc. Water will be one of our most precious commodities in the coming years - can we afford to increase the rate of loss from the Great Lakes via the St. Lawrence. What is the economic value of the water if it is kept in the lakes? The third is the impact on habitat and fisheries. Some of these issues are already being address through the lakes level study and climate change programs. Impacts on species at risk (SAR) will need to be addressed. And the fourth is the impact on people - first nations, tourists and the people who live in the Great Lakes basin. Being listed fourth does not imply a lack of importance, but rather that all impacts will be integrated in their effects on peoples' daily life and livelihood. Other questions could be addressed, such as alternate economic scenarios, but they are further out of the realm of the GLFC.

The enormous cost of the proposed Seaway expansion would make reversal of the policy unlikely in the event that the importance of overriding concerns about alien species or other issues indicated that it should not be used. It is important to consider all aspect of the problem before deciding to proceed into this venture.

## **Background Information and Concerns**

Where the information is strongly dependent on one source, that source is referenced. The information provided by each researcher is attached as an appendix.

### **The Seaway:**

With construction of the St. Lawrence Seaway in the 1950's, the depth of the former Atlantic - Great Lakes route was almost doubled - from 4.3 metres to 8.3 metres - and the number of locks was reduced by half, from 30 to 15. For the first time, the waterway could accommodate ships over 35,000 tons, up to 233.3 metres (765 feet) long and 23.2 metres (76 feet) wide. (The typical "laker" carries 25,000 tons of cargo, and measures 222 metres (728 feet) long and 23 (75 feet) metres wide.) ([GreatCanadianRivers.com](http://GreatCanadianRivers.com))

The proposed modifications consider expanding the locks to accommodate "Panamax"-sized ships which require locks 305 meters (1000 feet) long, 33.5 meters (110 feet) wide and 12.0 meters (39.5 feet) deep. All canals would be upgraded so that these large ships could reach Duluth. ([Panama Canal Authority 2001](http://Panama Canal Authority 2001))

There is no question of the economic importance of the Seaway and connecting channels to the Great Lakes Region. In the United States 45,000 jobs and 2 billion in personal income are attributed to the Seaway. The Seaway serves 40% of U.S. manufacturing and 50% of its soybean and corn crops. In Canada, the Seaway is associated with 67% of its industrial output and 33% of its gross national product. ([GreatCanadianRivers.com](http://GreatCanadianRivers.com)). However, it should be kept in perspective that "the Seaway has always carried a minute proportion of all US port traffic" ([Manno](http://Manno)).

### **Is the Army corps of Engineers Report Flawed?**

The Corps' initial report suggests that serious thought be given to enlarging the seaway both to increase the efficiency of the system and because there should be great economic benefit. Dr. Tom Muir, an economist with the Canadian Department of the Environment, examined their report and questions many of their assumptions and calculations. The following is precis of his report (Appendix 1).

Briefly, with an enlarged Seaway, the present shipping fleet could work at maximum capacity. It is also assumed that larger ships, which presently utilize ports on the eastern seaboard, would switch to Great Lakes' ports. The switch would be partly due to projected congestion at these ports in the future. The shipping cost reductions are assumed to stimulate economic development through consumer and business spending. Other transportation benefits are assumed to spin off.

According to Dr. Muir, the 'estimates of benefits are ridiculously high and have serious credibility problems. They are determined by an extended series of questionable and extremely positive assumptions concerning the amount of these transportation cost

reductions, how they pass through the economy, and the subsequent multiple and sometimes novel direct and indirect impacts and ripple effects. Canada is assumed to levy export taxes to recover some of the transportation savings; however, this may be prohibited by trade rules, or may be politically and administratively impossible. There also appears to be double-counting of the cost reduction pass-through and subsequent impacts.'

The predicted growth in shipping traffic in the Seaway is also questionable. The report assumes a growth rate of 0.7% to 0.8% a year until 2060 to levels 'far beyond anything ever experienced'. Much of the increase would be in container shipments, which presently are not allowed to use the Seaway.

The report did not include or explore the impacts and costs associated with environmental damage; such as erosion, blasting out of more land, dredging of contaminated sediments, and impacts of new exotics, or with changes in water levels, flows and possible compensating works. Nor were costs for mitigation considered.

To Dr. Muir, the Seaway expansion is 'economic folly'. The economic projections and benefits are greatly inflated and many costs not considered. The costs of the Seaway expansion are substantial and equate to a \$1.6-\$3.2 million U.S. subsidy per ship per year for 10 years for each up bound ocean ship transits in 1999 (641).

## **Concerns with Expansion:**

### ***Improvement of the Present Seaway***

Components of the seaway are 50 years old and in need of repair:

The American Great Lakes Ports Association (AGLPA) recently sent four key recommendations to the U.S. Army Corps of Engineers regarding the areas that should receive focus in the Corps' Great Lakes Navigation Study. "...that the primary focus of the Study be the maintenance and modernization of the St. Lawrence Seaway itself and related channels and ports throughout the system. The feasibility, costs and benefits of an expansion of the Seaway locks - in width, depth and length - to accommodate larger vessels should be analyzed. Specifically, we are asking for expansion **and/ or replacement of the existing 15 Seaway locks.**" (Seaway Compass v6 (2) 2001)

To present shippers the most important issue is "how long the present ditch can last" (Great Lakes Radio Consortium 24/02/2003)

### ***Water Levels in the Great Lakes***

Water levels fell a foot with the construction of the first Seaway and would be expected to fall again with the proposed deepening of the channels.

Lower water levels would be associated with:

- Further loss of wetlands and nearshore habitat especially in places like Lake St. Clair which would affect fish, wildlife and bird populations.
- Problems with access to shoreline, boat ramps etc.
- Problems with access to homes on islands
- Further requirements for dredging of harbours, marinas and river mouths

Lower water levels caused by Seaway Expansion would further aggravate the impact of potential declines in water level associated with climate warming.

Compensating structures could be built in the Detroit and St. Clair Rivers to both slow the flow, reduce the drop in water levels and produce electricity. It might be worth considering adding these structures to the St Clair and Detroit Rivers even if the Seaway expansion does not occur in order to restore lake levels to pre-1900 conditions. Such construction would require environmental assessment not only for affects on habitats and organisms presently using the rivers, but also on upstream and downstream impacts.

### ***Species at Risk***

The Detroit and St. Claire River corridor is the home of 14 fish species at risk. Their habitat needs will need to be determined and taken into consideration when any plans for modifying the corridor are considered.

Decreasing water levels in general around the lakes would impact SAR species as many of them are associated with shallow vegetative areas.

### ***Dredging***

Concerns have been expressed about the quality and large quantity of material that would be removed to deepen and widen the canals and port facilities. Some of it would be contaminated. How would one disposed of it.

### ***Erosion***

Increased shoreline erosion is expected with the passage of larger ships which may lead to unstable shorelines and subsequent hardening of more shoreline. Both would negatively impact on nearshore and embayment habitat.

Increased rate of water flow through the connecting channels: would that increase erosion of the bottom sediments and increase the load to the downstream lake - affecting habitat and contaminant concentrations (western Lake Erie) in both areas.

### ***Water Levels in the Ground (Ted Cowan)***

Water takes the path of least resistance and easily travels sideways rather than down. As lake levels fall, ground water levels fall and the land is dewatered. We need to understand the relationship between the amount of water in the lakes and ground water levels through out the adjacent land masses. For instance, water flows from Georgian Bay across southern Ontario affecting levels in Lake Simcoe and perhaps the cold water springs which emerge in the streams heading towards Lake Erie.

At the bottom of Lake Michigan at Gary, Indiana, the ground is basically sand for hundreds of feet down. Dr Cowan thinks that water may flow through this sand from Lake Michigan towards the Mississippi. If that is the case, then the water in the centre of the continent, i.e. in the Great Lakes, feeds ground water systems not only in the immediate vicinity of the lakes but west across the Great Plains through this door at the base of Lake Michigan. Therefore, factors, which affect water retention in the Great Lakes, may affect ground water supplies over a wide area of the continent.

Ground water supplies affect the overlying vegetation, therefore forests and crops as well as river levels.

We need to understand the implications of increasing the rate of drainage of the Great Lakes via the St. Lawrence and the resulting lowering water levels on ground water conditions both now and in the future, and how these changes will affect our crops, forests and rivers, and therefore, also our cities and industries. In this exercise we should integrate climate change expectations.

***Further Invasions of the Great Lakes, its Tributaries and Aquatic Systems through out the North American Continent by Ship-born Exotic Species (see Appendices 6,7)***

If the Seaway is expanded to accommodate more and larger (Panamax-sized) ships, the risk of exotic invasions increases. Dr. A. Ricciardi indicated that "A major effect of larger vessels entering the Great Lakes will be the delivery of substantially greater volumes of ballast water. This means they will (1) carry a greater number and diversity of exotic organisms, and (2) enhance the survivorship of organisms during transport – owing to the increased thermal stability and oxygen content of a larger volume of water. The result will be increased inoculation pressure by exotic species on the Great Lakes-St Lawrence ecosystem."

The risk is not only that that inoculum will be larger and probably in better physiological condition, but that a wider geographic range of ports of origin may develop. This would increase the number of potential invading species

For example, shipping traffic from western Europe could deliver at least ~20 invasive euryhaline species (including Ponto-Caspian invertebrates) to the Great Lakes. There are scores of other species that do not yet have invasion histories but could potentially become problematic if introduced outside of their native range.

At the moment, there is tacit approval to allow further invasions of exotics into the Great Lakes through shipping (and other routes), although there is a growing realization of the incredible impacts, both biologically and economically, of exotic species. The tacit approval stems from the failure to close avenues of entry - of which salt-water shipping into the Great Lakes is one. The biological impacts range from timing and success of commercial fisheries (e.g. effect of *Cercopagis* on the inland Russian fishing) to re-programming how an ecosystem functions (these are the biological engineers, such as dreissenid mussels). Such a succession of changes severely limits managers' ability to predict the state and manage conditions in the lakes. The economic costs are in the billions of dollars, sometimes for a single invader.

As Dr. Hugh MacIsaac warns. "Once invaders establish in our lakes, there is virtually no way we can eliminate them. One can hope that existing species will prey, parasitize or compete with nuisance NIS to reduce their impact, but management of these species is often virtually impossible. If there is one lesson we have learned from the history of Great Lakes' invasion, it is that 'an ounce of prevention is worth a pound of cure'...Invasion rate is positively correlated with economic activity of a country, particularly imports.... We think the Great Lakes remain highly vulnerable to invasion because many, many, species are now in a position and have the life history characteristics needed to survive transfer and introduction. We have identified 14 high-risk invertebrate species in Eurasia plus 33 lower risk ones. Dave Lodge and Cindy Kolar have identified 20 fish species that could get to and survive in the Great Lakes, five of which would almost certainly become invasive."

Both BOB and NOBOB vessels present a risk. Even if the larger ships "are restricted to larger estuarine ports they will likely pick up euryhaline species that could survive an incomplete ballast-water exchange (as have several species that were introduced to the Great Lakes over the past decade), and thus bypass the only protective measure in place." (Ricciardi). NOBOBs enter the lakes without ballast on board but their ballast tanks retain some water and sludge: This residue can be mixed with Great Lakes water at one port and later discharged at another. "Some euryhaline invertebrates will have resting stages (eggs, cysts) that can be transported in this ballast sediment—and thus in NOBOB vessels, which are not covered by any protective legislation." (Ricciardi). Studies are underway to determine the actual risk from NOBOBs. At present, no exchange-at-sea methodology or chemical/physical technology exists which can achieve 100% exchange or kill. Nor is human compliance ever 100%.

For some species, only a very small founder population is needed to initiate a successful invasion. In fact, the rate of invasion has been greater since 1989, after ballast water exchange was initiated, than in the previous period after the opening of the Seaway (1959-1988). There are a number of possible explanations for this trend: a) the species arrived earlier but were not found until after 1988, b) ships are faster so more animals survive the transit, and c) ships are carrying ballast water from areas which are themselves being invaded by exotics. The later certainly is true of ballast coming from the Baltic and North Seas where we have seen species first invade these areas from the Ponto-Caspian region and shortly afterwards turn up in the Great Lakes.

These findings indicate that the risk of introduction is increasing in spite of the precautions presently being taken. Many scientists think that ocean-going ships should be banned from the Great Lakes and that their cargo should be exchanged at Montreal or sent by rail from an east coast port.

### ***Native American Concerns***

Actions which affect the fishery, wildlife and quality of the reserve lands are important to native people. It is likely that some reserves, such as, Walpole Island, would be strongly impacted by lower water levels and additional erosion either through alteration of wildlife and fish habitat in Lake St. Claire and/or through changes to the habitat on Walpole Island, itself. Native people partially depend on wild resources in the region for food.

The St. Lawrence Seaway passes through 1000 miles of Haudenosaunee (Six Nations) Territory. The water is essential to their lives, considered sacred and provides them with the cultural base of their lifestyle as well as food.

There are treaty rights governing actions taken by either governments or native peoples that will affect the water way (Section 106 of the National Historic Preservation Act) and the original treaty with the Haudenosaunee which notes that the government and the native people "now travel on the river of life together."

### ***Recreation and Tourism***

Shoreline degradation due to erosion, lower water levels and loss of habitat will discourage use of the shore by people, whether naturalists, fishermen or recreational users. This may lead to lower levels of tourism.

Wetland and nearshore habitat loss could affect fisheries through decreases in habitat for nearshore species and for spawning of offshore species and growth of their young-of-the-year stages.

Greatly increased boat traffic, larger ships, increased flow rates (and decreased fishing potential?) may discourage recreational use of the connecting channels.

### ***Habitat and Fisheries***

Wetland and nearshore habitat loss through erosion, lower water levels, dredging and infilling (? Is this how they plan to deal with dedgred waste?) could affect fisheries through decreases in habitat and its associated food for nearshore species and for spawning of offshore species and growth of their young-of-the--year stages.

Breaking of ice for winter navigation (unclear if this is proposed) would impact local habitat.



Lower water levels also mean that the nutrients and contaminants put into the lakes will not be diluted as much as at present. This may affect concentrations in areas with restricted volumes and water exchange, such as the embayments, river mouths and harbours. These are generally regions with current nutrient and contaminant problems which are being addressed through the RAP remediation process.

**NOTE:**

I would like to thank those people who took the time to talk with me and provide me with written input. Others were also asked to contribute but did not have the time. Hopefully, if the GLFC does undertake some workshops these people can contribute at that point.

Although I was able to consult with a number of experts from a range of fields, the remarks are still somewhat preliminary as I was not able to talk with experts in hydrology or ground water.

The summary above was vetted by the contributors to ensure that their views were not misrepresented. They also gave permission for inclusion of their original submissions seen in the Appendices.

## Appendix 1. Dr. Jack Manno, Executive Director

### Great Lakes Research Consortium

Mr. Wayne Schloop  
US Army Corps of Engineers  
P.O. Box 1027  
Project Management Office, 7<sup>th</sup> Floor  
Detroit, MI 48231-1027

August 8, 2002

Re: *Toward a Sustainable Development Plan for Great Lakes Commercial Navigation: Comments on the Reconnaissance Report for the Great Lakes Navigation System Review*

Dear Mr. Schloop:

I am writing as the Executive Director of the Great Lakes Research Consortium with 16 member colleges and universities in New York State and 9 affiliated schools in the province of Ontario. These are not official comments from our Consortium, but are instead my own opinions based on my knowledge and experience with the Great Lakes -St. Lawrence River System and my interest in sustainability. As the Director of an organization dedicated to improving understanding of the Great Lakes in all their aspects – chemical, physical, biological, social, economic and political — I certainly support further study and consideration of improving water transportation on the Great Lakes Navigation System. I believe, however, that the current Information Paper or draft reconnaissance study published in June 2002 rests on a very limited concept of “improvement” and “federal interest,” and shows virtually no understanding of the economic and ecological possibilities of moving toward a sustainable water navigation system in the Great Lakes. It is understandable that the Corps chose to limit its reconnaissance to a narrow definition of “improvement” and “federal interest” since these have specific meanings in federal law and Corps experience, but it is long past time for these concepts to be revisited. The GL Maritime system could and should be improved along sustainable development lines in ways that make it considerably more benign, even environmentally beneficial. The interest in this is clearly federal, transcending as it does any local or even state jurisdictional interests. This is what a feasibility study should address, not the obviously destructive and overly simplistic path of building a 35-foot deep navigation system. If we were to go ahead with a major expansion, we couldn’t expect results in less than a decade or more. By then the need for an energy and resource conservation-based economy in North America will be even greater. It is possible now, and certainly desirable to plan for a Great Lakes Navigation System as an important element of an energy efficient transportation system in the future economy.

What would a feasibility study based on concepts of sustainable development include? First, it would consider the federal interest in a Great Lakes restoration plan which, like the Everglades plan, would move toward restoring as closely as possible the natural flows and fluctuations of water levels in the system. It would defer to the current Lake Ontario-St. Lawrence River study (another study the Corps personnel is leading) that promises to consider and hopefully remediate the negative environmental impacts of water level controls. Any deepening and widening of navigation channels would have significant impacts on water levels and would require compensating works to further control fluctuations.

A sustainable development plan for Great Lakes navigation would ask many questions about present material and energy flows. The objective of such a plan would be to capture the

economic and environmental benefits of water transport's energy savings while minimizing or eliminating the environmental disruption. In other words, the *first* feasibility study should be one that broadly looks at alternatives to physical expansion. One approach is a revitalized US and Canadian steel industry. Iron ore is now and is likely to remain the largest commodity flow in the system. It's decline by nearly 50% since the 1970s is also the leading cause of the shipping stagnation the reconnaissance report is interested in stemming. Following the logic of environmental sustainability, the industries of the future are those that can produce better with much less energy. Real progress in improving the energy efficiency of US and Canadian steel plants will lead to a resurgence of the industry, especially in a Greenhouse Gas limited world, and especially once the U.S. and Canada adopt international trade policies based on environmental criteria, as we eventually must.

The Lake Carriers Association responding to proposals to deepen and widen Great Lakes navigation channels predicts 15% increased hauling power per ore-hauling trip. These are really small gains; especially considering how lower water levels in a drier world might just undermine these projected increased loads. Clearly we do not suffer from a capacity problem under current conditions, and a revived steel industry could quickly address the profitability problem with increased volume. Most shippers would accept lighter trip loads for greater volume.

What about opening new bulk commodities such as paper, metal and plastics for recycling? Once gas prices begin to reflect the true social and environmental costs of fossil fuels, the energy efficiency gains from the combination of water transport and recycling should make these commodities flourish.

These are just two ideas about how to spur economic growth in the Great Lakes Navigation System while helping rather than harming the environment. If we put our minds together we can think of many more.

Whenever the Great Lakes Navigation System Review publishes traffic figures and volume figures you should compare them with the volume at major US and Canadian East and West Coast ports. This will make it clear that Great Lakes shipping has never and will never compete with these larger and ever expanding ports. Studies have indicated that while international maritime traffic has increased 600% over the past 30 years, the Seaway traffic has declined by 20%. The Seaway has always carried a minute proportion of all US port traffic, and this should be made clear in the report and decision-making process. Baltimore shipping channel is now 50 feet deep. Once the Great Lakes ports go to 35 will we need to start the feasibility study for 50? Continual expansion of the system is not a viable option.

The section of your report that discusses environmental considerations makes the point that opportunities for incorporating environmentally beneficial features into the Navigation system would arise with the proposed "improvements." But this opportunity already exists, especially if we move forward with a study of navigation in the context of a Great Lakes Restoration Plan. This section also refers to the energy savings of using water transport rather than truck or rail. While these savings are important they only exist upriver from Montreal and can be gained by the current system. Also under the section on environmental considerations, the report's authors state that, "The most dramatic impacts to the ecosystem have likely already occurred.' Although we all hope this is true, there is really no scientific or common sense basis for this optimism; we really have no idea about what drama yet awaits us. Deepening the connecting channels could have extremely dramatic effects on St. Clair river wetlands, where nearly half of all GL fish productivity may occur.

Here are a few additional comments:

The report describes a stakeholder survey but it does not include information about who was surveyed nor why these people were chosen nor who is considered a stakeholder. A thorough stakeholder analysis should be done before any additional study occurs.

The report should be much clearer about what has changed since previous Seaway studies concluded that there was no economic justification for Seaway expansion.

Is the potential for \$1.4 billion a year in benefits based on year-round shipping? If so, the report should be clear that this means a renewed attempt to open the channels for winter navigation, something that has been clearly rejected in the past.

I would enthusiastically support a feasibility study on the Sustainable Development of the Great Lakes Navigation System that would take account of the issues I've raised here as well as many others. This should be completely integrated with the development of a basin-wide Great Lakes restoration plan. The WRDA authorization language quoted in the report is clearly broad enough to make such a study possible. It would be a great challenge and fun besides.

Sincerely,

Jack Manno, Executive Director  
Great Lakes Research Consortium

## **Appendix 2. Dr. T. Cowan,**

### **Ontario Federation of Agriculture**

#### **Summarization of a Conversation with Dr. Ted Cowan, Fisheries Economist**

The economic analysis of the Seaway expansion was "shoddy". It was cranked up into a miraculous belief. The numbers are so bad that they will be treated derisively which is counter productive.

Would we have more economic expansion by keeping the water than by loosing it down the drain. - you can trade yourself into serfdom. What is the value of the water we presently have in the lakes?

#### **Water levels:**

Dredging of the Detroit River lowered Lakes Michigan and Huron 13"

In the 1880s in the North Channel, Cow Island was a massive white fish spawning shoal - now it is a penninsula

Detroit River has high flow rate and compensating structures to produce electricity could be built on either side of the river to slow the flow and prevent further lowering of water levels. You could get 600 megawatts/hour - more than one nuclear block. Try not only to compensate for present damage but to reverse the damage already done.

Loss of water is a real problem. With deepening the channel there is increased rate of water flow from the Great Lakes. This is a continuous loss, but the period of time when the increased water flow is needed for the locks is only a 100 hours/year (Ted this seems awfully low when you think of the traffic through the Welland locks during the whole season) while the tap is running continuously - 8760 hours a year.

Must ask, how valuable is the level of water we have now.

#### **Ground Water**

Water moves sideways as well as down - path of least resistance. E.g. in southern Indian in Carbondale are 100s of square miles of coal. In the 60's and 70's, they tried to expand the surface coal mines but they were unsuccessful. If they had opened a hole that size and depth it would have created a drought because the ground water recharge would all have gone into the coal mines.

At Gary Indiana for 100s of feet in depth, the ground is composed of sand. Water moves through this sand from the Great Lakes to the Mississippi (this is not in the climate change models). Therefore, water from the Great Lakes helps to recharge the ground water in the mid-west, probably as far as the mountains.

Need to understand the relationships between lake levels and ground water levels. There is one large basin encompassing the region east of the Rockies (Mississippi, Great Lakes and northern reaches). Ground water is an integrating factor just as air is an integrating factor.

Agricultural production around the basin is partially dependent on ground water and dewatering of the ground would harm production. River fisheries are also dependent of maintaining ground water levels.

Water moves from Georgian Bay to Lake Simcoe and down across southern Ontario. Cool water springs in the rivers entering Lake Erie are needed to maintain the trout reproduction in these otherwise warm water streams.

If there is significant dewatering, the forest may be in trouble, such as in the Michigan Peninsula where there are many forest plantations - can they take this double onslaught (Ted I missed something here)

Less ground water input will mean that the nutrient concentrations in the ground water will go up and we are already having problems with bacterial and nitrogen contamination from intense livestock holdings.

### **Transport**

The problem is transport. On the Mississippi barges play a major role in moving goods - Could we not do more to combine barge transport and railways. Should look at the costs of expanding and constructing the Seaway against the costs of using (constructing where needed) good rail and barge service.

Do we need this additional transport proposed by the Seaway expansion - probably not. Ships are built for different purposes and Panamax ships were not built for bringing goods into the Great Lakes. This is a form of megalomania.

### **Next Steps:**

#### **Research Programs Needed or Assessments:**

- 1) Transportation Alternatives
  - Rail and Barge
  - Other uses of the subsidies outlined in the present expansion proposal
- 2) Use of Mitigating Measures
  - Construction of weirs and generating units to produce clean electricity - this would count towards our Kyoto commitment
  - Beware of downstream changes such as messing with water levels
  - This type of work may also be considered justified by restoration of the lakes to previous conditions or climate warming where some scenarios predict a decrease in water levels
- 3) Clear understanding of long-term water balance for as much of the continent as is affected by the rainfall and ground water economy in the Great Lakes region - what is the role of the Great Lakes?
  - Remember that when you disturb things you can not predict the economic outcomes - if you take the system down another foot so the total drop is 2' - it may affect the flow in the Mississippi.

- Flows and levels in the lakes are related and are related to fish harvest and productivity often through recruitment success; e.g. water levels and whitefish harvest (effect through recruitment) (Collins XXXX).

"I see the centre of the continent as a sponge and we need to keep as much ground water in the centre as possible due to the adverse effects of dewatering on wildlife, agriculture, towns, fisheries, industries and harbours"

### **Dialogue**

We need an independent assessment of the impacts building on an interest in the question rather than appearing to have the answers.

Context of the discussion should be broad, open, inclusive and investigative (not suicidal). Many informed and interested groups should attend; such as Canadian Pacific, Canadian National, Sierra Club, Great Lakes United...

*However, everything (all decisions) should be put on hold until the groundwater study can provide a better understanding of the role of the Great Lakes in groundwater economy. Senior people in USGS and Canadian Geological Society would be very helpful here.*

### **Appendix 3. Mr. Murray Charlton,**

#### **National Water Research Institute, Environment Canada**

Seaway Expansion and the Threat of Continued Alien Invasions in the Great Lakes  
The views expressed here are my own and do not necessarily represent any position of Environment Canada.

Many biologists, naturalists, and lake users are alarmed by proposals to study expansion of the St. Lawrence Seaway to allow larger saltwater ships easy access to the Great Lakes. There are several reasons for concern and I will touch on two of them.

The physical alteration of the connecting channels is a concern. Potentially, and depending on the method used to restrict flow, the use of the connecting channels by citizens of the lakes may be altered or reduced or eliminated. In areas not affected by control structures the channel bottoms would be deepened with potential effects on fish habitat. Dredging of channels in Lake Erie and Lake Huron and Lake St. Clair would result in larger piles of dredge spoils providing more disruption during dredging and physical alteration of fish habitat. These effects would extend into the St. Lawrence River which is already affected by channel dredging and spoils piles.

The most disturbing aspect of the proposal is that if it were carried out the enormous cost would make reversal of the policy unlikely in the event that the importance of overriding concerns about alien species was realized. At the moment there is an inadvertent policy to continue introduction of alien species in ballast water of saltwater ships. Despite efforts to exchange ballast water at sea there are life stages of organism that are likely to survive in sediment and water regardless of ballast exchange or treatment methods. A 100% kill treatment has not been devised and even more important there will never be a 100% method to ensure human behaviour that would result in 100% compliance to any ballast water treatment regulation. Of enduring concern are the vessels termed "NOBOB" which are full of cargo and do not carry ballast water except for the residual water that can not be pumped out. These ships cannot exchange ballast they do not have so they import organisms in small volumes of water and sediment. Only a few organisms are required to start and alien invasion as is shown by the Bythotrephes invasion of Southern Ontario small lakes. The result is that there has been one new species discovered per year since the zebra mussels came to Lake Erie 1988. Allowing saltwater ships access to the Great Lakes is the inadvertent policy that is promoting the invasion of alien species.

The engineering approach to ballast water treatment is to provide a process for a high percent of control or kill. The biological imperative is for no more introductions in the Great Lakes. The biological imperative is impossible for engineers to guarantee especially given inevitable non-compliance of operations for whatever reason. This is at the heart of the reasoning that the only way to eliminate further alien species invasions from ballast water is to stop saltwater shipping. What is not known is whether there are any overriding reasons that necessitate the continuance of saltwater shipping despite the inevitable alien invasions that would result.

Suggested route to handle the issue.

At the moment the question of whether to maintain saltwater ship access has not received serious presentation to or consideration by the public, scientists, or decision makers. At best only derisive comments are received from the shipping industry when the question is raised by the odd wayward biologist. Yet according to one high ranking representative of the industry there are no studies on the implications of saltwater shipping from a socioeconomic viewpoint.



I feel a symposium or conference should be generated for the purpose of examining the socioeconomic aspects of 1) present saltwater shipping, 2) expanded saltwater shipping, 3) no saltwater shipping in the Great Lakes. In this way, the question of whether there should be saltwater shipping at all could be brought to the public as a legitimate question. The outcome from the conference may be useful as analytical input to decision making but decisions are also made on the basis of a feeling of right versus wrong. Here, the approach may come down to why the continued risk and certainty of further alien species invasions is less important than the continued and expanded saltwater shipping access to the Great Lakes. Or is it?

## **Appendix 4. Dr. Tom Muir,**

### **National Water Research Institute, Environment Canada**

#### Trade-Induced Transportation Issues - Shipping

Internationally, two aspects of the liberalized trade paradigm are being felt with regard to Great Lakes shipping. First, the pursuit of efficiency and rationalization, and, second, the promise of trade growth projections, are being used to propose the possibility of greatly expanding the Great Lakes - St. Lawrence Seaway system, up to and including the accommodation of larger ocean vessels up to the Panamax class (1000 footers).

Again, as in the Mid-Pen highway proposal, the further degradation of the Great Lakes ecosystem through a variety of stresses gets minimal consideration in the project rationale - the pursuit of economic growth. For example, the ecosystem impacts and huge economic costs of exotic species, and the growing problem they represent, are skimmed over. This is particularly significant because effective solutions to the ballast water management problem - if they exist - will have cost impacts on the ocean vessels that could remove their competitive advantage, which is part of the rationale.

In this context, it is interesting that this proposal to expand the ability of ocean ships to penetrate the Great Lakes is at odds with a growing Great Lakes scientific community view that salties be kept out of the lakes, period. They would be redirected to Montreal as the farthest west, and preferably to the Atlantic provinces for a modal shift.

In the first rationale, the promise is for lower shipping costs for the existing fleet and shipments, as all vessels would be able to fully load all the time. In addition, some existing container ships and bulk commodity flows, of larger size and deeper draft, are assumed to switch mode and location from the Atlantic East Coast to the Great Lakes. Then these same shipping cost reductions are assumed to generate fantastically high amounts of economic development through consumer and business spending. Other transportation benefits are also assumed to spin off.

Unfortunately, these estimates of benefits are ridiculously high and have a serious credibility problem. They are determined by an extended series of questionable and extremely positive assumptions concerning the amount of these transportation cost reductions, how they pass through the economy, and the subsequent multiple and sometimes novel direct and indirect impacts and ripple effects. Canada is assumed to levy export taxes to recover some of transportation cost savings to exports, however, this may be prohibited by trade rules, or may be politically and administratively impossible. There also appears to be double-counting of the cost reduction pass-through and subsequent impacts. Moreover, as noted above, the cost impacts of effective ballast water management techniques that eliminate exotics are not considered.

Besides, the analysis of impacts on current traffic indicates the gains come at the expense of current activity at the Atlantic coast ports. It is difficult to see how any net effect would be significantly positive, and in any case, the deliberate poaching of the East Coast business and economy would not go unopposed.

In the second rationale, despite stagnant to falling traffic on the Seaway system since the early 1980s, the study projections of the future show a steady growth of 0.7% to 0.8% a year till 2060, to levels far beyond anything ever experienced. Moreover, other projections of global trade

assume that container shipments will double over the next decade, as well as again in the following one. It is speculated that Atlantic ports may be congested and not able to adequately support the growth so this may be a source for Great Lakes expansion. These traffic projections indicate that the only major growth will be in container shipments which currently cannot move on the GL/SLS, although this is not explained

The proposal has extraordinary construction activities suggested, and large consequences ignored. As noted above, the currently burning issue of exotic species is noted as involved, but neither explored, nor accounted for. Furthermore, the impacts of blasting, deepening and widening, of dredging and disposal, of water level and flow issues and compensating works or the lack thereof (they are not included in the preliminary information available), of the impacts on shoreline erosion of large ship operation, and other impacts, are not considered up front. Predictably, the project has stirred up a great deal of public, ENGO, and media opposition.

Perhaps, what seems to be the strangest observation of all, and regardless of the huge environmental impacts, is that the project is not seen and rejected at the outset as economic folly. This failure shows a profound numerical illiteracy that is widespread, even beyond project proponents.

One doesn't have to go far to see that the numbers available don't make any economic sense. To begin with, the present laker fleet is largely obsolete. No new ships have been built for the Canadian inland fleet since 1984 and none are currently planned.

Instead, domestic owners have rehabilitated the existing self-unloading fleet, and converted grain carriers to self-unloaders, for carrying basic materials. This has reduced the number of ships carrying grain. The cost of conversions is from \$12 million to \$30 million. The cost of a newly built self-unloader is from \$55 to \$65 million (Jenkins et al, 2001).

The U.S. domestic fleet is heavily reliant (80%) on the domestic steel industry. This fleet carries a very significant tonnage solely within the Great Lakes, never using the Seaway. None of the cargoes carried by the U.S. domestic fleet go through the Montreal/Lake Ontario section, and only enter Lake Ontario infrequently. Indeed, this internal U.S. fleet tonnage amounts to about 64% of total Great Lakes tonnage carried during the last decade (Jenkins et al, 2001).

Thus, to a great extent the proposal amounts to a very costly and environmentally disruptive subsidy regime for shipping. It benefits, in the first instance, the ocean shipping sector (that is the main idea - open the Great Lakes to the entire ocean fleet), and only secondarily, and maybe, the domestic fleet. Further, since the economic analysis and rationale done pertains, directly, only to the existing fleet and tonnage shipped, this subsidy pertains to only about 318 individual ocean ships, the number that entered the Seaway during the 2000 shipping season. In 1999, ocean ships completed 641 round-trip transits of the Montreal/Lake Ontario section of the Seaway. These transits give a complete view of the cargoes carried by ocean ships on the Great Lakes (Jenkins et al, 2001).

A new ocean-going bulk carrier built offshore for the Great Lakes trade costs about US \$20 - \$25 million. The market value of a one that is 15 years old is about US \$6 million. Available estimates of the cost of the Seaway expansion proposal are highly preliminary, incomplete and omit many costs, however, they still amount to from US \$10 billion to \$16 billion in capital costs alone, excluding annual interest, operating, and maintenance costs, as well as environmental and ecosystem impacts and costs of mitigation (for example, compensating works). The capital costs may approach \$20 billion.

To provide some context to the ridiculous economic proportions of these project costs, consider that you could give every upbound ocean ship movement of 1999 (there were 641) almost US \$1.6 million to US \$3.2 million a year, for 10 years (US\$160,000 to US\$320,000 a year for 100 years), and equal this cost estimate, not counting the interest and other costs. Put another way, you could give each of the 318 ships US \$3.2 million to US \$6.4 million a year for 10 years (US\$320,000 to US\$640,000 a year for 100 years). In other words, you could buy each of these 318 ships more than once to ten times over (depending on new or used costs noted above), during the 10 years.

It is said that only about 15%, or one out of 7, of the ocean going fleet can access the Great Lakes. Making the impossible assumption that ocean ships will increase upbound transits by this 7 times in the near term, following project completion, implies a proportional increase in individual ocean ship visits to 2226 per year and transits to 4487 per year.

The potential subsidy in these cases is US \$230,000 to US \$460,000 per transit per year for 10 years, or US \$450,000 to US \$900,000 per ship per year for 10 years, again, not including interest or any of the other costs. Again, you could basically buy, at the used price of US \$6 million, every one of these ships outright by the end of the 10 year period. And recall, this doesn't include the interest or any other costs. Any way it's put, and you can look at it over various time periods, it doesn't make sense at all.

## Appendix 5. Dr. N.E. Mandrak

### Great Lakes Laboratory for Fisheries and Aquatic Sciences

#### Fisheries and Oceans, Canada

#### Potential Impact of Water Level Changes on Fish Species at Risk in the St. Clair - Detroit River System

A high diversity of fishes is present in the St. Clair - Detroit River Ecosystem (SCDRE). This high fish diversity is primarily the result of the warm temperatures of southwestern Ontario. Fourteen species assigned a conservation status by COSEWIC are known, or likely, to occur in the SCDRE (Table 1). This high number of fish species at risk (SAR) is a product of the high fish diversity and the extensive human impacts on the aquatic environment (e.g. industrial pollution, exotic species, dredging). The most notable introduced species are common carp (*Cyprinus carpio*), gobies (*Neogobius melanostomus*, *Protorhinus marmoratus*), and dreissenid mussels (*Dreissena* spp.).

Most of the fish SAR would likely be impacted by water level changes. Many are benthic fishes (e.g. northern madtom) that would be impacted directly by dredging, and most prefer vegetation that may be indirectly impacted by water level changes related to dredging and/or climate change.

Table 1. Species listed by COSEWIC known, or likely, to occur in the SCDRE. Habitat information taken from COSEWIC reports for each species.

Scientific Name	Common Name	COSEWIC Status	Preferred Habitat
<i>Notropis anogenus</i>	Shiner, Pugnose	END	SO,V, L
<i>Noturus stigmosus</i>	Madtom, Northern	END	SA,GR, M
<i>Ammocrypta pellucida</i>	Darter, Eastern Sand	THR	SA, M
<i>Erimyzon sucetta</i>	Chubsucker, Lake	THR	SO,V, L
<i>Lepisosteus oculatus</i>	Gar, Spotted	THR	SO,V, L
<i>Myoxocephalus thompsoni</i>	Sculpin, Deepwater	THR	SA, L
<i>Percina copelandi</i>	Darter, Channel	THR	SA, M
<i>Ictiobus cyprinellus</i>	Buffalo, Bigmouth	SC	SO,V, L
<i>Ictiobus niger</i>	Buffalo, Black	SC	SO,V, L
<i>Lepomis gulosus</i>	Warmouth	SC	SO,V, L
<i>Lepomis humilis</i>	Sunfish, Orangespotted	SC	SO,V, L
<i>Macrhybopsis storeriana</i>	Chub, Silver	SC	SA, L
<i>Minytrema melanops</i>	Sucker, Spotted	SC	SA,GR, M
<i>Opsopoeodus emiliae</i>	Minnnow, Pugnose	SC	SO,V, L

COSEWIC Status: END, Endangered; THR, Threatened; SC, Special Concern

Habitat: Substrates: SO - soft, SA - sand, GR - gravel, V - vegetated; Flow: L - low, M - medium; H - high.

## Appendix 6. Dr. A. Ricciardi



McGill

Redpath Museum  
McGill University

859 Sherbrooke Street West  
Montreal, PQ, Canada H3A 2K6

Dr. Ora Johannsson  
Board of Technical Experts  
Great Lakes Fisheries Commission

20 February 2003

Dear Dr. Johannsson,

Here is my opinion regarding the potential impact of the U.S. Army Corps of Engineers' plan to alter the Great Lakes Seaway to accommodate large Panamax-type vessels.

A major effect of larger vessels entering the Great Lakes will be the delivery of substantially greater volumes of ballast water. This means they will (1) carry a greater number and diversity of exotic organisms, and (2) enhance the survivorship of organisms during transport – owing to the increased thermal stability and oxygen content of a larger volume of water. The result will be increased inoculation pressure by exotic species on the Great Lakes-St Lawrence ecosystem.

If these larger ships have sufficient access to inland water ports, then they will pick up freshwater/oligohaline species when ballasting. But even if they are restricted to larger estuarine ports they will likely pick up euryhaline species that could survive an incomplete ballast-water exchange (as have several species that were introduced to the Great Lakes over the past decade), and thus bypass the only protective measure in place. Furthermore, some euryhaline invertebrates will have resting stages (eggs, cysts) that can be transported in ballast sediment—and thus in NOBOB vessels, which are not covered by any protective legislation. For example, shipping traffic from western Europe could deliver at least ~20 invasive euryhaline species (including Ponto-Caspian invertebrates) to the Great Lakes. There are scores of other species that do not yet have invasion histories but could potentially become problematic if introduced outside of their native range.

Sincerely,

Dr. Anthony Ricciardi  
Professor, McGill School of Environment  
McGill University  
Montreal, Canada

## **Appendix 7. Dr. H. MacIsaac,**

### **University of Windsor**

Here are my comments on the proposal to expand ship canals or dredge deeper connecting channels and our problem with invading species.

Exotic species have had a wide range of impacts on Great Lakes ecosystems, ranging from non-apparent to profound. We, of course, are most concerned by the species with profound effects, like sea lamprey, zebra and quagga mussels, and spiny and fishhook waterfleas. Sea lamprey caused massive declines in lake trout in upper basins when their populations were at peak abundance; they continue to impact the deeper Great Lakes differentially, depending on their abundance in them. The Great Lakes Fishery Commission's targeted research program stands an excellent and cost-effective example of dealing with a nuisance NIS once they have established in the lakes. These efforts were initially chemically based, but increasingly using more innovative approaches, and provide a very valuable service for Canadians and Americans.

Zebra and quagga mussels can safely be called ecosystem engineers in the Great Lakes: their effects range from chemical to physical to biological. The biological ones include expected impacts such as improvements in water clarity to unexpected ones including their apparent link to botulism deaths of waterfowl. These species have re-programmed the lower Great Lakes in a manner that severely limits managers' ability to forecast lake state and to do their job. Round gobies appear to be linked to the mussels and waterfowl deaths. They are increasingly widespread and abundant, and may be displacing some benthic fishes. Fishhook and spiny waterfleas clearly impact the size-structure and species composition of plankton in Lakes Ontario and Michigan. The former species invaded Lake Erie in 2001 and by summer 2002, was turning up in massive amounts fouled on commercial gill nets. This fouling is caused by mass movements of water, which bring the animals in contact with the nets. Russian experiences indicate that severe fouling by fishhook fleas caused fishermen not to deploy nets during periods when fouling is most intense. What is the probability this will occur with our commercial fishery? If this occurs repetitively, it will adversely impact the world's largest freshwater commercial fishery.

We have just completed a paper that analyzes the invasion rate (species/year) since the seaway was first opened in 1959. We regressed the invasion rate against time for periods before (1959-1988) and after (1989-2000) implementation of voluntary ballast water controls. The slope of these two regression lines differed -- with a significantly higher slope in the AFTER period. Why? One possibility is that there exists a lag between establishment of new NIS and their initial discovery. Certainly this is possible in some (many) cases. Thus invaders may have come in prior to the new rules, but were discovered afterwards. Another possibility is that we have more shipping. While the number of ships has declined over the past 40 years, the cargo tonnage imported has varied - most recently it has increased between 1989 and 2001. Another possibility is that ships are faster or that they carry ballast water from areas that

themselves are being invaded. Clearly, we think the Baltic and North Seas pose significant invasion risk to the Great Lakes. These two basins have been heavily invaded by species of Ponto-Caspian (and other) origin in recent years, and serve as a staging point for new NIS to enter the Great Lakes. We have a large study underway with USA colleagues to address whether NOBOB ships, which now dominate trade into the Great Lakes, may be contributing to the on-going invasion problem. We have identified viable eggs of numerous invertebrate species in sediments or residual water in ballast tanks of these ships, including species not yet identified in the Great Lakes. We have yet to determine the scale of threat posed by these vessels, however. It also should be noted that the Shipping Federation of Canada has recognized the role played by ships in invasions, and has volunteered their vessels for our research projects. They have been most accommodating to our studies to identify and quantify invasion risk posed by NOBOB vessels.

Once invaders establish in our lakes, there is virtually no way we can eliminate them. One can hope that existing species will prey, parasitize or compete with nuisance NIS to reduce their impact, but management of these species is often virtually impossible. If there is one lesson we have learned from the history of Great Lakes invasions, it is that 'an ounce of prevention is worth a pound of cure'. We argue that the USA and Canada must focus on identification and elimination of major vectors that transport NIS to our countries. This preventative approach will be cheaper and far more effective than trying to deal with invaders once they have established. Unlike chemical pollutants, we cannot reverse biological invasions and their effects.

We are presently working on a project to analyze inland spread of spiny waterfleas from the Great Lakes. This results are truly astonishing. Certain inland lakes, once invaded, will become invasion 'hubs', that will cause spread to many, many other lakes. For example, our survey data and mathematical model indicates that Lake Muskoka was invaded from Lake Huron, and has in turn caused 18 direct invasions of other lakes in Ontario, plus 17 additional secondary, tertiary invasions mediated through other lakes like Simcoe. We think Simcoe and Nipigon are new 'hubs' that will spread the species still further. The spread occurs through a whole host of human-mediated mechanisms (we have identified 8 plausible ones for this species). Each species will be spread by a different complement of mechanisms. So, one major vector brings the species to North America (shipping, live human foods, pet trade), yet once they establish in the Great Lakes, a whole host of mechanisms spread them inland. We have also tracked spiny waterflea spread in a stepping stone fashion to 5-6 inland lakes in succession.

Invasion rate is positively correlated with economic activity of a country, particularly imports. In Canada, our economy is humming along with 2-5% growth per annum. We think the Great lakes remain highly vulnerable to invasion because many, many species are now in position and have the life history characteristics needed to survive transfer and introduction. We have identified 14 high risk invertebrate species in Eurasia plus 33 lower risk ones. Dave Lodge and Cindy Kolar have identified 20 fish species that could get to and survive in the Great Lakes, five of which would almost



certainly become invasive.

We must not become defeatist about our chances to prevent invasions. Rather we must use of heads and wallets. The Auditor General's reports to parliament in 2001 and 2002 stated that the federal government must develop comprehensive programs to effectively manage this problem. This will require increased levels of funding to the departments responsible (in this case to DFO, Environment Canada and Transport Canada), for both personnel and operational costs. The cost of doing nothing will far exceed the investments required, so these programs and expenditures ought to be considered government 'savings' or, at a minimum, very cost-effective expenditures. Prevention of establishment of one pest NIS can save Canadians billions of dollars. For example, in my own backyard we are currently experiencing the initial invasion of emerald ash borer (beetle), which has already been estimated to have caused between \$5-9 billion US damage in the Detroit area alone! Canada must proactively identify the vectors that allow invaders in and eliminate them. Three Asian carp species are poised to enter the Great Lakes. If they do so, they will impact wetlands, fisheries and boater safety. Various US states and the IJC are spending millions of dollars to create electrical barriers in Chicago to prevent spread into Lake Michigan from the Mississippi drainage, yet some undergrads in my lab bought live bighead carp in a food store in Toronto in November 2002. Eliminating live sales of potentially injurious fishes is perhaps the easiest and least intrusive act a caring government could do to protect the Great Lakes today. Why haven't we done it?

If the ship lanes are deepened (dredged), it could actually reduce invasions. This would assume that total tonnage of cargo remains the same, thus requiring fewer, fuller ships to enter the Great Lakes. Because each ship carries some invasion risk, fewer ships translated into lower risk. If we get more ships, the risk would rise commensurately. Deeper channels would also allow ships to enter the system laden with more cargo, which would clearly have a positive influence on their balance sheets. That should translate into cheaper production costs and ultimately cheaper goods for consumers. Dredging will, of course, stir up many hazardous chemicals (mercury, PCBs, PAHs etc.) that are presently stored away in lower sediments in the lakes. Some of these chemicals will wind up in the food web.

If the connecting canals were lengthened or widened, we could see much bigger ships use the Great Lakes, again possibly reducing the number of invasions or increasing the rate depending on vector supply (ship number).

## Appendix 8.

### HAUDENOSAUNEE ONONDAGA NATION

HEMLOCK ROAD – BOX 319-B – VIA NEDROW, NEW YORK 13120

Hanadagayus  
George W. Bush  
President  
United States of America  
White House  
1600 Pennsylvania Avenue  
Washington, DC

December 21, 2002

Greetings Brother,

We send you greetings from the Hodiyaneshon' (Chiefs), Gayaneda' go'ndibwamyoh' (Clanmothers and Faithkeepers), men, women, and children of the Haudenosaunee. The Grand Council of Chiefs of the Haudensaunee Confederacy (comprised of the Seneca, Cayuga, Onondaga, Oneida, Mohawk and Tuscarora Nations) wish to inform you of our concern regarding the proposed expansion of the St. Lawrence Seaway, which currently flows through over 1,000 miles of Haudenosaunee Territory.

The Haudenosaunee also known as the Six Nations and the United States have a special relationship that dates back to our dealings with the Continental Congress and your first President, George Washington. Our nations established a firm and permanent peace by the Treaty Canandaigua of 1794. By that treaty, the United States promised not to disturb the Haudenosaunee in the free use and enjoyment of our lands. Article Seven of that treaty stipulates that if our nations have a complaint about the conduct of your people, we are to address the our complaint directly to the President.

We now send this letter as our formal objection and complaint by the Haudenosaunee on Behalf of all our nations to any project designated to make the St. Lawrence Seaway wider and deeper. The St. Lawrence River is not a canal, it is a living ecosystem. We have not been consulted in the preliminary discussions of this project as required under Section 106 of the National Historic Preservation Act, nor have any of our nations been formally notified that such a major undertaking is being considered. Section 106 requires federal agencies to engage our nations in early, formal consultation on these matters. We remind you that we should be discussing these matters on a nation-to-nation basis.

We are extremely concerned about this proposed project for several reasons. Foremost, we are concerned that the widening and deepening of the waterway would further erode the healthiness of an already weakened ecosystem. As you must be aware, the Great

Lakes watershed is the single largest source of fresh water in the world. It is of critical importance that the integrity of the water be protected. The proposed expansion of the waterway would pose a direct threat to clean water and endanger the natural environment for all peoples of North America. The healthiness of all peoples is directly related to the healthiness of the environment.

We hold a deep spiritual, cultural and social connection to the water as well as to all aspects of Mother Earth. We must all consider the long term impact that such an event will have on the quality of life for Americans, Canadians, the Haudenosaunee and all living creatures of the natural world. Leadership is responsible to all peoples to protect our precious inheritance – water – which is the fundamental element of life.

We are also concerned that by allowing more foreign vessels into our territory, you increase the risk of more introduced species that will upset the delicate balance of nature. Municipalities along the St. Lawrence and the Great Lakes are already suffering great hardship due to introduced species such as the zebra mussel, sea lamprey and rough goby. These species have invaded our waterways and cause serious environmental, economic and recreational nightmares. The main avenue for this introduced species has been from the ballast that has been dumped by foreign ships. By allowing more such ships into our territory, you will increase the opportunity for more species to be introduced and more damage will result. The trough of the propeller wake from these monstrous, ocean-going ships, will further damaged the water, disrupting habitat, shoreline integrity, and recreational use of the waterways.

The St. Lawrence River and Great Lakes waterways have served as a major source of life for the Haudenosaunee and other indigenous nations. The water is sacred to our people as it is the life blood of Mother Earth. We cannot survive without clean water. The rivers provide us with a cultural-based lifestyle as well as a source of food. The dredging of the river will result in more loss of habitat, wetlands, spawning grounds and an overall loss to our traditional way of life. We are also concerned that important sacred sites and areas of cultural significance will also be lost, endangered or altered by the expansion of the Seaway. The proposed project would also disrupt the homelands of the Haudenosaunee with the proposed removal of several islands within our territory. We object to the loss of such lands.

When our ancestors first met on the shores of the Hudson River, near present-day Albany, New York, we made a treaty that we call the Guswhenta (Two Row Wampum). That early 17<sup>th</sup> century agreement noted that we now travel on the river of life together. What we do affects each other. Together we must work to restore the health of the environment and protect the ecosystems from which we are dependant. We call for the restoration of environment that was initially disturbed fifty years ago when the Seaway was first constructed.

The Haudensaunee leadership strongly opposes any expansion of the Seaway. We are committed to protecting the land and water as they are a sacred trust that we must protect for the future generations. Destruction to the sacred land and resources can no longer be

tolerated. We ask that you consider our words and put an end to any further planning on this proposed project.

These are the thoughts of our people. We await your timely response to this important matter.

Dawnaytoh,

Tadadahoh  
Hoyaune' (Chief) Sidney I. Hill  
Haudenosaunee  
c/o Onondaga Nation  
Box 319-B  
Via Nedrow, NY 13120

## Appendix 9. Dr. K. Minns

### Great Lakes Laboratory for Fisheries and Aquatic Sciences, Fisheries and Oceans Canada

#### Seaway Expansion

Direct habitat impacts in connecting channels and those harbours receiving vessels - dredging to obtain deeper channels and presumably expansion of port facilities, encroaching on habitats via infill (Vic might be able to find out if HH has speculative plans for port expansion given an expanded seaway).

Indirect impacts through greatly enhance potential for exotic introductions, presumably from a wider range of sources.

Presumably expanded channels would have implications for flow and level management of water in the Great Lakes - maybe L Huron outflow would have to be managed?

Need for someone to do a tradeoff analysis of banning shipping from the GLs and transshipping via rail/road vs increased ecosystem impacts in GLs. How strong are the economic arguments for the existing seaway let alone an expanded one? The ecological costs are pretty clear with no end in sight.

Winter navigation might be required to make an expanded seaway financially viable with consequences for habitats near the seaway (Art Niimi looked at this much earlier?)

Isolating the GLs from ocean traffic raises the wider issue of whether ship or water movements apart from the natural outflow should be allowed at all - eg Chicago diversion canal - Nick is looking into this viz risk of species coming from southern GLs and Mississippi into GLs.