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NOTES

THE NEW COLD WAR: THE BATTLE TO PREVENT EURASIAN INVADERS FROM DESTROYING THE GREAT LAKES

*The bottom line is that these invaders are turning the Great Lakes into a zoo—not an ordinary zoo where the animals are safely confined but a zoo where they are unleashed to wreak havoc and devastation on the native ecological community.*¹

INTRODUCTION

The Great Lakes once were beautiful blue inland seas, providing a means of travel for indigenous people, explorers, and traders; a home to large populations of fish supplying the food necessary for natives and settlers; and later supported a multibillion dollar fishing industry. Eventually, due to human abuse through pollution and neglect, the lakes turned into a cesspool, devoid of life in many areas.² Pollution, however, is no longer the primary threat thanks to years of government regulation and industry reform. Instead, the current and future threat comes from Europe and Asia in the form of living organisms

¹ News Release, Int'l Joint Comm'n, IC Calls on Congress to Protect the Great Lakes: First Action Needed to Prevent Ecosystem from Becoming "Invader Zoo" (Mar. 25, 2004), available at http://www.ijc.org/rel/news/040325_e.htm (quoting *Ballast Water Management: New International Standards and National Invasive Species Act Reauthorization: Joint Hearing Before the Subcomms. on Coast Guard and Maritime Transp. and Water Resources and Env't of the H. Comm. on Transp. and Infrastructure*, 108th Cong. 127 (2004) (statement of The Honorable Dennis Schornack, U.S. Section Chair, Int'l Joint Commission)).

² See Dan Egan, *Zebra Mussels, Other Intruders Ravage Lakes*, MILWAUKEE J. SENTINEL, Oct. 31, 2005, at 1A (discussing the deadly effects of Lake Erie's low-oxygen environment on fish and birds, and quoting Henry Regier, a University of Toronto professor, describing Lake Michigan as "stripped down to just a very simple and sad caricature" of its former condition).

able to take over the Great Lakes, destroy the ecosystem and its native species, and turn the watershed into a wasteland.³

Over the past two decades, concern over the deteriorating ecosystem of the Great Lakes has increased significantly. This heightened interest in protecting the lakes is due to various issues, including pollution; proposals to export drinking water to other states, foreign countries, and commercial water bottlers; and the impact of invasive or non-native species inadvertently introduced into the lakes. The topic of controlling invasive species came to the forefront due to the substantial environmental and economic harm caused by the zebra mussel, a thumbnail sized organism from the Ukraine. Although small in stature, the zebra mussel is responsible for millions of dollars in damage annually and is suspected of contributing to the destruction of food sources for native fish populations.⁴ Since zebra mussels were discovered in the lakes in 1988, cities and utilities have spent roughly \$1.5 billion removing them from water pipes.⁵ Current estimates place the annual cost to taxpayers and businesses at \$30 million to control the mussels in the Great Lakes region.⁶ Zebra mussels clogging the water intake system of Monroe, Michigan alone caused \$2 million worth of damage.⁷ The U.S. Fish and Wildlife Service anticipates that it will cost \$5 billion to control the mussel over the next decade.⁸ Another notorious invasive species, the sea lamprey, forces states, provinces, and federal agencies to spend millions annually to keep the population from reaching a point that would threaten to destroy the lake trout population and a \$4.5 billion per year commercial fishing industry.⁹

Researchers believe that there are now at least one hundred and eighty non-native species in the Great Lakes, with about three quarters of those arriving since the opening of the St. Lawrence Seaway in 1959.¹⁰ One former federal scientist reports that invasive species completely changed Lake Erie's ecosystem and created a dead zone

³ *Id.*

⁴ *Id.*

⁵ Dan Egan, *Turning Tide on Invasive Species: Top Scientists to Study Ways to Stop Intruders on St. Lawrence Seaway*, MILWAUKEE J. SENTINEL, Nov. 13, 2005, at 1A.

⁶ Doug Haddix, *Destructive Stowaways: Loopholes and Gaps in U.S. Law Allow Ships to Dump Foreign Water and Its Contents—Tiny Creatures, Eggs and Other Forms of Life—at American Ports. Ballast Water Has Spread Hundreds of Costly Foreign Pests*, COLUMBUS DISPATCH, Oct. 28, 2003, at 1A.

⁷ *Zebra Mussel Poses Threat to Water Supplies*, CHI. TRIB., Nov. 7, 1989, at 3.

⁸ Haddix, *supra* note 6.

⁹ John C. Kuehner, *Groups Push to Protect Great Lakes from Foreign Pests*, PLAIN DEALER (Cleveland), Mar. 26, 2005, at B4.

¹⁰ John C. Kuehner, *Coast Guard Looks to Stop Pests from Sneaking into Great Lakes*, PLAIN DEALER (Cleveland), May 7, 2005, at B7.

in the lake in which nothing can survive due to a lack of oxygen in the water.¹¹ Many scientists believe that recovery efforts and the lakes' natural ability to deal with already present invasive species are hampered by the number of non-native species now in the lakes and those potentially arriving in the future.¹²

The primary method by which invasive species reach the Great Lakes is via the ballast water contained in international ships conducting trade on the lakes.¹³ Experts note that, since the Seaway opened, a new species turns up in the lakes on average once every eight months.¹⁴ Environmental organizations such as the National Wildlife Federation and Great Lakes United are calling on the U.S. and Canadian governments to enact tougher laws to regulate the discharge of ballast water by international ships.¹⁵ At least two prominent scientists believe that the Seaway must be closed to stop the spread of invasive species, at least until ships are subject to tougher regulations regarding the ballast water they carry or until better methods of treating and sterilizing ballast water are developed and incorporated by ships operating on the Seaway.¹⁶

Currently, joint United States and Canadian organizations are conducting two studies that will have important and far reaching ramifications for the environmental health of the Great Lakes. The first study, the Great Lakes St. Lawrence Study (GLSLS), is evaluating the infrastructure needs of the lakes and the Seaway, particularly the locks and other engineering mechanisms related to commercial navigation on the waterway.¹⁷ The GLSLS is also designed to address the economic and environmental implications of any engineering modifications to the waterway.¹⁸ The primary governmental bodies behind the GLSLS are the U.S. Army Corps of Engineers and Transport Canada, although the U.S. Department of Transportation, U.S. Fish and Wildlife Service, the U.S. and Canadian St. Lawrence Seaway management authorities, and Environment Canada are also participat-

¹¹ Mike Lafferty, *New Troubles for Great Lakes: Invasive Species Turning Back Recent Progress*, COLUMBUS DISPATCH, Dec. 9, 2005, at 01E.

¹² *Id.*

¹³ See John Veysey, *Exotic Species Slip Through Ballast Rule Loophole*, MILWAUKEE J. SENTINEL, July 26, 2004, at 1G ("Everybody agrees that ballast water is the biggest threat. 'The Commandant has called this his number one environmental problem'" (quoting Coast Guard spokeswoman Jolie Shifflet).

¹⁴ Kuehner, *supra* note 9.

¹⁵ *Id.*

¹⁶ See Lafferty, *supra* note 11; Stephen Watson, *Zebra Mussel Threat Prompts Call to Close Welland Canal to Ships*, BUFFALO NEWS, Dec. 30, 2004, at B2.

¹⁷ Great Lakes St. Lawrence Seaway Study, <http://www.glsls-study.com/English%20Site/home.html> (last visited Mar. 7, 2007).

¹⁸ *Id.*

ing.¹⁹ The study began in May 2003 and is expected to be completed in the spring of 2007, with an official report following shortly thereafter.²⁰ The GLSLS came on the heels of a Corps of Engineers report recommending the renovation and expansion of the St. Lawrence Seaway due to the deterioration of the Seaway structure and the inability of the current Seaway to accommodate the newest and largest ships in international trade.²¹ Congress rejected the expansion proposal, at least temporarily, and ordered the current study to focus on maintaining and improving the existing facilities.²²

Meanwhile, the simultaneous study is focusing on the environmental impact of the Seaway and shipping trade on the Great Lakes, specifically investigating options to restrict or prevent the introduction of foreign species into the watershed.²³ The National Academy of Sciences, a well respected private organization, is working with its Canadian counterpart, the Royal Society of Canada, on a two-year study slated to be completed in 2008.²⁴ The study will also look into ways of increasing global trade on the lakes.²⁵ The collective results of this study, undertaken by some of the top scientists from the U.S. and Canada, and the GLSLS will have a significant impact on the future of the Great Lakes, the Seaway, and the ballast water management strategies to keep invasive species out of the ecosystem.

This Note investigates the current U.S. and Canadian ballast water management regimes in place to prevent the introduction of invasive species into the Great Lakes. Part I of this Note describes the U.S., Canadian, and international law governing the introduction of invasive species through ballast water discharges. Part II discusses the techniques and technology currently existing or in development that may be available for ballast water filtration and sterilization. Part III examines possible avenues for regulation at the state, provincial, and federal levels, while examining the cooperation at and between these levels of government both within and across the U.S.-Canadian border. Part III also explores previous government regulatory responses to environmental crises and the government's ability to respond similarly to invasive species. Part IV urges the Great Lakes states and provinces to enact regulations to the extent possible without overstepping constitutional boundaries, forcing the U.S. and Canadian federal

¹⁹ *Id.*

²⁰ *Id.*

²¹ Egan, *supra* note 5.

²² Dan Egan, *Uncharted Waters*, MILWAUKEE J. SENTINEL, Nov. 1, 2005, at 1A.

²³ Egan, *supra* note 5.

²⁴ *Id.*

²⁵ *Id.*

governments to work together on creating and implementing a new ballast water management regime utilizing new filtration and sterilization technologies to prevent the future introduction of invasive species into the Great Lakes.

I. THE CURRENT REGULATORY BLOCKADES TO BALLAST WATER CONTAINING INVASIVE SPECIES

A. *United States Federal Regulations*

U.S. ballast water management is more advanced than its Canadian counterpart. The federal government delegated responsibility for regulating ballast water to the Coast Guard through the Non-Indigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA) and the National Invasive Species Act of 1996 (NISA).²⁶ The Coast Guard requires ships entering the St. Lawrence Seaway from international ports to either exchange their ballast water prior to entering U.S. waters (at least 200 miles from land), to retain the ballast water on board while in U.S. waters, or to use a Coast Guard approved alternative for treating the water (typically, dumping the water in a specified area within U.S. waters).²⁷ The Coast Guard created a safety exception that allows ships that are unable to safely exchange ballast water at sea, or those forced to discharge water in order to protect the ship and its crew, to expel the water in the lakes without violating the regulations.²⁸ Ships must record their ballast water practices and submit these reports to the Coast Guard.²⁹ Failure to comply with these regulations results in a maximum fine of \$27,500 per day, and a willful violation constitutes a class C felony.³⁰ The Coast Guard determines whether a ship has complied with the regulations by boarding the ship and measuring the salinity of the water within the ballast tanks.³¹ A salinity of thirty parts per thousand is considered evidence that the water came from the ocean and that any freshwater organisms from foreign waters would likely not be able to survive in the tanks following water exchange.³²

²⁶ Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, Pub. L. No. 106-646, 104 Stat. 4761 (amended by National Invasive Species Act of 1996, 16 U.S.C. § 4701 (2000)).

²⁷ 33 C.F.R. § 151.2035(b) (2006).

²⁸ *See id.* § 151.2037(a).

²⁹ *Id.* § 151.2041.

³⁰ *Id.* § 151.2007.

³¹ Great Lakes St. Lawrence Seaway System, *Ballast Water Management in the Great Lakes St. Lawrence Seaway System*, http://www.greatlakes-seaway.com/en/navigation/ballast_water.html (last visited Mar. 26, 2006) (discussing U.S. Coast Guard inspection procedure for foreign-flagged vessels).

³² *Id.*

A major loophole in the regulations relates to ships that enter the Seaway fully loaded with cargo, thus not carrying ballast water, and declare themselves to have no ballast. These no-ballast-on-board (NOBOB) ships actually retain some water and sediment in their ballast tanks, allowing organisms to survive.³³ When these ships unload their cargo and load new cargo, they pump water in and out of the tanks, allowing the sediment in the ballast tanks to mix with the new ballast water.³⁴ Subsequent discharges release non-native organisms into the water.³⁵ In 2005, the Great Lakes states petitioned the Coast Guard to take action to close this loophole, as nearly nine out of ten international ships entering the lakes “are fully loaded and have no need for ballast.”³⁶ A ballast tank sampling study by the National Oceanic and Atmospheric Administration estimated that NOBOB ships “carry literally billions of live critters each year into the Great Lakes basin,” as well as human pathogens such as cholera.³⁷ In response, the Coast Guard instituted a voluntary practice of “Ballast Water Management for Vessels Entering the Great Lakes that Declare No Ballast On Board.”³⁸ These management practices request that ships incapable of undertaking a full ballast water exchange at sea conduct a saltwater flushing of the tanks by adding enough salt water to the tanks to mix with the existing residue, allowing the ships to then flush the mixture from the tanks.³⁹ The effectiveness of this new rule is undetermined because it is a voluntary practice.

Reporting and enforcement present additional problems. Although ships must submit reports, the Coast Guard has not entered these reports into a database.⁴⁰ The Coast Guard has not issued a report on the effectiveness of the regulations, as Congress did not mandate regular reports concerning the ballast water exchange program.⁴¹ A 2003 investigation found that no ships were fined and that the Coast Guard only issued five warning letters since the inception of the program.⁴² A Minnesota Congressman stated that the only way to get the shipping industry to cooperate “is to have fines and penalties” and

³³ Kuehner, *supra* note 10 (explaining that these organisms include “zebra mussels, round goby and sea lamprey.”).

³⁴ *Id.*

³⁵ *Id.*

³⁶ *Id.*

³⁷ Dan Egan, *Loophole in Ballast Law Lets Invasive Species in*, MILWAUKEE J. SENTINEL, Oct. 31, 2005, at 1A.

³⁸ Ballast Water Management for Vessels Entering the Great Lakes That Declare No Ballast on Board, 70 Fed. Reg. 51,831 (Aug. 31, 2005).

³⁹ *Id.* (explaining how best practices should be incorporated).

⁴⁰ Haddix, *supra* note 6.

⁴¹ *Id.*

⁴² *Id.*

“tough enforcement,” which are currently lacking in the management program.⁴³

B. Canadian Regulations

Canada first enacted voluntary ballast water guidelines in 1989 when the Canadian Coast Guard developed regulations for ships entering the St. Lawrence Seaway. A 1998 amendment to the Canada Shipping Act addressed the need for a statutory management regime by authorizing the Governor in Council to “make regulations respecting the control and management of ballast water.”⁴⁴ In accordance with the Act, Transport Canada issued proposed regulations in 2005 that would require mandatory ballast exchanges similar to those required by the U.S. Coast Guard.⁴⁵ The Coast Guard and proposed Canadian regulations are substantially similar in most respects. For example, both provide for the same distance from shore that the exchange must take place and both grant the same safety exceptions. The introductory statement to the proposed regulations notes that “[t]o every extent possible, the proposed Regulations do harmonize with the United States’ rule.”⁴⁶ Until these mandatory regulations are imposed, however, one Canadian expert describes Canada as relying “on U.S. initiatives to protect the lakes from the ships.”⁴⁷

C. International Objectives

The 1982 United Nations Convention on the Law of the Sea first proposed that member nations should take steps to prevent the introduction of foreign species into their marine environments. To aid nations in achieving this goal, in 2004 the International Maritime Organization (IMO), a United Nations agency, adopted the International Convention for the Control and Management of Ships’ Ballast Water and Sediments (BWM Convention).⁴⁸ The IMO is responsible for the safety and security of shipping and prevention of pollution by ships.⁴⁹ The BWM Convention establishes minimum

⁴³ Egan, *supra* note 37 (quoting Minnesota Congressman Jim Oberstar).

⁴⁴ Canada Shipping Act, R.S.C., ch. S-9, § 657.1 (1985) (Can.) (amended 1998).

⁴⁵ Ballast Water Control and Management Regulations, 139 C. Gaz. Pt. I, at 2129 (June 11, 2005), available at <http://canadagazette.gc.ca/part1/2005/20050611/pdf/g1-13924.pdf> (discussing the purpose of the amendment as reducing the harm to Canada’s aquatic life).

⁴⁶ *Id.*

⁴⁷ Veysey, *supra* note 13 (quoting Professor Hugh MacIsaac of the University of Windsor).

⁴⁸ International Convention for the Control and Management of Ships’ Ballast Water and Sediments, Feb. 13, 2004, http://www.imo.org/Conventions/mainframe.asp?topic_id=867 (discussing that the intent of parties to the treaty is to eliminate the harm to aquatic organisms).

⁴⁹ Press Release, IJC Commends IMO for Global Ballast Water Convention and High-

standards for member nations similar to the Coast Guard's ballast exchange provisions.⁵⁰ The BWM Convention allows member nations to have stricter standards than the minimum set by the convention.⁵¹ This allows nations facing a more serious invasive species problem to enforce tougher regulations while not infringing on the right of other nations to have lower standards. The BWM Convention comes into force twelve months after ratification by thirty member nations. As of February 26, 2006, only six nations are parties to the BWM Convention, with the U.S. not among them.⁵²

II. FINDING NEW METHODS TO KEEP CONTAMINATED BALLAST WATER OUT OF THE GREAT LAKES

A. *Developing New Technologies and Techniques*

Experts agree that the current method of ballast water exchange is insufficient and that treating the tanks is the most effective way to kill organisms.⁵³ However, early experiments with chemicals proved unsuccessful. Chlorine is an effective agent at killing organisms but concentrated amounts can erode a ship's ballast tank over time, threatening the safety of the ship and crew.⁵⁴ Copper ions proved problematic because the discharge of copper itself is restricted in the lakes.⁵⁵ Another option is the VELOX system, a sterilization technology combining chemicals and ultra violet light.⁵⁶ All of these possibilities require further testing and development.

In 1997, the Lake Carriers' Association, composed of U.S. and Canadian shipping companies, used the ship Algonorth as a floating laboratory to test methods for fighting the spread of invasive

lights Significance to Protecting the Great Lakes (Feb. 18, 2004), available at http://www.ijc.org/rel/news/040218_e.htm (explaining that ships implementing the ballast plan must keep a log of their ballast water management).

⁵⁰ International Convention for the Control and Management of Ships' Ballast Water and Sediments, Feb. 13, 2004, http://www.imo.org/Conventions/mainframe.asp?topic_id=867 (explaining that ships must have the correct certification and submit to ballast water testing by state inspectors).

⁵¹ *Id.*

⁵² IMO, Summary of Conventions, http://www.imo.org/Conventions/mainframe.asp?topic_id=247 (last visited Mar. 7, 2006); http://www.imo.org/includes/blastDataOnly.asp/data_id%3D16611/status.xls (last visited Mar. 7, 2007).

⁵³ Haddix, *supra* note 6.

⁵⁴ Egan, *supra* note 37.

⁵⁵ *Id.*

⁵⁶ Chris Wiley, *Ballast Water Management in Canada: National Direction, Regional Realities*, 2 TOL. J. GREAT LAKES' L. SCI. & POL'Y 249, 256 (2000) (discussing the VELOX system).

species.⁵⁷ The \$1.3 million project focused on filtration and other technologies including chemicals, ultraviolet lights, and heat treatment.⁵⁸ Screens on the water intake pipes prevented organisms larger than 25 microns from entering the ballast tanks.⁵⁹ The filters were 5 feet long, weighed about 1,000 pounds, and were capable of filtering water at the rate of 1,500 gallons per minute, a necessarily high rate due to the need of ships to fill and empty their ballast tanks rapidly, particularly in emergencies.⁶⁰ One estimate placed the cost of implementing filtration systems on the 400 ships that pose the greatest risk to the lakes at \$200 million, "a drop in the bucket when you're talking about the Great Lakes ecosystem being at risk."⁶¹ Other shipboard experiments include the Great Lakes Ballast Water Treatment Demonstration Project, which tests a joint filtration-UV system, and the Department of Fisheries and Oceans Canada's testing of a hydrocyclone/UV system.⁶²

In addition to creating new technologies to cope with the ballast water problem, it may be possible to use existing technologies and infrastructures to remove non-native organisms. One option is to implement a system in which ships coming into a local port or entering the Seaway are able to pump out ballast water using land-based pumps or hoses that are connected to local waste water treatment facilities. The ship would then take on ballast water directly from the lakes. This lake water could later be expelled at any time without fear of introducing non-native organisms. The shipping industry is familiar with this treatment method, as oil tankers are required to exchange their contaminated ballast water, which is held in their oil tanks, at onshore facilities.⁶³ The oil-diluted ballast water is pumped out of the ship to an onshore treatment facility, which reduces the concentration of oil prior to discharging the treated water.⁶⁴

⁵⁷ Thomas W. Gerdel, *Ship May Help Keep Lakes Free of Pests*, PLAIN DEALER (Cleveland), Jan. 28, 1997, at 1C.

⁵⁸ *Id.* (discussing methods such as filtration designed to prevent pathogens from entering the lakes).

⁵⁹ *Id.* A micron is one-thousandth of a millimeter. WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY 1428 (1986).

⁶⁰ *Id.*

⁶¹ Haddix, *supra* note 6 (quoting Dennis Schornack, co-chairman of the International Joint Commission, referring to the ships traveling from the Black and Caspian Seas, which is a well known origin of invasive species able to adapt to the Great Lakes).

⁶² URS/DAMES & MOORE, FEASIBILITY OF ONSHORE BALLAST WATER TREATMENT AT CALIFORNIA PORTS, at E-2 (2000) (explaining the emphasis on studying systems aboard the ships) (copy on file with the Case Western Reserve Law Review).

⁶³ See Prince William Sound Regional Citizens' Advisory Council, *NIS and Ballast Water*, <http://www.pwsrcc.org/projects/NIS/bw.html> (last visited Mar. 31, 2006) (estimating that 107 million gallons of ballast water were dumped into Prince William Sound in 1998).

⁶⁴ *Id.*

At a similar Great Lakes facility, ballast water removed from ships would be treated and presumably this would sanitize the water and kill any organisms and bacteria. Waste water plants already in existence may suffice, or it may be necessary to build new, specially equipped lakeside facilities. Another benefit is that ships would no longer face the safety concerns associated with ballast exchange at open sea, concerns that are strong enough to necessitate an exception to the current mandatory Coast Guard guidelines. Such a program would likely require federal funding rather than forcing state and local communities to bear the cost of constructing and maintaining the system. A different potential problem, overloading the facility, could be solved by constructing large holding tanks.⁶⁵ The shipping industry is looking into the feasibility of treating ballast water at an onshore treatment center on the Lake Erie coast.⁶⁶

The California Association of Port Authorities, using a grant from the U.S. Environmental Protection Agency (EPA), undertook a study examining the implementation of onshore ballast water treatment facilities at California ports.⁶⁷ This narrow, limited study was completed in 2000 and provides some analogies to potential Great Lakes facilities. The study looked at the technical and operational feasibility of creating facilities with a combined system of filtering and UV treatment technologies available at that time.⁶⁸ The facility would treat the water and sediment from ballast tanks, release the treated water, and transfer the treated sediment to landfills.⁶⁹ The study determined that local wastewater plants are probably unable to accommodate ballast water because saltwater is incompatible with the bacteria used to treat freshwater.⁷⁰ Thus, separate facilities would be required for treating ballast water. The study estimated that retrofitting vessels to use an onshore facility would cost, on average, four hundred thousand dollars per ship, and the facilities themselves somewhere in the tens of millions of dollars, although it is important to note that the study estimated the cumulative costs for facilities at eleven of California's ports.⁷¹ Other costs examined included routine maintenance of the facilities and costs borne by the shippers due to delays.⁷² The study concluded that onshore treatment facilities did not

⁶⁵ See URS/DAMES & MOORE, *supra* note 62, at 22 (finding that storage tanks with the capacity to handle two days of maximum discharge are necessary).

⁶⁶ Watson, *supra* note 16.

⁶⁷ URS/DAMES & MOORE, *supra* note 62.

⁶⁸ *Id.* at E-4.

⁶⁹ *Id.* at 9.

⁷⁰ *Id.* at 10.

⁷¹ *Id.* at 15.

⁷² *Id.*

merit significant further investment due to the limited technologies then available.⁷³

While not a viable option for California ports in 2000, an onshore treatment facility may be ideal for the Great Lakes based on the fact that all ships enter the lakes via the St. Lawrence Seaway. This would allow for a single treatment facility that ships could utilize as they enter the lakes rather than constructing a facility at every port. One possibility is to construct onshore treatment facilities on both the U.S. and Canadian shores near the Welland Canal, allowing the two nations to share the costs of construction and maintenance. This would enable ships to exchange ballast water prior to entering the locks and facilitate a faster process by providing an alternative exchange facility should one be unable to accommodate an incoming ship due to ballast water exchanges underway.

To promote technological innovations and improvements, a number of U.S. federal agencies are sponsoring two ballast water treatment competitions that began in 2006. In 2005, the National Oceanic and Atmospheric Association, in conjunction with the Fish and Wildlife Service, asked for proposals to develop a "Research, Development, Testing, and Evaluation" (RDTE) facility in the Great Lakes region to support progress in the development of ballast water treatment technologies.⁷⁴ The competition began in 2006 with the winning proposal receiving a nine hundred and fifty thousand dollar grant to produce a multi-year cooperative agreement between federal, state, and private entities to create and operate a Great Lakes ballast water RDTE facility.⁷⁵ Those two agencies, along with the U.S. Maritime Administration, are also accepting proposals for projects to demonstrate and test new ballast water treatment technologies.⁷⁶ The eight selected proposals will each receive \$200,000 to carry out their tests and demonstrations.⁷⁷ The Maritime Administration is providing vessels for use in conjunction with these projects.⁷⁸

Whether the future treatment technology involves filtration, sterilization, or a combination of both, new ships will have to be built to accommodate the new technology and current ships will need to be

⁷³ *Id.* at 49–50.

⁷⁴ National Oceanic and Atmospheric Administration (NOAA), Availability of Grant Funds for Fiscal Year 2006, 70 Fed. Reg. 37,766, 37,783 (June 30, 2005); *see also* Ballast Water Technology Demonstration Program, <http://www.seagrant.noaa.gov/research/nonindigenous/ballast/index.html> (last visited Mar. 31, 2006).

⁷⁵ NOAA, Availability of Grant Funds for Fiscal Year 2006, 70 Fed. Reg. at 37,783–84.

⁷⁶ *Id.* at 37,784–85.

⁷⁷ *Id.*

⁷⁸ *Id.*

retrofitted or undergo a complete overhaul of their ballast tanks.⁷⁹ The shipping industry, like any other industry, is not receptive to measures that will increase the costs of doing business. One method of ensuring compliance and fostering accelerated research and development of new technologies is offering subsidies and tax incentives to shipping companies and shipbuilders.⁸⁰ The United States Great Lakes Shipping Association supports federal proposals that provide incentives for technology to treat ballast water.⁸¹ No matter which methods are eventually employed, incentives should be provided to the shipping industry to hasten compliance.

B. Closing the St. Lawrence Seaway

A more drastic approach is the closing of the St. Lawrence Seaway. Scientists argue that closing the Seaway at the Welland Canal would restore the natural barrier of Niagara Falls between Lakes Erie and Ontario.⁸² A study examined the potential economic loss to the region if the Seaway closed and determined that it would only cost the shipping industry roughly \$55 million per year due to the competitiveness of other transport options, such as lakers (ships that operate only on the lakes), barges, rail, and trucks.⁸³ The \$55 million figure came from looking at the current shipments carried on the lakes and estimating the cost associated with transporting that material via the alternatives.⁸⁴

Possible incidental benefits from closing the Seaway include the fact that shipping goods by truck or train is generally faster than shipping on the lakes. "Intermodal" container traffic, transported across the ocean by ships and across the continents by rail and truck, dominates the shipping industry because of its ability to deliver goods quickly.⁸⁵ In addition, whereas the lakes are closed to shipping three months out of the year due to weather, intermodal shipping is a year-round industry.⁸⁶ By closing the Seaway and building a larger port facility for ships to transfer goods, shippers may actually enjoy the

⁷⁹ Wiley, *supra* note 56, at 257.

⁸⁰ Sandra B. Zellmer, *Enjoy the Donut: A Regulatory Response to the White Paper on Preventing Invasion of the Great Lakes by Exotic Species*, 2 TOL. J. GREAT LAKES' L. SCI. & POL'Y 207 (2000).

⁸¹ Kuehner, *supra* note 9.

⁸² Egan, *supra* note 22.

⁸³ See Peter T. Leach, *Seaway Savings 'Minimal'*, J. COM. ONLINE, Dec. 13, 2005, <http://www.joc.com/> (discussing transportation study by Grand Valley State University marketing professor John Taylor).

⁸⁴ Egan, *supra* note 5.

⁸⁵ Egan, *supra* note 22.

⁸⁶ *Id.*

benefit of being able to transport goods year-round through a tightly run intermodal shipping industry based at a point near the mouth of the Seaway. Another option is to transfer cargo from ocean ships to the smaller lakers. This plan focuses on unloading international ships at ports such as Halifax and Montreal that are open year-round, then loading the cargo into the lakers for the journey across the lakes.⁸⁷ An added benefit is that during the winter months the cargo could be transferred to rail or truck instead of to lakers. Both of these proposals, however, would create additional costs associated with contracting with two shippers to transport goods, as well as the costs inherent in the delay due to transferring the cargo.

There is strong opposition to closing the Seaway to international ships. Opponents, including the St. Lawrence Seaway Management Corporation and the Lake Carriers' Association, maintain that the Seaway is a vital part of the North American manufacturing economy and stress that closing the Seaway is too extreme. According to the Lake Carriers' Association, forcing ships to unload and transfer their cargoes to trucks and trains would result not only in increased costs but in higher pollution and traffic inherent in overland shipping.⁸⁸ The Great Lakes Commission reported that ships are cleaner and safer than trucks and trains.⁸⁹ Ships can carry much more cargo than trucks and trains, as the average shipload of cargo is equal to 870 truckloads or 225 rail cars.⁹⁰ Seaway operators also point to the fact that ships use 20% of the energy trucks require and can move a ton of cargo five hundred miles on a single gallon of fuel.⁹¹ The Seaway accommodates a large volume of traffic; for example, Welland Canal statistics show that thirty-three million tons of cargo is shipped through the canal each year.⁹² International trade provides roughly 25% of the Seaway tolls collected annually, and these tolls allow the entire Seaway to operate.⁹³ Although international trade only accounts for about

⁸⁷ *Shoe-horning Down the Canal*, TORONTO STAR, June 6, 2004, at A7.

⁸⁸ Watson, *supra* note 16.

⁸⁹ James L. Tyson, *Robust Economy in Midwest Boosts Great Lakes Shipping*, CHRISTIAN SCI. MONITOR, Aug. 25, 1995, at 8.

⁹⁰ Egan, *supra* note 22; Watson, *supra* note 16.

⁹¹ Egan, *supra* note 22. By comparison, railroads can move a ton of cargo approximately 410 miles on a gallon of fuel. ENO TRANSPORTATION FOUNDATION, EFFICIENT GOODS MOVEMENT AND THE ENVIRONMENT, SUMMARY OF SYMPOSIUM SERIES OCTOBER 2005-MARCH 2006 4 (2006), available at <http://enotrans.com/Policy%20Forums/PolicyForums.htm> (scroll to "Efficient Goods Movement and the Environment"; then click "Read the Summary Report").

⁹² Watson, *supra* note 16.

⁹³ Ernst-Ulrich Franzen, Editorial, *Control the Seaway*, MILWAUKEE J. SENTINEL, Nov. 2, 2005, at A12.

6.9% of the total cargo moved on the Lakes, closing the Seaway must be considered a last resort.⁹⁴

III. REGULATING AT DIFFERENT LEVELS OF GOVERNMENT AND ACROSS BORDERS

The first and least attractive option for ballast water management is continuing the current standards and practices. The existing ballast water management standards are promulgated by the U.S. Coast Guard under the NANPCA and the NISA.⁹⁵ There are questions regarding the effectiveness of these regulations. Although the NANPCA and the NISA enable the Coast Guard to implement effective regulations, the Coast Guard does not appear willing to take drastic action, particularly when the shipping industry vociferously objects.⁹⁶ The Coast Guard moved very slowly from voluntary to mandatory regulations and is not sufficiently addressing the NOBOB loophole.⁹⁷ Some federal lawmakers, particularly those from Great Lakes states, recognize the weaknesses inherent in the current regulatory scheme and are attempting to enact new legislation imposing strict guidelines for ballast water management in the lakes.⁹⁸ Unfortunately, these efforts are not catching the attention of more legislators and, therefore, are not succeeding. Other options for regulation exist at the federal, state, and provincial levels.

A. Clean Water Act

For several years, commentators contended that the Clean Water Act (CWA)⁹⁹ should apply to ballast water discharged from ships.¹⁰⁰

⁹⁴ *Id.*

⁹⁵ See *supra* Part I.A.

⁹⁶ Eric Reeves, *Exotic Politics: An Analysis of the Law and Politics of Exotic Invasions of the Great Lakes*, 2 TOL. J. GREAT LAKES' L. SCI. & POL'Y 125, 151–52 (2000) (discussing how the Coast Guard backed off its plan in 1999 to increase the testing standard for ballast water following shipping industry protests).

⁹⁷ See Kuehner, *supra* note 10 (describing a letter from the Great Lakes states to the Coast Guard in which the states called the Coast Guard's proposal to have a meeting in 2005 to discuss the NOBOB loophole "too little, too late, and simply insufficient to resolve the NOBOB problem").

⁹⁸ See Gene Schabath, *Bill Would Ban Foreign Ships' Ballast Water: Rule Would Override EPA, Saves Lakes from Some Species*, DETROIT NEWS, Sept. 24, 2003, at 1E (describing effort of U.S. Representative Candace Miller of Michigan in enacting new law setting a minimum testing standard for ballast water exchange and sterilization of ballast tanks).

⁹⁹ Clean Water Act, 33 U.S.C. § 1251(a) (2000).

¹⁰⁰ See, e.g., Andrew N. Cohen & Brent Foster, *The Regulation of Biological Pollution: Preventing Exotic Species Invasions from Ballast Water Discharged into California Coastal Waters*, 30 GOLDEN GATE U. L. REV. 787 (2000) (arguing that the Clean Water Act should apply to ballast water discharges); Brent C. Foster, *Pollutants Without Half-Lives: The Role of Federal Environmental Laws in Controlling Ballast Water Discharges of Exotic Species*,

The purpose of the CWA is “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.”¹⁰¹ The CWA prohibits the discharge of pollutants, including biological materials, from a “point source,” such as a ship, into the navigable waters of the United States without a National Pollutant Discharge Elimination Systems (NPDES) permit.¹⁰² Under the CWA, the EPA has primary authority for implementation and enforcement. The EPA issued regulations exempting discharges “incidental to the normal operation of a vessel” from the permit regulation.¹⁰³ In effect, this enabled ships to discharge their ballast water without having to obtain a permit and without violating the CWA, despite the fact that the unambiguous language of the CWA otherwise applies to a ship’s discharge of ballast water into navigable U.S. waters.

In 2005, a U.S. District Court in California determined that the CWA applies to ballast water discharged from ships in *Northwest Environmental Advocates v. EPA*.¹⁰⁴ Northwest Environmental Advocates and others filed suit against the EPA claiming that the regulation exempting discharges from vessels should be repealed because it conflicts with the CWA, which does not exempt such discharges.¹⁰⁵ Attorneys General from six Great Lake states intervened as plaintiffs and filed a brief in support of the contention that the EPA regulation violated the CWA.¹⁰⁶ The court rejected the EPA’s arguments that Congress assented to the regulation by not overruling it with legislation and that other acts, including the NANPCA and the NISA, were designed to pre-empt the CWA with regard to ballast water management.¹⁰⁷ The court concluded that the EPA “acted in excess of its statutory authority” and ordered the EPA to repeal the regulation exempting discharges incidental to the normal

30 ENVTL. L. 99 (2000) (asserting that the Clean Water Act and other federal acts restrict ballast water discharges); Zellmer, *supra* note 80 (suggesting that the Clean Water Act is an effective solution for ballast water regulation).

¹⁰¹ *Nw. Envtl. Advocates v. U.S. EPA*, No. C 03-05760 SI, 2005 WL 756614, at *1 (N.D. Cal. Mar. 30, 2005) (quoting 33 U.S.C. § 1251(a)).

¹⁰² *Id.* at *8–9 (citing 33 U.S.C. §§ 1311(a), 1342(a), 1362; Comm. to Save Mokelumne River v. E. Bay Mun. Util. Dist., 13 F.3d 305, 308 (9th Cir. 1993)); see also Nat’l Wildlife Fed’n v. Consumers Power Co., 862 F.2d 580, 583 (6th Cir. 1988) (defining fish and fish remains as “pollutants” because they are “biological materials” under the CWA).

¹⁰³ 40 C.F.R. § 122.3(a) (2005).

¹⁰⁴ *Nw. Envtl. Advocates*, 2005 WL 756614.

¹⁰⁵ *Id.* at *2.

¹⁰⁶ *Id.*

¹⁰⁷ *Id.* at *11.

operation of a vessel from the obligation to obtain a permit under the CWA.¹⁰⁸

The six Great Lakes states requested the court to require the EPA to draft interim rules regarding ballast water by April 1, 2006 and to adopt final regulations by October 1, 2007.¹⁰⁹ In September 2006, the court issued a permanent injunction repealing the EPA's regulation that exempted discharges from ships, effective September 30, 2008.¹¹⁰ The court determined that permanent injunctive relief was appropriate because "the environmental injury in this case—introduction of invasive species—is more certainly irreparable than most."¹¹¹

Although no appeal has yet been filed as to the original decision or the injunction, the EPA may choose to appeal, or it may look to Congress to create an exception identical to the EPA's regulation. The EPA could also press Congress to enact one of the numerous draft laws pertaining to ballast water management, thereby circumventing the application of the CWA to ballast water.¹¹² It remains to be seen what effect, if any, this ruling will ultimately have for ships discharging their ballast water in the normal course of operations.

B. Cooperation Between the U.S. and Canada

The U.S. and Canada have a long history of cooperation on issues related to the Great Lakes and the environment. This cooperation exists at both the federal and state/provincial levels. The relationship began with the signing of the Boundary Waters Treaty of 1909.¹¹³ The treaty created the International Joint Commission (IJC) to assist the countries in preventing and resolving disputes involving the boundary waters. The IJC advises the two governments on measures necessary for restoring and maintaining the integrity of the Great Lakes ecosystem.¹¹⁴ The IJC is taking an active role in advising the two nations on measures to halt the introduction of invasive species into the Great

¹⁰⁸ *Id.* at *13.

¹⁰⁹ Brief for the States of New York, Illinois, Michigan, Minnesota, Wisconsin and the Commonwealth of Pennsylvania on Selection of Remedy and Final Order of Judgment, at 12, *Nw. Envtl. Advocates v. U.S. EPA*, No. C 03-05760 SI (N.D. Cal. Mar. 30, 2005), 2005 WL 2869027.

¹¹⁰ *Nw. Envtl. Advocates v. U.S. EPA*, No. C 03-05760 SI, 2006 WL 2669042 (N.D. Cal. Sept. 18, 2006).

¹¹¹ *Id.* at *11.

¹¹² Emily Plett-Miyake, *EPA Must Repeal Ballast Water Exception*, SANDBAR (Nat'l Sea Grant Law Center, U. Miss.), July 2005, at 1, available at <http://www.olemiss.edu/orgs/SGLC/National/SandBar%20PDF/sandbar4.2.pdf>.

¹¹³ Treaty Between the United States and Great Britain Relating to Boundary Waters Between the United States and Canada, U.S.-Gr. Brit., Jan. 11, 1909, 36 Stat. 2448.

¹¹⁴ The International Joint Commission—What It Is, How It Works, http://www.ijc.org/en/background/ijc_cmi_nature.htm (last visited Mar. 31, 2006).

Lakes. The organization is urging the U.S. and Canada to not only adopt the IMO's BWM Convention for minimum standards, but to take advantage of the opportunity to impose stricter standards than required because of the need for regulations in the Great Lakes and the nations' ability to institute and enforce such restrictions.¹¹⁵ The IJC has also repeatedly pressed the U.S. and Canadian governments to take action to protect the lakes from invasive species, both unilaterally and bilaterally.¹¹⁶ One result of IJC recommendations is the Great Lakes Water Quality Agreement between the U.S. and Canada.

The Great Lakes Water Quality Agreement (GLWQA) identifies its purpose as restoring and maintaining "the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem."¹¹⁷ The GLWQA does not address regulation of ballast water or invasive species, but it does request the U.S. and Canadian governments to conduct studies to determine whether fish or invertebrates in ballast water discharges constitute a threat to the lakes.¹¹⁸ Since the inception of the GLWQA, government agencies of both countries have conducted such studies and found that ballast water is not only a threat to introduce non-native species, it is by far the primary means for their introduction into the lakes.¹¹⁹ The GLWQA further requires that the U.S. and Canada have compatible regulations regarding the discharge of substances into the lakes, providing the foundation for the two nations to work together to set a single standard for ballast water discharges.¹²⁰

Another binational organization playing a major role in protecting the Great Lakes ecosystem is the Great Lakes Fishery Commission, established in 1955 by the Convention on Great Lakes Fisheries between the U.S. and Canada. The Commission's two major responsibilities are: (1) developing "coordinated programs of research on the Great Lakes, and, on the basis of the findings, [recommending] measures which will permit the maximum sustained productivity of stocks

¹¹⁵ News Release, Int'l Joint Comm., IJC Commends IMO for Global Ballast Water Convention and Highlights Significance to Protecting the Great Lakes (Feb. 18, 2004), available at http://www.ijc.org/rel/news/040218_e.htm.

¹¹⁶ News Release, Int'l Joint Comm., IJC and GLFC Urge Bi-National Action to Prevent Invasive Species (Sept. 21, 2004), available at http://www.ijc.org/rel/news/040921_e.htm; News Release, Int'l Joint Comm., IJC Calls on Congress to Protect the Great Lakes First Action Needed to Prevent Ecosystem from Becoming "Invader Zoo" (Mar. 25, 2004), available at http://www.ijc.org/rel/news/040325_e.htm.

¹¹⁷ Agreement Between the United States of America and Canada on Great Lakes Water Quality, U.S.-Can., art. II, Nov. 22, 1978, 30 U.S.T. 1383 [hereinafter Great Lakes Water Quality Agreement].

¹¹⁸ *Id.* at annex 6.1(b).

¹¹⁹ See Egan, *supra* note 37 (discussing studies concerning effects of invasive species and the conclusion that ballast water is the primary vector for such species to enter the lakes).

¹²⁰ Great Lakes Water Quality Agreement, *supra* note 117, at annexes 4, 5.

of fish of common concern;" and (2) formulating and implementing "a program to eradicate or minimize sea lamprey populations in the Great Lakes."¹²¹ In fact, the Commission arose in response to the devastating effects of the invasive sea lamprey, which by 1950 reduced the Lake Huron lake trout population to zero, decimating a vital commercial and sport fishing industry.¹²² Thanks to relentless efforts by the Commission in conjunction with U.S. and Canadian federal, state, and provincial governments, a stable lake trout population now exists in the lakes, including the once devoid Lake Huron.¹²³ Although the sea lamprey, like other invasive species, can never be completely eradicated once introduced into the ecosystem, the "unprecedented, allied attack by state and federal interests" is keeping the population under control and represents "the greatest threat to lampreys."¹²⁴ A similar plan of action could be just as effective in the legislative forum at preventing the release of invasive species through ballast water discharges in the lakes.

C. Cooperation Between Great Lakes States and Provinces

The Great Lakes states and provinces also have a long history of cooperation when dealing with regulatory issues related to the lakes. One relevant example of a compact between states and provinces is the Joint Strategic Plan for Management of Great Lakes Fisheries, signed in 1981 by the fishery agencies of the eight Great Lakes states and Ontario, along with a small number of U.S. and Canadian federal agencies and tribal agencies.¹²⁵ The plan notes that "of particular concern is the protection of the aquatic ecosystem from introductions of non-native species."¹²⁶ The plan advocates that the signatories "shall collectively identify and promote procedures that will protect aquatic resources from unauthorized introductions of non-native species, e.g., via aquaculture and shipping."¹²⁷ The Great Lakes states and provinces are also parties to the Great Lakes Charter, a nonbinding agreement in which the states and provinces agree to consult with and seek the consent of other signatories when planning water diversions.¹²⁸

¹²¹ Great Lakes Fishery Commission, About the Great Lakes Fishery Commission, <http://www.glf.org/aboutus/brief.php#mission> (last visited Mar. 26, 2006).

¹²² Lynn Henning, *Lampreys Are Being Driven out of Lake Huron*, DETROIT NEWS, Mar. 3, 2002, at 6C.

¹²³ *Id.*

¹²⁴ *Id.*

¹²⁵ GREAT LAKES FISHERY COMMISSION, A JOINT STRATEGIC PLAN FOR MANAGEMENT OF GREAT LAKES FISHERIES (1997 rev.), available at <http://www.glf.org/fishmgmt/jsp97.htm>.

¹²⁶ *Id.*

¹²⁷ *Id.*

¹²⁸ COUNCIL OF GREAT LAKES GOVERNORS, THE GREAT LAKES CHARTER OF 1985, avail-

The goal of the Charter is the maintenance of the Great Lakes ecosystem and its natural resources.¹²⁹ Although these agreements are not legally binding, they are examples of the willingness and ability of state and provincial agencies to reach an understanding and implement a plan to carry out common goals.

The Great Lakes states frequently work together on common issues pertaining to the ecosystem. In the context of ballast water management, former Wisconsin governor Tommy Thompson declared, “[w]e are resolved to keep the Great Lakes open to world commerce but closed to biological invaders.”¹³⁰ As previously described, the states indicated their willingness to collaborate on ballast water management by intervening as plaintiffs and filing a brief in support of the invalidation of the EPA’s ballast water exemption from the CWA in *Northwest Environmental Advocates v. EPA*.¹³¹ Six states also petitioned the Coast Guard in 2004, urging the agency to take immediate action to close the NOBOB loophole in the mandatory ballast water exchange regulations.¹³² As one commentator noted, the pressure from Great Lakes governors, at least to close the NOBOB loophole, is “forc[ing] the hands of the federal government.”¹³³ Historically, many of the Great Lakes states considered the problem of invasive species to be a federal problem that required federal money. The sea lamprey and zebra mussel, however, changed that philosophy. In the 1990s, Michigan, for example, began allocating millions of dollars towards fighting the sea lamprey in state waters.¹³⁴ The Great Lakes Fishery Commission also contributed millions towards sea lamprey eradication.¹³⁵ The increase in state action, combined with federal financing, is credited with bringing the lamprey population under control.¹³⁶

The states often work together under federal guidance as well. The Water Resources Development Act of 1986, passed by Congress to control Great Lakes water diversion and exportation, compels the

able at <http://www.cglg.org/projects/water/docs/GreatLakesCharter.pdf>.

¹²⁹ *Id.*

¹³⁰ Gerdel, *supra* note 57.

¹³¹ Brief for the States of New York, Illinois, Michigan, Minnesota, Wisconsin and the Commonwealth of Pennsylvania on Selection of Remedy and Final Order of Judgment at 12, *Nw. Envtl. Advocates v. U.S. EPA*, No. C 03-05760 S1 (N.D. Cal. Mar. 30, 2005), 2005 WL 2869027.

¹³² Kuehner, *supra* note 10. The Coast Guard requires ships to dump their ballast two hundred miles offshore and intake sea water; however, if the ships do not have full ballast tanks, or No Ballast on Board, they are not required to empty their ballast tanks and may take in sea water, possibly bringing invaders into the lake system. *Id.*

¹³³ Veysey, *supra* note 13.

¹³⁴ Henning, *supra* note 122.

¹³⁵ *Id.*

¹³⁶ *Id.*

eight Great Lakes states to act in unanimity with regard to water diversion.¹³⁷ Any planned diversion or exportation of Great Lakes water, including that of tributaries, must be unanimously approved by all Great Lakes governors.¹³⁸ The Act recognizes not only the need of Great Lakes states to respect each other's water interests, but also the ability of the states to work cooperatively in protecting what is arguably their greatest natural resource.

One major drawback to state and provincial regulation (or federal regulation applied only to the Great Lakes) is that ships will simply divert their trade from Great Lakes ports to other ports along the U.S. and Canadian ocean coasts. This would have a harmful economic impact on the states and provinces bordering the lakes. To illustrate, if the federal government of either nation imposed standards requiring ships using the Seaway and lakes to be modified with technology within the ballast tanks that could filter or sterilize the water, international ships not in compliance may simply choose to forego these trade routes and conduct all of their trade at coastal ocean ports with railroads and trucks carrying the cargo inland. The NISA itself regulates ballast water exchange differently for ships going into the Great Lakes and those conducting trade along the ocean coasts.¹³⁹ This disparate treatment, if applied in the same manner to regulations regarding the construction or modification of ships, could have a profoundly negative effect on the international shipping trade on the lakes.

D. Federalism Concerns

Under the U.S. Constitution, the regulation of interstate commerce is the domain of the federal government.¹⁴⁰ As a result, state regulations of ballast water discharges affecting interstate commerce may at first glance appear to be preempted by federal law. It appears, however, that so long as state law does not regulate vessel design or construction, or operational requirements in direct conflict with federal operational requirements, states are able to regulate ballast water management without running afoul of the Commerce Clause (or the Dormant Commerce Clause).¹⁴¹ States retain the authority to protect the health and safety of their citizens and the authority to regulate and safeguard their natural resources.

¹³⁷ Water Resources Development Act of 1986, Pub. L. No. 99-662, § 1109, 100 Stat. 4082, 4230-31 (codified as amended at 42 U.S.C. §1962d-20 (2000)).

¹³⁸ *Id.*

¹³⁹ 16 U.S.C. § 4711(a), (c) (2000).

¹⁴⁰ U.S. CONST. art. I, § 8, cl. 3 ("The Congress shall have Power . . . To regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes . . .").

¹⁴¹ See *infra* notes 142-56 and accompanying text.

Federal courts have addressed the rights of states to regulate the importation of non-native species and the discharge of oily ballast water in state waters. The Supreme Court, while noting that the Commerce Clause “significantly limits the ability of States and localities to regulate or otherwise burden the flow of interstate commerce,” recognized that states retain “broad regulatory authority to protect the health and safety of its citizens and the integrity of its natural resources.”¹⁴² In *Maine v. Taylor*, the Court upheld a Maine statute prohibiting the importation of non-native baitfish.¹⁴³ Maine aimed to keep parasites and non-native species out of the state by instituting a complete ban on baitfish imports. The Court noted that the blanket restriction discriminated “on its face against interstate trade,” but upheld the law because it served a legitimate local purpose and that purpose could not be served as well by available nondiscriminatory means.¹⁴⁴ Maine met this test because it proved that baitfish shipments introduced harmful bacteria and parasites into Maine’s state water, contained other unwanted fish and organisms that harmed Maine’s ecosystem, and that a complete ban on shipments was necessary because no effective means of testing the shipments for bacteria, parasites, and non-native species existed.¹⁴⁵

The Ninth Circuit in *Chevron U.S.A., Inc. v. Hammond* upheld an Alaska law prohibiting the discharge of ballast water containing oil.¹⁴⁶ *Chevron* only addressed *oily* ballast water under the Clean Water Act, although the recent decision in *Northwest Environmental Advocates v. EPA* relied on *Chevron* to determine that ballast water containing invasive species is also covered by the CWA.¹⁴⁷ The Alaska statute in *Chevron* prohibited the discharge of oily, polluted ballast water into state waters and instead required that oil tankers discharge oily ballast water at onshore facilities.¹⁴⁸ The court determined that “[w]hile this requirement may impose some financial burden on the regulated vessels and require their owners to make some economic choices in order to comply, such a burden neither converts the discharge prohibition into a design feature nor justifies a finding of federal preemption.”¹⁴⁹ The statute avoided federal preemption by leaving the

¹⁴² *Maine v. Taylor*, 477 U.S. 131, 151 (1986).

¹⁴³ *Id.* at 151–52.

¹⁴⁴ *Id.* at 138.

¹⁴⁵ *Id.* at 141–42.

¹⁴⁶ 726 F.2d 483 (9th Cir. 1984).

¹⁴⁷ *Nw. Envtl. Advocates v. U.S. EPA*, No. C 03-05760 SI, 2005 WL 756614, at **8–13 (N.D. Cal. Mar. 30, 2005) (finding that ballast water can contain “biological material,” such as fish and fish remains, and is therefore a pollutant).

¹⁴⁸ *Chevron*, 726 F.2d at 500.

¹⁴⁹ *Id.*

design of vessels and equipment to the Coast Guard.¹⁵⁰ The Supreme Court previously ruled that when states attempt to regulate oil tanker construction and equipment standards, the state statutes are preempted by federal law because “Congress intended uniform national standards for design and construction of tankers that would foreclose the imposition of different or more stringent state requirements.”¹⁵¹ Later, in a similar case, the Court ruled that state laws which imposed stricter standards than federal laws in the areas of oil tanker crew training and English proficiency, ship navigation, and specific reporting requirements were preempted by the overlapping federal statutory provisions.¹⁵² These decisions define the boundaries pertaining to ship design and crew training that states regulating ballast water cannot overstep.

Due to the lack of stringent regulation by the federal government, states are beginning to take matters into their own hands. Because the Coast Guard implemented the mandatory ballast exchange rule only for ships traversing the Great Lakes, California and Washington both enacted statutes regulating the release of ballast water in response to the increase in non-native species in their ports and rivers. California instituted a mandatory exchange program based on the Coast Guard’s then voluntary regulations.¹⁵³ Washington’s statute, effective in 2000, proclaims its intention “to complement, to the extent its powers allow it, the United States coast guard’s ballast water management program.”¹⁵⁴ In addition to requiring ballast water exchange at open sea, the Washington statute provides that beginning in 2007, ships are unable to discharge any ballast water in state waters unless it has been exchanged at sea or treated by another method to meet a standard established by the state, with absolutely no exceptions.¹⁵⁵ If a ship is unable for safety reasons to complete an open sea exchange, the ship is not exempt from the statute and must retain the ballast water on board until it is out of state waters and it is safe to make the exchange.¹⁵⁶

The initiative displayed by these Pacific states is beginning to spread into the Great Lakes region. Michigan, for example, long believed that the invasive species problem rested on the federal government’s shoulders and undertook minimal action to address the

¹⁵⁰ *Id.* (explaining that the statute only regulated discharge of the ballast).

¹⁵¹ *Ray v. Atl. Richfield Co.*, 435 U.S. 151, 163 (1978).

¹⁵² *United States v. Locke*, 529 U.S. 89 (2000) (holding that Washington state’s tanker regulations were preempted by federal law).

¹⁵³ Marine Invasive Species Act, CAL. PUB. RES. CODE § 71200. (West Supp. 2006).

¹⁵⁴ WASH. REV. CODE § 77.120.005 (2005).

¹⁵⁵ *Id.* § 77.120.030(2).

¹⁵⁶ *Id.*

problem. Because the federal government failed to adequately address the matter, however, the Michigan legislature passed one of the first state regulations in the region governing the release of ballast water. Michigan's law, effective January 1, 2007, provides that "[u]nless a discharge is authorized by a permit, order, or rule of the [Department of Environmental Quality], the discharge into the waters of this state from an oceangoing vessel of any ballast water is prima facie evidence of a violation" of the act, which prevents the discharge into state waters of any substance that is or may become injurious to public health, animals, plants, or the value of fish and game.¹⁵⁷ The duty to obtain a permit prior to discharge parallels the obligation under the federal CWA but specifies its application to ballast water discharged from ships. Michigan's law is not preempted by the U.S. Constitution, which reserves the power to regulate public health and natural resources to the states, or the CWA, which allows states to enact regulations that are more stringent than those contained in the CWA. The NISA likewise specifies Congress' intent that the act shall not affect the authority of the states "to adopt or enforce control measures for aquatic nuisance species, or diminish or affect the jurisdiction of any State over species of fish and wildlife."¹⁵⁸

Canada's system of federalism, as it relates to the power of provinces to regulate natural resources, is similar to that of the United States. Canadian environmental regulation begins at the provincial, rather than the federal, level. In the Great Lakes region, Ontario is responsible for water pollution and fisheries regulation through the Ontario Ministry of the Environment and the Ontario Ministry of Natural Resources.¹⁵⁹ The federal government, meanwhile, regulates commerce, including commercial shipping throughout the lakes.¹⁶⁰ There is also some overlapping regulation due to the Federal Fisheries Act.¹⁶¹ The Fisheries Act does not specifically address invasive species, while the contemporary provincial act, the Ontario Fishery Regulations, authorizes provincial control of invasive species.¹⁶² At the same time, the Canada-Ontario Agreement of 2002 states that Canada will implement ballast water management regulations in conjunction

¹⁵⁷ MICH. COMP. LAWS ANN. § 324.3109(4) (West Supp. 2005) (underline omitted). A lawsuit challenging the law was filed by several shipping organizations in federal court in March 2007, alleging that the state law violates the Commerce Clause. Jeff Alexander, *Shippers Sueing Over Invader Barrier Laws*, MUSKEGON CHRON., Mar. 22, 2007, at A1.

¹⁵⁸ 16 U.S.C. § 4725 (1996).

¹⁵⁹ Reeves, *supra* note 96, at 183.

¹⁶⁰ *Id.* at 182–83.

¹⁶¹ *Id.* at 186.

¹⁶² *Id.* at 183.

with the U.S., research new methods for treating ballast water residues, and exercise control of the sea lamprey eradication program.¹⁶³

A number of ports in British Columbia, including Vancouver, have instituted mandatory ballast water procedures.¹⁶⁴ The mandatory guidelines implemented by the port authorities mirror the voluntary guidelines in effect pursuant to Canadian Coast Guard regulations. Rather than utilizing the salinity measurement standard promulgated by the U.S. Coast Guard, Vancouver's port law focuses on the identification of microscopic organisms known as copepods as a biological indicator of whether the ballast water came from coastal areas or the open sea.¹⁶⁵ As discussed, Canadian prevention of the introduction of invasive species is both a provincial and federal regulatory matter, much like it is in the U.S.

E. Previous Regulatory Responses to Environmental Concerns

The Exxon Valdez oil spill in 1989 heightened public awareness of oil tanker safety and led to widespread demand that Congress act to prevent similar environmental catastrophes. The U.S. government acted swiftly, enacting the Oil Protection Act of 1990 (OPA) within a year and a half of the disaster.¹⁶⁶ The OPA broadens the response and enforcement authority of the federal government, including heightened penalties for noncompliance.¹⁶⁷ The OPA also preserves state authority to establish laws governing prevention and response measures and allows states to have harsher liability regulations than the OPA provides.¹⁶⁸ Additionally, and most significantly, the OPA incorporates oil tanker design regulations requiring that all new ships be built with double hulls and that all single hulled vessels be phased out of service or modified to meet the double hull specifications by 2015.¹⁶⁹ Oil shipping companies were reluctant to build double hulled tankers, arguing that the costs of construction were prohibitive and that the industry would be unable to comply.¹⁷⁰ Despite the opposition of the oil shipping industry, the federal government recognized the

¹⁶³ Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem, Lakewide Management Annex to the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem, 136 C. Gaz. Pt. I, at 2338, 2363 (July 27, 2002), available at <http://canadagazette.gc.ca/part/2002/20020727/pdf/g1-13630.pdf>.

¹⁶⁴ Wiley, *supra* note 53, at 258 (referring to Ballast Water Exchange Program Vancouver Port Corporation, Harbourmaster Department Standing Order (Feb. 1997)).

¹⁶⁵ *Id.* at 259.

¹⁶⁶ 33 U.S.C.S. § 2701 (LexisNexis 2005 & 2 Supp. 2006).

¹⁶⁷ U.S. ENVTL. PROT. AGENCY, OIL POLLUTION ACT OVERVIEW, <http://www.epa.gov/oilspill/opaover.htm> (last visited Mar. 26, 2006).

¹⁶⁸ 33 U.S.C.S. § 2718.

¹⁶⁹ 46 U.S.C. § 3703a (2000).

¹⁷⁰ Egan, *supra* note 37.

importance of protecting the environment from future ecological catastrophes due to oil spills and enacted the necessary preventative legislation.

Canada and the IMO quickly adopted similar regulations governing oil tankers operating outside of U.S. waters. Pursuant to the Canada Shipping Act, Canada enacted its Oil Pollution Prevention Regulations (OPPR) in 1992.¹⁷¹ Meanwhile, Transport Canada and the Canadian Coast Guard developed the Oil Tanker Double Hull Construction Standards,¹⁷² incorporated into the OPPER in 1995, based on the OPA and the IMO's International Convention for the Prevention of Pollution from Ships (MARPOL).¹⁷³ Internationally, the IMO amended MARPOL in 1992 to require that new oil tankers be fitted with double hulls and that single hulled tankers be refitted with a second hull or phased out of service by 2015, mirroring the OPA.¹⁷⁴ In response to more oil tanker spills in 1999 and 2002, the IMO further amended MARPOL to advance the phase out deadline to 2010.¹⁷⁵ Member states, including Canada, agreed to similarly accelerate their national regulations; however, the U.S. declined to change its 2015 deadline. Although the oil shipping industry originally bristled at the thought of having to construct a new fleet of safer tankers, by the mid 1990s, oil shipping rates had only increased by ten percent as shippers upgraded their tankers to comply with the OPA and passed some of the costs on to the consumer.¹⁷⁶ The oil tanker industry now boasts of the safety of its fleet and its compliance with the regulations.¹⁷⁷

IV. RECOMMENDATIONS FOR IMPROVED BALLAST WATER MANAGEMENT TO PREVENT FURTHER INTRODUCTIONS OF INVASIVE SPECIES

The ballast water management system in place today needs significant changes to prevent future introductions of invasive species to the Great Lakes. The current versions of the NANPCA and the NISA lack the strength necessary to create a system of rules, treatment tech-

¹⁷¹ Oil Pollution Prevention Regulations, SOR/1993-3 (Can.).

¹⁷² TRANSPORT CANADA, MARINE SAFETY, T.P. 11710 E, STANDARDS FOR THE DOUBLE HULL CONSTRUCTION OF OIL TANKERS (rev. 2005), available at <http://www.tc.gc.ca/MarineSafety/tp/TP11710/TP11710e.pdf>.

¹⁷³ Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships, 1973, opened for signature Feb. 16, 1978, 17 I.L.M. 546 [hereinafter MARPOL 73/78].

¹⁷⁴ *Id.* 1992 amendment (entered into force July 6, 1993).

¹⁷⁵ *Id.* revised annex I (entered into force Jan. 1, 2007).

¹⁷⁶ ROBERT V. PERCIVAL ET AL., ENVIRONMENTAL REGULATION 143 (2d ed. 1996).

¹⁷⁷ Egan, *supra* note 37.

nology, and enforcement that will prevent the release of invasive species through ballast water. These regulations completely defer to the Coast Guard and do not mandate reporting or provide for congressional oversight. Furthermore, some commentators question the testing standards utilized by the Coast Guard, pointing out that there is little evidence that the required salinity concentration actually kills freshwater organisms, and that because some ships depart from salt-water ports, the salinity standard does not actually prove that a ballast water exchange at open sea occurred.¹⁷⁸

A. Reform Begins at the State and Provincial Level

New regulations for ballast water management should begin at the state and provincial level. States are showing the most initiative in attacking the problem through new legislation, both in the Great Lakes region and on the Pacific coast. The Great Lakes states are unified in tackling the invasive species problem head-on and are beginning to use other means to advance their position, including intervening as plaintiffs and filing a brief arguing that the CWA prevents ballast water discharges without a permit.¹⁷⁹ The ability and willingness of states and provinces to work together on Great Lakes issues is demonstrated not only by joint efforts related to fishery and ecosystem health, but also by endeavors restricting the diversion and exportation of the region's freshwater to other nations, states, and commercial entities. States and provinces have the incentive to work together to solve the issue absent stringent and effective federal regulations because states, provinces, and their local communities bear the brunt of the costs associated with damage caused by invasive species. This is especially illustrated by the costs associated with the removal of zebra mussels from clogged pipes and the prevention of sea lampreys and other species from destroying commercial and sport fisheries.

The framework for coordination at the state and provincial level is already in place. The historical working relationship between the Great Lakes states and provinces provides the necessary foundation for regulations at that level of government. As a result, the first steps

¹⁷⁸ See Zellmer, *supra* note 80, at 210 (citing Eric Reeves, Analysis of Laws & Policies Concerning Exotic Invasions of the Great Lakes: A Report to the Michigan Department of Environmental Quality 57 (Mar. 15, 1999) (unpublished manuscript, on file with Sandra D. Zellmar, szellmar@unl.edu)) (discussing failures inherent in salinity testing standards).

¹⁷⁹ Brief for the States of New York, Illinois, Michigan, Minnesota, Wisconsin and the Commonwealth of Pennsylvania on Selection of Remedy and Final Order of Judgment at 12, *Nw. Envtl. Advocates v. U.S. EPA*, No. C 03-05760 SI (N.D. Cal. Mar. 30, 2005), 2005 WL 2869027.

toward a broad and effective regulatory scheme should be taken by the states and provinces cooperatively. That process may already be underway following the Michigan legislative effort and indications that Minnesota and Wisconsin may follow.¹⁸⁰ Once state and provincial action is in progress, regulatory uniformity across jurisdictions is vital to a successful regional ballast water management program. Testing standards and methods must be identical to ensure that the results of ballast water sampling of a particular ship are the same at every port that ship enters and is tested as it navigates through different jurisdictions across the lakes.

State and provincial action should spur the U.S. and Canadian federal governments to act. Based on the shipping industry's negative reaction to proposals that it should be subject to permitting requirements under the CWA, the industry is likely to be even more averse to permitting requirements in each state and province. Faced with having to obtain a permit for every jurisdiction in which ballast discharge may occur, shippers are likely to appeal to the federal governments to create one universal permit for the entire waterway. State and provincial action thus capitalizes on the shipping industry's interest in lower costs and less bureaucracy to generate more pressure on the U.S. and Canadian federal governments to act to create a cooperative and uniform ballast water management program that meets or exceeds the standards demanded by the states and provinces.

B. Follow-Up Action by the U.S. and Canadian Federal Governments

Once the states and provinces put a new ballast water management system into motion, the federal governments of the United States and Canada can then implement regulations that build on state and provincial laws, and even preempt them to ensure that there are no loopholes or overlapping regulations that enable shippers to evade the law. State and provincial action alone is not enough, as ships may simply choose to unload cargo at ocean ports rather than on the Great Lakes. While this may be an effective means of keeping invasive species out of the lakes, it would be economically detrimental to the region, especially to the St. Lawrence Seaway, which relies on shipping tolls to maintain its viability.¹⁸¹ Eventually a uniform standard is necessary for ships entering all U.S. and Canadian waters to ensure that shippers do not simply avoid the lakes.

The two federal governments also need to play a primary role in enforcement. The Coast Guard possesses the advantage of jurisdiction

¹⁸⁰ Egan, *supra* note 37.

¹⁸¹ Franzen, *supra* note 93.

to enforce federal laws throughout the lakes. States and provinces, however, can only regulate ships that enter their jurisdictional waters and lack the personnel and other tools of enforcement. States, therefore, are limited to policing ballast water only when a ship enters a port and state officials are able to board the ship. This is a major reason the federal government must assist with tougher federal regulations and make Coast Guard vessels, personnel, and other tools and technologies available to states for enforcement and policing at sea.

The model of building the law from the bottom up also meshes with the international legal regimes governing ballast water. The IMO regulations awaiting ratification allow for nations to follow standards that are stricter than those promulgated by the IMO. Similarly, U.S. federal environmental regulations, such as the CWA, the NISA, and the NANPCA, explicitly protect state sovereignty and authority over health and natural resources by allowing states to impose restrictions and standards above and beyond those enacted by Congress. One example of state and federal environmental law working in concert is the treatment of oily ballast water in Alaska. Onshore treatment is regulated by the EPA via the CWA and the NPDES permit system, as well as by a permit system implemented by the Alaska Department of Environmental Conservation, all pursuant to IMO regulations contained in MARPOL.¹⁸² To prevent the introduction of more invasive species, the same “unprecedented, allied attack by state and federal interests” currently underway to control the non-native sea lamprey must also be utilized to enact and enforce regulations preventing the introduction of additional invasive species through ballast water discharges.¹⁸³

In the past, the U.S. federal government demonstrated a willingness to take appropriate measures to protect the ecological integrity of U.S. waters, despite the fact that the measures were extremely unpopular with the shipping industry. The federal government should react to the invasive species problem in the same swift and effective manner as it did when faced with the prospects of future oil tanker spills. Ballast water management would benefit from federal legislation along the lines of the Oil Protection Act. Unlike the NANPCA and the NISA, the OPA does not defer to the Coast Guard for regulations and includes complex specifications and timelines that ships must meet to ensure compliance.¹⁸⁴ Certainly the Coast Guard, as the

¹⁸² MARPOL 73/78, *supra* note 173; Prince William Sound Regional Citizens' Advisory Council, *NIS and Ballast Water*, <http://www.pwsrcc.org/projects/NIS/bw.html> (last visited Mar. 31, 2006).

¹⁸³ Henning, *supra* note 122.

¹⁸⁴ See Oil Protection Act of 1990, 33 U.S.C.S. § 2701 (LexisNexis 2005 & 2 Supp. 2006).

primary enforcement body, should have input in ballast water management. Regulations should not be left to the sole discretion of the Coast Guard, however, because Congress has the ability to study the issue and carefully develop rules and technological specifications based on testimony from experts representing interested parties including scientists, environmental groups, the shipping industry, government agencies, and the Great Lakes states.

At the 1999 Great Lakes Water Quality Forum, a biennial conference under the GLWQA, some argued that the CWA provided a preferable means for setting a national standard "due to the EPA's expertise in dealing with this sort of process, the provisions for public consultation in the statute, and strong enforcement provisions."¹⁸⁵ Shipping industry representatives, however, are not interested in dealing with the permit system under the CWA, particularly because of the bureaucratic process and administrative costs associated with the process.¹⁸⁶ The oil shipping industry is subject to the CWA and the NPDES permit system and complies with the regulations related to the mandatory onshore treatment of oily ballast water from oil tankers. Apart from the associated costs, it is not apparent why shippers on the Great Lakes are so opposed to similar regulations. Although the recent judicial interpretation of the CWA provides some hope that the federal government will be obligated to enforce stricter ballast water regulations under the Act, it is just as likely that the EPA will appeal the recent ruling or that Congress will find a way to specifically exempt ballast water meeting current Coast Guard salinity requirements. States cannot afford to wait on the federal government or hide behind the CWA when they retain the power to police and regulate state waters.

Another proposal calls on the GLWQA itself to be amended to provide the framework and authority necessary to allow the U.S. and Canada to coordinate the creation and implementation of new, uniform regulations.¹⁸⁷ The IJC could be utilized to direct the joint efforts of the two nations and their various related agencies, such as the EPA and the Coast Guard, while synthesizing the actions of the agencies under the various national acts, such as the CWA, the NANPCA, the NISA, and the Canada Shipping Act.¹⁸⁸ Amending the GLWQA is not an easy task, however, particularly because it is effective in dealing with a wide variety of issues, and signatories may be unwilling to

¹⁸⁵ Eric Reeves, *The Exotic Policy Workshop: The GLWQA, Ballast Water, and Aquaculture*, 2 TOL. J. GREAT LAKES' L. SCI. & POL'Y 261, 265 (2000) (footnote omitted).

¹⁸⁶ *Id.*

¹⁸⁷ See *id.* at 262-63.

¹⁸⁸ Zellmer, *supra* note 80, at 242.

risk amending the document to deal specifically with invasive species.¹⁸⁹ A more likely and amenable course of action is the enactment of new legislation in conjunction with Canada, including a framework mirroring the GLWQA, creating a new ballast water management regime.

It is also imperative not to forget the interests and concerns of the shipping industry. It is just as important, however, to recognize that, as with any other business, shipping companies must consider the economic realities of regulations and are adverse to requirements that negatively affect their operating expenses. Tax breaks and other incentives for compliance and for research and development of new filtration and sterilization technologies are helpful in encouraging cooperation from the shipping industry. The United States Great Lakes Shipping Association publicly stated its support for legislative proposals providing incentives for new ballast water treatment technology that can be implemented as soon as possible.¹⁹⁰

C. Technologies and Techniques to Be Determined by Experts

Regulations involving a combination of inboard sterilization and filtration technology and ballast water exchanges onshore or at sea would provide the best means of keeping invasive species in ballast water out of the lakes. The inboard filtering and sterilization system allows NOBOB ships to treat their tanks without having to lighten their cargo loads or risk the safety of the ship by taking on ballast water to conduct an exchange. The most intriguing option is the lake-side treatment facility. Ships entering the St. Lawrence Seaway or while at port in the lakes could stop at an onshore water exchange and treatment facility and safely discharge ballast water. The decision of which option, or probably combination of options, will be most effective is best left to scientists, engineers, and ship architects who have the requisite knowledge and experience, including that from dealing with the oily ballast water of oil tankers. Ideally, the studies currently underway will address these options and provide guidelines for states, provinces, and the federal governments to follow so they may enact more stringent regulations for ballast water management to protect the Great Lakes from invasive species. Mandating the implementation of new treatment and sanitization regulations is up to legislatures at the state, provincial, and federal levels. Rather than waiting for new technologies and techniques to appear, these governing bodies must force the issue because the Great Lakes and their inhabitants do not have

¹⁸⁹ Reeves, *supra* note 185, at 262–63.

¹⁹⁰ Kuehner, *supra* note 9.

the luxury of waiting around for the shipping industry to develop and institute what will probably be expensive modifications to their ships.

CONCLUSION

Perhaps the greatest obstacle to implementing stricter and more effective ballast water regulations is the fact that invasive species do not create the same universal concern and motivation for change as do more sudden and instantaneous environmentally destructive incidents, such as oil spills. Images of dead alewives on the beach, trout with sea lamprey wounds, and zebra mussels clogging water intakes do not invoke public outcry or alarm in the same manner as occurred following the broadcast images of birds and mammals covered in oil and dead or dying due to the Exxon Valdez disaster. Unfortunately, invasive species have the same, if not a more severe, impact on an ecosystem as an oil spill. The effects to the environment may not be as immediately apparent, but over time they are more widespread and enduring.

Invasive species cannot be ignored simply because they do not create psychologically troubling imagery inherent in other environmental catastrophes. Protecting the Great Lakes from further introductions of non-native species requires significant action at the federal, state, and provincial levels. Joint cooperation across national boundaries and among different levels of government is the best means for implementing an effective regulatory framework to prevent international ships from dumping ballast water containing non-native species into the lakes. The Great Lakes states and provinces need to collectively act now to create and implement stricter ballast water regulations and hopefully spur the federal governments of the U.S. and Canada to action. Considering that a new invasive species shows up in the lakes approximately every eight months, legislatures must take the initiative immediately to prevent the Great Lakes and their native species from losing the battle to the nonstop stream of invaders.

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