

# **BALLAST WATER MANAGEMENT: NEW INTERNATIONAL STANDARDS AND NATIONAL INVASIVE SPECIES ACT REAUTHORIZATION**

---

(108-57)

## **JOINT HEARING**

BEFORE THE  
SUBCOMMITTEES ON  
COAST GUARD AND MARITIME TRANSPORTATION  
AND  
WATER RESOURCES AND ENVIRONMENT  
OF THE

COMMITTEE ON  
TRANSPORTATION AND  
INFRASTRUCTURE  
HOUSE OF REPRESENTATIVES

ONE HUNDRED EIGHTH CONGRESS

SECOND SESSION

MARCH 25, 2004

Printed for the use of the  
Committee on Transportation and Infrastructure



U.S. GOVERNMENT PRINTING OFFICE

95-122 PS

WASHINGTON : 2005

---

For sale by the Superintendent of Documents, U.S. Government Printing Office  
Internet: bookstore.gpo.gov Phone: toll free (866) 512-1800; DC area (202) 512-1800  
Fax: (202) 512-2250 Mail: Stop SSOP, Washington, DC 20402-0001

## COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE

DON YOUNG, Alaska, *Chairman*

THOMAS E. PETRI, Wisconsin, <i>Vice-Chair</i>	JAMES L. OBERSTAR, Minnesota
SHERWOOD L. BOEHLERT, New York	NICK J. RAHALL, II, West Virginia
HOWARD COBLE, North Carolina	WILLIAM O. LIPINSKI, Illinois
JOHN J. DUNCAN, Jr., Tennessee	PETER A. DeFAZIO, Oregon
WAYNE T. GILCHREST, Maryland	JERRY F. COSTELLO, Illinois
JOHN L. MICA, Florida	ELEANOR HOLMES NORTON, District of Columbia
PETER HOEKSTRA, Michigan	JERROLD NADLER, New York
JACK QUINN, New York	ROBERT MENENDEZ, New Jersey
VERNON J. EHLERS, Michigan	CORRINE BROWN, Florida
SPENCER BACHUS, Alabama	BOB FILNER, California
STEVEN C. LATOURETTE, Ohio	EDDIE BERNICE JOHNSON, Texas
SUE W. KELLY, New York	GENE TAYLOR, Mississippi
RICHARD H. BAKER, Louisiana	JUANITA MILLENDER-McDONALD, California
ROBERT W. NEY, Ohio	ELIJAH E. CUMMINGS, Maryland
FRANK A. LoBIONDO, New Jersey	EARL BLUMENAUER, Oregon
JERRY MORAN, Kansas	ELLEN O. TAUSCHER, California
GARY G. MILLER, California	BILL PASCRELL, Jr., New Jersey
JIM DEMINT, South Carolina	LEONARD L. BOSWELL, Iowa
DOUG BEREUTER, Nebraska	TIM HOLDEN, Pennsylvania
JOHNNY ISAKSON, Georgia	NICK LAMPSON, Texas
ROBIN HAYES, North Carolina	BRIAN BAIRD, Washington
ROB SIMMONS, Connecticut	SHELLEY BERKLEY, Nevada
SHELLEY MOORE CAPITO, West Virginia	BRAD CARSON, Oklahoma
HENRY E. BROWN, Jr., South Carolina	JIM MATHESON, Utah
TIMOTHY V. JOHNSON, Illinois	MICHAEL M. HONDA, California
DENNIS R. REHBERG, Montana	RICK LARSEN, Washington
TODD RUSSELL PLATTS, Pennsylvania	MICHAEL E. CAPUANO, Massachusetts
SAM GRAVES, Missouri	ANTHONY D. WEINER, New York
MARK R. KENNEDY, Minnesota	JULIA CARSON, Indiana
BILL SHUSTER, Pennsylvania	JOSEPH M. HOEFFEL, Pennsylvania
JOHN BOOZMAN, Arkansas	MIKE THOMPSON, California
CHRIS CHOCOLA, Indiana	TIMOTHY H. BISHOP, New York
BOB BEAUPREZ, Colorado	MICHAEL H. MICHAUD, Maine
MICHAEL C. BURGESS, Texas	LINCOLN DAVIS, Tennessee
MAX BURNS, Georgia	
STEVAN PEARCE, New Mexico	
JIM GERLACH, Pennsylvania	
MARIO DIAZ-BALART, Florida	
JON C. PORTER, Nevada	
VACANCY	

SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION

FRANK A. LOBIONDO, New Jersey

HOWARD COBLE, North Carolina

WAYNE T. GILCHREST, Maryland

PETER HOEKSTRA, Michigan

JIM DEMINT, South Carolina

ROB SIMMONS, Connecticut

MARIO DIAZ-BALART, Florida, *Vice-Chair*

DON YOUNG, Alaska

*(Ex Officio)*

BOB FILNER, California

PETER A. DeFAZIO, Oregon

CORRINE BROWN, Florida

JUANITA MILLENDER-McDONALD,  
California

NICK LAMPSON, Texas

MIKE THOMPSON, California

JAMES L. OBERSTAR, Minnesota

*(Ex Officio)*

(III)

SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT

JOHN J. DUNCAN, JR., Tennessee, *Chairman*

SHERWOOD L. BOEHLERT, New York	JERRY F. COSTELLO, Illinois
WAYNE T. GILCHREST, Maryland	ROBERT MENENDEZ, New Jersey
VERNON J. EHLERS, Michigan	GENE TAYLOR, Mississippi
STEVEN C. LATOURETTE, Ohio	NICK LAMPSON, Texas
SUE W. KELLY, New York	BRIAN BAIRD, Washington
RICHARD H. BAKER, Louisiana	JOSEPH M. HOEFFEL, Pennsylvania
ROBERT W. NEY, Ohio	MIKE THOMPSON, California
GARY G. MILLER, California	TIMOTHY H. BISHOP, New York
JOHNNY ISAKSON, Georgia	LINCOLN DAVIS, Tennessee
ROBIN HAYES, North Carolina	ELEANOR HOLMES NORTON, District of Columbia
HENRY E. BROWN, JR., South Carolina	JERROLD NADLER, New York
BILL SHUSTER, Pennsylvania	EDDIE BERNICE JOHNSON, Texas
JOHN BOOZMAN, Arkansas	EARL BLUMENAUER, Oregon
CHRIS CHOCOLA, Indiana	ELLEN O. TAUSCHER, California
STEVAN PEARCE, New Mexico, <i>Vice-Chair</i>	BILL PASCRELL, JR., New Jersey
JIM GERLACH, Pennsylvania	JAMES L. OBERSTAR, Minnesota
MARIO DIAZ-BALART, Florida	<i>(Ex Officio)</i>
RODNEY ALEXANDER, Louisiana	
DON YOUNG, Alaska	
<i>(Ex Officio)</i>	

# CONTENTS

## TESTIMONY

	Page
Cangelosi, Allegra, Senior Policy Analyst, Northeast-Midwest Institute, Washington, D.C. ....	20
Cox, Joseph J., President, Chamber of Shipping of America, Washington, D.C., representing the Shipping Industry Ballast Water Coalition .....	20
Gilmour, Rear Admiral Thomas G., Assistant Commandant for Marine Safety, Security and Environmental Protection, Washington, D.C., accompanied by Lieutenant Commander Kathleen Moore, Chief, Environmental Standards Division, and Aquatic Nuisance Species Program Manager, Washington, D.C. ....	8
Hazlewood, Catherine L., Clean Oceans Program Manager, the Oceans Conservancy, Washington, D.C. ....	20
Mann, Dr. Roger I., Acting Director for Research and Advisory Science, Virginia Institute of Marine Science, Gloucester Point, Virginia .....	20
Ullrich, David A., Executive Director, Great Lakes Cities Initiative, Chicago, Illinois .....	20
Weakley, James H.I., President, Lake Carriers' Association, Cleveland, Ohio ..	20

## PREPARED STATEMENTS SUBMITTED BY WITNESSES

Cangelosi, Allegra .....	36
Cox, Joseph J. ....	48
Gilmour, Rear Admiral Thomas G. ....	54
Hazlewood, Catherine L. ....	58
Mann, Roger I. ....	78
Ullrich, David A. ....	84
Weakley, James H.I. ....	91

## ADDITIONS TO THE RECORD

Department of Natural Resources, State of Michigan, James Dexter, Acting Chief, Fisheries Division, letter to Hon. Jennifer M. Granholm, Governor, March 26, 2004 .....	94
Great Lakes organizations, letter, April 28, 2004 .....	95
Hoekstra, Hon. Pete, a Representative in Congress from Michigan, statement Full Scale Ozone Ballast Treatment for Removal of Marine Invasive Species, executive summary .....	100
International Association of Fish and Wildlife Agencies, statement .....	109
National Environmental Coalition on Invasive Species, statement .....	113
Nutech 03, Inc., statement .....	119
Sherman, Tom, President, Aquacide LLC, statement .....	124
Schornack, Hon. Dennis, U.S. Section Chair, International Joint Commission, statement .....	127
University of Washington, School of Aquatic and Fishery Sciences, Seattle, Washington, Dr. Russell Herwig, Ph.D., Research Associate Professor, Jeffery R. Cordell, Principal Research Scientist, Jake C. Perrins, Research Scientist, statement .....	132



## **BALLAST WATER MANAGEMENT: NEW INTERNATIONAL STANDARDS AND NATIONAL INVASIVE SPECIES ACT REAUTHORIZATION**

---

**Thursday, March 25, 2004**

HOUSE OF REPRESENTATIVES, COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION, SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT, WASHINGTON, D.C.

The subcommittees met, pursuant to notice, at 10:06 p.m. in room 2167, Rayburn House Office Building, Hon. Frank A. LoBiondo, [chairman of the Subcommittee on Coast Guard and Maritime Transportation] presiding.

Mr. LOBIONDO. Good morning. The Subcommittee on Coast Guard and Maritime Transportation and the Subcommittee on Water Resources and the Environment, a joint hearing, will commence now this morning.

Today we are meeting to examine the issue of ballast water management, to review the new international standards that were adopted at the recent meeting of the International Maritime Organization, and to consider the reauthorization of the Ballast Water Management Provisions of the National Invasive Species Act.

Previous introductions of invasive species via ballast water have led to severe ecological and economic consequences in many coastal areas throughout the Nation. It is extremely important that we put measures in place that will prevent any future introduction of non-indigenous aquatic organisms. Congress has repeatedly taken up the issue of ballast water management over the past 15 years, imposing increasingly more stringent guidelines and regulations on commercial vessels. The last major action, the National Invasive Species Act mandated that vessels undergo ballast water exchange before entering the Great Lakes.

Recently, the Coast Guard began formulating mandatory regulations for ballast water exchange nationwide. This decision reflects the need to expand the rules in place in the Great Lakes to all commercial shipping in U.S. waters in order to protect all of America's shores from invasive species. However, it may be necessary to set regulations that require more stringent ballast water management procedures than the current practice of ballast water exchange. We should not simply settle for a lower standard of protection if we are able to achieve something more.

At the recent meeting of the International Maritime Organization, the international community adopted an ambitious standard which all ballast water-carrying vessels would be expected to com-

ply with by the year 2016. While I am happy that the international community has recognized the importance of ballast water management, I have questions of whether the standard that has been agreed to is both environmentally proactive and feasible within the given time frame of less than ten years.

I look forward to hearing all of the witnesses' testimony in regard to these concerns. I expect that both subcommittees will use the findings of this hearing to further address measures that will increase our ability to prevent the invasion of our coastal waters by non-indigenous aquatic organisms.

I would now like to yield to Chairman Duncan before I go to Mr. Filner.

Mr. DUNCAN. Thank you, Mr. Chairman. You very adequately covered the subject here today. I want to also welcome everyone to our hearing on ballast water management.

As Chairman LoBiondo has pointed out, we are meeting today to review new international ballast water management standards from the International Maritime Organization, and to consider the reauthorization of the Ballast Water Provisions of the National Invasive Species Act in light of these new standards.

This charges that ballast water from ships can result in invasions of aquatic organisms into our waters, displacing native species and seriously impacting marine ecosystems and infrastructure. We are finding that reducing the introduction and spread of aquatic invasives is a difficult problem to solve. Ballast water exchange does not appear to be enough to solve the problem. We need alternative ballast water management measures that will protect aquatic ecosystems and infrastructure, ensure ship and passenger safety, and maintain interstate and foreign commerce.

Some people endorse risk space ballast water standards and believe they will spur the development of new technologies to meet them. Others, however, believe we will never have the data needed to develop scientifically credible risk-based standards and, therefore, support technology-based standards.

The international community recently took the first steps to develop alternative ballast water measures. At a recent meeting of the International Maritime Organization, the international community adopted performance standards for ballast water treatment. These standards would require vessels to reduce the amount of organisms in discharged ballast water to meet specified levels.

The scientific basis for the level specified in the standards, however, is unclear. Scientists currently do not have the information needed to establish a scientifically credible standard based on risk. Data are very limited. It is also unclear whether the standards can be achieved. Currently there are no ballast water management technologies that have been demonstrated, or vessels that can meet the IMO standards.

Many hope that the IMO standards will spur the development of sufficient technologies to effectively manage this ballast water. I hope our witnesses today will tell us their views on the feasibility of developing scientifically credible and effective standards, and the Coast Guard's efforts to develop a mandatory ballast water program, including a standard based on risk, the IMO's ballast water management standards, and what needs to happen to continue



moving forward in international efforts to prevent the introduction and spread of invasive species in U.S. waters from ballast water discharges.

This is a very, very expensive problem that we are dealing with. It is very, very expensive to solve it. How the United States decides to address these issues will have a tremendous impact both domestically and internationally because of the U.S.'s dominance in overseas trade as an importing and exporting nation.

I thank you, Mr. Chairman, for calling this hearing.

Mr. LOBIONDO. Thank you, Chairman Duncan.

Mr. Filner?

Mr. FILNER. Thank you, Mr. Chairman, and Mr. Chairman.

I am surprised to see so many people here on ballast water. To all of you I say, "Get a life."

[Laughter.]

Mr. FILNER. Actually, Mr. Chairman, I did invite Richard Clark to testify here today, which I understand he is going to say that ballast water management was seen by the Bush Administration as an important subject, but not urgent.

Mr. LOBIONDO. I think that is a devastating critique.

Mr. FILNER. We all know that problems occur with the taking of ballast water in one part of the world and discharging it in our part of the world. Animals and plants that may thrive in one part, may have no natural enemies in the new waters in which they were introduced. We have seen the problems that have occurred. We have, in fact, grown in our knowledge of this over the last decade or two.

We tried to deal with this problem by requiring vessels, for example, entering the Great Lakes to exchange their fresh water ballast with salt water ballast in the hopes that the fresh water critters would be flushed out of that. Those that remain would not survive in the salt water.

Then we made the ballast water exchange voluntary for our coastal ports. That has been a failure because many ship owners were unwilling to participate. Now the Coast Guard is in the process of prescribing regulations to make ballast water exchange mandatory for all ships entering the United States. However, we are not entirely sure just how effective that exchange is at killing the plants and animals in that ballast water.

So, Mr. Chairman, as you pointed out, it is time to move on to the next phase of the solution, and that is ballast water treatment. This Committee delayed consideration of legislation to require that treatment in order to give the International Maritime Organization sufficient time to develop an international system for ballast water treatment. The IMO did reach an agreement, but it failed to adequately protect the environment of the United States.

I guess that is what happens when organizations only listen to ship owners. They, of course, want to do whatever is cheapest, even though it may not adequately deal with our problem.

In the case the IMO adopted a discharge standard that requires minimal treatment of the water. I think it is time for Congress to establish an interim standard for the treatment of ballast water that will protect our marine environment. Then as the technology

improves, the standard can be raised to provide an even greater protection for the coastal waters.

I look forward to hearing from today's witnesses on their views on the standards that Congress should enact to help stem the invasion of foreign species into our coastal waters.

Thank you, Mr. Chairman. I look forward to working with you and our colleagues on the Water Resources Subcommittee to develop appropriate legislation.

Mr. LoBiondo. Thank you, Mr. Filner.

I recognize Mr. Gilchrest, who has been doggedly persistent on this issue for some time.

Mr. Gilchrest. Thank you, Mr. Chairman. Doggedly persistent with my fellow colleague, Congressman Ehlers, for sure. A number of things have been mentioned here about causing an imbalance of the local ecological system which these aquatic species create. That is a significant problem, and Mr. Filner, we not only recognize that as a problem, but it is an urgent problem from I hope now both sides of the aisle.

Mr. Ehlers and I cosponsored a couple of different bills. The bulk of H.R. 1081, the Aquatic Invasive Species Research Act, which has passed through the Science Committee, deals with aquatic nuisance species. The jurisdiction is in this Committee and the Resources Committee.

We hope, as a result of this hearing and as a result of what the IMO has recently done, we can move that bill through the two Committees and have it reach the House floor. We hope to have it passed and signed by the President before the end of this session.

We do not always like the word "mandatory," but in this case I think the word "mandatory ballast water management" is appropriate. We will move that through the House Resources Committee fairly soon. I have a hearing on aquatic nuisance species in Hawaii on the 15th of April to see what the problems are over there.

I want to make a comment about the IMO. The International Maritime Organization I think is one of the best entities in the United Nations. It is filled with engineers, and it is filled with professional people that discuss basically engineering designs, architectural designs, and safety.

So there is almost no politics involved in the IMO. Almost no politics. I am not saying there are politics involved in this particular consensus that they have come up with, the standards for ballast water. I do not think so.

I think the IMO and the American continuum in the IMO have done what they could to work with the consensus community to move us in the next direction, and the next positive step toward recognizing that there are problems with species that are invasive when they get into other waters and other waters.

We know the more famous ones, Zebra mussels, Asian carps. I know MSX and dermal in the Chesapeake Bay. The list goes on. It is about a \$100 billion problem with it in the United States, which is pretty significant.

When you compare that with almost the same amount of money that we rely upon for strong economies in certain areas of the country as far as fisheries are concerned, if you look at recreational

fresh water fishing, that is about a \$75 billion to \$100 billion enterprise.

If you look at the Chesapeake Bay and the impact of invasive species, that has dramatically caused a decline in that healthy economic. The ecosystem is no longer healthy because the fish are no longer healthy and their habitat has been infused with this invasive species. So it is a significant problem.

What I would like to say to the Coast Guard folks that are here today is this. You do a good job. I am surprised I do not see Joe in the room. I was hoping I would see Joe Angelo to talk about the times we had in London together in 1942; no, it was not that long ago.

I will say that the IMO has done the best job it could under the circumstances. But now the United States I think has to take a role of leadership in the world and by doing so, the rest of the world will respond. I think this is a problem that is more urgent than many people would suspect.

While foreign species sometimes are compatible with the ecosystems, we are dealing with invasives that are not compatible that are costing a great deal of money.

I look forward to your testimony. Mr. Chairman, I appreciate your calling the hearing. We look forward to working with you on moving this bill to the floor.

Mr. LOBIONDO. Thank you. Now, Mr. Ehlers, again who Mr. Gilchrest has pointed out, has been very involved and persistent on this issue. Welcome.

Mr. EHLERS. Thank you, Mr. Chairman. Thank you for having this hearing. Today marks an important turning point in the debate over how to deal with the threat posed to our economy and our environment by aquatic invasive species. One noteworthy fact is the building of awareness about this issue.

After four hearings in two years among our respective Committees, I no longer need to spend the first three minutes of my opening statement explaining what invasive species are.

For the better part of a decade, the States, Congress, the Administration, the international community and the private sector have struggled mightily over how to regulate ballast water simply because discharged ballast water from ships is commonly regarded as the greatest threat for the introduction of aquatic invasive species.

In the Great Lakes this is not just a threat; it is a reality. Zebra mussels, sea lamprey, and the round goby are but a few examples of hundreds of invaders that ships have brought into the Great Lakes. These alien creatures ruin fishing and cost taxpayers many millions of dollars each year.

But the debate has now reached a critical point. Last year, Congressman Gilchrest, who has great expertise on this issue, and I introduced two pieces of legislation, H.R. 1080, and H.R. 1081, which, among many other things, have clear and specific goals for regulating ballast water.

Also last year the Coast Guard took a small but significant step by proposing that ballast water exchange be mandatory for the entire Nation, not just the Great Lakes. To the consternation of many, several States also joined the fray by proposing State regulations, a trend that could result in a plethora of varying and poten-

tially contradictory regulations for shippers to maneuver through. Frankly, I cannot blame them because they are very frustrated. They are seeing the damage occurring in their harbors because we have not acted.

Finally, last month the international community chimed in, proposing an international framework that calls not only for ballast water exchange, but also ballast water treatment technology for all ships.

These seemingly disparate events are encouraging, but I temper my optimism by taking a larger view of how these pieces fit together and asking this question: What is the clearest path forward that will finally protect our waters from discharged ballast water?

The answer is made clear by several unfortunate realities. One, the Coast Guard has not yet taken enough domestic actions to solve this problem. Two, the standards and time lines in the International Marine Organization's Convention are troubling in many respects and it is not clear when they would go into effect. Three, the State actions, while important in many regards, have several shortcomings.

It is up to Congress to bring these parties to the table and forge a consensus on how to protect our waters. What is the clearest path forward that will finally protect our waters from discharged ballast water? Reauthorizing the National Invasive Species Act is the answer.

Let us not spend another decade in debate. Invasive species do not respect political boundaries or time lines, and like other pollutants, they are self-propagating and have no half-life, and have very expensive impacts on our Nation.

We should deal with this reality by passing legislation which, at a minimum, brings an end to ballast water exchange, spells out clear standards for the treatment of ballast water, gets technology on ships as soon as next year, and finally, is supported by a robust research program as outlined in my Invasive Species Research bill, H.R. 1081.

I want to mention that that is very important because in many cases we do not know the best answer. We do not even know the pathways. We do not know the best treatment.

One final note. I want to express my appreciation for the Administration's work during IMO negotiations. Their strong stand garnered few allies, but they were able to achieve some crucial wins in a Convention that is only a small step forward. Most notably, under the treaty, the United States can take domestic actions that are more stringent than those outlined in the Convention.

We know that the IMO Convention will not adequately protect our waters, so we should look to domestic legislation to do so. I look forward to working with the Committee and the Administration to achieve this goal.

Thank you again, Mr. Chairman. I look forward to working with you as we write legislation to reauthorize NISA and do the necessary research.

Mr. LOBIONDO. Thank you, Mr. Ehlers.

I would ask unanimous consent that any member can submit testimony for the record.

Mr. Filner?

Mr. FILNER. I would ask unanimous consent that our colleague, Congressman Stupak of Michigan who is not on this Committee, but has a longtime record of defending the quality of water in the Great Lakes can also submit a statement for the record.

Mr. LOBIONDO. Without objection.

Mr. Thompson?

Mr. THOMPSON. Thank you, Mr. Chairman. I will submit revised and extended comments later on.

I want to thank you for having the hearing. I want to thank all of my colleagues, who in their opening statements, have expressed not only their concern, but the importance of this issue.

I represent a harbor up in Northern California, Humboldt Bay, that I think was the first West Coast port to take this under serious consideration and put in place efforts at the very local level to deal with the issue of ballast and invasive species, and all the problems that they have.

I am just very concerned that the International Agreement has overlooked completely the coast-wise, from one port to the next, the short run ballast problem. It is a real problem. In my State of California, I would guess that we probably have a greater threat on a short run situation where someone takes on ballasts in San Francisco where they have about 200 recognized invasive species, and bring those up to Humboldt Bay. We have at least the same threat as someone coming from a foreign port.

I think the only way to deal with this is on-board treatment. As we all know, we are probably a long ways away from being able to do that. I think any agreement that we have and any attempt to address this problem has to address the issue of coast-wise ballast transportation. I hope that we can certainly focus in on that.

Thank you very much, Mr. Chairman.

Mr. LOBIONDO. Thank you. Mr. Brown?

Mr. BROWN. Thank you, Mr. Chairman. I represent the coast of South Carolina and several ports, but Charleston is the major port. Certainly this is a concern of ours. I apologize for being late, and maybe you have already addressed this, but I am going to give you one other chance. If you have, I will just take the text from the recorded documents.

Mr. LOBIONDO. Mr. Brown, we are in opening statements.

Mr. BROWN. I apologize. We are glad to represent Charleston and are glad to have the Coast Guard's presence in our area. We certainly look forward to a later discussion this issue. It is a major concern with our major port.

Thank you.

Mr. LOBIONDO. We will be happy to accommodate your questions just a little bit down the line.

Mr. Baird?

Mr. BAIRD. I thank the Chairman. I want to particularly thank the Coast Guard for their work, but also compliment my good friend and colleague, Mr. Ehlers, who has been a stalwart champion of this.

You know, invasive species are not something that register very high on the polls, but they clearly are the second largest cause of environmental degradation in our country. As the Chair from my

Science Committee work pointed out, these things self-replicate. There are no natural predators.

In several areas in my district we are facing immense challenges with partinographs in the Willoby Bay. We pray that Zebra mussels do not get into the western slope of the Rocky Mountains' fresh water system. Were they to invade the Columbia River system, as they have the St. Lawrence seaway, we would experience billions of dollars of devastation, a terrible obstacle to our salmon recovery efforts, and profound impacts on our power systems.

So your efforts to try to keep that from happening are much appreciated. We pray that it will not happen, but we need to legislate to make sure it will not happen.

I yield back and thank the gentleman.

Mr. LOBIONDO. I think we have covered all of the members for opening statements.

Now I would like to welcome our first panel. From the United States Coast Guard is Rear Admiral Thomas H. Gilmour, Assistant Commandant for Marine Safety, Security and Environmental Protection, here in Washington, D.C. He is accompanied by Lieutenant Commander Kathleen Moore, Chief, Environmental Standards Division, and Aquatic Nuisance Species Program Manager.

Thank you for joining us. Admiral, please proceed.

**TESTIMONY OF REAR ADMIRAL THOMAS G. GILMOUR, ASSISTANT COMMANDANT FOR MARINE SAFETY, SECURITY AND ENVIRONMENTAL PROTECTION, WASHINGTON, D.C.; ACCOMPANIED BY LIEUTENANT COMMANDER KATHLEEN MOORE, CHIEF, ENVIRONMENTAL STANDARDS DIVISION, AND AQUATIC NUISANCE SPECIES PROGRAM MANAGER, WASHINGTON, D.C.**

Admiral GILMOUR. Good morning, Mr. Chairman, and distinguished members of both Committees. As stated, I am Rear Admiral Tom Gilmour. I am the Assistant Commandant for Marine Safety, Security and Environmental Protection. Accompanying me is our expert on ballast water management, Lieutenant Commander Kathleen Moore, Chief of our Environmental Standards Division.

It is a pleasure to appear before you today to provide the Coast Guard's views on the recently adopted International Convention for the Control of Management of Ships' Ballast Water and Sediments, and the National Invasive Species Act Reauthorization.

As pointed out, last month the Coast Guard led the interagency United States delegation to the International Maritime Organization's Diplomatic Conference on Ballast Water Management for Ships. The conference adopted the International Convention for Control and Management of Ships' Ballast Water and Sediments 2004, which is a significant step forward in the international effort to combat invasive species introduced by ships' ballast water.

The key objectives achieved by the U.S. delegation in the negotiations were, number one, the retention of the sovereign right of a party to impose more stringent measures than the measures in the Convention consistent with international law. Secondly, implementation of ballast water discharge standards on a schedule of fixed dates beginning in 2009; phasing out the practice of ballast water

exchange; retention of the ability of port States to conduct ballast water sampling for the purpose of evaluating compliance; and lastly, provisions for the experimental testing of prototype ballast water treatment systems on operating vessels.

The ballast water discharge standard adopted at the conference was not this stringent standard proposed by the United States. However, the standard adopted will still exceed the capabilities of current technology and when met, should reduce the number of invasive species via ballast water.

We will evaluate the results of this conference through the Executive Branch interagency process to determine the next steps with respect to ratification of this instrument.

Working under the broad authorities granted by the current legislation, the Coast Guard's ongoing program and regulatory efforts are addressing many of the ballast water management provisions in the Convention. In this regard, we established the Shipboard Technology Evaluation Program, STEP, in January 2004 to encourage the development of effective ballast water treatment technologies.

We have final rules currently in clearance for assessing penalties for non-reporting of ballast water management, and for establishing a national program for mandatory ballast water management.

In addition, we have begun the environmental impact analysis of several alternative standards in preparation for issuing a rule establishing a single, enforceable, biologically meaningful, and scientifically sound ballast water discharge standards for the United States.

In considering the legislation for ballast water management to protect the waters of the United States, I would offer the following comments. A ballast water management plan and a ballast water record book should be required for each ship that has ballast water tanks. Further legislation should recognize the possible impacts of domestic vessels operating between U.S. ports, and the risks of transferring non-indigenous species between different aquatic areas.

There should be authority to continue to evaluate prototype or experimental ballast water treatment technologies on board operating vessels. A single ballast water discharge standard should be biologically meaningful, scientifically sound, and enforceable.

We in the Coast Guard have concentrated a great deal of our time and effort over the last two years to improving maritime security. But we have not, and we will not, neglect the other two legs of our three-legged stool—marine safety and environmental protection—as part of our business.

All three of these areas are intertwined, supporting our goal to reduce all maritime risks. Success in all three areas is necessary if we are to ensure our Nation's ability and that of our international partners to use the sea safely, securely, fully, and wisely in our pursuit of common objectives.

Reducing the threat of invasive species introduction through ballast water management is the Coast Guard's highest environmental priority. Ballast water management rules are three of the top ten regulatory projects for the Coast Guard, and the top environmental priority for the Coast Guard.

Our objective is to develop the best national program for ballast water management to protect the waters of the United States.

I thank you for the opportunity to speak before both Subcommittees. We look forward to working with our interagency partners, industry, and Congress as we continue our efforts to implement a way forward for an effective ballast water management regimen for the United States.

I will be happy to answer any questions.

Mr. LOBIONDO. Thank you, Admiral, very much. I am going to yield my time to Mr. Gilchrest. I know you have a degree of expertise here. I want to make sure that we get to you and Mr. Ehlers at the beginning of this.

Mr. GILCHREST. I cringe when anybody says I have a degree of expertise.

Mr. LOBIONDO. I did not say which degree. I said a degree of expertise.

[Laughter.]

Mr. GILCHREST. I have a good deal of interest. My expertise probably leaves much wanting.

The few questions that I have to the Coast Guard relate to our ability to retain our sovereign right to impose stricter standards. I think it is a very positive thing. Would you recommend, to this Committee, that we impose stricter standards than what you worked out with the IMO?

Admiral GILMOUR. Well, in our proposed rule-making, we are working certainly in this area. What I think we should do, as I said, is that that is part of the scientifically supportable and biologically meaningful part. I think we should develop a standard that is scientifically supportable and biologically meaningful.

Mr. GILCHREST. Are there standards in this agreement with the IMO? Do you have a certain standard to determine whether or not that ballast water has been cleansed sufficiently? Is there some kind of a biological standard that you have in this agreement with IMO?

Admiral GILMOUR. There is a standard, and as I said in my opening statement, it is not the same standard we proposed. But I think we are a long way from determining, or we are a distance from determining, biologically meaningful and scientifically supportable standard.

Mr. GILCHREST. So the standards that exist in the agreement with IMO, you say we do not have the knowledge or the technology even to meet that standard today?

Admiral GILMOUR. I think that is probably a fair statement, sir.

Mr. GILCHREST. The implementation schedule starts in 2009?

Admiral GILMOUR. Yes, sir.

Mr. GILCHREST. When does the phaseout of ballast water exchange start? What does that mean? You have five provisions with the IMO. One of them is phasing out ballast water exchange; I think I heard you say?

Admiral GILMOUR. Yes, sir. Although I was not at the conference, Lieutenant Commander Moore was. That is part of our overall policy to do away with the exchange and to have a biologically meaningful and scientifically supportable standard.



Mr. GILCHREST. The overall goal is to do away with ballast water exchange and to treat the ballast water?

Admiral GILMOUR. Yes, sir.

Mr. GILCHREST. When does that start? 2009? 2016?

Admiral GILMOUR. Yes, sir; I will defer that to Lieutenant Commander Moore.

Ms. MOORE. Yes, sir. Sir, in 2012 begins the first applicability of the D-2 discharge standard to existing vessels. In a way, beginning in 2009, in fact, vessels will begin to treat to a discharge standard, but throughout the period out until 2016, some will still continue to conduct exchange.

After 2016, the exchange is no longer an option and treating ballast water to a ballast water discharge standard is a part of the Convention.

Mr. GILCHREST. You also made a comment that water sampling by the home state, I assume that means either Customs or the Coast Guard, or some entity at these ports that is from the Federal Government. You had retention of sovereign right to impose more strict standards?

Admiral GILMOUR. Yes, sir.

Mr. GILCHREST. Does that mean we still go by the schedule of this process? Can we start testing, using our own standards sooner than what you have just laid out?

Admiral GILMOUR. Well, yes, sir. Whatever you come up with in the legislative side, we could certainly go forward with. But, yes, sir; I think we could start testing. In fact, we would like to start testing as soon as we can on experimental systems.

To answer your question, we would be the entity through our Port State Control Program to do ballast water sampling, as we currently do.

Mr. GILCHREST. So the time frame that you have laid out with the consensus with the IMO, especially the part about experimental testing for improve ballasted water technology to understand what biological organisms need to be eradicated, do you feel that the time frame for that is for the IMO, and that experimental testing needs to take as long as the agreement that you have with the IMO? We are hoping that it might be accelerated a little bit.

My time is up but I am going to try to throw this out really quickly and maybe you can answer it at this time or some other time. Is there any way that you can explain to us this morning how you come up with standards for the vast array, the myriad of different kinds of biological organisms that respond to so many different things in so many different ways?

Admiral GILMOUR. I guess I will take the second question first. I think it is an extreme scientific challenge, and we are going to work with our fellow agencies, EPA, NOAA, and Fish and Wildlife, as we have to this point, along with industry and scientific folks to try to determine those very critical scientific issues that you have brought up.

I would say, as far as testing goes, I think we need a reasonable time frame to develop the technologies, not only to develop the standard, but also to give industry and our technologists a chance to develop the systems, and also within that, to phase out what we are currently doing.

Although we would not say the time frame set out by IMO is unreasonable, I think we will also consider that as we develop requirements.

Mr. GILCHREST. Thank you very much.

Thank you, Mr. Chairman.

Mr. LOBIONDO. Mr. DeFazio?

Mr. DEFAZIO. Thank you, Mr. Chairman. Either to the Admiral or to the Lieutenant Commander, what was the negotiating position of Panama, Malta, Cypress, and others? As I understand it, the U.S. proposed 0.01 for an IMO standard. What did they propose initially?

Ms. MOORE. Sir, off the top of my head, I do not recall.

Mr. DEFAZIO. Was it something like 100?

Ms. MOORE. Yes. Japan and Norway, both of those countries, provided papers into the conference that specified 100.

Mr. DEFAZIO. OK. Now how would 100 vary from normal sea water or harbor water?

Ms. MOORE. From what little data there is, sir, there has been some measurement done on the number of organisms, or the concentration of organisms in ballast water. After a number of transits, ballast water being unmanaged, unexchanged, and untreated, 100 is on the order of magnitude of the average, or the median number for the organisms that show up in unmanaged ballast water.

We felt very strongly that that was not protective.

Mr. DEFAZIO. Great. And that does not even use the minimal sort of ballast water exchange? So it would be lower just by doing ballast water exchange?

Ms. MOORE. Very possibly.

Mr. DEFAZIO. All right. So how is it that the United States decided to compromise a tenth? Ten seems to me, as an international standard, since 0.01 is to ten as 1 is to 10,000?

Admiral GILMOUR. Something like that.

Mr. DEFAZIO. So something that is 10,000 times less stringent than ours?

Ms. MOORE. Sir, we strongly advocated a 0.01 and when the vote came, it was a package vote, and we abstained from the vote in order not to support the 10.

Mr. DEFAZIO. But if you had voted no, then it would not have gone forward; is that not correct?

Ms. MOORE. It was a choice between two values.

Mr. DEFAZIO. A majority vote?

Ms. MOORE. It was a majority vote, sir.

Mr. DEFAZIO. I thought this was a consensus thing. OK, it was a majority vote. So we abstained?

Ms. MOORE. Yes, sir.

Mr. DEFAZIO. Now we have this very weak and very distant schedule. I guess then we really need to focus on what we are going to do under port state control? Our standard of 0.01, what do you think is the most promising? We have had a number of hearings on this over my years in the Committee, and a number of proposals. What is the most promising technology now?

Admiral GILMOUR. Sir, I would just like to reiterate one piece, though. We still have the right, through the IMO, to—

Mr. DEFAZIO. Sure, we can go to 0.01, right. We will impound their ships.

Admiral GILMOUR. There are a number of technologies that show promise. Lieutenant Commander Moore can certainly point a lot of those out, but I think our problem now is they have really not been tested on the scale of what would be needed for a ballast water system shipboard. We need to work in that area.

Mr. DEFAZIO. OK. I keep asking that question.

In this interim standard of ballast water exchange, is that going to be required under the IMO?

Ms. MOORE. Yes, sir.

Mr. DEFAZIO. OK. Immediately?

Ms. MOORE. On entry into port; yes, sir.

Mr. DEFAZIO. So are we going to establish areas where people will do this exchange? There is a problem. Many times people do not want to do it on the high seas. They are worried about stability and those sorts of things. Are we going to establish areas closer to the coast line? Are we going to check each vessel, since we are now checking them for security, will part of our check list become, "When and where did you exchange your ballast water?"

Admiral GILMOUR. Yes, sir. The notice is in final review, but we advocate open ocean exchange, as we do currently on the Hudson River and in the Great Lakes. Indeed, through our Port State Control Program, we will check ballast water records. We will take samples, as we currently do, in New York and the Great Lakes.

Mr. DEFAZIO. Will you do that for all shipping, then, in the future?

Admiral GILMOUR. Yes, sir, as part of our Port State Control Program. We will not only look at the risk for safety as we do, and security, but we will also develop a risk matrix to look at vessels considering numerous factors.

Mr. DEFAZIO. You mean like the Watch List issue?

Admiral GILMOUR. It would depend on many things, where they are coming from, previous experience with those vessels, flag state, as you pointed out—the same things we do on the safety and security side. So, yes, sir.

One thing I would point out, having been in New York when the mandatory ballast water program on the Hudson River came. It is not an exact science. I am probably telling many of you who know that. It is a difficult thing for our folks to do. It is not always exact in our ability to measure that. We are really just looking at salinity at this point.

Mr. DEFAZIO. OK. Thank you.

Thank you, Mr. Chairman.

Mr. LoBiondo. Thank you.

Chairman Duncan?

Mr. DUNCAN. Thank you, Chairman LoBiondo. I know that we need to get onto this other panel as quickly as possible. So I will not be very long.

You said it is not an exact science. According to the materials that I have been supplied, we really do not have the technology to deal with this problem as of yet. We do not really have scientific standards, as of yet. We do not really have the data that we need

to make much more than a lightly educated guess about what to do about this problem.

Based on what I have been told, this is a problem. You are talking about at least hundreds of millions, and maybe even in the billions that we are talking about. What is the Coast Guard doing? Do you have a group of people doing research on this? I am told that most scientists have studied these invasive species for awhile, but there has not been much research done about what to do about the limits on the organisms and the ballast water and all that.

Admiral GILMOUR. I will answer your question in general, and then let Lieutenant Commander Moore talk about some of the scientific groups that we are working with.

We have a Notice of Proposed Rulemaking that we hope to have completed sometime in the winter of 2005 to set this ballast water discharge standard. Right now we are partnering with EPA, NOAA, Fish and Wildlife, and others, to develop an environmental impact statement to support this rule. But I think as was pointed out, there are certainly environmental issues. There are cost issues that we are going to have to consider in this NPRM.

I think there are many promising technologies out there, but as I said earlier, we just have not looked at them on the full scale of what we need for ballast water management systems.

Ms. MOORE. Yes, sir. The EIS is going to analyze a series of alternative standards and establish their performance with respect to both the marine environment and also eventually achievability.

In order to develop those standards and define them specifically, we have been working with NOAA's Great Lakes Environmental Research Lab, and the Smithsonian's Environmental Research Center in Maryland to be able to better understand, first of all, what are the numbers of organisms presently in ballast water, what percentage of reduction, or what orders of magnitude of reducing those numbers would really significantly reduce the threat of an invasion or an introduction.

We have also worked to determine what those values are and also working to determine what the technologies are that would achieve those, as well as what the detection methods would be.

So there are many technical problems that we are working with these institutions, as well as a number of academic institutions, to solve.

Mr. DUNCAN. I will tell you that I do not know if I have heard of a more serious problem where there has been less real research done on it as of yet. I hoped that there was an agreement at this last IMO meeting in February to start doing a little more research on this.

The cost of Zebra mussel prevention and remediation just in the Great Lakes is estimated to be between \$100 million and \$400 million per year. Now having that wide a variation of the cost estimate just on that one invasive species shows me that people do not know where we are on this thing. But it also shows that it is a potentially very, very expensive problem. I know the Great Lakes are huge.

Some of this that I am hearing is just boggling my mind. I think we need to do more research before we come down with some sort of standards or rules that are going to cost the consumers of this

Nation billions and billions of dollars. It is obviously a serious problem.

But if we get into something without having enough research and real scientific data to back things up, then we are going to misfire, and we are going to spend a ton of money doing it.

I yield back the balance of my time.

Mr. LOBIONDO. Thank you.

Mr. Oberstar, thank you for joining us. The floor is yours.

Mr. OBERSTAR. I thank you very much, Mr. Chairman, Mr. Costello, and Mr. DeFazio for holding this hearing. This is one of the most important enduring issues to those of us who live along the Nation's fourth seacoast, but it has also become apparent that the issue of invasive species is important to those who live in the Nation's salt water ports as well.

For a long time, our concerns on the Great Lakes were viewed with somewhat passing interest by those on the salt water ports until curious species began showing up in their harbors, taken from distant lands, dumped in their harbors, and causing serious damage to native species.

I guess I have been at this about 40 years now, starting up here as an administrative assistant to my predecessor, John Blatnik, who was Chairman of this Committee. I served as an administrator to the Committee staff, recounting again and again the lesson of the lamprey eel that entered the Great Lakes, which is one-fifth of all the fresh water on the face of the earth, in ballast brought in by a vessel presumably when the Wellen Canal opened in 1829.

It took over 100 years for that creature to spread, take hold, take up residence in the estuaries of the rivers that discharge into the Great Lakes, and then explode on the Great Lakes fishery population.

I remember as a high school student the alarm to which the news was greeted of the plummeting of the lake trout catch in one year in the Great Lakes from 3 million pounds to 300,000 pounds. The whitefish fishery went from 2.5 million pounds to 250,000 pounds.

Then began the frantic effort to find ways to combat the lamprey eel. Eventually lampericide was settled on and now the U.S. and Canada are collectively spending a little over \$6 million for the rest of our lives. The culprit is ballast water. We all know what it is.

There was expectation that exchange on the high sea would work. Mr. Ehlers, our resident scientist on the Committee, has given great thought to it. Mr. Gilchrest has addressed these issues as well from his perspective as a biologist.

But that has not worked sufficiently because not all of the ballast water is pumped out. We find that microorganisms reside in the materials in the tanks of these vessels. We were expecting that the Coast Guard in the IMO negotiations would negotiate. I commend the Administration for taking a tough stand.

But the Coast Guard recommended a treatment standard of 0.01 organisms per cubic meter. It seems now that in the final playing out of the IMO that we are not going to get there. What standard would you recommend to the Administration and for this Committee to consider for domestic legislation as a ballast water treatment standard?

Admiral GILMOUR. I would think as we look at this, it needs to be scientifically supportable, biologically meaningful, and for us to be able to enforce it. But at the same time we want to have a standard that would stretch technology. The technology does not exist. We want to go beyond the best technology and stretch the technology to do something that is meaningful.

So I do not know that we have an exact number. You know the number we went to IMO with. You know the number that came out of IMO. We need to, as we are now, work with our partners to try to come up with an exact standard or work towards a standard.

Mr. OBERSTAR. While we have been deliberating this issue, and having learned the lesson of the lamprey, your Asian milfoil has introduced itself into the Great Lakes, as well as the roundeyed gobi, the Zebra mussel that Chairman Duncan so thoughtfully discussed filters everything out of the water. It is clear water. There is nothing in it. There is a new spiny echinoderm that is destroying benthic organisms in the harbors in the Great Lakes.

And now there is a new phenomenon in the harbor of Duluth and Superior where from .10 feet below the surface down to a 10 foot level, steel pilings are corroding. It has just happened in the last two years. It has never happened before. We do not know why. Is it from the sulfur emitted by the Zebra mussels as they are feeding on the columns below that? We have just never had steel columns corrode in fresh water in those harbors.

We just are not making progress on this issue. At risk is the water quality, the quality of life, the fishery, and one-fifth of all the fresh water on the face of the earth.

Admiral, I have great love and admiration for the Coast Guard. Yesterday, on behalf of Chairman Young at the Homeland Security Agency, I sang, "Keep your hands off the Coast Guard. Let us retain our jurisdiction in this Committee. They do great work. You are splitting them up and not giving them the resources and the direction they need."

I am disappointed that you are not here recommending the same standard that you recommended to the IMO. I get frustrated, not just because I am, but because every environmental organization, every fisheries group, every port director throughout the Great Lakes is frustrated, upset, and angry that we do not have better progress on this issue.

Why are you not prepared to recommend to the Congress the same standard you recommended to the IMO, at least?

Admiral GILMOUR. Yes, sir. I really do share your concerns in all of these areas. I know your history on the issue and I appreciate it. I think we can safely say that we would be glad to work with the other administrative agencies that I mentioned before, and work with Congressional staffs to develop a standard.

But I think we had a stand at IMO. Others had a vastly different stand, as was pointed out. The number came somewhere in the middle. But we need to really take a good scientific look at this issue.

Mr. OBERSTAR. Admiral, I know how those international shipping organizations react. In a Committee trip to major maritime points in Italy and Greece three or four years ago, we raised this issue directly. The Greek shipping federation was absolutely strung out

over our idea of regulating ballast and making them clean it up. I know what resistance you are up against. But it is our water and it is our future generations.

Thank you, Mr. Chairman.

Mr. LOBIONDO. Thank you, Mr. Oberstar.

Unfortunately, you have heard the bells ring, Admiral Gilmour and Commander Moore. We are down to less than eight minutes. I apologize. It looks like we have four votes.

Mr. Ehlers, we do not have time to get into questions. Mr. Brown and Mr. Taylor I think also had questions.

I would ask you to please submit for the record the amount of money appropriated in fiscal year 2004 and requested in 2005 for the research you described with NOAA and the Smithsonian, and any other agencies that we are dealing with. Without objection, so ordered.

Once again, I apologize.

The Subcommittee will stand in recess until the votes are concluded. At that point Mr. Duncan will be taking over the Chair.

Thank you.

[Recess.]

Mr. DUNCAN [ASSUMING CHAIR]. The Subcommittee will come back to order.

I apologize for this lengthy series of votes that we had, but it could not be helped.

We will go now to Dr. Ehlers.

Mr. EHLERS. Thank you, Mr. Chairman. First of all, I just want to thank the Coast Guard for their testimony and their apparent willingness to really tackle a problem. I wanted to note that because in the past that has not always been the case. We had some very negative comments to make about the Coast Guard in the past. I am pleased to see the change of heart.

Your testimony provided good information about the IMO convention, but there is one key point and that is that 30 countries, which also represent at least 35 percent of the world's shipping industries, must ratify the Convention before it actually enters into force. I am aware that IMO adopted a Convention in 2001 with a much lower threshold for adoption, 25 countries representing 25 percent, but it still has not entered into force.

Based on your experience with these negotiations, how do you feel that we are going to make progress on this? When do you think we will ever get a ratification of the Convention; if ever? Or should we simply ignore it in our planning?

Admiral GILMOUR. Well, I think guessing when a ratification for any kind of a convention would be somewhat guess work. But we do keep close tabs at IMO. Mr. Angelo, who was discussed earlier, goes to many of our committee meetings. So I would certainly not ignore it, but at the same time, we plan on going ahead with our initiatives to address this issue, and indeed have a Notice of Proposed Rulemaking on ballast water discharge standards.

We are going to continue down the path at the same time IMO looks at the issue.

Mr. EHLERS. Are you also proceeding along without the best ballast water treatment center at the same time?

Admiral GILMOUR. Yes, sir; that would be part of our ballast water discharge standard, would be some sort of treatment standard.

Mr. EHLERS. All right. Mr. Chairman, you mentioned during your comments that there is a real need for more research. There is much that has been done. There is enough known now to establish an interim standard, but you are absolutely right. We do need considerably more research to really find the best way of doing it, not just what looks like the best way right now.

That does not prevent us from adopting the interim standard, but I just wanted to be pointed out that you are absolutely right on that. That is why I have introduced a bill to do the research that we need to do on this issue.

Back to the Coast Guard. You mentioned the IMO agreed to include a provision that allows parties to take unilateral actions that may be more stringent than the Convention. If we were to pass NISA reauthorization that required tighter time lines and more stringent standards for treatment of ballast water as a condition for entering the port, we would be acting in a manner consistent with the intention of the Convention; would we not?

Admiral GILMOUR. Yes, I believe you would, sir.

Mr. EHLERS. Thank you. Earlier you made a comment that the time line in the IMO is not unreasonable. I am not quite sure what you meant by that. I think it is unreasonably slow and that we should move faster than that. I do not know if you even recall making that comment.

Admiral GILMOUR. Yes, sir. Not to try to get into our Notice of Proposed Rulemaking, I guess I would clarify it by saying there are a number of issues to look at. Number one is setting a standard, as I said earlier, that is scientifically supportable and biologically meaningful and that we can enforce. Then reviewing where we are to that standard is not a process that we can do too quickly. I think it is an issue of technology, depending on where the standard is set. I would think that we would have to have ample time in there to take a look and review the process as we go. I guess I would say, too, through the Administrative Procedures Act, we do have to look at alternatives for both environmental impact statements costs and benefits.

Mr. EHLERS. Let me just make one additional comment on that. Again, it ties into something that the Chairman observed earlier about the incredible cost of this. Haste is important in this case. We have to proceed rapidly with the research. We have to proceed rapidly with the decisions. We already heard the extent of the Zebra mussels. It costs taxpayers of this country several hundred million dollars a year.

I recall when the State of Michigan passed their law, and the representative of the shipping industry came to see me and said, "I hope we do not do something like that in Congress." I said, "Why not?" He said, "Well, it will cost us too much." I said, "Well, make a deal. We will not do it, but we will simply make you liable for the results of the invasive species. How is that?"

That was surprisingly not satisfactory to him. The cost is huge and the prevention is a minor part of the cost of letting them get in.



I yield back the balance of my time. Thank you.

Mr. DUNCAN. Thank you very much. Mr. Gilchrest?

Mr. GILCHREST. I went through my questions earlier, Mr. Chairman.

Mr. DUNCAN. I know you had earlier questions. I did not know whether you had additional questions or comments?

Mr. GILCHREST. I just had one. It will only take 60 seconds.

The standard that was proposed at the IMO, on what basis was that proposal made, what scientific conclusions? Mr. Oberstar asked, "Is that a suggested standard that the Coast Guard would propose for the U.S.?"

Admiral GILMOUR. I think the standard was really based on trying to stretch the technology as much as we possibly could, knowing it is not achievable right now. Through our discharge standard, we will have to look at a number of alternatives and using the best data that we have, and the best scientific knowledge we have to do environmental impact statements and cost benefits.

I guess I would like to say, too, that hopefully through our Shipboard Technology Evaluation Program, we will get some treatment systems installed on ships.

Mr. GILCHREST. Is this just political leverage, then, the 0.01 standard that was proposed at IMO, and there is no value to it?

Admiral GILMOUR. No, sir; I think we have some scientific basis. I would let Lieutenant Commander Moore talk to it.

Ms. MOORE. Yes, sir; in preparation for the IMO negotiations over a period time, the U.S. Coast Guard, along with the National Science Foundation, hosted a series of workshops where we brought in biologists, marine ecologists, and a number of other expertise to discuss both the pattern, in other words, the format of the standard, and also what potential values would be recommended.

There were a series of three workshops, and out of them came a series of recommendations, everything from no detectable amount of organisms to some values. We looked at those values. We also looked at a paper submitted to MEPC-49, which is the prior committee meeting that negotiated the draft convention, we looked at the data submitted there which was an evaluation of what number of organisms comes into port in an unmanaged ballast tank. In other words, the number of organisms that appear if you do not do anything to the ballast.

Looking at those values, both the scientists' recommendations, as well as what shows up in unmanaged ballasts, we chose a number that was several orders of magnitude reduced from what shows up in unmanaged ballasts. It was around the order of magnitude of what the scientists were recommending.

With the infancy that invasion biology is at right now, the lack of science that we have specifically of how many organisms would constitute an invasion, that was the best that we could do to develop a negotiating position. I think we tried to advocate that as strongly as possible at IMO.

Mr. GILCHREST. So the same scientific community is there? Would they make a recommendation for that to be a U.S. standard right now?

Ms. MOORE. That I do not know, sir.

Mr. GILCHREST. Can you give us a list? Was it people from the National Science Foundation?

Ms. MOORE. They sponsored one of the workshops, sir.

Admiral GILMOUR. But I think I would determine it a best guess for the information we had. We wanted to go forward. We had to use the best we had, sir.

Mr. GILCHREST. Thank you very much.

Thank you, Mr. Chairman.

Mr. DUNCAN. All right. Thank you, Admiral Gilmour and Lieutenant Moore.

We will move on to the second panel. Thank you very much. You have been very, very helpful.

The second panel is made up of Joseph J. Cox, who is here to represent the Shipping Industry Ballast Water Coalition. He is the President of the Chamber of Shipping of America. He is from Washington, D.C.

We have James H.I. Weakley, who is President of the Lake Carriers' Association. He is from Cleveland, Ohio. We have Roger I. Mann, who is the Acting Director for Research and Advisory Science at the Virginia Institute of Marine Science, from Gloucester Point, Virginia.

We have Catherine L. Hazlewood, who is the Clean Oceans Program Manager with the Oceans Conservancy from Washington, D.C. We have David A. Ullrich who is the Executive Director of the Great Lakes Cities Initiative from Chicago, Illinois. We have Allegra Cangelosi, who is the Senior Policy Analyst at the Northeast-Midwest Institute. She is also from Washington, D.C.

I am sorry that you have had to wait. Thank you very much for being here. We always proceed in the order that the witnesses are listed on the call of the hearing. So, Mr. Cox, we will go with you first.

**TESTIMONY OF JOSEPH J. COX, PRESIDENT, CHAMBER OF SHIPPING OF AMERICA, WASHINGTON, D.C., REPRESENTING THE SHIPPING INDUSTRY BALLAST WATER COALITION; JAMES H.I. WEAKLEY, PRESIDENT, LAKE CARRIERS' ASSOCIATION, CLEVELAND, OHIO; ROGER I. MANN, ACTING DIRECTOR FOR RESEARCH AND ADVISORY SCIENCE, VIRGINIA INSTITUTE OF MARINE SCIENCE, GLOUCESTER POINT, VIRGINIA; CATHERINE L. HAZLEWOOD, CLEAN OCEANS PROGRAM MANAGER, THE OCEANS CONSERVANCY, WASHINGTON, D.C.; DAVID A. ULLRICH, EXECUTIVE DIRECTOR, GREAT LAKES CITIES INITIATIVE, CHICAGO, ILLINOIS; AND ALLEGRA CANGELOSI, SENIOR POLICY ANALYST, NORTHEAST-MIDWEST INSTITUTE, WASHINGTON, D.C.**

Mr. COX. Thank you, Mr. Chairman. Thank you and Chairman LoBiondo for holding this hearing. Mr. Chairman and members, I represent the Shipping Industry Ballast Water Coalition. We have been active on this particular issue for these past four years in both regulatory and legislative initiatives.

I will make summarizing comments here. Mr. Chairman and members, we recognize there is a problem here. We support an effort to find a solution that is environmentally protective, technologically achievable, and is practical and economically achievable.

We ourselves as representatives of the industry have met with various vendors. We have interviewed those vendors. We know that we have all struggled with the question of reviewing technologies without the benefit of a common standard or measurement technique.

Today we have that standard, recently arrived at in consensus internationally at the International Maritime Organization. I would like to make six points relative to that Convention and to the United States activity in this area.

First, we believe the U.S. should ratify this Convention and it should form the basis of a robust national preventive program. Second, we strongly support the performance standard in Regulation D-2 of the Convention. Marine biologists remain in active debate on the efficacy of various levels, although the levels in D-2 are the consensus of the international group of experts.

As I listened to the testimony of the Coast Guard panel, Mr. Chairman and members, it brought to my attention that there is a regulation D-5 in the Convention which calls for a pre-implementation review of that standard, which would occur three years prior to the initiation of that standard for a particular type of vessel.

In 2009, new vessels have to have some type of protection within the standard. That means that in 2006, a short two years from now, we will be reviewing this standard to see whether or not it is an appropriate standard.

The earlier testimony also indicated that we do not know whether we can hit the standard that is in the international Convention. I would submit, Mr. Chairman and members, that if we make the target small enough, then we will disincline people from a desire to try to hit that target.

We have an opportunity to set a target and when we hit that target, we have an opportunity to ratchet that target down and make it smaller for those who are capable of firing the right type of ammunition.

Our third point, Mr. Chairman, is that while ballast water exchange is not required in the Convention until it comes into force, we support establishing a mandatory program now.

Fourth, the Convention has specific implementation dates that are rigorous, taking into account the challenges that we are going to have in developing and installing complex treatment systems on thousands of existing ships.

Fifth, a shipboard testing program is vital to developing solutions. Scientifically valid testing is costly at \$1 million a ship by our estimate. We support an experimental shipboard testing program, such as the STEP program that we heard the Coast Guard refer to earlier.

Sixth, and finally, Mr. Chairman, we strongly support the national program as the exclusive method of compliance for vessels trading in our waters. We believe the levels of control in the Convention, the need for national and international consistency, and the ability to quickly develop new technology, buttresses the need for this single national standard.

Mr. Chairman and members, that concludes my verbal testimony. I would certainly be available for questions.

Mr. DUNCAN. Thank you very much, Mr. Cox.

Mr. Weakley?

Mr. WEAKLEY. Good morning, Mr. Chairman, and members of the Subcommittee. Thank you for this opportunity to address the hearing. I am James Weakley, President of the Lake Carriers' Association. We represent 15 American corporations operating 57 U.S. flag vessels exclusively within the Great Lakes. These companies annually move as much as 125 million tons of cargo. These cargos, iron and ore for the steel industry, limestone for the construction industry, and coal for our utilities, drive our Nation's economy.

Just as important, we relax along the shores of the Great Lakes and drink from the world's largest supply of fresh water. The Great Lakes are our home.

The lake Carriers' Association has been a leader in the effort to find a solution to the problem of ballast water transport and introduction of non-indigenous species. When the ruffe was discovered in Duluth Superior Harbor, LCA developed the voluntary Ballast Water Management Plan for vessels trading within the Twin Ports to prevent the spread of the ruffe from the western basin of Lake Superior. The U.S. Fish and Wildlife Service called the plan "the cutting edge of technology," and rightfully so.

Even though vessels call on Duluth Superior more than 1,000 times a year, the ruffe remains largely confined to western Lake Superior. Only two other populations have been discovered since voluntary implementation of these procedures.

LCA has also pioneer research on filtration and treatment of ballast water. In partnership with the Northeast-Midwest Institute, LCA tested ballast water filtration and secondary treatments on a Canadian-flag Laker and a barge. Filtration showed definite promise, especially when coupled with ultraviolet irradiation as a secondary treatment. There must be more testing and refinements, but should filtration prove to be one of the solutions, its foundations were laid on the Great Lakes.

Today's hearing focuses on the International Convention for the Control and Management of Ship's Ballast Water and Sediments, which the IMO completed last month, and reauthorization of the National Invasive Species Act.

While I support the goals of the IMO Convention, I cannot support its ratification. This treaty for the time would govern our domestic waterborne commerce if a U.S.-flag vessel transits the waters of another nation in the course of its voyage between two U.S. ports.

U.S.-flag Lakers often transit Canadian waters. During a Jones Act move, for example, on an upbound transit of the Detroit/St. Clair Rivers, a U.S.-flag Laker alternates between U.S. and Canadian waters 17 times.

This new regulation of domestic Great Lake shipping by the IMO Convention is unnecessary. U.S.-flag Lakers never leave the system, so their ballast water is not a vector for the introduction of new exotics. Our ballast water contains only what is already in the Lakes. We must focus our efforts on preventing new introductions.

Furthermore, the Great Lakes have been traditionally exempt from IMO Conventions because our operating conditions are so different from those encountered in the ocean trades. Vessels in the deep sea trades transit different environments on a regular basis.

On the Lakes, we operate in waters that are hydrographically connected and form an enclosed aquatic ecosystem.

If, in fact, such moves should be regulated, a bilateral agreement between the United States and Canada is the most appropriate vehicle for addressing any Lakes-specific issues, not an international treaty.

The other topic under consideration today is the reauthorization of the Native Invasive Species Act. LCA supports H.R. 1080 and H.R. 1081, and commends the sponsors for recognizing that vessels operating in an enclosed aquatic system need not be subject to full application of the ballast water regulations that are to come.

Vessels operating exclusively within the enclosed Great Lakes aquatic system pose no threat to the Great Lakes environments. The Great Lakes are interconnected. The waters of Lake Superior flow into the St. Mary's River, and then are dispersed throughout the system.

This means that the ruffe, which is migrating along the southern shore of Lake Superior unchecked, will reach the St. Mary's River, and could migrate to the lower Lakes. Therefore, it would be meaningless for vessels that are confined to the Great Lakes to filter or treat their ballast water.

On the Lakes, our focus must be on finding the means to stop future introductions via the ballast water on vessels entering from the oceans. To require U.S.-flag Lakers to treat or exchange their ballast would have no environmental benefit, but would increase the cost of delivering raw goods and materials that fuel our Nation's economy.

Thank you.

Mr. DUNCAN. Thank you very much, Mr. Weakley.

Dr. Mann?

Dr. MANN. Mr. Chairman and members of the Committees, it is pleasure to be here today.

My testimony will focus on three questions: What data is available to support the setting of specific standards; what level of confidence do we have that a particular standard will have a meaningful impact; and, are the recent IMO standards adequate and should we adopt them?

Let us start with the first one, the problem. I pose a question: What are the target organisms of concern given our current understanding of technology and biology, and who amongst the target organisms do we have a chance of eliminating from ballast water prior to discharge in U.S. waters?

We go up the size scale. Microscopic invaders include single cell bacteria that might be pathogenics to humans or marine species; single cell phytoplankton that may change the nature of food chains; cyst-forming organisms that are responsible for harmful algal blooms, and the reproductive spores of plants that in final forms may be large and imposing members of marine communities.

Moving up the size ladder again, we encounter small invertebrates that compete directly with native species, and very importantly, the early life history stages, and by that I mean the eggs and the larvae of the vast majority of marine animals. The eggs and larvae stages of larger organisms are abundantly present in

ballast water and represent a documented threat for eventual establishment of an invading species in U.S. waters.

Larger still and we encounter adult stages of a wide variety of organisms, but in general I consider these to be of minor importance because they are generally killed by the filling process, passing through pumps and pellets and so on.

So we have identified a suite of organisms. I think that the eggs and the larvae of the various life history stages are the ones that we should be focusing on.

So the answer is that we need to move quickly to control discharge of threat organisms in the reauthorization. NAISA is the tool. Ballast water exchange is a very limited management tool. Indeed, I believe it is inadequate.

In previous testimony, in November 2002 and in April 2003, I proposed adoption of a standard of requiring a 100 percent kill of all organisms in excess of 50 microns. I maintain my support for this standard.

I have heard many comments on this and previous commentaries about how difficult this is to set a standard. This is not difficult. If you look across the hundreds of thousands of species of marine organisms, you look across their various life history stages, and you look at the sizes of the eggs and the larvae, there are very good reasons why they are the size that they are.

It is all to do with evolution. It is not here today. It is not a difficult thing to do. The 50 micron standard is within reach of current technologies. It would be successful in retaining essentially all of the early life history stages, including eggs, of the vast majority of aquatic invertebrates, vertebrates, and macroalgae, which have documented problems in the past.

It is biologically defensible, and it is enforcement. I state quite clearly that I can teach anybody in this room in 30 minutes how to check this. It is easy to do.

While this standard will not insure removal of most phytoplankton and toxic dinoflagellates that cause red tides, a group that truly causes a serious challenge to any and all of the current research technologies, it does represent a significant advance.

I believe we should seek uniformity to defensible technology-based standards that will provide technology developers with trackable performance goals, and allow the Coast Guard's STEP program to certify technologies for commercial application. We have the pieces in place. Let us do it.

Incremental common sense dictates employment of the best available tools now, and better tools in due course. Reauthorization language always allows you in due course to come back and ratchet up standards.

Let me now address the utility of the recently adopted IMO Convention. Within them I do applaud a number of things: the move to universal compliance, uniform comprehensive record management, recognition of alternatives to ballast water exchange, testing and approval, encouraging of the shipping industry to partner in the development of technologies, and the periodic review of standards. These are all good.

But the IMO standard is too little and it is too late. It is too little in terms of approaching right standards within the size ranges. It is going to be too late by the time it is ratified. Target organisms can be based and categorized on size. The tolerance level for the 50 micron standard, and the IMO standard, I just do not think is good enough. We can do 100 percent.

The 10 to 50 micron standard would include some, but not all, of the phytoplanktons and toxic dinoflagellates. This is going to be a very difficult thing both to achieve and extraordinarily difficult to enforce.

The IMO standard for toxigenic bacteria focuses on such things as *Vibrio cholerae*. The standard that is proposed is right at the very detection limit of *Vibrio cholerae* in the laboratory. It is essentially unenforceable in practical application at this point in time.

There is also focus on *E. coli* and *Enterococcus*. These are bacteria that have extraordinarily short half-lives in marine systems. They die in salt water, so they are not a problem. In truth, the real value of these toxigenic bacteria standards are for on-site testing of technologies before they are approved for installation, just the sort of the thing that the STEP program was put together to do.

So while I applaud certain of the IMO efforts and products, I do think that we can do better, and I do think that we should do better.

Again, I thank the Committee. That concludes my statement.

Mr. DUNCAN. Thank you very much, Dr. Mann.

Ms. Hazlewood?

Ms. HAZLEWOOD. Hello, Mr. Chairman, Congressman Gilchrest, and staff of the Subcommittees. My name is Catherine Hazlewood and I am the Clean Oceans Program Manager for the Ocean Conservancy. The Ocean Conservancy is a national nonprofit organization that strives to act for the oceans through science-based advocacy. They are headquartered here in Washington, D.C., but we have additional offices and staff in Alaska, California, Washington, Florida, Maine, Virginia, and the U.S. Virgin Islands.

Thank you for the opportunity to testify today regarding the recent adaptation of the Ballast Convention and the U.S. reauthorization of the National Invasive Species Act.

Like our colleagues here today, the Ocean Conservancy has long worked to prevent and to control the spread of aquatic invasive species. Our efforts to date have ranged from local and regional projects to national and international policy. We are also a current appointee to the National Invasive Species Advisory Committee.

Today you have heard and will hear about the specific standards negotiated at the IMO Convention. While TOC is grateful for the leadership provided by the U.S. delegation at the Convention, I would like to use my time today to focus on the need for us to do better here in the United States.

The U.S. must set a high bar for domestic regulation of invasive species because they impose such an enormous and growing threat to our Nation, both environmentally and economically.

There are three main points to my testimony today: First, we must set more protective ballast standards for ballast water management than the IMO Convention, standards that reflect the les-

sons we have learned since the last NISA reauthorization amendments in 1996.

Second, to fully address the problem of aquatic invasive species, we must address several other vectors and pathways if they are spread, when we currently do not address, and which the IMO Convention did not purport to address.

Third, we need to fully support our agencies with all the necessary tools, mechanisms, and funding to prevent and control the spread of invasives.

Congress has the opportunity to accomplish much of this through the NAISA legislation which is currently pending before the House and Senate, and which is sponsored by Mr. Gilchrest.

I would like to take the remainder of my time to address the importance of these three main points in more detail. Number one, the need for more comprehensive ballast management.

The initial IMO standards are based on exchange, which several members have noted will fail to protect many species from entering U.S. waters. Exchanging ballast water is a practice that can range from 10 percent effectiveness to 95 percent effectiveness.

While it may be a realistic first step for the world as a whole, the standard does not reflect what the U.S. needs and what it is currently capable of achieving.

Consider the Great Lakes where, since 1996, the exchange has been mandatory. Even with the reported 97 percent compliance rate, new invasive species have continued not just to spread, but as members have noted, become established within the Great Lakes.

The IMO Convention fully permits nations to take more stringent action. TOC urges the Committee to move forward with NISA reauthorization to accomplish this in the United States. We need a standard that will promote the ongoing development of effective ballast water treatment technologies, and facilitate improvement over time.

NAISA would accomplish this through its utilization of a final standard that is not tied to some specific number or percentage, but instead it requires the application of the best available technology for the applicable category or class of vessels. This is necessary to promote economic and environmental stringency as well as technological innovation.

Secondly, I would like to address the point that we should address all vectors. Ballast water exchange is one of many vectors for the spread of invasive species, but it is not the sole vector. Many of the species that are most injurious to the United States are those that were introduced by other means.

Consider, for example, *Caulerpa taxifolia*, a toxic algae introduced to California waters. It is not known whether or not that species came from ballast water or if it was from an aquarium enthusiast who dumped the plant once it had overgrown their own aquarium.

It has been suggested in the past that we address only ballast water organisms. However, of even higher concern to The Ocean Conservancy, NOAA has recently announced a goal to quintuple our production of aquaculture in the open ocean. Without specific safeguards provided by NAISA, this has the potential for the



escapement of genetically-modified, non-native, or even farm-raised native fish. That remains extremely high.

NAISA would provide us the opportunity to consider these issues comprehensively. It would provide the Federal Government with rapid response mechanisms so that when new invasive species were identified, the Government could work with States to quickly control and eradicate them. It would provide us with crucial screening provisions so that we could do a better job insuring that that species did not enter the country illegally.

It would also greatly enhance the ongoing research that has been done which is critical to help us with the development of better understandings of how these species are spread, their effect on our environment, and how we may safely address them without causing more harm than we solve.

Finally, I would address my third point very quickly that we need to provide agencies with the mechanisms to ensure our Federal program will really work through better coordination, through adequate funding, and some basic enforcement.

Consider our record to date as compared with the State of California which has a State ballast management law in effect. National reporting on ballast water exchange was made mandatory in 1996, yet in 2000, only about one-fifth of the vessels filed mandatory reports. Compare that with the State of California which had a compliance level at about 75 percent.

We need to utilize NAISA as an opportunity to provide a comprehensible, workable solution.

To conclude, it is widely accepted that the Nation is facing an increasing rate of aquatic species introduction. The known cost of failing to regulate invasive species discharges in the order of billions of dollars to date, are far higher than the costs associated with regulation.

If we only ratify the IMO Ballast Water Convention, we ensure that only the current status quo continues. We urge Congress to do better, to act quickly to consider NISA reauthorization to prevent further permanent damage to the Nation's waterways, and to the people, wildlife, and industries that depend upon them.

Thank you.

Mr. DUNCAN. Thank you very much, Ms. Hazlewood.

Mr. Ullrich?

Mr. ULLRICH. Thank you very much, Chairman Duncan. I greatly appreciate the opportunity to speak here today. I am Dave Ullrich. I am the Executive Director of the Great Lakes Cities Initiative, which is a group of 40 to 50 cities around the Great Lakes. It has been organized by Mayor Daley of Chicago to get more directly involved in the protection and restoration of the Great Lakes.

I want to talk a little bit today about the invasive species, and particularly ballast water, and to just share a little bit about the real effects that this is having on cities all around the Great Lakes, and as we heard in port cities in our coastal areas as well.

This is an urgent problem. I heard Congressman Gilchrest mention that on two separate occasions. It is a very costly problem. The unique situation here is that we have an opportunity to prevent disasters from occurring in the future.

Having been involved directly over the last six or seven years in trying to deal with this, I must express some real frustration that there has not been action sooner because the costs keep piling up. Cities are bearing the brunt of those costs.

Let us look at just a couple of areas. First of all, in terms of drinking water, I think everyone has heard about the encrusting of intake structures, not only for drinking water supply, but for industrial sources as well. We will heard millions, hundreds of millions, billions of dollars that this is costing. It has spread out over many different people who have to absorb these costs. It is a very costly thing that is being dealt with.

Taste and odor problems are related to the presence of the invasive species and problems that they are causing. Certainly we have a higher degree of concern about the security of our country. Water supplies are something of great concern to cities in terms of providing a high quality reliable source and the threats of intentional or unintentional introductions are something that cities are greatly concerned about.

Beaches may seem more like an amenity but they are a real element of the quality of life in cities. We dealt with the alewives where they had to be taken out by front-end loaders in the 1960's to deal with them. Zebra mussels came in the 1980's. The Lake shores have been covered with them, plus the related problems. Algal blooms that have come out have required the closing of beaches. Most recently, there has been an increase in botulism and deaths of fish and wild fowl washing up on the beaches of the Great Lakes.

The economic effects, as I have mentioned, have been significant. I spoke with one of our member cities of Erie, Pennsylvania, and since 1992 they have spent about \$1.6 million alone in Erie, Pennsylvania to deal with the zebra mussel problem in their water supply system. For a city of that size, that is a very significant amount of money.

It is harming the recreational boating industry as well, with the higher maintenance costs that are imposed. It makes it more difficult for boaters to enjoy the great waters of the Great Lakes.

The Subcommittees are absolutely correct in terms of focusing on ballast water because it is the primary pathway for the introduction of new invasive species into the Great Lakes system and into other ports.

The other thing is that it is a known universe of vessels that can be dealt with. The medium that needs to be dealt with is in a confined space and can be controlled and can be dealt with. I realize there needs to be more research, and there always needs to be more research on proper standards, and proper techniques, but this cannot keep going on forever.

This does need to be dealt with on a Federal level as well. We are dealing with a global economy. We have the shipment of goods going all around the world. It has to have the Federal involvement. If we get into a patchwork of State and local requirements all over the Great Lakes or the other coastal areas, it is going to create an extremely difficult situation for the shipping industry, which would be inappropriate.

The action by the International Maritime Organization is welcome. I wish it had been much sooner. I wish there had been more stringent requirements that came out of it. It is good that they are focusing on best management standards, record keeping, and deadlines. But all of those need to be tighter and there needs to be fewer exceptions that can be allowed under the Convention.

It is good that countries are allowed to impose more stringent standards. I hope that if the U.S. ratifies this Convention, it will take the full opportunity to go ahead with more stringent standards than are provided.

There also has to be an assurance of strong compliance and enforcement activity. If they are not met, they are not going to do any good. The National Aquatic Invasive Act that is in front of you now is an excellent step to take in dealing with this very serious problem.

The ballast water exchange may have helped somewhat in the Great Lakes, but as has been pointed out, new species are being introduced all the time. I think a statement has been provided by Chairman Schornack of the International Joint Commission that about every eight months, a new species is being introduced. We have the opportunity and the ability to stop that.

We must pass NAISA and we must pass it now to require best management practices, set protective standards, and mandate record keeping and reporting. We have to have a rapid response capability for those that slip through. There needs to be continued research. We have to provide for inspections and enforcement.

Again, we have a unique opportunity to prevent even more serious problems in the future. It is going to take some action and action quickly. On behalf of the Great Lakes Cities Initiative, Mayor Daley, and the leadership of the other mayors, we strongly urge you to move ahead with passage of NAISA and other actions to control this very serious problem.

Thank you very much.

Mr. DUNCAN. Thank you very much.

Ms. Cangelosi?

Ms. CANGELOSI. Good afternoon. I would like to thank the Subcommittees for inviting my testimony at this timely hearing on the recent IMO agreement on ballast water, and on the ongoing urgent need for Congress to reauthorize the National Invasive Species Act of 1996.

In my written testimony I contrast the Convention with current and pending domestic policy, including the NISA reauthorization legislation pending before these Subcommittees, H.R. 1080 and H.R. 1081, and makes specific recommendations for Congressional action.

To summarize that analysis, there are some similarities, but also striking differences between the IMO Convention and existing and proposed U.S. policy. Some of these differences may present such serious departures from our pending and existing goals that ratification of the treaty is not useful for domestic purposes.

But given the flexibility and ambiguity built into the convention, most policy decisions remain in the hands of Congress and Federal agencies, irrespective of that choice. While that decision is being made, Congress should work quickly to develop detailed and effec-

tive domestic policy, including regional agreements with our neighbors, that draws on the strong points of the agreement, but is not constrained by its weaknesses.

So what are the strong points of the Convention? It is a true achievement that an international convention has been crafted to hold new ships first, and ultimately all ships, to a ballast discharge performance standard. This approach is consistent with proposed U.S. Coast Guard regulation, and the pending legislation, NAISA, which gives agencies four years to promulgate the final environmentally-protected standard analogous to the IMO Convention standard.

The logic applied to derive a standard for discharges is the second strong point and should be of interest for domestic purposes. That logic, put forward by the International Council for the Exploration of the Sea, ICES, is that a ballast water standard should require a substantial reduction over the median observed concentrations of organisms in untreated ballast discharge globally.

This approach would, as a policy, normalize ballast discharge densities, which vary widely, to a consistently low number. Moreover, a treatment system would have to deliver overkill most of the time to reliably comply, even under worst case scenario densities. In addition, it might be easier to measure compliance against such a standard over time, though this utopian enforcement scenario is still some years off.

Current U.S. policy does not have a standard for ballast discharge. Agencies should give careful consideration to the ICES approach and explore similar approaches to setting standards for sea chests, ship hulls, and coastal voyages.

What are the weaknesses of the Convention? The formula is promising but the data set from which the IMO numeric standards were derived is quite weak for this purpose, so weak that claims should not be made that this or any standard derived from such a database is environmentally protective or science based.

Congress should direct agencies to determine the densities or organisms in ballast discharges from ships specifically visiting U.S. harbors consistent with the research program laid out in H.R. 1081. If a standard is set in law based on existing data, Congress should make it easy to adjust pending the better information while using the same formula.

The IMO diplomatic conference altered the ICES recommended limits for plankton upward, and added limits on concentrations of pathogenic microbes. The resulting IMO standard has little to recommend for U.S. policy and is a second major weakness of the Convention. If Congress sets a preliminary standard for ballast discharge based on the IMO approach, my written testimony contains recommendations for some ways to improve it.

Third, the implementation approach of the Convention is the biggest weak point. The Convention makes the assumption that treatments would become available sooner for smaller ballast capacity ships than large, and stages its deadlines accordingly. This assumption is unnecessary and may not be true. Staggered deadlines will delay the infusion of the substantial resources of large ship owners to help solve the treatment question, and create less incentive for vendors to invest in treatments for large ships.

The timing within the implementation approach contemplated in the IMO agreement is painfully slow across the board, too slow for domestic purposes.

Finally, to further hedge its bets, the Convention sets forth an open-ended technology review process three years prior to the imposition of the standard, as soon as 2006. There the IMO may vote to change any aspect of the Convention, its standard, and even, and perhaps most conveniently, and likely, the deadlines.

NAISA outlines a much better approach to domestic implementation. Agencies are directed to set a performance benchmark for treatment for each class of new and existing ships based on what a review of best available technology, economically achievable, can deliver.

Any technology that can be shown to meet or exceed that performance benchmark would be allowable, and those that cannot meet it, would not be allowable. Periodic surveys of treatments available for new and existing ships will lead to the steady, upward ratcheting of that benchmark toward the environmentally protected standard.

This approach assures that the best treatments will be used when they become available rather than delaying the use of methods better than ballast water exchange pending the perfect solution. The "all or nothing" approach will deliver to us nothing.

My other recommendations are summarized in my written testimony. A credible U.S. Federal program to prevent ship-mediated transfers of exotic organisms will stabilize the regulatory landscape domestically and provide leadership and experience to the global community in support of implementation of the international convention.

I urge the Subcommittees to work quickly to enact such a program and to work with their colleagues in the Resources Committee to develop strong provisions addressing the other major vectors of aquatic invasive species.

Thank you again for allowing me to testify.

Mr. DUNCAN. Well, thank you very much.

Dr. Mann, you say in your testimony the standard requiring 100 percent mortality of all organisms greater than 50 microns, this standard is technically and economically attainable, it is practically enforceable and would effectively eliminate these invaders.

Then you go on to the 10 to 50 micron standard would include some but not all, phytoplankton and so forth. Even 100 percent mortality here will not eliminate invasions and is probably not attainable. Are you talking there just about the 10 to 50 micron levels?

At another point in your testimony, you said something about that it would be easy to take care of this problem. Would you explain that to me?

Dr. MANN. Let me go through those in order. I think the 50 micron standard would include all of those life history stages of animals and some plants that have a documented threat, if you look at everything that is here so far.

In fact, if you go to the back end of the IMO document as it arrived to me over the internet, there were two pages of tables in there that lists all kinds of organisms that have been moved

around the world. If you look at all of those, and if you look at their early life history stages, they would all be taken out by a 50 micron standard.

Do I believe that we can get to the point where you can kill everything over 50 microns? If you can kill 98 percent of it, you can kill 100 percent of it. Organisms that are that small, if you think about them, they have a lot of surface and not very much volume. They are all very, very fragile. It is not difficult to kill one; therefore, it is not difficult to kill the lot. I think arguing about the 98 percent versus the 100 percent is a red herring. If you can kill them, go for it.

How can you test that you have killed them all? That is actually quite easy as well. That is what I said is easy. I think it is easy to set the standard based on biology. You do not find many things that have eggs or larvae that are smaller than 40 microns. There is a very good reason for this based in the evolution of marine forms. You see this across worms, crabs, barnacles, shellfish, fish. Choose whichever group that you want.

How do you test it? That is easy, too. This is a ballast tank and the ice cubes in it are the organisms. How do you get the ice cubes out? You pass it through a mesh that will retain the ice cubes. You can buy 50 micron mesh by the square yard. We have been able to do it for 30 or 40 years. You pour it through. You retain the old organisms. You wash them back into a smaller volume.

Then to that you add a dye, a simple dye. The one that we use in our laboratory is something that is called neutral red. You can buy it from any supply house. What does neutral red do? It stains things that are alive red. Things that are not alive do not pick up the stain.

So you have your organisms concentrated. You let them take up the dye, if they are alive. Then you add formalin and that kills everything. Now what you end up with in the bottom of here is a mix of things. Those that were dead before you put the dye in. They are not red. Those that were alive when you put the dye in, they are red.

If your ballast tank treatment system works, you will not find a red organism in the bottom of that. You do not have to know whether they are the larvae of fish, crabs, barnacles, whatever. All you have to do is count red things versus not-red things. If there are no red things in there, you have killed everything.

Mr. DUNCAN. Let me ask you this. You make it sound so simple and easy. Maybe it is. You are the expert here and I know almost nothing about it. But I have been led to believe that there is not really technology currently available, or that we are not far enough along that we would really have verifiable technology that could take care of these problems as simply and as easily as you indicate.

In fact, in our briefing memo, it says, "Currently there are no technologies that have been demonstrated aboard vessels that would meet the standards established by the Convention."

Dr. MANN. That statement is correct on a technicality. There are no technologies that have been demonstrated on vessels. Here you have part of the problem with this whole process. There are sitting in this room behind me representatives of at least two companies who are trying to develop these technologies.

When I have given testimony in the past, there have been members of several companies who have come along. They are extraordinarily frustrated because they are investing money in trying to develop technologies. In the absence of a standard, they cannot sell anything.

Because they cannot sell anything, they cannot go to the ship owners. They cannot get the ship owners to participate in the business partnership. The ship owners do not want to spend the money without having a standard. Everybody is in a do-loop where nothing gets done.

I have worked with one of these, and I believe, and I have seen this in pilot scale, at 1,000 gallons an hour, that you can get this to work. I think if you were to fill this bench here with the people who represent these technology companies, and hold up a standard in front of them and say simply, "Can you meet 50 microns, yes or no?" I think you would have a line of hands here.

But the reason why this has not been demonstrated on ships is a business issue. In the absence of a standard, these companies that have already invested millions of dollars, to get them on board a ship is going to cost more. Shipping lines are not willing to partner in this because there is nothing in it for them at the moment.

Mr. DUNCAN. Let me ask this. Do all of you agree that it would cost in the ball park of a million dollars per vessel to install equipment?

You are shaking your head, Ms. Cangelosi.

Ms. CANGELOSI. I am shaking my head for two reasons. One is that I do not believe it would cost that much per vessel. That is a too broad statement given the variety of types of vessels and the variety of types of treatments.

The other reason is that the price will be set by the market place. These vendors are savvy enough to hang back and see what they can get for their treatment. Some of it will depend on how heavy the installation burden is versus a treatment that does not have a heavy installation burden. It is too soon to cite a price.

But having that, I can say that I have been working with some treatment vendors that would propose something less than that to retrofit a Great Lakes size ship with a treatment system that I would consider fairly effective.

Thank you.

Mr. DUNCAN. Mr. Cox?

Mr. COX. Thank you, Mr. Chairman. To the same question, I presume. Yes, sir; it is a common misunderstanding by those who do not recognize our industry. We can buy, for example, a radio and we can say it is going to cost \$50,000 for the radio. But to put the radio on the ship and to run all of the wiring, and to make sure that it is done in a proper maritime manner, is easily double that cost.

When you talk about outfitting these things on vessels, you are talking about talking it into a ship repair location where you can do a proper job of getting it in there, gas freeing any parts of the vessel or the engine room that you are going to have to gas free. So it is not merely the cost of the piece of equipment. It is the cost of putting the vessel in there, the cost of the down time of the vessel because you are taking it out of its normal rotation.

So that is what we factor in when we say a million dollars a ship. Now, obviously if there is a small coastal vessel, that price might be lower.

But, Mr. Chairman, since I have the microphone, that small coastal vessel might not have the volume of ballast water that we are talking about treating on large ships where that million dollar cost is easily met.

For example, we roughly would have probably, in terms of gallons, 16 million to 18 million gallons of ballast on board a ship. So just using the figure that we heard about treating 1,000 gallons an hour, you can see that one problem is that you cannot take 16,000 hours to take care of the ballast.

Mr. DUNCAN. I apologize. I have to go to a vote. I am going to turn this over to Mr. Gilchrest.

Mr. GILCHREST [ASSUMING CHAIR]. I am going to yield to Dr. Ehlers so he can get his questions in. I appreciate your comment.

Mr. EHLERS. Thank you, Mr. Chairman. I am not sure I have time to get my questions in. Whatever I do not get in, I will submit for the record. I do apologize. I will not be able to return because I have to chair a markup at 1:00.

First of all, I am very pleased that four of the six witnesses on this panel explicitly support the NISA reauthorization legislation that Congressman Gilchrest and I authored. I am very pleased with that. I think that is indicative of the likelihood that this bill be able to proceed to markup fairly quickly and I hope passage through the House.

Mr. Cox, among the witnesses here you seem to be in the minority for calling for the U.S. to both ratify and adhere to the IMO treaty. While I understand and appreciate your concern about an uneven regulatory environment, you seem to recognize the reality of the situation by calling for pre-exemption of State regulation.

But as Mr. Ullrich from the Great Lakes Cities Initiative states in his testimony, State initiatives are born out of the frustration of essentially transferring the cost of this problem from the shipping community to the taxpayers. Given that, it is likely to be some time before we know if the IMO Convention will enter into force and that this Convention will not protect our resources.

How can we resolve your desire for a level regulatory environment or for the States to protect their taxpayers?

Mr. COX. Thank you, Congressman. I am used to being in a minority. I represent American shipowners. But frankly, sir, I think you are hitting at a very important point, and that is that we certainly support the Convention being a framework, that establishes a framework in other words, for the national legislation. By that we mean that we have a target that we can adopt and begin to work with and certainly start the process as soon as possible.

I do not think that we said that we should wait for ratification of the treaty before we start our process. We certainly support ratification of a treaty because it does set an international standard. It will bring the world into conformance with that international requirement, but at the same time we can start our processes and base them on the framework that is contained in that convention, and get on with this process.



Mr. EHLERS. I think what we will be trying to do is develop legislation that will stay within the framework of the IMO document, but set a process where the standards could ultimately be adjusted based on the best technology that we have so that the States feel like the resources are being protected. Otherwise, the States are going to go ahead. I know that. My State did already. California has done it. Washington is in the process. I think you will have a real mess on your hands if we do not come up with something good. If it is not good enough, the States are not going to accept that.

Would you tend to agree with that?

Mr. COX. Yes, sir; I think I tend to agree that a State would probably want to take some action to protect their citizens if they felt that the Federal initiative was not being good enough. But I would suggest that if we use the framework of this Convention to establish national legislation, that indeed will encompass all the current requirements that we see in State legislation, and indeed, I think in all instances go beyond what the current State requirements are. So I think that we are not talking about stepping back from anything that is currently applicable in this industry. We are talking about ratcheting it a little bit tighter than what currently exists.

Mr. EHLERS. I think if we did take care of the States' concerns, we would certainly be stronger than the IMO Convention. I do not see any way around that. Let us face it. The U.S., in spite of all the shipping that it does, is probably still one of the more pristine environments.

It is possible that Europe does not worry about it because they have had ships from other countries coming in and out of their ports for 500 years. They probably already have every alien species from the world in their water. But we are still trying to protect our water, particularly the Great Lakes, but also the coastal waters.

I think we simply have to set a tough standard regardless of what IMO does and the ships that want to come to our ports are going to have to meet that.

Mr. GILCHREST. We are down to about five minutes.

Mr. EHLERS. We have to go vote. I apologize. I will not be able to return. I request that I would be able to submit the rest of my questions. Thank you.

Mr. GILCHREST. Without objection, so ordered.

I have a markup with Mr. Ehlers at 1:00. We have a vote on the floor right now. Then I have another hearing at 2:00. But we will stay in touch with all of you folks. I would just replicate the last comment that Mr. Ehlers made and that is that we have an opportunity for the United States to set the standard for the world. I think we can do it responsibly and reasonable. That is what we are going to shoot for.

Thank you all for your testimony. It was very well done.

The hearing is adjourned.

[Whereupon, at 12:04 p.m., the subcommittees were adjourned, to reconvene at the call of their respective Chairs.]

UNITED STATES HOUSE OF REPRESENTATIVES  
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE  
SUBCOMMITTEE ON COAST GUARD AND MARATIME TRANSPORTATION  
SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT  
  
BALLAST WATER MANAGEMENT HEARING  
  
MARCH 25, 2004  
  
TESTIMONY OF  
  
ALLEGRA CANGELOSI, SENIOR POLICY ANALYST  
  
NORTHEAST-MIDWEST INSTITUTE

**TESTIMONY OF**  
**ALLEGRA CANGELOSI, SENIOR POLICY ANALYST**  
**NORTHEAST-MIDWEST INSTITUTE**

Good morning, and thank you for the opportunity to testify before this joint hearing by the Subcommittees on Water Resources and Environment, and Coast Guard and Maritime Transportation of the Transportation and Infrastructure Committee. This hearing is extremely timely given recent negotiation by the International Maritime Organization of the "International Convention for the Control and Management of Ships' Ballast Water and Sediments", and the urgent need for Congress to reauthorize the National Invasive Species Act of 1996.

Invasive species issues have risen to the forefront of natural resource conservation concerns over the past decade. The statistics on economic impacts, often quoted and always staggering, range into the billions of dollars. The permanent degrading changes to US coastal and inland aquatic systems caused by invasive aquatic organisms affect the standard of living, recreation, employment, and health of the American public. With states stepping into the breach to establish local and sometimes conflicting regulations to enhance prevention, the need for a federal program that effectively and credibly will prevent further such damage is grave.

My role and interest in this field began in 1989 when, as Great Lakes Task Force Coordinator, I assisted Senator Glenn and Congressman Nowak in gaining enactment of the first national legislation regulating discharges of aquatic invasive species from ships, the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990. As Senior Policy Analyst at the Northeast-Midwest Institute, I then assisted Senator Glenn and Congressman LaTourette in achieving enactment of the reauthorization of that law, the National Invasive Species Act of 1996. At the same time, the Northeast-Midwest Institute began a partnership with the Lake Carriers' Association to examine ballast treatment options for ships entering the Great Lakes. The two organizations raised funds from the Great Lakes Protection Fund, Environmental Protection Agency, the National Oceanic and Atmospheric Administration among other sources to conduct first-hand high flow tests of promising ballast treatment methods on a barge-based platform located in Duluth-Superior Harbor, and on ships plying the Great Lakes and West Coast. The results of this work can be viewed on our Website ([www.nemw.org](http://www.nemw.org)).

Commercial vessels are the leading vector of unintentional introductions of aquatic invasive organisms into US waters. Ballast water exchange, a ship operation designed to purge near coastal organisms in the high seas, has long been regarded as a faulty but useful stop-gap measure to help attenuate ship-mediated organism transfers. The list of limitations associated with this method is long and of concern to environmental and maritime interests alike. A rapid transition from BWE to effective ballast water treatment is a stated goal in the National Invasive Species Act, and internationally through the International Maritime Organization. Such a transition is particularly important for the Great Lakes region, where the preponderance of ships enter the lakes with only unpumpable -- yet fertile -- ballast residuals from foreign ports. Ballast water exchange of this water is not an option on the voyage into the lakes, and only treatment can eliminate the risk of organism transfer. As a source of water for households, power plants and manufacturing facilities, the Great Lakes are vulnerable to profound impacts by invasive organisms, yet a Great Lakes-only solution is a fallacy given the many ways organisms can spread intracontinentally. The only way to protect an ecosystem like the Great Lakes is through an effective prevention net cast nationally and internationally.

This hearing seeks to investigate the potential relationship between the International Maritime Organization's (IMO) International Convention for the Control and Management of Ships' Ballast Water and Sediments and U.S. domestic policy. In my testimony, I briefly contrast the IMO convention with existing U.S. policy, and the terms proposed in the reauthorization legislation pending before these

Subcommittees, the National Aquatic Invasive Species Act (H.R. 1080) and the Aquatic Invasive Species Research Act (H.R. 1081). Next, I identify key features of the convention relevant to domestic policy and discuss their advantages and disadvantages. Finally, I make recommendations for Congressional action.

### **1. Relationship of the IMO Convention to U.S. Domestic Policy – Consistency with Important Distinctions**

It will not be difficult for a Port state party to IMO to have policies consistent with the new IMO Convention. On the one hand, the convention explicitly allows party states to implement more aggressive policies than the terms of the convention. At the same time, as a practical matter, Port states that are party to the Convention may choose simply not to enforce terms within it. Moreover, the convention explicitly allows them to exempt certain voyage routes and regions at their discretion (IMO guidelines to be developed). To that extent the Convention serves as both a ceiling and a floor for Port state action.

Nonetheless, the Convention terms are not a good fit for existing U.S. law, largely because the law is outdated; there is greater compatibility with pending domestic regulation and legislation. In particular, if the U.S. ratifies the agreement, new implementing legislation would likely be needed because the National Invasive Species Act of 1996 offers ships the option of BWE in statute, while the Convention terms could lead to elimination of this option (albeit many years down the line). The USCG recently issued a proposed rule which would implement a system more consistent with that outlined in the Convention, and the reauthorization proposal for NISA currently pending before the Committee, the National Aquatic Invasive Species Act (NAISA), is also consistent with the Convention in this regard. Like the convention, the proposed USCG rule and NAISA would replace the guaranteed option of BWE with a performance standard leading to likely phase out of BWE.

The Convention and proposed U.S. domestic policy have other areas of great similarity. For example, all require ballast water exchange in the near term, Ballast Management Plans, reporting of ballast operations, and early implementation of treatment by new ships relative to existing ships.

Some distinctions between the Convention and current and pending U.S. domestic law exist but are nonetheless compatible as they pertain to the time-lag associated with the entry-into-force of the international agreement relative to domestic law. The NAISA proposal, for example, details an interim regulatory stage which would largely predate the IMO Convention entry into force. This interim regulatory stage preserves the option of BWE for ships, but sets forth a clear alternative regulatory approach for ships that choose treatment which can exceed the effectiveness of BWE as operationalized by a numeric standard. (The “final” regulatory stage contained in NAISA overlaps the Convention and USCG proposed rule terms in intent and time-frame. This final regulatory stage would establish and implement an environmentally protective standard for ballast treatment which is reviewed and revised over time.)

However, there are also differences between the terms of the Convention and pending U.S. policy that are both substantive and consequential. These differences pertain to specifics of ballast water exchange requirements, and regulation of ballast discharges. For example, the Convention contains a set of numeric standards for ballast discharge, while an environmentally protective standard for ballast discharge has not been defined under U.S. law. The USCG is seeking comment on a proposed set of options, and NAISA leaves a standard for the final regulatory stage to the agencies to define over a four year period supported by targeted research authorizations. Moreover, NAISA provides a goal for the standard of risk elimination, and requires that it address the whole ship (not just ballast water). Any standards issued are to be reviewed and revised periodically with these goals in mind. The Convention, in contrast, does not take a “whole ship” approach, and has no process for periodic review of the standards.

While there is little yet developed in USCG regulation on this matter, the Convention also takes a significantly different approach to proposed U.S. law in addressing the concern that technology may not exist to meet an environmentally protective standard by the deadlines proposed. NAISA provides agencies the option of creating a temporary performance benchmark consistent with the capabilities of available technologies economically achievable for each class of ship based on periodic technology surveys. Thus, the deadlines don't change, but the required performance could be initially less than the environmentally protective standard. In contrast, the Convention presumes that technologies will be available sooner for some types of ships than others, based on size, and stages deadlines for compliance with a standard accordingly. Moreover, it sets forth an open-ended pre-standard review process three years prior to the first imposition of a standard (as soon as 2005). At this forum, if cost-effective technology is not determined to be available to meet the standards, the IMO may vote to change any aspect of the convention, even, or most likely, the deadlines themselves.

Finally, the Convention and pending domestic policy differ substantially in the timing of implementation. While there is no clear time-frame yet in USCG regulation, the NAISA timeline for imposition of a standard, 2006-2011 depending on the age of the ship, is far swifter than even the Convention's hoped for schedule (2008-2016), which, as stated earlier, is subject to change. Exhibit A is a chart summarizing these similarities and differences.

## **2. Advantages, Disadvantages and Recommendations for Domestic Policy Regarding Key Features of IMO Convention**

### *2.1 IMO Ballast Water Exchange Requirements*

The IMO convention will require ballast water exchange (BWE) of all ships following the convention's entry into force. Current U.S. policy (the National Invasive Species Act) already directs ships entering US ports to undertake BWE or an approved alternative; the regulatory program has been underway in the Great Lakes since 1992, and it is expected to begin for other U.S. ports by 2005. Proposed U.S. regulations for the national mandatory program stipulate that BWE be performed a minimum of 200 nautical miles from shore. NAISA would maintain the current U.S. geographic limits for BWE, but would add a performance standard for BWE (as well as a performance standard for the alternative treatment option). Ships using BWE must pump water for a period sufficient to assure a 95% ballast purge.

The approach of the IMO convention to implementing a ballast water exchange requirement differs from the U.S. approach in critical ways. Like NAISA, if fewer than three volumes exchange can achieve a 95% purge, fewer can be implemented by the ship master to meet the requirements of the Convention. However, unlike NAISA, no ship is required to do more than 3 volumes exchange, even if 3 volumes are insufficient to achieve a 95% purge. The Convention also expands the number of voyages in which BWE is a requirement by loosening the defining geographic strictures to allow BWE as close as 50 nautical miles from the nearest shore. Individual parties can allow exchanges even closer if it does not harm a neighboring party's waters. The disadvantage of this approach is that BWE may be carried out ineffectually or counterproductively in coastal zones.

**Recommendation:** Congress should a) require all ships using BWE to meet requirements to achieve 95% volume exchange as demonstrated by an initial dye test or model; b) not loosen the geographic limits on BWE consistent with the IMO convention unless research reveals BWE effectiveness in coastal environments; and c) encourage ballast treatment by ships engaged in near coastal voyages.

## *2.2 Ballast treatment standard in IMO Convention*

### *2.2.1 Theory Supporting IMO Standard Approach*

The IMO Convention contains a set of numeric performance standards for ballast treatment that is intended to be environmentally protective and readily monitorable. Current U.S. policy does not have a standard for ballast discharge, though the USCG has sought comment on three possible approaches. As noted earlier, NAISA defines an interim standard for treatment, but provides agencies flexibility in determining the environmentally protective ballast discharge standard, analogous to the standard in the IMO convention. NAISA gives agencies 4 years to finalize and publish the protective standard, which is then subject to periodic review and revision.

The IMO standard was derived using logic proposed by the Ballast Water Work Group of the International Council for the Exploration of the Sea (ICES). The ICES logic is that the standard should require a substantial reduction (at least 3 orders of magnitude) over the median observed concentrations of zooplankton and phytoplankton in untreated ballast discharge. The ICES Work Group compiled data from an eclectic set of existing studies -- all that was available -- to derive recommended numeric limits for zooplankton and phytoplankton in ballast discharge based on this approach. In determining the standard in the convention, the IMO accepted the ICES approach, and the data set, but altered the ICES numeric recommendations upward in response to negotiations. The IMO negotiators seemed to prefer to work with the mode (most common value) concentration as a starting point, rather than the median (middle value). The standards arrived at by the IMO group also substitute size ranges for taxonomic groupings (>50 micrometers, and >10 and < 50 micrometers, for zooplankton and phytoplankton, respectively). The IMO standard for zooplankton represents only a one log reduction from both the observed median and mode concentrations. The phytoplankton standard is virtually the same as the observed median concentration of microplankton, and just two orders of magnitude less than the mode. The IMO also added a set of limits for specific pathogenic microbes in ballast discharge.

The advantage of the ICES approach to deriving a discharge standard, if implemented, is that it would normalize all ballast discharge to a consistently low discharge density. Studies to date suggest great variability in the densities of organisms at discharge from ships' ballast systems. Studies conducted by the Northeast-Midwest Institute on the Great Lakes and the West Coast encountered variability in untreated discharge concentrations spanning 3 orders of magnitude, consistent with data set used by the ICES group. A percent reduction standard would not significantly alter such variability, just lower the numbers across the board. In addition, the ICES recommended approach adopted by the IMO will allow science to begin to estimate actual inoculation pressure in U.S. harbors, and help them assess levels of residual risk. From the standpoint of a treatment vendor, treatment systems would have to be designed quite conservatively to reliably meet such a standard given the extreme variability in natural organism densities in source harbors. Using the variability organism densities in untreated ballast discharge from the ICES-compiled data set as an illustration, a treatment system would have to deliver a 6 log reduction in zooplankton and a 7 log reduction in microplankton to reliably comply with the ICES-proposed standard under worst-case scenario densities. A 4 log and 3 log reduction, respectively, would be needed to meet the IMO negotiated outcome.

It must be acknowledged however, that the ICES/IMO approach to standard-setting is not truly science based in that it makes necessary assumptions in the context of very limited information regarding what discharge concentrations pose risk to receiving systems. Likewise, claims should not be made that it is environmentally protective. This approach assumes that high probability events (mode discharge densities) pose risk to the environment and must be reduced, and that a reduction in density from the mode value will yield a reduction in risk. The larger the reduction, the lower the risk. In fact, these assumptions may be wildly off-base and/or dependent upon the taxonomic group under discussion. For zooplankton,

high probability events (mode densities) already could constitute low risk, while low probability events (high-end densities) could constitute most of the problem. Alternatively, risk could be unrelated to density altogether, particularly in the case of bacteria and phytoplankton. If bacteria in ballast discharge are found to pose a threat to receiving systems (they may not), are the discharge limits in the IMO Convention adequate to make a difference? Is there any real difference in levels of protection that would be afforded by the numbers arrived at by the IMO for zooplankton versus the ICES recommendation and the U.S. position (which came in three orders of magnitude lower than the IMO standard)? Moreover, this approach to a standard also focuses only on ballast water of ships, while sea chests and ship hulls are being found to be of more and more concern to scientists as vectors for aquatic organisms. Is there true reduction in the risk of transfer of harmful organisms by ships if only one mode within a multiple-mode vector is limited?

It would be quite useful to know the relationship between risk and ballast discharge concentrations, but in fact, this relationship may never be knowable. For this reason, regulators must walk the line between adoption of conservative enough discharge limits to hedge bets against new invasions, and overly conservative estimates that unnecessarily limit the range of cost-effective and environmentally sound technologies available to achieve them. The standard-setting approach recommended by ICES is a reasonable way forward in that regard, provided the limits set forth can be shown to be at least environmentally meaningful, if not environmentally protective.

Finally, at some point in the future, this sort of standard could become “spot-check-friendly”. A regulatory agency could take a standing sample of ballast discharge and determine if the ship is in compliance without regard to intake quality. Currently, however, there is no reliable means to enumerate precise numbers of live organisms (other than zooplankton) in a standing sample of ballast discharge, and it could require 5-10 years for this utopian sampling scenario to become a reality.

**Recommendation:** Congress should direct agencies to use the ICES approach to deriving a standard for ballast water, but also direct them to use a similar approach to setting standards for sea chests and ship hulls. A quality data set should be generated specifically to service this standard setting as noted below. In addition, if the IMO/ICES approach is to be adopted for U.S. domestic purposes, it also should be acknowledged that there is no current means to measure for compliance with such a standard in relation to smaller live organisms, bacteria, eggs and resting stages. Congress should authorize agencies to make arrangements for type approval and indirect monitoring during the near-term pending development of more efficient and direct approaches to monitoring in the long-term.

### *2.2.2 Data Set Supporting IMO Standard*

The standard setting approach is rational, but the data set with which to implement the theory is not yet there. The IMO ballast discharge limits were negotiated in an information vacuum regarding the mean, median and mode organism concentrations currently discharged in untreated ballast globally. Scientists within ICES did the best that could be done to fill the gap with existing data, but the existing data were not generated for this purpose and cannot be reliably used in this way. Sampling and analysis inconsistencies between the studies call into question the validity of any comparison. As an example, one study took ten bucket samples (10 L each) of ballast water from each tank sampled. The water was then passed through a 55 micrometer plankton net. Other studies directly sampled ballast tanks using 80 micrometer plankton nets. The studies range widely in their attention to quantitative rather than qualitative outputs. Not all of the studies analyzed whether the zooplankton discharged were alive or dead, and only one analyzed phytoplankton viability. Moreover the size cut-offs substituted in the IMO formulation are not consistent with some of the studies’ sampling approaches. The studies involving zooplankton collection using 80 micrometer nets did not collect or count organisms between 50 and 80 micrometers. None of the studies examined the pathogens contained in the IMO standards.

However, even if the data in these studies were generated consistently, across taxa, and “by the book” quantitatively speaking, the number of tanks, ships and voyages sampled is too small to support conclusions about mean, median and mode densities of organisms in ballast discharge. Geographic differences in biota, ballast water age, different operators evaluating samples, variation caused by season and ship type all spell the need for many more repetitions before conclusive information is generated.

The danger of such a preliminary data set is that it could create the illusion of a science basis, and generate treatment standards that are off-target, causing ship owners and vendors to invest in calibrating their treatments to an unproductive endpoint. Overly lenient standards are tantamount to no regulation (except for the expense of implementing and complying with them), while unnecessarily strict standards will not help the environment if the result is inadvertent perpetuation of BWE as the prevailing ballast water management method, while cost-effective and environmentally sound alternatives that meet the strict standard elude us.

**Recommendation:** Congress should direct agencies to conduct targeted research to refresh the data set supporting the IMO approach to a standard, and make it especially relevant to densities encountered in discharges to U.S. waters. A similar data set should be developed for coastal voyage discharges, sea chests, and hull fouling organisms. Particular attention should be given to the need for and reasonable approach to regulation of bacteria. Such a research program is laid out in large part in H.R. 1081. If a standard estimate is set in law based on today’s data, Congress should make it easy to adjust the estimate pending better information (while using the same formula). If not, it should give agencies no more than 4 years to develop the standard (consistent with H.R. 1080).

### *2.2.3 Standards Set by IMO*

As noted above, it is difficult to judge the relevance of the numeric limits which the IMO ultimately negotiated, or to counter-propose alternatives, given the weakness of links between discharge concentrations and risk, and of the existing data base. From the standpoint of a treatment designer, there is probably little difference between a target of 0.1, 1, and 10 zooplankton per cubic meter, if the before-treatment densities might range to over 100,000 organisms per cubic meter. In all three cases, the system will be designed to deliver 100 percent kill. The microplankton standard arrived at by the IMO has little to redeem it. It encumbers treatment system design to the extent that a partial kill or removal of these organisms is required, while it will deliver little or no meaningful reduction in risk of new introductions of these usually asexually reproducing organisms. Worst of all, it presents an impossible enforcement burden for regulators. The bacteria standards warrant similar criticisms.

**Recommendation:** If Congress sets a standard for ballast discharge in law, it should consider going to zero live organisms above 50 microns (given some level of probability) to simplify enforcement. The microplankton standard should be much stricter than the IMO’s (by at least three orders of magnitude), and Congress should ask agencies to carefully review the merits of bacteria limits before imposing them at all. Once again, any standard set using the IMO/ICES approach should be conditioned on or tentative pending a refreshed and improved data set that focuses on discharges to U.S. waters.

## **3. Implementation Approach**

The Convention and NAISA take significantly different approaches to addressing the concern that technology may not exist to meet an environmentally protective standard by the deadlines proposed. NAISA directs agencies to create a temporary performance benchmark consistent with the capabilities of available technologies economically achievable for each class of ship based on periodic technology surveys. No presumptions are made regarding the relative rate at which technologies may become available for the various classes and sizes of ships. The benchmark will ratchet up over time as vendors compete to



capture market share by exceeding the effectiveness of prevailing technology. The deadlines implementing a performance standard approach to ballast regulation, then, do not change, but the required performance could be initially less than the environmentally protective standard.

The Convention presumes that technologies will be available sooner for ships with smaller ballast capacity than those with larger ballast capacity, and stages deadlines for compliance with a standard accordingly. The latter assumption may not only be untrue, it may inadvertently delay the infusion of the substantial resources of large ship owners to help solve the ballast treatment question. It certainly creates less incentive for vendors to invest in development of treatments for larger ships in the near term.

Moreover, the Convention sets forth an open-ended pre-standard review process three years prior to the first imposition of a standard (as soon as 2005). At this forum, if cost-effective technology is not determined to be available to meet the standards, the IMO may vote to change any aspect of the convention, even, or most likely, the deadlines themselves. During the (potentially extended) period prior to imposition of the IMO treatment standard, a ship owner may install treatment in lieu of BWE, but only if it is shown to meet the ultimate standard. In other words, it is an all-or-nothing proposition for treatment from the start, and nothing could well be the long-term outcome.

It is a true achievement that the Convention contemplates holding new ships first, and ultimately all ships, to a ballast discharge performance standard. However, the protracted time-line, open ended pre-review process, and the unnecessary presumption that more time will be needed for large ballast capacity ships to comply relative to smaller ships, detract from the Convention's value for purposes of domestic policy.

Recommendations: The best approach to solving the problems associated with uncertain technology development is laid out in NAISA. NAISA directs agencies to set and ratchet upward a performance benchmark based on best available technology economically achievable. This approach is an improvement on past "Best Available Technology" approaches in that the performance benchmark, not a technology, is the operative regulatory feature. Any technology that meets or exceeds that performance benchmark is allowable, and periodic surveys of treatments available for new and existing ships within the major classes will facilitate the steady upward ratcheting of that benchmark.

#### **4. Other Features of the Convention**

Two more aspects of the Convention warrant discussion. First, there is a great need for the U.S. to pursue regional agreement with and provide technology assistance to our neighbors as part of our national policies to prevent ship-mediated transfers into U.S. waters of harmful aquatic organisms. Because the Convention does provide such flexibility to Port states to implement more or less than the Convention prescribes, regional agreements among neighboring nations becomes extremely important. If the U.S. adopts more aggressive policies within or outside the Convention framework, the investment could be compromised if Canada or Mexico fail to enforce or otherwise weaken implementation. This fact is especially true for the border areas, including the Great Lakes, Puget Sound, the Caribbean, Southern California, and the Gulf of Mexico. It should be noted that the Great Lakes region offers a unique proving ground for treatments for smaller bulk cargo vessels. The maritime community is well motivated and receptive to being part of the solution rather than the problem.

Second, the Convention places requirements on party states to gain approval of the IMO before using any chemical treatment processes. This precaution is understandable given the potential for discharge of toxic residuals by one party in the waters of another party in the name of ballast treatment. Indeed, one state within the U.S. might have similar concerns about residuals originating with treatment of water in another state. Still, it is unlikely that an international review process would be more effective

and efficient than a U.S. domestic review process. Current U.S. law stipulates that ballast treatments approved by the USCG be environmentally sound, but there is no process in place for the USCG to make that determination. A clear U.S. process for reviewing environmental soundness of all proposed ballast treatments would help ships visiting U.S. ports to meet U.S. law, and would serve to guide international efforts to set up a workable and effective screening process for more global application.

Recommendation: Congress should direct the State Department to enter into negotiations with Canada, Mexico, and other neighboring nations to develop a regional agreement on prevention of ship-mediated transfers of aquatic invasive organisms. It should direct resource agencies to provide technical assistance to these neighboring nations to assist in implementation of the agreed policies. Finally, Congress should direct the Environmental Protection Agency to develop criteria for environmental soundness of ballast treatment and the USCG and EPA should use these criteria to screen potential ballast treatments prior to granting approval for their use.

### 5. Conclusions and Summary of Recommendations

In conclusion, there are some similarities but also striking differences between the recent IMO Convention on ballast water and existing and proposed U.S. policy. Given flexibility and ambiguity built into the Convention, most decisions remain in the hands of Congress regarding U.S. policy to prevent ship-mediated transfers of aquatic organisms, irrespective of its decision to ratify the agreement. It is critical that the U.S. step forward with a detailed and effective national program to prevent new introductions of aquatic invasive species by ships. A credible U.S. federal effort will help to stabilize the regulatory landscape domestically, and will provide leadership and experience to the global community in support of implementation of the international convention.

I respectfully submit the following recommendations for U.S. legislation to regulate the ship vector of aquatic invasive species as effectively and efficiently as possible:

- Ballast Water Exchange: Congress should a) require all ships using BWE to meet requirements to achieve 95% volume exchange as demonstrated by an initial dye test or model; b) not loosen the geographic limits on BWE consistent with the IMO convention unless research reveals BWE effectiveness in coastal environments; and c) encourage ballast treatment by ships engaged in near coastal voyages.
- Ballast Treatment Standard Approach: Congress should direct agencies to use the ICES approach to deriving a standard for ballast water, and direct them to use similar approaches to setting standards for sea chests and ship hulls. It should also direct agencies to make arrangements for type approval and indirect monitoring during the near-term pending development of more efficient and direct approaches to monitoring in the long-term.
- Data Set Supporting Standard Derivation: Congress should direct agencies to conduct targeted research to refresh the data set supporting the IMO approach to a standard, and make it especially relevant to densities encountered in discharges to U.S. waters. A similar data set should be developed for coastal voyage discharges, sea chests and hull fouling organisms. Particular attention should be given to the need for and reasonable approach to regulation of bacteria. If a standard estimate is set in law based on today's data, Congress should make it easy to adjust the estimate pending better information (while using the same formula). If not, it should give agencies no more than 4 years to develop the standard.

- Numeric Standard Contained in Convention: If Congress sets a preliminary standard for ballast discharge in law based on the IMO approach, it should consider going to zero live organisms above 50 microns (given some level of probability) to simplify enforcement. The microplankton standard should be much stricter than the IMO's (by at least three orders of magnitude), and Congress should ask agencies to carefully review the merits of bacteria limits before imposing them at all. Once again, any standard set using the IMO/ICES approach should be conditioned on or tentative pending a refreshed and improved data set that focuses on discharges to U.S. waters.
- Implementation of Standard: Congress should direct the USCG and EPA to implement the environmentally protective "final standard" using a modified best available technology approach. Agencies should be directed to set a performance benchmark for treatment for each class of new and existing ships based on what technology can deliver. Any technology that meets or exceeds that performance benchmark is allowable, and periodic surveys of treatments available for new and existing ships within the major classes will facilitate the steady upward ratcheting of that benchmark.
- Regional Agreements: Congress should direct the State Department to enter into negotiations with Canada, Mexico, and other neighboring nations to develop a regional agreement on prevention of ship-mediated transfers of aquatic invasive organisms. It should direct resource agencies to provide technical assistance to these neighboring nations to assist in implementation of the agreed policies.
- Environmental Soundness: Congress should direct the Environmental Protection Agency to develop criteria for environmental soundness of ballast treatment and the USCG and EPA should use these criteria to screen potential ballast treatments prior to granting approval for their use.

I wish to once again thank the Subcommittees for holding this hearing and inviting me to testify. A careful look at federal policy around the issue of ship-mediated transfers of invasive organisms is critical and justified. At the same time, it should be noted that ships are not the only significant vector of new introductions into U.S. waters. I urge the Subcommittees to do what they can to motivate progress on other aspects of the problem under the jurisdiction of the House Resources Committee, as well. If the Subcommittees Members or their staff have any questions, I am happy to provide any follow-up information you may require.

**Contact Information and Summary:**

Allegra Cangelosi, Senior Policy Analyst, Northeast-Midwest Institute,  
 218 D St. SE, Washington, DC 20003, 202-544-5200, fax 202-544-0043 [acangelosi@nemw.org](mailto:acangelosi@nemw.org)

I respectfully submit the following recommendations:

- Ballast Water Exchange: Congress should a) require all ships using BWE to meet requirements to achieve 95% volume exchange as demonstrated by an initial dye test or model; b) not loosen the geographic limits on BWE consistent with the IMO convention unless research reveals BWE effectiveness in coastal environments; and c) encourage ballast treatment by ships engaged in near coastal voyages.
- Ballast Treatment Standard Approach: Congress should direct agencies to use the ICES approach to deriving a standard for ballast water, and a similar approach to setting standards for sea chests and ships hulls. It should also direct agencies to make arrangements for type approval and indirect monitoring during the near-term pending development of more efficient and direct approaches to monitoring in the long-term.
- Data Set Supporting Standard Derivation: Congress should direct agencies to conduct targeted research to refresh the data set supporting the IMO approach to a standard, and make it especially relevant to U.S. waters. A similar data set should be developed for coastal voyage discharges, sea chests and hull fouling organisms. Particular attention should be given to the need for and reasonable approach to regulation of bacteria. If a standard estimate is set in law based on today's data, Congress should make it easy to adjust the estimate pending better information (while using the same formula). If not, it should give agencies no more than 4 years to develop the standard.
- Numeric Standard Contained in Convention: If Congress sets a preliminary standard for ballast discharge in law based on the IMO approach, it should consider going to zero live organisms above 50 microns (given some level of probability) to simplify enforcement. The microplankton standard should be much stricter than the IMO's (by at least three orders of magnitude), and Congress should ask agencies to carefully review the merits of bacteria limits before imposing them at all. Once again, any standard set using the IMO/ICES approach should be conditioned on or tentative pending a refreshed and improved data set that focuses on discharges to U.S. waters.
- Implementation of Standard: Congress should direct the USCG and EPA to implement the environmentally protective "final standard" using a modified best available technology approach. Agencies should be directed to set a performance benchmark for treatment for each class of new and existing ships based on what technology can deliver. Any technology that meets or exceeds that performance benchmark is allowable, and periodic surveys of treatments available for new and existing ships within the major classes will facilitate the steady upward ratcheting of that benchmark.
- Regional Agreements: Congress should direct the State Department to enter into negotiations with Canada, Mexico and other neighboring nations to develop a regional agreement on prevention of ship-mediated transfers of aquatic invasive organisms. It should direct resource agencies to provide technical assistance to these neighboring nations to assist in implementation of the agreed policies.
- Environmental Soundness: Congress should direct the Environmental Protection Agency to develop criteria for environmental soundness of ballast treatment and the USCG and EPA should use these criteria to screen potential ballast treatments prior to granting approval for their use.

**Exhibit A:**  
**Comparison of key features of IMO Convention with pending US domestic policy:**

	<b>IMO Convention</b>	<b>USCG Regulations</b>	<b>NAISA</b>
Imposition of Best Management Practices	Yes	Proposed	Proposed
Requirements for Ballast Management Plans	Yes	Proposed	Proposed
Reporting of ballast operations	Yes	Proposed	Proposed
Performance standard for BWE	Maximum of 3 tank volumes regardless of 95 % exchange	Volume equal to 3 tank volumes for flow-through or 1 empty-refill (Existing for GL, proposed nationally)	Proposed standard of 95 % volumetric exchange
Performance standard for BWT	Numeric standards predicting environmental protectiveness. Whole ship not addressed	3 alternatives proposed. Whole ship not addressed	Proposed goal of risk elimination. 4 years to determine. Whole ship addressed
Earlier compliance with BWT standard for new ships	Yes	Not addressed	Proposed
BWT type approval and spot checks	To be discussed	Not addressed	Proposed
Availability of BWT technologies to meet standard	Presumes technologies will be available sooner for some types of ships than others; pre-standard review escape hatch allowing delay	Not addressed	Proposed option of creating temporary performance benchmark for available technologies
Post BWT standard review	Not addressed	Not addressed	Proposed periodic review and revision
BWT standard implementation timeline	2008 to 2016; subject to review and change	Not addressed	Proposed imposition 2006 - 2011

**SHIPPING INDUSTRY BALLAST WATER COALITION**  
**Industry Stakeholders Promoting Safe & Effective Ballast Water Management**

---

Testimony of  
**Joseph J. Cox**

On behalf of the  
**Shipping Industry Ballast Water Coalition**

Regarding  
**“Ballast Water Management: New  
International Standards and National Invasive  
Species Act Reauthorization”**

Before the  
**Coast Guard and Maritime Transportation and  
Water Resources and Environment  
Subcommittees**

of the  
**House Transportation and Infrastructure  
Committee**

**March 25, 2004**

Good morning Mr. Chairman and members of the subcommittees. My name is Joe Cox and I am testifying on behalf of the Shipping Industry Ballast Water Coalition. The Coalition is a broad-based industry coalition formed to promote the development of a practical, effective, and comprehensive mandatory national ballast water management program in the United States to address the important issue of transfer of aquatic non-indigenous species via discharged ballast water in a manner protective of marine safety and the environment. Our coalition and its member associations represent the full spectrum of vessels – tankers, bulk carriers, container vessels, roll-on/roll-off vessels, towing vessels, and barges, both U.S. and foreign-flag – that carry the preponderance of this nation's domestic and international commerce, the public U.S. ports at which they call, and U.S. maritime labor. A list of the Coalition members is attached as part of my written testimony.

During the past four years, the Coalition has responded to every legislative and regulatory initiative relative to the management of ballast water. Individual members of the Coalition have been active on this issue for well over a decade at the international, national and sub-national levels. Coalition members have also participated as industry advisors to the United States delegation and on the delegations of non-governmental organizations at the International Maritime Organization (IMO). Likewise, Coalition members have testified before Congress on a number of occasions on this issue as well as at the state and local levels in both legislative and regulatory proceedings. Coalition members have participated and continue to participate in other fora including the Invasive Species Advisory Committee, the Aquatic Nuisance Species Task Force and as presenters at a wide range of policy and technical conferences addressing invasive species and ballast water management.

We are not here today to tell you there is no problem. The Coalition members have recognized the problems posed by aquatic nuisance species and their translocation in ship's ballast water for many years. We have, as indicated earlier, been a part of the processes which have sought solutions to this problem in a manner that is environmentally protective, technologically achievable, will lend itself to international consistency and is practical and economically achievable. Throughout these processes, we have consistently advocated the need for appropriate environmental controls that take into account the significant commitments that will be borne by the maritime industry to achieve meaningful progress on a global basis. And throughout this process, we have constantly advocated that since maritime shipping is an international business, it must be regulated by consistent international and domestic requirements.

In the past, the Coalition faced a conundrum with ballast water management, i.e. which comes first, establishing a ballast water performance standard or waiting for technology development to tell us what can be achieved. Mr. Chairman, the absence of ballast water management treatment performance standards and experimental test criteria has contributed to the lack of widespread ballast water technology development.

Today, we are pleased to note, however, the finalization of the International Convention for the Control and Management of Ship's Ballast Water and Sediments, which was completed at the IMO last month. The Convention provides a critically needed set of management tools through which the maritime industry can be regulated in a manner that is predictable, transparent and responsive with regard to environmental benefits, technological achievability and international consistency. Moreover, the Convention provides for processes through which the ballast water performance standard may be adjusted, based on the availability of technology to meet that standard, as determined by a pre-implementation review process. With this background in mind, we offer the following industry perspectives.

First, we believe the IMO Convention should be ratified by the United States and should form the basis of the U.S. national ballast water management program. The Convention, which the U.S. played a leading role in negotiating, has been under development for over a decade and represents an international consensus regarding the starting point for the international regulation of ballast water management aboard ships. Although U.S. legislative efforts may ultimately be appropriate to establish additional programs not addressed under the Convention, such as additional research and development programs and response and remediation efforts, the provisions of the Convention incorporate the best means available for the mitigation of invasions due to ship's ballast water. It is also worth noting that the world's major maritime and trading nations have agreed to this important Convention. The next critical step is to promote prompt ratification of this Convention by all IMO nations, including the United States.

Second, Mr. Chairman, we support the performance standard in Regulation D-2 of the Convention and believe the D-2 performance standard should be the initial performance standard adopted by the United States. Furthermore, we believe it is critical that the performance standard be subject to the same pre-implementation review process as outlined in the Convention, which will adjust the standard after taking into account new data collected in robust technology demonstration projects and the emergence of new treatment technologies. Simply put, marine biologists worldwide have debated the issue of performance standards for years and have not yet arrived at any definitive conclusions regarding the relative effectiveness of ballast water performance standards. The science of invasion biology has not developed sufficiently to provide certainty in that regard. The only conclusion that has been reached is the generally accepted view that a more rigorous standard is likely to provide more environmental protection. But this view does not consider critical factors such as the relationship between a more rigorous standard and the resulting reduction in risk, the availability of technology, and the costs of developing and installing that technology on board ships. The view that a more rigorous standard, in and of itself, is more environmentally protective cannot be allowed to lead to the establishment of an unachievable performance standard.



A performance standard must take into account the absence of and need for standardized test data regarding the efficacy of ballast water treatment technologies applied to different taxonomic species in different geographic regions, the time necessary to develop effective treatment technologies that can be installed on ships, the operational realities of maritime transportation, and the critical role that the maritime transportation industry plays in the world's economic prosperity. Clearly zero or near zero discharge is the ultimate protection from aquatic invasive species, although it is simply not currently achievable. A scientist's desire to set a more rigorous standard achievable in a laboratory must be balanced by government and industry's common concerns with respect to technology development, achievability and enforceability. The existence of the Convention's performance standard represents the current international consensus as to what will be achievable at the various phased-in implementation dates and the performance standard will establish a much-needed target for technology developers to work towards. Government, industry and scientific experts who are most knowledgeable on the subject developed this consensus. We strongly encourage the United States to embrace this international standard, subject to the pre-implementation review, as the appropriate starting point.

Third, while the Convention does not mandate compliance with the ballast water exchange requirements until entry into force, the Coalition supports the implementation of a mandatory national ballast water management program which requires all vessels to perform ballast water exchange prior to discharging ballast water in U.S. waters subject to certain exceptions relating to safety of the vessel and its crew and certain route restrictions. We support the U.S. Coast Guard's plan to soon promulgate final rules establishing a mandatory national program and mandating ballast water exchange.

Fourth, the Convention contains specific implementation phase-in dates for compliance with the performance standard based on the age of the vessel and its ballast water capacity. These phase-in dates were arrived at through extensive discussions at IMO, which took into account the amount of time necessary for technology development, the challenges of installing complex and costly treatment systems onboard thousands of existing ships, the time necessary to incorporate new treatment systems into new ship designs and the differences in the sizes and types of vessels that carry ballast water. While we fully support these phase-in dates, it is important to note that they establish a challenging schedule for the installation of shipboard treatment technologies that do not exist today.

Fifth, a scientifically valid and defensible experimental shipboard testing program is critical to the development of useful data to enable sound decisions to be made as to the capabilities of new ballast water treatment technologies. Based on current estimates, these shipboard studies are likely to cost in excess of one million dollars per vessel due to the customized nature of the developing technology, the costs of installation, the costs associated with ensuring the

studies are scientifically valid, and the costs associated with the impact to vessel operations. These investments are not small and will be borne almost entirely by ship owners and operators, who could just as easily wait for other entities to bear the costs to develop treatment technologies. For these reasons, an experimental shipboard testing program must provide sufficient incentives for proactive ship owners and operators that are willing to participate in the development of new treatment technologies. The Coalition therefore strongly supports the adoption of a national experimental shipboard testing program that provides sufficient incentives for the early development and installation of new treatment technologies. The program recently announced by the U.S. Coast Guard called the "Shipboard Technology Evaluation Program (STEP): Experimental Ballast Water Treatment Systems" appears to be just such a program and we would encourage its adoption and funding as the primary national experimental shipboard testing program for ballast water treatment technologies.

In conclusion, the Coalition strongly believes that a carefully crafted and internationally consistent national ballast water management program should be the exclusive method of compliance for vessels trading in U.S. waters. While well-intentioned, sub-national ballast water management initiatives, such as those currently in place in some states and even in some ports, should be preempted by federal regulations issued pursuant to national legislation. We believe the levels of control in the Convention, the need for consistent national and international standards, and the critical need to quickly develop new treatment technologies that meet the international performance standard, buttress the need for a national program that is consistent with international requirements. Inclusion of preemptive language will prevent the creation of a patchwork quilt of state and local ballast water management laws in the U.S. and will enable the maritime industry to focus on meeting the challenging requirements of the national and international programs. Furthermore, we believe that the unique nature of the aquatic invasive species problem requires a national and international approach so that risk mitigation efforts can be complementary and coordinated rather than duplicative and burdensome.

Mr. Chairman, I thank you for the opportunity to testify on this important issue on behalf of the Shipping Industry Ballast Water Coalition and I would be happy to answer any questions you may have.

**Members of the Shipping Industry Ballast Water Coalition:**

**American Association of Port Authorities**

Kurt Nagle, President and CEO  
(703) 684-5700

**American Maritime Congress**

Gloria Cataneo Tosi, President  
(202) 842-4900

**American Petroleum Institute**

Stephanie R. Meadows, General Manager, Marine Transportation  
(202) 682-8578

**American Waterways Operators**

Jennifer Carpenter, Senior Vice President – Government Affairs and Policy Analysis  
(703) 841-9300

**BIMCO**

Mr. Niels Mortensen, Senior Manager  
45 4436 6800

**Chamber of Shipping of America**

Joseph J. Cox, President  
(202) 775-4399

**International Association of Independent Tanker Owners (INTERTANKO)**

Jonathan Benner, U.S. Representative, Legal and Governmental Affairs  
(202) 274-2880

**Maritime Institute for Research and Industrial Development**

Jim Patti, President  
(202) 463-6505

**Transportation Institute**

Gerard C. Snow, Director, Government Affairs  
(301) 423-3335

**World Shipping Council**

Christopher Koch, President and CEO  
(202) 589-1230

U. S. Department of  
Homeland Security  
United States  
Coast Guard



Commandant  
United States Coast Guard

2100 Second Street, S.W.  
Washington, DC 20593-0001  
Staff Symbol: G-ICA  
Phone: (202) 366-4280  
FAX: (202) 366-7124

**DEPARTMENT OF HOMELAND SECURITY**

**UNITED STATES COAST GUARD**

**STATEMENT OF REAR ADMIRAL THOMAS GILMOUR**

**ON THE**

**BALLAST WATER MANAGEMENT: NEW INTERNATIONAL STANDARDS  
AND  
NATIONAL INVASIVE SPECIES ACT REAUTHORIZATION**

**BEFORE THE**

**SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT**

**AND THE**

**SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION**

**COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE**

**U.S. HOUSE OF REPRESENTATIVES**

**MARCH 25, 2004**

DEPARTMENT OF HOMELAND SECURITY  
UNITED STATES COAST GUARD  
STATEMENT OF REAR ADMIRAL THOMAS GILMOUR  
ON THE  
BALLAST WATER MANAGEMENT: NEW INTERNATIONAL STANDARDS AND  
NATIONAL INVASIVE SPECIES ACT REAUTHORIZATION  
BEFORE THE  
SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT  
AND THE  
SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION  
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE  
U.S. HOUSE OF REPRESENTATIVES  
MARCH 25, 2004

Good Morning, Mr. Chairmen and distinguished Members of both Subcommittees. I am Rear Admiral Thomas Gilmour, Assistant Commandant for Marine Safety, Security and Environmental Protection. It is my pleasure to appear before you today to provide the Coast Guard's views on the recently adopted International Convention for the Control and Management of Ships' Ballast Water and Sediments, and National Invasive Species Act Reauthorization.

The Coast Guard is a leader in ensuring America's maritime environment is protected. We take great pride in providing valuable services that preserve and protect our nation's waters, making them cleaner, safer, and more secure for legitimate use. The Coast Guard remains committed to providing a leadership role on ballast water management both domestically and internationally and working diligently with all stakeholders to protect U.S. waters from the introduction of aquatic nuisance species.

Last month, the Coast Guard led the interagency United States delegation to the International Maritime Organization's (IMO) Diplomatic Conference on Ballast Water Management for Ships. The Conference adopted the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004, which is a significant step forward in the international effort to combat invasive species introduced by ships' ballast water. The U.S. delegation played a major role in ensuring that a number of key objectives were included in this new treaty.

One significant provision of the Convention for the U.S. is an article that explicitly recognizes the right of a party to take more stringent measures than those in the Convention, to prevent invasive species introductions, consistent with international law. Another important provision of the Convention calls for ships to meet a ballast water discharge standard according to a schedule of fixed dates, beginning with certain ships constructed in 2009. These fixed dates serve as a signal to the shipping industry as well as the emerging ballast water treatment industry of the need for investment, plans and inventory to meet equipment requirements. Another key feature of the implementation schedule is the phasing out of the practice of ballast water exchange, which means most ballast water discharges will eventually have to meet a maximum concentration standard. The Convention contains provisions for the experimental testing of prototype ballast water treatment systems on operating vessels. In addition, the Convention contains a U.S. backed provision that allows the sampling of ballast water from ships as a port state control activity for the purposes of evaluating compliance with the Convention.

While there were many important and positive provisions adopted by the Conference, one significant element that does not comport with the U.S. position is the stringency of the ballast water discharge standard. The ballast water discharge standard adopted by the Conference was less than 10 viable organisms per cubic meter greater than or equal to 50 micrometers in minimum dimension and less than 10 viable organisms per milliliter less than 50 micrometers and greater than or equal to 10 micrometers in minimum dimension and discharge of indicator microbes not to exceed specified concentrations. This was not as stringent as the United States proposed standard of less than .01 living organisms per cubic meter greater than or equal to 50 micrometers and less than .01 living organisms per milliliter less than 50 micrometers and greater than 10 micrometers and discharge of indicator microbes not to exceed specified concentrations. However, the standard adopted by IMO is concentration-based, which was desired by the U.S. and still exceeds the capabilities of current ballast water treatment technologies, and when met, may reduce the number of invasions via ballast water.

On Tuesday, March 23<sup>rd</sup>, the Coast Guard and its federal agency partners presented the results of the Ballast Water Conference at a public meeting held at Coast Guard Headquarters. Over the coming months, we will evaluate the results of this Conference through the executive branch interagency process to determine the best course of action the U.S. should pursue with regard to the Convention.

Our objective now is to develop the best national program for ballast water management to protect the waters of the United States. Working under the broad authority granted by current legislation, the Coast Guard's ongoing program and regulatory efforts are addressing many of the ballast water management issues covered by the Convention. We launched the Shipboard Technology Evaluation Program (STEP) in January 2004. STEP is intended to facilitate the development of effective ballast water treatment technologies, thus creating more options for vessel owners seeking alternatives to ballast water exchange. As an incentive to participate, vessels accepted into this program may be granted a limited equivalency to ballast water management regulations, while the prototype system operates satisfactorily. We believe this program is essential to spur the development of the ballast water treatment industry. Also, two final rules are currently in clearance - one for assessing penalties for non-reporting of ballast water management and one for establishing a national program for mandatory ballast water management. These rules are expected to raise the level of compliance for reporting and increase the number of vessels conducting ballast water management when entering from outside our Exclusive Economic Zone, while increasing compliance with best practices for ballast water uptake. Finally, the Coast Guard has begun the environmental impact analysis of several alternative standards in preparation for issuing a rule establishing an enforceable, biologically meaningful and scientifically sound ballast water discharge standard for U.S. waters. The Environmental Protection Agency, National Oceanographic and Atmospheric Administration, and Fish and Wildlife Service, are working with us as cooperating agencies to help support preparation of the Environmental Impact Statement. We are also working to establish the criteria for evaluating the performance of ballast water treatment equipment. The Coast Guard continues to receive valuable input from stakeholders and partners such as the scientific community, federal and state agencies, water treatment technologists and the shipping industry to develop effective criteria.

In considering legislation for ballast water management to protect the waters of the U.S., there are certain provisions that we believe would be fundamental to such legislation and would also be consistent with the new IMO Convention. These would include requirements for a ballast water management plan and a record book to be kept for each ship that has ballast water tanks. Future legislation should recognize the possible impacts of domestic vessels operating between U.S. ports and risks of transferring non-indigenous species between different aquatic areas. In addition, future legislation should recognize the importance of and provide appropriate authority for continued

development and evaluation of prototype or experimental ballast water treatment technologies aboard operating vessels and a single, biologically meaningful, scientifically sound and enforceable ballast water discharge standard. Such a standard would relieve the states of the burden of having to develop additional regulations to protect their waters and provide certainty to the shipping industry that a single standard would be applicable to all US ports.

Thank you for the opportunity to provide you with the outcome of the IMO conference on ballast water management and possible ways forward. The Coast Guard looks forward to working with Congress as we continue our ongoing efforts to implement an effective ballast water management regime. I will be happy to answer any questions you may have.

**Ballast Water Management:**  
**New International Standards and**  
**National Invasive Species Act Reauthorization**

Testimony of

Catherine L. Hazlewood, Esq.  
Clean Oceans Program Manager  
The Ocean Conservancy

Before the  
Subcommittee on Water Resources and the Environment  
and the  
Subcommittee on Coast Guard and Marine Transportation  
Transportation and Infrastructure Committee  
United States House of Representatives  
25 March 2004



## Introduction

Good morning. My name is Catherine Hazlewood, and I am the Clean Oceans Program Manager for The Ocean Conservancy (TOC). With over 80 staff and 150,000 members, The Ocean Conservancy strives to inform, inspire, and empower people to speak and act for the oceans through science-based advocacy. Headquartered in Washington D.C., TOC also has offices in Alaska, California, Washington, Florida, Maine, Virginia, and the U.S. Virgin Islands.

Thank you for the opportunity to testify today regarding the International Maritime Organization's (IMO) recent adoption of the International Convention for the Control and Management of Ship Ballast Water and Sediments,<sup>1</sup> and U.S. reauthorization of the National Invasive Species Act (NISA).<sup>2</sup> The Ocean Conservancy has significant experience working to prevent and control the spread of aquatic invasive species. Our efforts to date have ranged from local to international projects, and include:

- Co-sponsoring and co-writing the first state law (California) in the nation to mandate controls on ballast water discharges into state waters;
- Petitioning the Environmental Protection Agency to regulate ballast water discharges under the Clean Water Act;
- Supporting regional invasive species solutions as a member of the Western Regional Panel of the Aquatic Nuisance Species Task Force, which was set up under NISA;
- Supporting national invasive species solutions as a current appointee to the National Invasive Species Advisory Committee, which was set up under Executive Order 13112;
- Co-sponsoring and co-hosting several conferences on marine invasive species;
- Commenting to EPA on the agency's failure to consider invasive species in the development of effluent guidelines for the aquaculture industry, and in the development of impaired waters lists under the Clean Water Act;
- Commenting to NOAA regarding the proposed voluntary "Code of Conduct" for open ocean aquaculture facilities and its lack of regulatory authority to prevent or redress the discharge of an invasive species from an aquaculture facility;
- Testifying and providing comment to the Coast Guard as well as Congress on existing ballast water treatment standards and on the progress of NISA in controlling marine invasives; and

---

<sup>1</sup> Hereinafter IMO Ballast Convention.

<sup>2</sup> Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, as amended by the National Invasive Species Act of 1996, P.L. 104-332; U.S.C. §§ 4701 *et seq.*

- Advocating, in partnership with Northeast-Midwest Institute and other stakeholders, for increased appropriations for programs authorized by NISA.

Additionally, TOC has worked since the 1980s on national and international implementation of laws to prevent pollution from ships, including MARPOL and its implementing legislation, the Act to Prevent Pollution from Ships, the Clean Water Act, NISA, The Oil Pollution Act, and legislation to regulate pollution from cruise ships. In each of these efforts, we have worked to ensure the U.S. leads the rest of the world by example, through strong domestic legislation in addition to the successful negotiation of international agreements.

The Ocean Conservancy is deeply concerned with the slow pace of both international and U.S. aquatic invasive species prevention and control efforts to date. Last month's adoption of IMO's Ballast Convention was a reasonable first step toward a solution to a global problem, yet the Convention alone does not provide the national tools or mechanisms needed to prevent, mitigate and regulate the spread of invasive species in the U.S.

We must do more because invasive species bring such enormous costs to our nation, both environmentally and economically. Fortunately, we can do more; we possess the technology and the resources to set a higher bar in national legislation for ballast water management. We must address several other vectors of invasive species, which the IMO Ballast convention does not address. We also need to provide our federal agencies with all the necessary tools, mechanisms and funding to prevent and control the spread of invasives, such as rapid response, screening, and mitigation procedures.

Congress has the opportunity to accomplish much of this through reauthorization of the existing NISA, legislation for which is currently pending before the House and Senate.<sup>3</sup> The National Aquatic Invasive Species Act of 2003, currently before the Transportation and Infrastructure Committee, and the accompanying Aquatic Invasive Species Research Act currently before the House Resources Committee, together would go a long way to:

- comprehensively address deficiencies and gaps in NISA's existing ballast water management provisions;

---

<sup>3</sup> In the House, the NISA reauthorization legislation is comprised of two bills, The National Aquatic Invasive Species Act of 2003, currently before the Transportation and Infrastructure Committee, (H.R.1080), and the Aquatic Invasive Species Research Act, currently before the Resources Committee, (H.R. 1081). In the Senate these two bills are merged as one bill, the National Aquatic Invasive Species Act of 2003, (S. 525), which was referred to the Environment and Public Works Committee.

- establish a process for screening and regulating intentional imports of potentially invasive species, such as for aquaculture, live food, the pet/aquarium trade, and fisheries; and
- enhance research efforts through improved funding, coordination among agencies, standardization and access to data.

In the Senate, the two bills are joined as a single piece of legislation, reflecting their intended complementary nature. TOC urges the House to act on both bills to provide the first comprehensive attempt to address aquatic invasive species in the United States.

The Committee will hear testimony from the Coast Guard and other experts regarding the specific ballast water management standards negotiated at the IMO Ballast Convention. We support full participation by the United States in the Convention in order to provide world leadership in the dissemination of technology and research in this area. However, the United States can and should employ more stringent controls domestically through utilization of existing law and reauthorization of the National Invasive Species Act.

In the following testimony, I will describe the impacts of aquatic invasive species, drawing from earlier testimony TOC has provided to Congress. Second, I will briefly discuss the Convention's provisions, offering support for the recommendation that United States enact more comprehensive legislation nationally. Third, I will outline the general advantages of the NISA reauthorization legislation as introduced in providing the comprehensive approach we need. I will include additional recommendations where applicable for strengthening the legislation to prevent further permanent damage to the nation's waterways and the people, wildlife and industries that depend on them.

## **Aquatic Invasive Species: Impacts and Vectors**

### *Environmental Costs*

The ecological damage from invasive species<sup>4</sup> is enormous. According to the IMO, invasive species are one of the four greatest threats to the health of the world's oceans, along with other pollution, overexploitation of marine resources, and

---

<sup>4</sup> This testimony uses the term "invasive species" to refer to "alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health," where "alien species" are, "with respect to a particular ecosystem, any species, including its seeds, eggs, spores or other biological material capable of propagating that species, that is not native to that ecosystem." Executive Order 13112, "Invasive Species" (Feb. 3, 1999).

destruction of marine habitat.<sup>5</sup> It is now scientifically accepted that aquatic invasive species introductions "are a serious problem," that "the number of species successfully invading new habitats is increasing at an increasingly higher rate," and that the damage caused by aquatic invasives is in the billions of dollars and climbing.<sup>6</sup>

Invasive species are the number two threat to endangered and threatened species nationwide, second only to habitat destruction.<sup>8</sup> They consume native species and their food sources. They reduce the genetic variability of native species through cross-breeding. Aquatic invasive species are unlike chemical or conventional pollutants in that "waters. . . do not have the capacity to 'assimilate' [invasive species] without changing the species abundance and diversity of the waters, which is a change to the biological integrity of the system."<sup>9</sup> In other words, once a system is invaded, simply eradicating the invasive species, even if possible, will not restore the ecosystem to its prior state. Aquatic invasive species are fundamentally altering many of our aquatic ecosystems permanently.

#### *Costs to Human Health*

Scientists believe that "coastal ecosystems are frequently invaded by microorganisms from ballast water."<sup>14</sup> Ships' ballast water, the number one source of marine invasive species nationwide,<sup>15</sup> often contains viable bacteria and viruses

<sup>5</sup> See The Ocean Conservancy, *Ocean Invasion*, BLUEPLANET, vol. 1, issue 2, p. 18 (Spring 2002).

<sup>6</sup> *Id.* at 9.

<sup>8</sup> Wilcove, David *et al.*, "Quantifying Threats to Imperiled Species in the United States," BIOSCIENCE, Vol. 48, No. 8, pp. 607-15 (Aug. 1998).

<sup>9</sup> California Regional Water Quality Control Board, San Francisco Bay Region, "Prevention of Exotic Species Introductions to the San Francisco Bay Estuary: A Total Maximum Daily Load Report to U.S. EPA," p. 7 (May 8, 2000) ("California Report"), at <<http://www.swrcb.ca.gov/rwqcb2/download/Tmdl.pdf>>.

<sup>10</sup> Cohen, Dr. Andrew, San Francisco Estuary Institute, *Ships' Ballast Water and the Introduction of Exotic Organisms into the San Francisco Estuary*, p. 12 (Oct. 1998).

<sup>11</sup> *Id.*

<sup>12</sup> California Report, p. 1.

<sup>13</sup> *Id.*, p. 3.

<sup>14</sup> Ruiz, Gregory *et al.*, "Global Spread of Microorganisms by Ships," *Nature*, vol. 408, p. 49 (Nov. 2, 2000).

<sup>15</sup> See, e.g., Carlton and Geller, "Ecological Roulette: The Global Transport and Invasion of Nonindigenous Marine Organisms," *Science* (1993); Marine Board of the National Research Council, *Stemming the Tide*, National Academy Press, Washington D.C. (1996).

which may injure people who come into contact with the ballast water. The association of agencies in charge of providing drinking water in California found that "[t]he potential threat to the safety of our drinking water supplies from [ballast water] pathogens is enormous."<sup>17</sup> A study by the Smithsonian Environmental Research Center of ballast water of vessels entering the Chesapeake Bay found that 14 of the 15 vessels sampled contained a strain of cholera never before identified in the U.S.<sup>18</sup> In 1991, cholera indistinguishable from the Latin American epidemic strain was found in closed oyster beds in Mobile, Alabama during routine monitoring; ballast water is suspected as the source.<sup>19</sup> More recent data reiterate that cholera "can be delivered frequently by ships to estuaries with commercial ports," creating "an opportunity for the colonization of coastal ecosystems."<sup>20</sup> In 1998, oyster beds in Galveston Bay, Texas, were closed to harvesting because 416 persons in 13 states fell ill after eating raw oysters traced to this location. The oysters had been contaminated by bacteria never before detected in the United States, but common in Asia.<sup>21</sup> The USDA stated there was a "strong possibility" that the source of the bacteria was ballast water.<sup>22</sup>

#### *Economic Losses*

The total cost of invasive species to our nation's economy is staggering, with one leading study estimating a \$138 billion annual price tag.<sup>23</sup> Aquatic invasive species have a significant impact on industries such as water and power utilities, commercial and recreational fishing, tourism and agriculture. Areas which have been hit the hardest are now engaged in enormously expensive and likely futile efforts at remediation. For example, the Great Lakes and surrounding areas are presently in the midst of a crisis in dealing with the zebra mussel, which was introduced through

---

<sup>17</sup> Testimony by Stephen K. Hall, Executive Dir., Association of California Water Agencies, before the Assembly Select Committee on Coastal Protection, Alameda, California (Oct. 5, 1998).

<sup>18</sup> Rawlings, Tonya, "Ecology and Ballast-Mediated Transfer of *Vibrio Cholerae* 01 and 0139," Presentation at the Conference on Marine Bioinvasions, M.I.T., Cambridge, MA (Jan. 25, 1999).

<sup>19</sup> Centers for Disease Control and Prevention, "Morbidity and Mortality Weekly Report," vol. 42, no. 5, pp. 91-93 (Feb. 12, 1993).

<sup>20</sup> Ruiz, Gregory, *supra* note 14.

<sup>21</sup> See *Non-Cholera Vibrios*, Briefing for the Food Safety Institute, Ellen Doyle, Ph.D., University of Wisconsin, (1998) at <<http://www.wisc.edu/fri/briefs/nonvibri.htm>>

<sup>22</sup> See *Shellshocked: Tainted Ballast Water Suspected as Source of Bacteria in Oysters*, HOUST. CHRON. (Sept. 6, 1998).

<sup>23</sup> Pimental, David *et al.*, "Environmental and Economic Costs Associated with Non-Indigenous Species in the United States," Presented at AAAS Conference in Anaheim, California (Jan. 24, 1999).

ships' ballast water. The zebra mussel colonizes along hard surfaces such as ship's hulls, water pipes and other shoreline structures.<sup>24</sup> The accumulation of these organisms lead to blocked water intake pipes. Additionally, zebra mussels cause adverse economic impacts through their competition for food sources with small fish and other organisms in the Great Lakes, leading to disruptions at higher trophic levels as well. The Great Lakes have been inundated over time by several invasives, and the costs add each year. The Great Lakes states spend about \$10 million per year just to keep a single species, the sea lamprey, from decimating important game fisheries such as salmon and trout.

Species found in the United States also affect other nations' economies. For example, in the former Soviet Union the comb jelly, a jellyfish introduced into the Black and Azov Seas from the United States through ships' ballast, has virtually destroyed an entire fishery. Since the introduction of this species, fishing take in those seas has diminished 200,000 tons in a five-year period.<sup>25</sup>

A regional example is found in California, which is currently developing and implementing a multi-billion dollar plan to restore habitat and species in the San Francisco Bay-Delta Estuary. The Estuary is the primary source of water for two-thirds of all Californians, and it supports an agriculture industry that provides nearly half of the fresh fruits and vegetables for the country.<sup>26</sup> If the state is not successful in preventing further invasive species introductions, "the restrictions on water deliveries to protect endangered species will be such that we will not even come close to meeting existing demands for water out of the Delta . . . [and] [a]s shortages grow, our economic base and quality of life [in California] will decline since much of our economic prosperity and way of life are dependent on water from the Delta."<sup>27</sup> Such concerns are the reason that the California Farm Bureau, the Association of California Water Agencies, and the Metropolitan Water District were strong public supporters of the California ballast water law.

Unfortunately, once established, aquatic invasive species are virtually always "here to stay" due to the difficulty of eradicating them after they have been detected; the costs cited are simply to minimize the damage. For example, the nationwide cost of combating zebra mussels alone totals \$3 billion annually; similarly, the cost of the

<sup>24</sup> *Id.* at 9.

<sup>25</sup> Harbison and Volvik, "The Ctenophore, *Mnemiopsis leidyi*, in the Black Sea: A Holoplanktonic Organism Transported in the Ballast Water of Ships," *Nonindigenous Estuarine & Marine Organisms: Proceedings of the Conference & Workshops*, NOAA, Seattle, WA (April, 1993); "Invader Threatens Black, Azov Seas," *Science*, Vol. 263, pp. 1366-67 (Nov. 26, 1993); D. Baltz, "Introduced Fishes in Marine Systems and Inland Seas," *Biological Conservation*, Vol. 56, p. 151 (1991).

<sup>26</sup> Testimony of Stephen K. Hall *supra* n.17.

<sup>27</sup> *Id.*

Asian clam and European green crab totals \$1 billion and \$44 million nationwide each year, respectively.<sup>28</sup>

#### Vectors

Ballast water exchange is currently the major cause of aquatic invasive species introductions to the United States.<sup>29</sup> Shipping moves over 80% of the world's commodities and transfers approximately 3 to 5 billion tons of ballast water internationally each year. A similar volume may also be transferred domestically within countries and regions each year.<sup>30</sup> More than 21 billion gallons of ballast water containing living organisms are discharged into U.S. waters every year.<sup>33</sup> Though research has shown the rate of invasions attributed solely to shipping has been increasing exponentially over time,<sup>34</sup> scientists believe that the number of invasive species currently identified in ballast water still may "grossly underrepresent[t]" the actual number of invasive species in ships' ballast.<sup>35</sup>

In addition to ballast water exchange, there are numerous other vectors for invasive species, some of which are growing. These include coastal and open ocean

<sup>28</sup> Pimental, David *et al*, "Environmental and Economic Costs Associated with Non-Indigenous Species in the United States," Presented at AAAS Conference in Anaheim, California (Jan. 24, 1999).

<sup>29</sup> See, e.g., Carlton and Geller, "Ecological Roulette: The Global Transport and Invasion of Nonindigenous Marine Organisms," *Science* (1993); Marine Board of the National Research Council, *Stemming the Tide*, National Academy Press, Washington D.C. (1996).

<sup>30</sup> See <<http://globallast.imo.org/index.asp?page=problem.htm&menu=true>>.

<sup>33</sup> Reauthorization of the 1990 Non-indigenous Aquatic Nuisance Prevention and Control Act: Hearings on S. 1660 Before the Subcommittee on Drinking Water, Fisheries and Wildlife, Senate Environment and Public Works Committee Regarding Non-indigenous Species and S. 1660, (Testimony of Dr. James Carlton, Director of the Maritime Studies Program of Williams College and Mystic Seaport.).

<sup>34</sup> Ruiz, Gregory *et al*, "Invasion of Coastal Marine Communities in North America: Apparent Patterns, Processes and Biases," *Annu. Rev. Ecol. Syst.*, vol. 31, pp. 481-531, at 492-3 (2000); see also National Research Council, *Stemming the Tide: Controlling Introductions of Nonindigenous Species by Ships' Ballast Water*, p. 11 (1996).

<sup>35</sup> Ruiz, Gregory, *supra* n. 34 at 520 (discussing smaller invading organisms); see also Wonham, M.J. *et al*, "Fish and Ships: Relating Dispersal Frequency to Success in Biological Invasions," *Marine Biology*, vol. 136, pp. 1111-1121, at 1111, 1118 (2000) (discussing invasive fish).

aquaculture, hull fouling,<sup>36</sup> ballast sediments,<sup>37</sup> recreational fishing and boating, releases of exotic pets, intentional introductions (such as for a fishery or vegetation "restoration" effort), and aquatic transport of trash.<sup>38</sup> Introductions from each of these vectors can have a significant impact on local ecosystems, impacts that can spill over to connected waterways and spread hundreds or even thousands of miles.

An example of a relatively new vector in the United States that will require increased vigilance to control is marine based aquaculture. Marine aquaculture is poised to become a significant U.S. industry. NOAA has called for a five-fold increase in aquaculture productivity by 2012, with fish raised in pens in open oceans figuring prominently in this plan. While several pilot projects have moved forward in the coastal and open oceans, full-scale finfish aquaculture in the EEZ has not yet gained acceptance in the United States. Significant controversy has already ensued over the production of genetically modified, non-native, or farm-raised native fish. TOC is deeply concerned that aquaculture, without adequate safeguards to ensure these fish cannot escape, presents an enormous potential vector for invasive species.

Other vectors will continue to emerge over time, and the rate of invasion from new species is expected to continue to increase. We have already waited too long for a comprehensive federal approach, and are currently witnessing the devastating effects.

### **The IMO Convention and Its Limitations: U.S. Must Implement More Protective Measures**

Aquatic invasive species threaten the nation's natural ecosystems, economically important fisheries and aquatic supported industry, as well as public welfare and safety. There is no greater environmental threat posed by ships than that of the introduction of aquatic invasive species. We must do everything we can to effect tighter control of ballast water to prevent continuing and growing harm.

In February, the international community established baseline global ballast water management standards to prevent the spread of aquatic invasive species through

<sup>36</sup> National Sea Grant Program, *The Role of Shipping in the Introduction of Nonindigenous Aquatic Organisms to the Coastal Waters of the United States (other than the Great Lakes) and an Analysis of Control Options*, pp. 24-32 (April 1995).

<sup>37</sup> See, e.g., Godwin, L. Scott, "Hull Fouling and Ballast Sediments: The Importance of Vectors Other than Ballast Water in Transporting Nonindigenous Marine Species in the Hawaiian Islands," Presentation at the First National Conference on Marine Bioinvasions, M.I.T., Cambridge, Mass. (Jan. 25, 1999).

<sup>38</sup> Barnes, David, "Invasions by Marine Life on Plastic Debris," *NATURE*, Vol. 416, pp. 808-09 (April 25, 2002).



ballast water. The IMO adopted a new International Convention for the Control and Management of Ships' Ballast Water and Sediments. The IMO Ballast Convention will enter into force 12 months after ratification by 30 states, representing 35 percent of world merchant shipping tonnage.

The IMO Ballast Convention is a reasonable first international step to address a global problem. We commend the U.S. delegation to IMO for its efforts to pursue stringent standards at the Convention. However, even if these international standards are ultimately implemented, TOC believes we must do better in national legislation. The Convention is limited in scope to addressing only a single vector, the standards it does contain are weak, and it does not contain the additional tools or mechanisms needed for prevention and eradication of invasive species. Fortunately, the Convention and international law recognize the right of nations to take more stringent measures. The following section will briefly review the Ballast Convention and its relevance for the United States.

*The Convention's Ballast Management Standards are Insufficient*

The Convention generally provides that the discharge of ballast water must be in accordance with the ballast water management provisions of the Convention. Ships must have on board and implement a ballast water management plan. The plan, unique to each ship, will describe the specific management procedures required to comply with given standards. Existing ships will be required to comply after a phase-in period lasting several years.

The IMO Convention adopts an initial standard based on "exchange," meaning that ships must dispel their ballast water and exchange it for new water.<sup>39</sup> Additionally, over a phase in period lasting several years, the Convention provides for a ballast water performance standard.<sup>40</sup>

---

<sup>39</sup> The Convention requires ships performing ballast water exchange to do so with an efficiency of 95% volumetric exchange of ballast water. For ships exchanging ballast water by the pumping-through method, pumping through three times the volume of each ballast water tank is considered to meet the standard described. Pumping through less than three times the volume may be accepted provided the ship can demonstrate that the standard of at least 95% volumetric exchange is met. See I.M.O. CONVENTION, Annex, Reg. B-4, Reg. D-1 (2004).

<sup>40</sup> Under the performance standard, ships conducting ballast water management shall discharge less than 10 viable organisms per cubic metre greater than or equal to 50 micrometers in minimum dimension and less than 10 viable organisms per milliliter less than 50 micrometers in minimum dimension and greater than or equal to 10 micrometers in minimum dimension; and discharge of the indicator microbes shall not exceed the specified concentrations. See I.M.O. CONVENTION, Annex, D-2 (2004).

Unfortunately, the ballast water exchange standard will fail to prevent many aquatic invasive species from entering U.S. waters. Ballast water exchange is an insufficient and outdated standard here in the United States, where we have worked to control aquatic invasive species eradication for a longer time than in most other nations. While the standard may be a realistic floor for the world as a whole, the standard does not reflect what the U.S. needs and what it is currently capable of achieving.

For example, though ballast water exchange is already mandatory for vessels entering the Great Lakes, Canadian and Great Lakes resource management authorities issued a joint letter to the governments of Canada and the United States on July 20, 2001 that calls for further action to prevent aquatic species from entering the Great Lakes. Specifically, they found that "ballast water exchange alone . . . was insufficient to prevent ship-mediated introductions of AIS [alien invasive species]." They recommended that the governments work together to "establish and implement standards, measures, and accountability mechanisms that will prevent the further introduction of alien invasive species to the Great Lakes ecosystems."

This joint letter was based on the fact that, even with a reported 97% compliance under NISA's only mandatory ballast water exchange program, a number of new invasive species have become established in the Great Lakes, including round gobies, threespine stickleback, and rusty crayfish.<sup>41</sup> Thus, even if the Convention's ballast water exchange program is implemented, experience to date in the Great Lakes shows that it will fail to adequately protect U.S. waters from invasive species in the long term.

Moreover, vessel operators themselves believe that "[b]allast water exchange should be viewed as a short-term solution only,"<sup>42</sup> and at least one major port has found that "present ballast exchange methods should be viewed as a 'stop-gap' measure which can minimize, but not prevent, foreign species translocations and introductions."<sup>43</sup> There are numerous variables that limit the effectiveness of ballast water exchange.<sup>44</sup> These include: difficulty of completing an adequate exchange (which is the reason that effectiveness has been found to range from over 90% down to only 10%),<sup>45</sup> species becoming trapped in sediments, difficulty of verification, duration or route of

---

<sup>41</sup> California Report at 9, 19, 24-25.

<sup>42</sup> Port of Oakland, "Berths 55-58 Project Draft Environmental Impact Report," App. F, p. 41 (Dec. 1998).

<sup>43</sup> *Id.*, p. 9.

<sup>44</sup> *See, e.g., id.* at 9, 24-25, 31.

<sup>45</sup> *Id.*, p. 9; *see also* Rigby, Geoff, "Progress in the Management and Treatment of Shipping Ballast Water to Minimise the Risks of Translocating Harmful Nonindigenous Marine Organisms," Presentation at the First National Conference on Marine Bioinvasions, M.I.T., Cambridge, Mass. (Jan. 26, 1999).

voyage (which may make full, at-sea exchange impossible), safety considerations, technological limitations, and other factors.

Although the IMO ballast water convention also contains a ballast water performance standard, this is static and therefore neither standard will promote technological innovation or improved environmental performance over time. In moving from exchange to a performance standard, there is a need to provide incentive for ships to not only go beyond the status quo of exchange but to continually utilize better technologies. Laboratory and shore side prototypes can only go so far, we need to know what works in the real world and what is practically achievable for the industry.

In developing ballast water treatment technologies, we must also ensure the particular treatment doesn't cause more harm than it redresses. While the Convention requires parties to ensure that ballast water management practices do not cause greater harm than they prevent to their environment, human health, property or resources, or those of other nations, there are no principles to direct this requirement and thus its utility is limited.

Finally, the phase-in periods are years too long. The standards are based on either exchange or performance, and not on the use of a particular technology. Ships could feasibly implement these standards relatively quickly without the economic constraints of investment in any particular treatment technology or change in ship design. Thus, there is no economic or other justification for phasing in the implementation of the standards over several years.

*Convention is Limited in Scope to Ballast Water as the Sole Vector*

The Convention addresses only ballast water as a pathway for invasive species, and not any other known vector such as hull fouling, intentional introductions or others. Thus, even if the U.S. enacted legislation implementing the Convention's terms, or legislation on ballast water management generally, we would be providing an incomplete solution to a multi-faceted problem.

*Convention Provides No Additional Tools for Prevention or Rapid Response and Eradication*

The Convention doesn't provide the additional tools beyond ballast water management that are necessary for a comprehensive program to prevent and mitigate the spread of invasives, such as rapid response and screening. The IMO and the Convention have attempted to provide mechanisms for the dissemination of known technology to developing nations; however, with few nations acting unilaterally to regulate ballast water exchange, there has been very little economic demand for ballast water treatment technologies. The result has been little research or innovation.

To conclude, the Convention does not provide a structure that will ensure the timely development and implementation of state of the art treatment technologies, on ship and onshore. The U.S. should act to reauthorize NAISA to significantly strengthen and expand upon the foundation laid by the IMO Ballast Convention.

*Convention and International Law Fully Support Unilateral Action*

The U.S. is not only encouraged to take more protective measures, the U.S. is specifically permitted to do so. The IMO Convention acknowledges explicitly that nations have the right to take, "individually or jointly with other parties, more stringent measures with respect to the prevention, reduction, or elimination of the transfer of Harmful Aquatic Organisms and Pathogens through the control and management of ships' Ballast Water and Sediments, consistent with international law."<sup>46</sup>

International law is found in the United Nations Convention on the Law of the Sea (Law of the Sea), which recognizes the right of individual nations to take unilateral measures to protect their marine resources and territory from incoming invasive species.<sup>47</sup> UNCLOS specifically grants coastal states broad authority to establish requirements as a condition of entry into port.<sup>48</sup> The existing NISA, and the current reauthorization legislation, require ballast water management and treatment as a condition of entry into port, thus including all ships that will enter U.S. ports as permitted by UNCLOS. While UNCLOS additionally grants authority to effect environmental controls over ships operating within the territorial sea<sup>49</sup> and within the

<sup>46</sup> See IMO CONVENTION, Art. 2-3. In addition, parties should ensure that ballast water management practices do not cause greater harm than they prevent to their environment, human health, property or resources or those of other States. See IMO CONVENTION, Art. 2-7.

<sup>47</sup> Article 196(1) of UNCLOS provides that "states shall take all measures necessary to prevent, reduce and control pollution of the marine environment resulting from the use of technologies under their jurisdiction or control, or the intentional or accidental introduction of species, alien or new, to a particular part of the marine environment, which may cause significant and harmful changes thereto." Article 56 more broadly grants coastal states "sovereign rights" within their exclusive economic zone for the purpose of (among other things) "conserving and managing the natural resources," as well as jurisdiction over "the protection and preservation of the marine environment."

<sup>48</sup> The specific rights of a coastal nation to effect controls over incoming and transiting ships is discussed in Articles 211 and 21 of UNCLOS. Article 211, which generally discusses the regulation of pollution from vessels, permits a coastal state to establish particular requirements for the prevention, reduction and control of pollution of the marine environment for this purpose.

<sup>49</sup> Article 21 of UNCLOS discusses the rights of a coastal state within its territorial sea to adopt laws and regulations for several purposes, including the conservation of the living

EEZ,<sup>50</sup> the NAISA legislation purports to exercise control only over those ships trafficking in the territorial sea, and exempts ships operating in the Exclusive Economic Zone.

**NISA Reauthorization through NAISA and AISRA:  
Together the Bills Provide the Baseline for a Comprehensive National Solution**

The NISA legislation currently pending before Congress provides the necessary floor for deliberation concerning the appropriate strength and scope of a federal program to protect against invasive species. As noted earlier in my testimony, in the House the legislation is divided into two components. NAISA, which contains ballast water provisions, rapid response and screening mechanisms, has been referred to the Transportation and Infrastructure Committee. Research and further grant provisions contained in AISRA have been referred to the Resources Committee. In the following section, I will generally consider these two bills together, under the rubric of

---

resources of the sea, the prevention of infringement of the fisheries laws and regulations of the coastal state, the reduction and control of pollution thereof, and the prevention of infringement of the customs, fiscal immigration or sanitary laws and regulations of the coastal nation. These are subject to some limiting language in 21.2, preventing the imposition of restrictions on design, construction, manning or equipment upon a foreign ship in innocent passage unless giving rise to “generally accepted international standards.”

<sup>50</sup> Article 211 recognizes the rights of coastal states, where “conforming to and giving effect to generally accepted international rules and standards established through the competent international organizations....”. Recent efforts by the Senate and Administration to ratify the Law of the Sea treaty support the interpretation that UNCLOS permits nations the latitude to protect against pollution from foreign ships, including ships trafficking in the territorial sea as well as ships in the exclusive economic zone. *See* Resolution Urging Ratification, with Declarations and Understandings, Senate Foreign Relations Committee, (February 25, 2004), *and* Letter to Senators Lugar and Biden, William H. Taft, Legal Advisor to the Department of State, March 1, 2004, (*confirming the Administration's understanding that UNCLOS does not require the US to supplement or modify its domestic law related to the protection of the marine environment, human health, safety, conservation of natural resources, further that these laws are consistent with UNCLOS.*) Moreover, the United States and other nations have imposed regulation where necessary to prevent pollution from ships operating in coastal waters, consistent with UNCLOS. In the past, the U.S. has acted to prevent pollution coming from ships operating even in the exclusive economic zone, as in the case of the Oil Pollution Act of 1990. The Clean Water Act also authorizes regulation of some activities on ships operating in the territorial sea as well as the contiguous zone. Just last year the European Union sought to impose environmental protections following the oil spill disaster of the *Prestige*, a ship trafficking outside of a coastal territorial sea.

issues that must be addressed in any NISA reauthorization. In some cases, I will urge strengthening amendments.

*Ballast Water Management Must Facilitate Continued Improvement*

The first issue I will speak to is the imperative that NISA reauthorization legislation must contain a ballast water standard that facilitates improvement over time. NAISA utilizes an interim standard based on exchange,<sup>51</sup> but tightens the final standard to require application of the best available technology for the applicable category or class of vessels. This is necessary to promote economic and environmental stringency, as well as technological innovation. As noted earlier in the context of the Convention, establishing a single uniform standard – whatever it may be – fails to promote improvement over time. TOC recommends that the standard be further linked to a finding, as in the Clean Water Act, that the goal of legislation should be zero discharge of invasive species.<sup>52</sup>

NAISA also includes recognition of new sources, yet fails to impose a higher performance standard for these sources. New sources can more cost-effectively incorporate more stringent treatment technologies than existing vessels. TOC recommends that the legislation be amended to require a higher standard for new sources. For example, under the Clean Water Act, new sources are subject to “new source performance standards” that are based on “state of the art” technology, which are generally more stringent than standards for existing sources.<sup>53</sup> These standards require the greatest degree of effluent reduction for an individual class, and protect the investment of dischargers in these improved treatments for a fixed period. This system ensures that over time dischargers will incorporate more sophisticated technologies, and provides incentives for innovators to continue to develop better treatments.

NAISA would also improve treatment methods for aquatic invasive species by requiring EPA to promulgate regulations to evaluate treatment methods to ensure no adverse effects on human health, public safety or the environment result from their use.

The legislation would additionally address a growing problem – ships that avoid ballast water management through their current characterization of NOBOBs, ‘no

---

<sup>51</sup> The interim standard for ballast water exchange shall be an operational 95% volumetric exchange of ballast water. The interim standard for ballast water treatment shall be a biological effectiveness of 95% reduction in aquatic vertebrates and invertebrates, phytoplankton, and macroalgae.

<sup>52</sup> Currently the standard is linked to a “minimum risk” standard, which is difficult to assess.

<sup>53</sup> See 33 U.S.C. Sec. 1316.

ballast on board.' According to the Great Lakes Panel on Aquatic Nuisance Species, nearly 80 percent of oceangoing commercial ships are in a NOBOB condition upon entry, which exempts them from open-ocean ballast exchange requirements. However, even "empty" ballast tanks contain residual water and sediment that may harbor organisms that can be discharged when new water is added to the tanks and later expelled. Refilling and emptying ballast tanks is also believed to be a mechanism for expanding the range of aquatic invasive species already present in the Great Lakes. These vessels have become a growing problem on the Great Lakes, where they contribute to the spread of invasives yet avoid the mandatory exchange requirements that other shippers in the Great Lakes must follow.<sup>54</sup> By moving towards ballast treatment instead of solely exchange, while providing better research and response mechanisms, the legislation should lead to the identification of long term approaches to address the problems associated with NOBOBs.

*Legislation Must Address Other Potential Vectors Through Identification of these Vectors, Screening Mechanisms and Facilitation of Rapid Response*

As I have testified earlier, ballast water is one of growing number of vectors that spread invasive species. Both NAISA and AISRA would address these other vectors for the first time, a needed improvement in any federal legislation. They would establish a priority pathway management program, by directing the Aquatic Nuisance Species (ANS) Task Force to conduct pathway analysis to identify the highest risk pathways for introduction of aquatic invasive species and implement management strategies to reduce these introductions. Additionally, the Invasive Species Council would be directed to develop a set of screening guidelines for federal agencies to use to determine whether a planned importation of a live organism from outside the country into the U.S. should proceed, and if so, whether that importation should be conditioned. Where there are gaps in federal authority, the Act requires the Director of the U.S. Fish and Wildlife Service to screen the organisms. Grants are created to help states perform their own screening processes in addition to the federal process. All of these are important improvements to reduce the unintentional introduction of invasive species.

Aquatic invasive species are far more difficult to control once established than terrestrial species, and thus quick detection of, and rapid response to, new invasions is critical. Consider the example of one species that could have been controlled had the U.S. already utilized these provisions. An invasive green algae dubbed "killer algae" (*Caulerpa taxifolia*) was discovered in the waters of Southern California in early 2000. Native to tropical waters, it became popular in the aquarium trade in the late 1970s and either escaped or was released into the Mediterranean Sea in the

<sup>54</sup> See <<http://www.glc.org/advisor/01/ballast.pdf>>

mid-1980s. It is now widespread throughout much of the northwestern Mediterranean. It appears that the algae found off Southern California is a clone of the released Mediterranean plant, and can grow in deeper and colder waters than the tropical populations.

Its impacts have been compared to unrolling a carpet of Astroturf across the seabed. In areas where it has become well-established, it has caused economic and ecological devastation by overgrowing and eliminating native seaweeds, seagrass reefs, and other communities. Efforts to destroy this single patch of algae in Southern California have involved tarping off the affected area and injecting chlorine under the tarp. Even with this drastic and costly effort, which killed virtually everything under the tarp, the algae is still not completely gone. Moreover, the treatment was paid for primarily with hurriedly-assembled state funds; in states without such funding, such an invasion could have spread even more quickly, with devastating effects.

The reauthorization legislation would allow for the early detection and monitoring of invasives, and provide much needed federal rapid response mechanisms. The National Invasive Species Council's (NISC) ANS Task Force, in consultation with other agencies, is to develop a set of sampling protocols, a geographic plan, and a budget to support a national system of ecological surveys for rapid detection of aquatic invasive species. This national system would establish clear lines of communication and help identify pathways causing distribution of newly detected aquatic invasive species.

Both AISRA and NAISA would make emergency funding available to states and regions to implement approved rapid response contingency strategies. The ANS Task Force is directed to develop model state and regional rapid response contingency strategies to aid states and regions in the development of appropriate strategies. The (NISC) is directed to establish a Federal Rapid Response Team to implement eradication and control responses on federal land; assist in implementing rapid response measures on non-federal lands; and provide training to state, tribal and regional rapid responders.

Finally, the legislation would address the vector of hull fouling through its general research provisions, and through the education and training program directed towards marine and marina operators. These tools are necessary to provide the authority and resources sufficient to address invasive species.

*Legislation Must Provide for Needed Information, Research, and Education*

We are learning more each day about invasives and how they are spread, and there is a continuing need to expand upon this research. NISA's current research and monitoring provisions provide limited research into ballast water management



practices and the status of affected environments. Fortunately, these have been extended and expanded in the NAISA legislation. Additionally, AISRA would provide much needed additional research, including on non-ballast vectors. The research priorities are an integral component of the AISRA and are widely supported by our colleagues in the environmental community.<sup>55</sup> Some key programs newly proposed include:

- Development and implementation of ecological surveys at various sites to document baseline ecological information, identify pathways, and track the establishment of species;
- Development and implementation of pathway surveys to monitor those of high risk and determine practices contributing to their introduction;
- Analysis of the pathways of introduction to identify increasingly effective management actions and standards to reduce introductions and establishment;
- Dissemination of information to the public and appropriate agencies and institutions; and
- Promotion of environmentally sound and occupationally safe methods and treatment technologies for preventing, controlling and eradicating aquatic invasive species.

These provisions provide the necessary federal tools and guidance to improve our ability to detect and respond to invasive species. Currently states across the country are doing what they can to protect their borders from invasives, yet they have strongly advocated for increased federal participation.<sup>56</sup>

*Stable Sources of Funding must be Added*

Implementation of NISA's ballast water management program and research has been inadequate in part because of the lack of critical funding. These programs include: enforcement of ballast exchange regulations and guidelines, the Ballast Water Demonstration Program, research and outreach grants, the National Ballast Information Clearinghouse, and state Aquatic Nuisance Species Management Plans. Unfortunately, annual appropriations for these programs has been lacking. For example, research has been hampered by a lack of funding, coordination, standardization and access to data. A lack of needed research impairs the nation's ability to assess the effectiveness of ballast water management methods, roles of other sources of aquatic invasives, and the state of invasions in the nation's waters.

<sup>55</sup> Several environmental organizations have endorsed these provisions in the reauthorization legislation as introduced, including the National Wildlife Federation, Defenders of Wildlife and The Nature Conservancy.

<sup>56</sup> Halting the Invasion: State Tools for Invasive Species Management, ENVIRONMENTAL LAW INSTITUTE, (August 2002).

It would be unrealistic to provide substantially broader authority and responsibility for several federal agencies without providing them with the necessary financial support to meet their obligations. Regular, stable and increased funding is essential to the success of the program. In addition to significantly higher authorization of appropriations, TOC recommends the creation of a fund supplemented through user fees to be used for enforcement and rapid response. For example, the Clean Water Act has achieved general success in regulating point source discharges through its permit program, under which water users and dischargers pay fees for the enforcement and implementation of the Act.<sup>57</sup> Similarly, the California ballast water program includes fees of \$400 per qualifying vessel voyage, and as a result is more adequately funded and far more successful than its federal counterpart. We urge the Committee to consider strengthening the NAISA bill by adding a fee program to ensure the success of the overall program.

*Legislation Must Provide Accountability Through Enforcement*

Reporting on ballast water exchange was made mandatory in 1996 by amendments to the NISA program. However, compliance with even this initial step has been abysmal because of a lack of enforcement. The first and only report by the National Ballast Information Clearinghouse, issued in October 2000, found that only about one fifth of the vessels that entered U. S. waters from outside the EEZ filed the mandatory reports required under NISA.<sup>58</sup> Of those vessels that did report, only about one-fifth of those who stated an intent to discharge ballast water reported having performed a complete, mid-ocean ballast exchange. However, analysis suggested that a "significant proportion" of the ballast water volume reported as exchanged in mid-ocean actually came from coastal areas.<sup>59</sup>

Across the nation, compliance with mandatory reporting requirements improved only slightly over the 12-month period, remaining between 23% and 29% from October 1999 through June 2000. Only for the West Coast of the contiguous U.S. did compliance with the reporting requirement increase markedly over time, primarily from an increase in California, which receives the most ship arrivals. This increase coincided with implementation of the 1999 California state law that requires submission of copies of the federal ballast water management reports to the State Lands Commission, authorizes monetary and criminal penalties for noncompliance, charges fees for maintenance of the program, and utilizes an active boarding program that targets 20-30% of arrivals, far higher than the level

<sup>57</sup> Dischargers to publicly owned treatment works face charges that are generally based on volume or volume multiplied by toxicity weights, and can range from under \$100/month to \$90,000/month.

<sup>58</sup> Smithsonian Environmental Research Center, "National Ballast Information Clearinghouse Interim Report," (October 2000), <http://invasions.si.edu/NBIC/ballast.htm>.

<sup>59</sup> *Id.*

of boarding by the Coast Guard during that period. As a result, compliance with reporting in California increased over the 12-month reporting period to approximately 75% and remains higher today.

The report concluded that due to the poor nationwide reporting rate, it is difficult to estimate reliably: (a) patterns of ballast water delivery and (b) compliance with NISA's voluntary guidelines for ballast water management. In other words, compliance with the mandatory reporting requirement in NISA was so low that the Coast Guard did not even have enough data to determine whether NISA's voluntary ballast water management program should become mandatory. Today, reporting in California is well over 3 times that of the rest of the nationwide. California agencies use the funding available from the fee program to board over 25% of the incoming vessels as part of the enforcement program, further boosting compliance.

The current reauthorization legislation would increase penalties but lacks any of the other tools utilized in California, such as an active boarding program. As such the legislation fails to provide the means to ensure the success of its ambitious new programs. It is widely accepted that the nation is facing an *increasing* rate of aquatic species invasions. After over a decade of effort under NISA and its predecessor the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA), it is evident that we need substantially stronger enforcement tools to effectively prevent and control the introduction of invasive species into the nation's waters. We urge strengthened enforcement and funding provisions be added to the reauthorization legislation to accomplish this.

## Conclusion

The known costs of failing to regulate invasive species discharges – in the order of billions of dollars to date – are far higher than the costs associated with regulation. On top of these known costs is the “the incalculable cost of loss of biodiversity”<sup>61</sup> that aquatic invasive species have caused and continue to cause in the absence of an effective control program. We urge Congress to act quickly to prevent further permanent damage to the nation's waterways and the people, wildlife and industries that depend on them.

---

<sup>60</sup> Letter from Mary-Ann Warmerdam, California Farm Bureau Federation to Senator Byron Sher, Senate Environmental Quality Committee, California State Senate (July 1, 1999).

<sup>61</sup> California Report at 101.

Testimony submitted to  
U.S. House of Representatives  
Committee on Transportation and Infrastructure  
Subcommittees on Coast Guard and Maritime Transportation and Water Resources and  
Environment

Thursday, March 25, 2004

by

Professor Roger Mann  
Acting Director for Research and Advisory Services  
School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
Gloucester Point, VA 23062

Mr. Chairman, Members of the Committee, it is a pleasure to be here today in response to your invitation to provide testimony on new international standards proposed by the International Maritime Organization (IMO) to manage ballast water, and its relationship to National Invasive Species Act Reauthorization.

My name is Roger Mann. I am a Professor of Marine Science and Acting Director for Research and Advisory Services at the School of Marine Science, Virginia Institute of Marine Science, College of William and Mary. I have been a researcher in the field of marine science for over thirty years. During that period I have maintained an active interest in the biology of non-native aquatic species, and actively participated in research and policy development related to non-native species at the state, regional, national and international levels. The arrival of non-native species into the United States through ballast water and other vectors is widely recognized as a significant threat to the integrity of native ecosystems, and hence to the nation's economy as well as its recreational and aesthetic resources.

My testimony today will focus on three subjects. These are:

- 1) an explanation of what data is available to support the setting of specific standard(s);
- 2) what level of confidence do we have that a particular standard will have a meaningful impact on invasions; and
- 3) is it possible to determine with any level of specificity what the impact on invasions will be from setting a specific standard?

When setting the standard to keep out invaders, the place to start is with a simple series of questions: what are the target organisms and given our current understanding of technology and biology, which among the target organisms do we have a chance of eliminating from ballast water prior to discharge in US waters? Marine organisms of concern range all the way from the microscopic to the massive. At the microscopic end of the scale we encounter single cell bacteria that may be pathogenic to human and marine species, single cell phytoplankton that may change the nature of food chains in coastal environments, cyst forming organisms responsible for harmful algal blooms, and reproductive spores of plants that, in the final form may be large and imposing members of marine communities. Moving up the size ladder we encounter small invertebrates that compete directly with native species, often with undesirable outcomes, and the early life history forms (eggs and larvae) of the vast majority of marine organisms. Larger still and we encounter adult stages of a wide variety of organisms. Adult forms of larger organisms are probably of minor importance in this mix, the processes of filling tanks typically results in their death. However, the egg and larval stages of larger organisms are abundantly present in ballast water and represent a threat for eventual establishment of an invading species in US waters after discharge.

So we have identified the target organisms – predominantly microorganisms through early life history stages of larger organisms. We need to move quickly to control discharge of these organisms. The reauthorization of the National Invasive species Act of

1996 provides the opportunity for US legislation to regulate ballast water management in US waters. I have had the opportunity to comment on this reauthorization process before the U.S. House of Representatives, Committee on Resources, Subcommittee on Fisheries Conservation, Wildlife and Oceans in both November 2002 and April 2003. I urge the Congress to move forward on reauthorization. In my previous testimony **I proposed adoption of a standard requiring 100% kill of all organisms in excess of 50 microns (= 50 micrometers in the terms of the IMO Convention) maximum dimension in discharged ballast. I maintain my support for this standard.** This standard that is both within reach of current technologies for very large volumes and that would be successful in retaining all the life history stages, including eggs, of the vast majority of aquatic vertebrates, invertebrates and macroalgae. These are groups of organisms that have a track record of causing significant ecological and economic impacts in regions where they have become invasive. While this standard will not insure removal of most phytoplankton and toxic dinoflagellates that cause red tide blooms – a group that may well represent a very serious challenge to any and all of the currently researched control technologies – it does represent a significant advancement of current options focused on ballast water exchange.

Ballast water exchange is a very limited management tool. It presents continual safety challenges for ships masters, especially for bulk carriers in transoceanic passage. It is very expensive to effect. It will not produce uniform results because the starting ballast load will vary with season and location. “Variability in” will result in “variability out.” We seek uniformity to a defensible standard. We will not achieve this using ballast water exchange as a final standard. It is only acceptable as an interim approach until treatment technologies emerge to control ballast water associated organisms. Adoption of a rational standard will provide technology developers with tractable performance goals. We should not be handcuffed by the search for ultimate control tools while good, although perhaps not perfect, technology is within grasp to address the ecological problem at hand. Incremental common sense dictates employment of the best available tools now, and better tools in due course. The reauthorization language will contain provision for continual review and improvement in standards as technology improves.

Let me now address the utility of the recently adopted IMO Convention on ballast water management as adopted at the February 2004 conference at IMO’s London Headquarters. The Convention will go into force 12 months after ratification by 30 member states. This represents 35% of the world’s shipping tonnage. I wish to quote from the Convention (text in quotations) and offer comment on sections of its content (text in italics)

**“Annex - Section A General Provisions:** Except where expressly provided otherwise, the discharge of Ballast Water shall only be conducted through Ballast Water Management, in accordance with the provisions of this Annex.”  
*I applaud this move to universal compliance.*

**“Annex - Section B Management and Control Requirements for Ships**  
Ships are required to have on board and implement a Ballast Water Management Plan approved by the Administration (Regulation B-1). The

Ballast Water Management Plan is specific to each ship and includes a detailed description of the actions to be taken to implement the Ballast Water Management requirements and supplemental Ballast Water Management practices. Ships must have a Ballast Water Record Book (Regulation B-2) to record when ballast water is taken on board; circulated or treated for Ballast Water Management purposes; and discharged into the sea. It should also record when Ballast Water is discharged to a reception facility and accidental or other exceptional discharges of Ballast Water.”

*Again, I applaud this move to uniform and comprehensive record management, but a weak link emerges where each ship has a unique management plan. Any regulation that has to be custom fit to each ship is already too complicated.*

“Other methods of ballast water management may also be accepted as alternatives to the ballast water exchange standard and ballast water performance standard, provided that such methods ensure at least the same level of protection to the environment, human health, property or resources, and are approved in principle by IMO’s Marine Environment Protection Committee (MEPC). Under Regulation B-4 Ballast Water Exchange, all ships using ballast water exchange should:

- whenever possible, conduct ballast water exchange at least 200 nautical miles from the nearest land and in water at least 200 meters in depth, taking into account Guidelines developed by IMO;
- in cases where the ship is unable to conduct ballast water exchange as above, this should be as far from the nearest land as possible, and in all cases at least 50 nautical miles from the nearest land and in water at least 200 meters in depth.

When these requirements cannot be met, areas may be designated where ships can conduct ballast water exchange. All ships shall remove and dispose of sediments from spaces designated to carry ballast water in accordance with the provisions of the ships’ ballast water management plan (Regulation B-4).”

*While I applaud the recognition of alternatives my comments on the limited value of ballast water exchange have been expressed earlier.*

#### **“Annex - Section D Standards for Ballast Water Management**

There is a ballast water exchange standard and a ballast water performance standard. Ballast water exchange could be used to meet the performance standard.

**Regulation D-1 Ballast Water Exchange Standard** - Ships performing Ballast Water exchange shall do so with an efficiency of 95 per cent volumetric exchange of Ballast Water. For ships exchanging ballast water by the pumping-through method, pumping through three times the volume of each ballast water tank shall be considered to meet the standard described. Pumping through less than three times the volume may be accepted provided the ship can demonstrate that at least 95 percent volumetric exchange is met.”

*I reiterate my comments on the limited utility of ballast exchange.*

**“Regulation D-2 Ballast Water Performance Standard** - Ships conducting ballast water management shall discharge less than 10 viable organisms per cubic meter greater than or equal to 50 micrometers in minimum dimension and less than 10 viable organisms per milliliter less than 50 micrometers in minimum dimension and greater than or equal to 10 micrometers in minimum dimension; and discharge of the indicator microbes shall not exceed the specified concentrations. The indicator microbes, as a human health standard, include, but are not be limited to:

- a. Toxicogenic Vibrio cholerae (O1 and O139) with less than 1 colony-forming unit (cfu) per 100 milliliters or less than 1 cfu per 1 gram (wet weight) zooplankton samples;
- b. Escherichia coli less than 250 cfu per 100 milliliters;
- c. Intestinal Enterococci less than 100 cfu per 100 milliliters.”

*The regulation for organisms greater than 50 micrometers (=microns) recognizes this size in accordance with my proposed standard, but does not require 100% mortality. A 100% mortality standard is tractable with current technology and is not cost prohibitive. The standard for organisms between 10 and 50 microns are very commendable, although probably not achievable in the same time frame as the regulation for organisms in excess of 50 microns. Consider here that the US Coast Guard STEP program (Shipboard Technology Evaluation Program: Experimental Ballast water Treatments) requires only 98% removal of organisms over 50 microns and simple reporting of organisms smaller than 50 microns. I suggest adoption of an interim standard that will immediately address the greater than 50 micron standard with current technologies while working towards technologies capable of addressing both size standards as suggested by IMO. The human health standards for toxigenic Vibrio cholera are such that compliance would require sterilization of the water. Vibrio are difficult to kill. A standard of 1 cfu per 100 milliliters is at the detection limit of current methods, and therefore cannot be guaranteed in practical application. Vibrio would be problematic in certain geographical regions (e.g., the coastline of the Indian subcontinent) but not elsewhere. We have no compendium of knowledge describing water quality at ports of loading, yet the ability to enforce proposed IMO regulations at receiving ports are incompatible with vessel loading schedules. Items b. and c. address Escherichia coli and Enterococcus. Both of these have very short survival times in seawater and, with rare exceptions, present no significant risk in practical terms. The E. coli standard is twice that used by EPA to close bathing beaches. In truth, the value of the standards addressing toxigenic and/or pathogenic bacteria are for setting performance standards for treatment technologies to be examined in test systems.*

“Ballast Water Management systems must be approved by the Administration in accordance with IMO Guidelines (Regulation D-3 Approval requirements for Ballast Water Management systems). These include systems which make use of chemicals or biocides; make use of organisms or biological mechanisms; or which alter the chemical or physical characteristics of the Ballast Water.”



*Testing and approval of technologies by formal procedures is appropriate.*

**“Prototype technologies**

Regulation D-4 covers Prototype Ballast Water Treatment Technologies. It allows for ships participating in a program approved by the Administration to test and evaluate promising Ballast Water treatment technologies to have a leeway of five years before having to comply with the requirements.”

*I applaud this measure to encourage the shipping industry to partner in the development of new technologies*

**“Review of standards**

Under regulation D-5 Review of Standards by the Organization, IMO is required to review the Ballast Water Performance Standard, taking into account a number of criteria including safety considerations; environmental acceptability, i.e., not causing more or greater environmental impacts than it solves; practicability, i.e., compatibility with ship design and operations; cost effectiveness; and biological effectiveness in terms of removing, or otherwise rendering inactive harmful aquatic organisms and pathogens in ballast water. The review should include a determination of whether appropriate technologies are available to achieve the standard, an assessment of the above mentioned criteria, and an assessment of the socio-economic effect(s) specifically in relation to the developmental needs of developing countries, particularly small island developing States.”

*Periodic review of standards is sound*

To return to my three original questions:

Question #1. An explanation of what data is available to support the setting of specific standard(s);

Question #2. What level of confidence do we have that a particular standard will have a meaningful impact on invasions; and

Question #3. Is it possible to determine with any level of specificity what the impact on invasions will be from setting a specific standard?

The target organisms can be categorized based on size. The 50 micron standard would be successful in retaining all the life history stages, including eggs, of the vast majority of aquatic vertebrates, invertebrates and macroalgae. 100% mortality within this size range, a technically and economically attainable goal, is practically enforceable, and would effectively eliminate these invaders. The 10-50 micron standard would include some, but not all phytoplankton and toxic dinoflagellate of the type that cause harmful algal blooms. Even 100% mortality here will not eliminate invasions, and is probably not attainable anyway. A listing of toxigenic or pathogenic bacteria can be as long as deemed necessary, but its use is in defining performance standards of technologies, not in practical application.

In conclusion, I again thank the Committee for the opportunity to provide testimony. This completes my testimony.

Before the

**U.S. HOUSE OF REPRESENTATIVES  
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE**

**Subcommittee on Water Resources and Environment  
and the  
Subcommittee on Coast Guard and Maritime Transportation**

**Joint Hearing**

**“Ballast Water Management: New International Standards  
and National Invasive Species Act Reauthorization”**

**March 25, 2004**

**TESTIMONY OF**

**David A. Ullrich**

**Executive Director**

**Great Lake Cities Initiative**

**UNITED STATES HOUSE OF REPRESENTATIVES  
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE**

**SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION  
SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT**

**Joint Hearing  
Ballast Water Management: New International Standards  
and National Invasive Species Act Reauthorization**

**March 25, 2004**

***Testimony of:*  
David A. Ullrich  
Executive Director  
Great Lakes Cities Initiative**

Good morning Chairman Duncan, Chairman LoBiondo, Ranking Member Costello, Ranking Member Filner and distinguished members of the Subcommittees. My name is David Ullrich and I am the Executive Director of the Great Lakes Cities Initiative. I am honored to appear before you today to present the views of Great Lakes Cities Initiative on ballast water issues. I appreciate this opportunity and the attention you are giving to this very important subject.

The Great Lakes Cities Initiative is a growing coalition of more than 40 mayors who represent cities and towns located along the Great Lakes in both the U.S. and Canada. Mayor Richard M. Daley of Chicago launched the Initiative in 2002 and is the current chair. A list of mayors who are participating in the Initiative is attached to this statement. The Initiative is based in Chicago and it is a project of the Northeast-Midwest Institute.

The Great Lakes Cities Initiative has three primary goals: (1) to help advance the long-term protection and restoration of the Great Lakes, (2) to strengthen the role of local leaders in Great Lakes decision-making, and (3) to share best practices among Great Lakes cities and towns.

I am here today to talk about an issue of great concern to the mayors of the Great Lakes Cities Initiative. Preventing the introduction of new invasive species is one of the top priorities of the Great Lakes mayors. Because ballast water from ships is the primary way that aquatic invasive species are introduced to the Great Lakes, special attention must be given to this source to find solutions that will reduce and ultimately eliminate future introductions of such species. Cities bear the brunt of the impacts from invasive species in many forms, including clogged water intake structures, impaired drinking water quality, fouled beaches, reduced recreational activity, increased maintenance costs, and many other problems. The fundamental safety and security of the drinking water for millions of people is at stake. Ballast water management is not something that cities or states alone can handle. It requires strong federal action, together with international cooperation, especially with Canada and Mexico.

### **Impacts on Cities**

Cities all along the shores of the Great Lakes deal with and pay for the problems presented by invasive species every day and have done so for many years. In the 1960's, alewives were dying by the millions and washing up on the shores. Beaches were closed and cities spent millions of dollars to clean up the dead fish, only to have more die and wind up on shore. Lamprey eels entered the Great Lakes even earlier, and decimated the lake trout populations, adversely affecting commercial and sport fishing. In the late 1980's, the zebra mussels became one of the most devastating invasive species. While disrupting the biological balance in the lakes, they also encrusted municipal water intakes and many other types of structures, requiring extensive time and resources from cities to deal with the problems caused. The companion quagga mussels have followed the zebra mussels, and continue to damage the lakes and impose costs on cities to deal with their after affects.

The problems go well beyond the immediate and direct effects of the various invasive species. In most cases, cities are the primary providers of drinking water and domestic use water for citizens, so there is much at stake for Great Lakes mayors in assuring a high quality and reliable source of water. Over 25 million people in the Great Lakes Basin rely on water from the lakes to drink. In recent years, several Great Lakes cities have experienced taste and odor problems in their drinking water which are thought to be related to the presence of zebra and quagga mussels. It is not unrealistic to think that the drinking water supply could be vulnerable to the unintentional or intentional introduction of microbial contamination that could present a significant threat to public health. Protecting the security of this bountiful source of drinking water, which represents almost 20 percent of the surface fresh water in the world, must be a high priority on a national level.

The problem of zebra mussels clogging water intake structures has been the subject of investigation in the recent past. Electric utilities and municipal water treatment plants take in some of the largest quantities of waters among the various users. In a study looking at costs during the period from 1989 to 1994 for 51 facilities using chemical treatment, the average total control costs for the medium sized plants reached a high in 1993 of \$154,000 for each facility and \$84,000 for small plants. For the City of Erie, Pennsylvania, alone, the total cost over the period from 1992 to 2003 was over \$1.6 million. Although the costs varied from year to year during the study period, this is a very significant expense imposed upon taxpayers when considered across the Great Lakes Basin. Other studies looking at industries, businesses, and communities estimated the impact to be over \$5 billion in the 1993-1999 period.

Swimming beaches are a very important for recreation for many residents and visitors all around the Great Lakes and contribute significantly to the economy. During the few warm summer months, many thousands of people go to beaches for an opportunity to enjoy the beauty of the lakes and the refreshing qualities they provide. Lately, there have been increasing numbers of swimming bans at Great Lakes beaches because of bacterial pollution believed to come from a variety of potential sources, but problems have also been presented by algal blooms and dead fish and waterfowl related to botulism. Although there is not absolute proof of the cause, many scientists link the problems to zebra mussels and other invasive species.

These and other problems related to invasive species are issues that cities must deal with on a regular basis. They are costly to cities and local taxpayers, time consuming, and detract from the quality of life for citizens and visitors to the cities. Strong action is needed now to prevent the introduction of more invasive species in the future and to provide the tools to effectively control invasive species already present in the Great Lakes and other bodies of water.

### **Ballast Water**

Invasive species have entered the United States and the Great Lakes basin in a variety of ways over the years, but the most significant source for aquatic invasive species in the Great Lakes has been ballast water. Ships coming into the St. Lawrence Seaway have brought along with them in their ballast water many different species since it began operations. Although there has been a requirement for ballast water exchange in the open seas for ships coming into the Great Lakes for a number of years, it has not proven to be 100% effective in eliminating all of the living organisms. The exchange of water outside the 200 mile zone is not always completely successful, and many ships are exempted from the requirement because they have "no ballast on board" (No-BOB) for a particular load. As these ships off load cargo and take on ballast water, then later load cargo and pump out ballast water, the living organisms in the ballast tanks are pumped out into the open water.

Because ballast water is such a significant source of aquatic invasive species, it is the appropriate point of focus for attention is preventing further introductions. In addition, particularly with regard to the Great Lakes, there is a fixed and manageable number of ships that must be dealt with to address the problem. Also, the ballast water medium is contained in tanks so treatment can be controlled more effectively. Understandably, there are many challenges in terms of the appropriate treatment approach, safety on the ships, and costs. However, considering the costs being imposed on cities and the damage to the environment, this must be treated as a very high priority matter. Finding the solution can and must be accomplished in a manner that is effective and does not adversely effect the shippers.

### **Federal Action**

The problem of introducing invasive species in ballast water is one of international scope and requires strong federal action. With the increasing globalization of the economy, there will be more and more international trade and shipment of goods from one part of the world to another. In a situation like this, the Federal government can best represent the interests of the United States, with strong input from state and local governments. Unfortunately, because of the slow process in international forums and the difficulty in getting strong, national legislation passed, ballast water continues to carry invasive species from one part of the world to another. The level of frustration at the state and local level has risen to a point where some have actually passed laws or are considering legislation that would regulate ships and their ballast water. If this trend were to continue, there would be an inconsistent and ineffective control system that would present an exceedingly difficult situation for shippers. Ships that move from port to port in different jurisdictions would spend an inordinate amount of time and money learning the requirements and taking the steps to comply with them. It

would be far better to have a consistent system imposed nationally so that all ships entering U.S. waters would be subject to the same requirements and the same enforcement system.

Beyond the impracticalities of inconsistent requirements across the country, separate efforts to regulate ballast water would impose a burden on cities and states that they are not in a position to take on. Developing the necessary expertise on maritime law, control technologies, monitoring and inspection systems, and enforcement protocols is beyond the scope of most cities and states, and would be an inefficient duplication of effort across our seacoasts and the Great Lakes. Far better is a system where requirements can be established at the national level with the appropriate public process for comment, then implemented by a federal agency in a manner that would be fair and consistent across all U.S. ports for all ships.

#### **International Maritime Organization and International Convention**

The International Maritime Organization (IMO) has been working for a number of years with its member countries on ballast water and sediment management issues to deal with the problem of invasive species in a way that is effective and safe for shippers. The negotiations came to a successful conclusion this February with the adoption of the International Convention of the Control and Management of Ships' Ballast Water and Sediments. The Convention is a significant step in the right direction toward controlling ballast water and invasive species, but will not solve the problem completely in a timely manner. The basic management approach through ballast water exchange is fundamentally sound. In order to make sure the exchange is effective, there is a ballast water standard that must be met. If the standard is not met through the exchange, then further treatment of the water is necessary to make sure there is compliance. Ships must have a plan and maintain logs to document their ballast water management practices, and those records must be available for inspection. These requirements are phased in over a period of time between 2009 and 2016. The Convention provides for exceptions to the requirements and allows countries to take more stringent measures not subject to IMO approval. The Convention does not come into effect unless there is ratification by 30 countries representing 35% of global gross tonnage.

Most importantly, the Convention demonstrates that the world community understands the significance of the invasive species problem caused by ballast water and has taken action to control it. However, the ballast water standards themselves, the time allowed for compliance, and the opportunity for exceptions to the rules creates a concern on the part of cities that must deal with the problems posed by invasive species. In addition, it is not clear how member countries will ensure that a high level of compliance with the requirements and that enforcement will be timely and effective when necessary.

The Convention provides an opportunity for ratifying countries to impose more stringent requirements if they deem it necessary to protect their interests. If the United States ratifies the Convention, we urge the Federal government to take full advantage of this opportunity to impose management practices and set standards that will provide the highest degree of assurance that the introduction of invasive species from ballast water can be reduced and ultimately eliminated. In addition, the management practices and standards should become effective sooner, and interim

requirements are needed promptly to control ballast water prior to the effective date. There also must be a reliable reporting, inspection, and enforcement system to assure high levels of compliance are achieved. Collectively, a much greater awareness of the magnitude and serious nature of this problem and a sense of urgency for solving it is needed.

#### **Federal Legislation**

The United States Congress has demonstrated its concern for the invasive species problem and its commitment to deal with it through passage of the National Invasive Species Act (NISA). The law was first passed in 1990 and amended in 1996. The law has helped draw attention to the problem and increase the understanding of it. Also, it imposed ballast water exchange requirements for the Great Lakes ships, which has provided much needed protection for the resource.

Congress is now considering the National Aquatic Invasive Species Act (NAISA), which would amend NISA. The Great Lakes Cities Initiative supports strong legislation to deal with the problem of invasive species, and NAISA includes many of the key elements needed. Immediate action is needed for all ships to require ballast water exchange, best management practices, plans and record keeping, rapid response capability, effective compliance and enforcement, and more research. Only through prompt action will we be able to prevent the serious environmental damage and major economic costs associated with the introduction of more invasive species. Mayors of the Great Lakes Cities Initiative wrote in November 2003 in support of NAISA, and continue to encourage timely legislative action, promulgation of the necessary regulations, and strong enforcement of the requirements.

Although the primary concern today is with ballast water, it is important to recognize that invasive species enter the United States environment through a variety of sources. One of the most dramatic examples is the Asian carp, which was brought here intentionally to deal with aquatic nuisance problems in fish farms. Having escaped the farms during major flooding, the Asian carp are now creating significant problems in the Mississippi and Illinois Rivers. Mayor Daley, with support from other Great Lakes mayors, is working closely with state and federal officials to keep the Asian carp out of Lake Michigan through an electric barrier system in the Chicago Sanitary and Ship Canal. Passage of NAISA would be an important step forward in effectively dealing with threat of the Asian carp, and threats of other similar invasive species that threaten vitally important waterways.

#### **Conclusion**

On behalf of the mayors of the Great Lakes Cities Initiative, I sincerely thank Chairman Duncan, Chairman LoBiondo, Ranking Member Costello, Ranking Member Filner and all the other Subcommittee Members for holding this important hearing and for providing me with the opportunity to share our views. The Great Lakes mayors are very encouraged that the Subcommittees have demonstrated an ongoing commitment to work on ballast water issues, and we look forward to working cooperatively with the Subcommittees in any way we can to advance progress on this and other related matters of importance.

**Members of the Great Lakes Cities Initiative  
March 2004**

<u><b>U.S. Cities/Towns</b></u>	<u><b>Canadian Cities/Towns</b></u>
Buffalo, NY - Mayor Anthony Masiello	Becancour, Quebec - Mayor Maurice Richard
Chicago, IL - Mayor Richard M. Daley* (Chair)	Collingwood, Ontario - Mayor Terry Geddes
Cleveland, OH - Mayor Jane Campbell*	Fort Erie, Ontario - Mayor Wayne H. Redekop
Detroit, MI - Mayor Kwame M. Kilpatrick	Goderich, Ontario - Mayor D.J. Shewfelt
Duluth, MN - Mayor Herb Bergson*	Kingston, Ontario - Mayor Isabel Turner
Erie, PA - Mayor Richard E. Filippi*	Marathon, Ontario - Mayor Pat Richardson
Evanston, IL - Mayor Lorraine H. Morton	Niagara on the Lake, Ontario - Mayor Gary Burroughs
Gary, IN - Mayor Scott L. King*	Parry Sound, Ontario - Mayor Ted Knight
Hammond, IN - Mayor Thomas McDermott, Jr.	St. Catherines, Ontario -
Highland Park, IL - Mayor Michael Belsky	Mayor Timothy H. Rigby* (Vice Chair)
Manitowoc, WI - Mayor Kevin M. Crawford	Sainte Catherine, Quebec - Mayor Jocelyne Bates
Marquette, MI - Mayor Jerry Irby*	Salaberry-de-Valleyfield, Quebec - Mayor Denis Lapointe
Milwaukee, WI - Mayor Marvin Pratt	Sault St. Maire, Ontario - Mayor John Rowswell
Niagara Falls, NY - Mayor Irene J. Elia	Thunder Bay, Ontario - Mayor Ken Boshcoff
Portage, IN - Mayor Douglas W. Olson	Toronto, Ontario - Mayor David Miller*
Racine, WI - County Executive Bill McReynolds	Ville de la Prairie, Quebec - Mayor Guy DePre
Racine, WI - Mayor Gary Becker*	Windsor, Ontario - Mayor Eddie Francis
Rochester, NY - Mayor William A. Johnson, Jr.*	
Sturgeon Bay, WI - Mayor Colleen Crocker-MacMillan	
Superior, WI - Mayor Dave Ross	
Toledo, OH - Mayor Jack Ford*	
Traverse City, MI - Mayor Margaret Dodd	
Vermillion, OH - Mayor Jimmy L. Davis	
Whiting, IN - Mayor Robert Bercik	
Wilmette, IL - Mayor Nancy Canafax	
Windpoint, WI - Board President John Knuteson	
Zion, IL - Mayor Lane Harrison	

\* denotes Steering Committee member



## Lake Carriers' Association



*The Greatest Ships on the Great Lakes*

---

Written Testimony of  
James H. I. Weakley  
President - Lake Carriers' Association

Regarding  
"BALLAST WATER MANAGEMENT: NEW INTERNATIONAL STANDARDS AND  
NATIONAL INVASIVE SPECIES ACT REAUTHORIZATION"

Joint Hearing  
House Subcommittee on Coast Guard and Maritime Transportation  
and  
House Subcommittee on Water Resources and Environment  
House Transportation and Infrastructure Committee

Rayburn House Office Building • Committee Room 2167  
Washington, DC

March 25, 2004

LAKE CARRIERS' ASSOCIATION  
 TESTIMONY OF JAMES H. I. WEAKLEY, PRESIDENT  
 MARCH 25, 2004 • RHOB – COMMITTEE ROOM 2167

JOINT HEARING OF HOUSE SUBCOMMITTEES ON  
 COAST GUARD AND MARITIME TRANSPORTATION AND  
 WATER RESOURCES AND ENVIRONMENT

Good morning Mr. Chairman and members of the Subcommittees. Thank you for the opportunity to address this hearing. I am James H. I. Weakley, President of Lake Carriers' Association. We represent 15 American corporations operating 57 U.S.-flag vessels exclusively within the Great Lakes. These companies annually carry as much as 125 million tons of cargo. These cargos – iron ore for the steel industry, limestone for the construction industry, coal for utilities.... – drive the nation's economy. Just as important, we relax along the shores of the Great Lakes and drink from the world's largest supply of fresh water. The Great Lakes are our home.

Lake Carriers' Association has been a leader in the effort to find a solution to the problem of ballast water transport and introduction of non-indigenous species. When the ruffe was discovered in Duluth/Superior Harbor, LCA developed the Voluntary Ballast Water Management Plan for vessels trading to the "Twin Ports" to prevent the spread of the ruffe from the western basin of Lake Superior. U.S. Fish & Wildlife Service called the Plan "the cutting edge of technology," and rightfully so. Even though vessels call on Duluth/Superior more than 1,000 times a year, the ruffe remains largely confined to western Lake Superior. Only two other populations have been discovered since voluntary implementation of these procedures.

LCA also has pioneered research on filtration and treatment of ballast water. In partnership with the Northeast-Midwest Institute, LCA tested ballast filtration and secondary treatments on a Canadian-flag Laker and a barge. Filtration showed definite promise, especially when coupled with ultraviolet irradiation as a secondary treatment. There must be more testing and refinements, but should filtration prove to be one of the solutions, its foundations were laid on the Great Lakes.

Today's hearing focuses on The International Convention for the Control and Management of Ship's Ballast Water and Sediments, which the International Maritime Organization (IMO) completed last month, and reauthorization of the National Invasive Species Act.

While I support the goals of the IMO Convention, I cannot support its ratification. This treaty would, for the first time, govern our domestic waterborne commerce if a U.S.-flag vessel transits the waters of another nation in the course of its voyage between two U.S. ports. U.S.-flag Lakers often transit Canadian waters during a Jones Act move. For example, on an upbound transit of the Detroit/St. Clair Rivers, a U.S.-flag Laker alternates between U.S. and Canadian waters 17 times!

This new regulation of domestic Great Lakes shipping is unnecessary. U.S.-flag Lakers never leave the system, so their ballast water is not a vector for introduction of new exotics. Our ballast water contains only what is already in the Lakes. We must focus our efforts on preventing new introductions.

LAKE CARRIERS' ASSOCIATION  
TESTIMONY OF JAMES H. I. WEAKLEY, PRESIDENT  
MARCH 25, 2004 • RHOB – COMMITTEE ROOM 2167

JOINT HEARING OF HOUSE SUBCOMMITTEES ON  
COAST GUARD AND MARITIME TRANSPORTATION AND  
WATER RESOURCES AND ENVIRONMENT

Furthermore, the Great Lakes traditionally have been exempt from IMO Conventions because our operating conditions are so different from those encountered in the ocean trades. Vessels in the deep-sea trades transit different environments on a regular basis. On the Lakes, we operate in waters that are hydrographically connected and form an enclosed aquatic system. If in fact such moves need to be regulated, a bi-lateral agreement between the United States and Canada is the most appropriate vehicle for addressing any Lakes-specific issues, not an international treaty.

The other topic under consideration today is reauthorization of the National Invasive Species Act. LCA supports House Bills 1080 and 1081 and commends the sponsors for recognizing that vessels operating in an enclosed aquatic system need not be subject to full application of the ballast water regulations that are to come.

Vessels operating exclusively in the enclosed Great Lakes aquatic system pose no threat to the Great Lakes environment. The Great Lakes are interconnected. The waters of Lake Superior flow into the St. Marys River and then are dispersed throughout the system. This means the ruffe, which is migrating along the southern shore of Lake Superior unchecked, will reach the St. Marys River, and could migrate to the lower Lakes. Therefore, it would be meaningless for vessels that are confined to the Great Lakes to filter or treat their ballast water. On the Lakes, our focus must be on finding the means to stop future introductions via the ballast water on vessels entering from the oceans. To require U.S.-flag Lakers to treat or exchange their ballast would have no environmental benefit, but would increase the cost of delivering raw materials that fuel the nation's economy.

Thank you.

JHIW:GGM:lca  
g:\weakley\speeches\2004\0325-ballast water management.doc



STATE OF MICHIGAN

JENNIFER M. GRANHOLM  
GOVERNORDEPARTMENT OF NATURAL RESOURCES  
LANSINGK. L. COOL  
DIRECTOR

March 26, 2004

Mr. Frank A. LoBlondo, Chairman  
Coast Guard & Maritime Transportation Subcommittee  
507 Ford House Office Building  
Washington, DC 20515

Dear Chairman LoBlondo:

The Michigan Department of Natural Resources (MDNR) is very concerned about the negative impacts to recreational fisheries caused by aquatic invasive species. Tens of millions of dollars have been spent trying to control invasive species, and control measures continue annually. Their effect on recreational fisheries is difficult, if not impossible, to quantify and many invasive species are so new that we have yet to realize their full effect on recreational pursuits. Great Lakes anglers and charter boat operations have suffered through diminished lake trout populations since the 1950s because of the parasitic sea lamprey. Anglers in the southeast complain that round and tube nosed gobies are so abundant they can't catch commonly caught sport species such as yellow perch and walleye. Marinas around the basin are plagued by aquatic invasive macrophytes such as purple loosestrife and Eurasian water milfoil which clog bays and harbors often fowling outboard, inboard, and jet motors of recreational vehicles. In many areas, user groups wear shoes into the water to prevent their feet from being cut by zebra mussels. All these examples have detracted from the overall quality of fishing in the Great Lakes and more importantly account for lost recreational opportunity that cannot be measured.

Now we are faced with the possibility of new introductions. Asian carp, snakeheads, hydrilla and others potentially pose serious threats to angling pursuits. This is the time to take all precautions in an attempt to prevent their introductions into the Great Lakes. The State of Michigan recently passed laws banning the possession of certain species we feel pose the most immediate risk. However, only a coordinated effort at the federal level, stricter than presently employed, will affect the flow of new species into the Great Lakes from overseas. The MDNR supports strengthening of and improvement in regulations to prevent future introductions.

Sincerely,

James Dexter, Acting Chief  
FISHERIES DIVISION  
517-373-3375

CC: K. L. Cool, Director, MDNR  
George Burgoyne, Deputy Director  
Kelley Smith, Chief Fisheries Division  
Todd Grischke, MDNR

STEVENS T. MASON BUILDING • P.O. BOX 30025 • LANSING, MICHIGAN 48909-7525  
www.michigan.gov • (517) 373-2329

Fax: 517-373-0381 • Mar 26 '04 9:54 P.02

DNR FISHERIES

Eastern Surfing Association; Environmental Advocates of New York;  
Great Lakes United; Lake Michigan Federation; Lake Superior Alliance;  
Michigan United Conservation Clubs; National Wildlife Federation; Ohio  
Environmental Council; Save the River; Tip of the Mitt Watershed Council;  
Trout Unlimited-Illinois Council; Western Pennsylvania Conservancy;  
Wisconsin Association of Lakes

April 28, 2004

Susan Bodine  
Majority Staff Director  
Subcommittee on Water Resources and Environment  
B-376 Rayburn House Office Building  
Washington, D.C. 20515

John Rayfield  
Majority Staff Director  
Subcommittee on Coast Guard and Maritime Transportation  
507 Ford House Office Building  
Washington, D.C. 20515

Re: March 25, 2004 hearing on Ballast Water Management: New International Standards and  
National Invasive Species Act Reauthorization

Dear Ms. Bodine and Mr. Rayfield:

Congress has an exciting opportunity to pass the most comprehensive legislation yet to deal with the problem of invasive species in the United States - the National Aquatic Invasive Species Act (NAISA, S. 525, H.R. 1080/H.R. 1081). The undersigned Great Lakes organizations maintain that a coordinated, national solution to the problem of aquatic invasive species is the preferred management option, and that NAISA is the best available tool to move that solution forward. Nevertheless, distinct ecosystems such as the Great Lakes do call for special approaches, and we ask that you include the recommendations below in NAISA.

We endorse the viewpoint, shared by several witnesses at the March 25, 2004 joint hearing before the Coast Guard and Maritime Transportation and Water Resources and Environment Subcommittees and by the National Environmental Coalition on Invasive Species, that the recently passed IMO convention is an important step for the global community, but offers insufficient protection from new invasive species entering the waters of the United States via the ballast tanks of ocean ships. As aquatic invasive species have had a severe impact on the fish and wildlife of the Great Lakes ecosystem, as well as a tremendous impact on regional economies, our recommendations focus on special steps that Congress can take to enhance protection for the Great Lakes under NAISA.

#### **Why a Specialized Great Lakes Approach Makes Sense**

The Great Lakes are ideally situated to receive special consideration for protection from invasive species. Unlike other U.S. coastal zones, which are exposed to the greater ocean waters, the Great Lakes are a "closed" aquatic ecosystem. A single waterway, the St. Lawrence Seaway, functions as the primary entry point for invasive species from ships' ballast tanks to the Great Lakes. The other major potential entryway for invasive species is the Chicago Sanitary and Ship Canal. Focusing on these two entry points could

April 28, 2004  
Page 2

effectively control a large percentage of potential new invasive species. Additionally, the Great Lakes system serves as an entry point for many invasive species that impact inland freshwater lakes and rivers across North America. Researchers have identified predominant vectors for transportation of invaders to the Great Lakes as well as specific species found at commercial ports in the Eastern Europe Ponto-Caspian region that pose a threat of invading. By targeting prevention and research efforts on these discrete vectors and species, many potential invasions could be prevented before reaching the Great Lakes and spreading throughout the nation's inland waters. Third, regional ports, shippers, and lake carriers are receptive to a more aggressive invasive species prevention strategy for the Great Lakes. Finally, the existing management strategy of open ocean ballast water exchange has been in place in the Great Lakes over a decade, and is simply ineffective. Most ships entering the Great Lakes declare "No Ballast On Board (NOBOB)," which the Coast Guard has interpreted as exempt from the management requirement. Even when implemented, the exchange procedure does not remove many potential invaders from ballast tanks.

#### **Recommendations**

1. Ballast water standards must be established immediately. We support the establishment of aggressive yet achievable interim ballast water standards to encourage technology development, and particularly the rapid establishment of biologically effective final ballast water standards that are scientifically proven to fully protect Great Lakes waters from ballast-mediated invasions. The lack of standards is a significant impediment to developing badly needed ballast water treatment technologies.
2. The Great Lakes should provide a testing ground for immediate experimental on-board ballast water treatment technologies. NAISA should allow for and support a regional experimental program if endorsed by the Great Lakes states and consistent with federal provisions. Due to the relatively few ocean-going ships that ply the Great Lakes, experimental treatments could easily be implemented and monitored once standards are articulated. Should a treatment be demonstrated to be successful, rapid replication of the treatment regionally and nationwide would be possible as ships move to achieve standards under NAISA. A side effect of this real-time experiment will be a reduction in species entering the Great Lakes due to the use of technologies on the small number of ocean-ships that are the vector for ballast mediated invaders.
3. Congress should use NAISA to explore alternative transportation options for foreign cargos entering the United States via the St. Lawrence. A transfer facility that allowed ocean-going ships to discharge their cargo to lake carriers or rail transit prior to entry into Lake Ontario would eliminate much of the threat of invasive species entering via ballast water and whole ship transfer, and may also ameliorate homeland security concerns.
4. NAISA should direct relevant agencies, including the U.S. Army Corps of Engineers and U.S. Environmental Protection Agency-Great Lakes National Program Office, to prioritize long-term permanent hydrologic separation of the Mississippi River and Great Lakes watersheds. This should include funding for a study to clarify the feasibility and cost-effectiveness of engineering and transportation options for separating the two basins. Additionally, NAISA should provide full funding for the complete construction, operation, and maintenance of two permanent underwater barriers in the Chicago Sanitary and Ship Canal (commonly known as Barrier I and Barrier II).

April 28, 2004  
Page 3

5. Agencies and industries alike must be held responsible for prevention of aquatic invasive species introductions via ballast water tank transfer. The nature of new ballast water standards and management programs demands that clear enforcement and accountability measures are provided for in NAISA.

Thank you for your efforts to craft legislation that recognizes the scale of this national problem, yet is flexible enough to respond to the needs of unique ecosystems such as the Great Lakes. If you have any questions or comments, please do not hesitate to contact Joel Brammeier at (312) 939-0838 x4 or [jbrammeier@lakemichigan.org](mailto:jbrammeier@lakemichigan.org).

Sincerely,

Joel Brammeier  
Manager of Habitat Programs  
Lake Michigan Federation

Andy Buchsbaum  
Director, Great Lakes Natural Resource Center  
National Wildlife Federation

Wil Cwikiel  
Program Director  
Tip of the Mitt Watershed Council

Jason Dinsmore  
Policy Specialist  
Michigan United Conservation Clubs

Molly Flanagan  
Lake Erie Program Coordinator  
Ohio Environmental Council

David Higby  
Great Lakes Project Director  
Environmental Advocates of NY

Edward L. Michael  
Chairman  
Illinois Council of Trout Unlimited

Peter Murray  
Executive Director  
Wisconsin Association of Lakes

Jennifer Nalbone  
Habitat and Biodiversity Coordinator  
Great Lakes United

Bob Olsgard  
Lake Superior Waterkeeper  
The Lake Superior Alliance

Lester Priday  
Northeast Director  
Eastern Surfing Association

Magilla Schaus  
Great Lakes District  
Eastern Surfing Association

Katherine Smitherman  
Director of Public Policy  
Western Pennsylvania Conservancy

Stephanie Weiss  
Executive Director  
Save the River

**Opening Statement of  
Congressman Pete Hoekstra  
Joint Hearing on Ballast Water Management: New International Standards and  
National Invasive Species Act Reauthorization  
Subcommittee on Water Resources and the Environment  
Subcommittee on Coast Guard and Maritime Transportation  
March 25, 2004**

I commend the Chairman of the Coast Guard Subcommittee as well as the Chairman of the Water Resources Subcommittee for calling today's hearing. You, Mr. Chairman, have taken a strong leadership role in focusing on the problem of invasive species in the Great Lakes and across the nation. I hope that everyone participating in this hearing today can agree that we must move forward together in developing the best response to the scourge of invasive species.

The Second Congressional District of Michigan, which I represent, includes roughly 200 miles of some of the most beautiful shoreline of Lake Michigan. On a day-to-day basis, the quality of life and indeed, the very livelihood of many of my constituents is directly linked to the health of Lake Michigan and the other Great Lakes.

As you, Mr. Chairman, know all too well the problems created by invasive species have had an immense impact on the Great Lakes Region. The introduction of additional non-native species to the Great Lakes is one of the largest economic and environmental threats to the Great Lakes region today.

We can debate which techniques will best stem their introduction or adequacy of the effectiveness of current laws, but there is little debate that once an invasive species become established its impacts are too frequently profound.

I believe our current defenses are inadequate and for now, we are losing the battle against these Great Lakes intruders.

Since the 106<sup>th</sup> Congress I have introduced legislation that seeks to accelerate action by the Coast Guard to stem the introduction of invasive species into the Great Lakes from ballast water and the sediments contained in ballast tanks. Concrete action by the Coast Guard under the base 1990 legislation and the 1996 amendments contained in NISA has been painfully slow. Action has been paralyzed by seemingly endless analysis.



In building a better defense for the Great Lakes against the introduction of new invasive species, we must make vigorous use of the most effective tools currently available, while awaiting the improved techniques derived from additional research and its application through the free enterprise system.

I am pleased to hear of the progress for ballast water control and management under the International Maritime Organization Convention but I do not believe it should slow our work in the U.S. to establish a more stringent standard. The Great Lakes and our nation's waters deserve no less.

I look forward to working with the Committee to achieve this goal.

Thank you Mr. Chairman.

Full-Scale Ozone Ballast Water Treatment for Removal of Marine Invasive Species

*Executive Summary*

William J. Cooper<sup>1</sup>  
Gail M. Dethloff<sup>2</sup>  
Robert W. Gensemer<sup>3</sup>  
Marcia L. House<sup>2</sup>  
Richard A. Mueller<sup>6</sup>  
Gregory M. Ruiz<sup>7</sup>  
William A. Stubblefield<sup>3</sup>

Jeffery R. Cordell<sup>2</sup>  
Paul A. Dinnel<sup>4</sup>  
Russell P. Herwig<sup>2</sup>  
Joel A. Kopp<sup>5</sup>  
Jake C. Perrins<sup>2</sup>  
Gary M. Sonnevil<sup>8</sup>  
Ewout VanderWende<sup>9</sup>

<sup>1</sup>Department of Chemistry and Center for Marine Science  
University of North Carolina at Wilmington  
5600 Marvin K. Moss Lane  
Wilmington, NC 28409

<sup>2</sup>School of Aquatic and Fishery Sciences  
University of Washington  
1120 Boat Street  
Seattle, WA 98195-5020

<sup>3</sup>ENSR International  
4303 W. LaPorte Avenue  
Ft. Collins, CO 80521

<sup>4</sup>Shannon Point Marine Center  
Western Washington University  
1900 Shannon Point Road  
Anacortes, WA 98221

<sup>5</sup>Petrotechnical Resources Alaska  
310 K Street, Suite 407  
Anchorage, AK 99510

<sup>6</sup>Northeast Technical Services Co., Inc.  
P.O. Box 38189  
Olmsted Falls, Ohio 44138

<sup>7</sup>Smithsonian Environmental Research Center  
647 Contees Wharf Road/PO Box 28  
Edgewater, MD 21307-0028

<sup>8</sup>U.S. Fish and Wildlife Service  
Kenai Fishery Resource Office  
PO Box 1670  
Kenai, AK 99611

<sup>9</sup>BP Exploration (Alaska) Inc.  
900 E. Benson Boulevard/PO Box 196612  
Anchorage, AK 99519-6612

June 13, 2002

## 1 EXECUTIVE SUMMARY

### 1.1 Background

The discharge of organisms found in the ballast water of oil tankers and other cargo freighters may be a major threat to public health and the environment around the world. These organisms may cause substantial economic injury in countries in whose water they are discharged. Many of these organisms are not native or established in coastal regions (including ports) where they are discharged with ballast water, and thus are collectively referred to as nonindigenous species (NIS) or invasive species. NIS can substantially disrupt the structure and function of coastal marine ecosystems. The U.S. Coast Guard also estimates that NIS introductions cause approximately \$6 billion in economic damage in the United States annually. For example, the U.S. government estimates that over the past 10 years it has cost nearly \$4 billion to repair damage caused by the non-indigenous zebra mussel alone, impacting shorelines, water treatment, and power generating stations in and around the Laurentian Great Lakes.

Although many transfer mechanisms (or vectors) have contributed historically to the invasion of coastal habitats by aquatic NIS, shipping has been the vector responsible for most known invasions. The rate of new invasions appears to be increasing over time, and many of these invasions are attributed to the transfer and discharge of ships' ballast water. In short, ballast water is contributing strongly to the overall increase in newly detected invasions in coastal marine ecosystems.

Ballast water exchange is currently the only management strategy available for ships to reduce the quantities of non-indigenous coastal organisms in ballast water. Ballast water exchange, or mid-ocean exchange, occurs when ships replace coastal water in their ballast tanks with open ocean water to reduce the abundance of coastal NIS. It is a management strategy that many ships can implement immediately, and which does not require retrofitting or development of new technology.

Ballast water exchange (BWE) has some significant limitations and is viewed generally as a stopgap measure to reduce the risk of invasions. First, it is not always possible to safely conduct an exchange, because of risks to the structure and safety of vessels (especially in heavy seas). Second, even when performed, BWE still leaves a residue of coastal organisms. Third, for many voyages of short duration (e.g., coastwise transits limited to a hours or a few days), sufficient time may not exist to complete ballast water exchange, and the distance from shore may be insufficient to be entirely effective (as described above).

Therefore, efforts are now underway to develop and implement technological alternatives to ballast water exchange. Although many treatment possibilities are being explored, their evaluation is at an early stage and no alternative treatments have yet been approved by state, regional, or federal regulatory authorities. At the present time, the U.S. Coast Guard (as directed by the National Invasive Species Act of 1996) and some states require that alternative treatments be, at a minimum, as effective as BWE. However, no specific guidelines or minimum standards of efficacy currently exist to assess the performance of these alternative treatments.

### 1.2 Testing the Effectiveness of Ozone as a Potential Treatment Technology

In 1998, British Petroleum Alaska and Nutech O3, Inc. (hereafter referred to as BP and Nutech) undertook the development and testing of ozone gas as a potentially effective alternative method of decontaminating ballast water that contains NIS. A full-scale prototype ozonation system was installed in September 2000 and tested on board the BP-affiliate ship the *S/T Tonsina* (Alaska Tanker Company), a 869-foot, double-hull oil tanker with 12 segregated ballast water tanks, with a total capacity of approximately 11,000,000 gallons (41,365,000 L).

BP and Nutech subsequently partnered with several academic and industrial research institutions to design and implement a rigorous, independent analysis of the ozone system's ability to remove non-indigenous or invasive species from marine ballast water. The study described in this report represents the first of several experimental phases planned to provide a full evaluation of the efficacy of the prototype Nutech ozone system aboard the *S/T Tonsina*. The primary goal of this present (Phase 1) study was to conduct a field-scale test of the operation and efficacy of this ballast water treatment system for removal of a wide range of coastal marine organisms.

The specific objectives of the present study were to:

- 1) Determine the efficacy of a full-scale ozone system to remove coastal organisms compared to ballast water exchange.
- 2) Assess the possible environmental risks of discharging ozone-treated ballast water by measuring chemical constituents of the water over time and using whole effluent toxicity testing to assay the latent toxicity of the ballast water at the time of discharge.
- 3) Obtain operational experience with the prototype ozone system in order to implement further system improvements.

In short, this first phase represents a "proof of concept" for the Nutech ozone treatment system, providing key data needed to address each of the three primary objectives. It is important to recognize the current data, in Phase 1, are limited to a few trials from one port system.

### 1.3 Experimental Design

This study is the first of several phases, and measured the effects of ozone treatment and ballast water exchange, replicated on multiple dates with ballast water originating from Puget Sound. The experiments were designed to compare changes in treatment tanks over time to those observed in untreated control tanks. Treatment tanks (designated for ozone or ballast water exchange) were filled from the same source as untreated control tanks and all tanks were sampled at fixed time points throughout the same experiment.

Three ozone experiments and two ballast water exchange experiments were conducted. Including a third tank as a control, ballast tanks were filled at the same time and location to obtain a direct comparison between the efficacy of exchange and ozonation. Samples were

collected at multiple time points, including before and after treatment, from each tank using several access locations (manways or Butterworth® openings) on the deck of the ship. Treatments were as follows: No. 3 wing port (ozone treatment); No. 3 wing starboard (air-sparged control); and No. 4 port (ballast water exchange). Samples were used to measure changes in biota and water chemistry over time, as described below.

Effects of treatment on biota were measured in two ways. First, for organisms entrained in the ballast tanks, samples were collected from treatment and control tanks at least before and after treatment, and sometimes at intermediate time points, to compare changes in concentration and condition of resident organisms between treatments. This approach was used to measure effects of ozone and ballast water exchange treatments on bacteria, phytoplankton, and zooplankton. Second, for larger organisms (which are rare and more difficult to sample), a defined number of individual organisms were placed in various types of cages to measure the effect of ozone treatment. This second approach was used for fish, crabs, mysids, and amphipods. These caged organisms were placed in ozone treated and control tanks to compare mortality rates over time; a similar approach was not used in the BWE tanks, due both to the turbulence associated with this treatment and the mode of action, which was considered to be primarily achieved through removal and not mortality.

One preliminary and three full experiments were conducted over the course of one year. The preliminary test, designed to provide data for the full scale testing, provided information on the chemical reactions of ozone, including by-product formation and their effects on bacteria. Experiment 1 closely mimicked the ozone dosage that could be achieved on the *S/T Tonsina* during routine operations. During a typical 3.5-day voyage, the ozone system would apply 0.62 mg/L/hours ozone to the 2,850,000 L of each segregated ballast water tank in the vessel for a duration of five hours. This would be achieved by treating the 12 segregated ballast water tanks separately. During experiment 1, the ozone-loading rate was 0.59 mg/L/hours and lasted 5 hours. Experiment 2 achieved an ozone-loading rate of 0.86 mg/L/hours that resulted from improved operation of the ozone generator. In experiment 3, where only the vertical portions of the tanks were treated and the experiment lasted for 10 hours, an ozone-loading rate of 1.35 mg/L/hours was achieved. In Experiments 2 and 3, much larger amounts of ozone were purposely directed to the tank compartment that were sampled.

## 1.4 Results

### 1.4.1 Efficacy of Ballast Water Exchange

Ballast water exchange removed an average of 64% of the target animals measured in the first two exchange experiments (Figure 1.1). For each experiment, 5 coastal organisms were selected, on the basis of their abundance and restricted coastal distribution, to provide a quantitative measure of exchange efficacy. Figure 1.1 indicates the percent reduction observed in the ballast water exchange treatment relative to the control treatment of each of the target taxa. The data are displayed by experiment, indicating the variation observed among taxa. Despite considerable variation among taxa, the mean efficacy among taxa was similar between experiments: 59 % and 69 %.

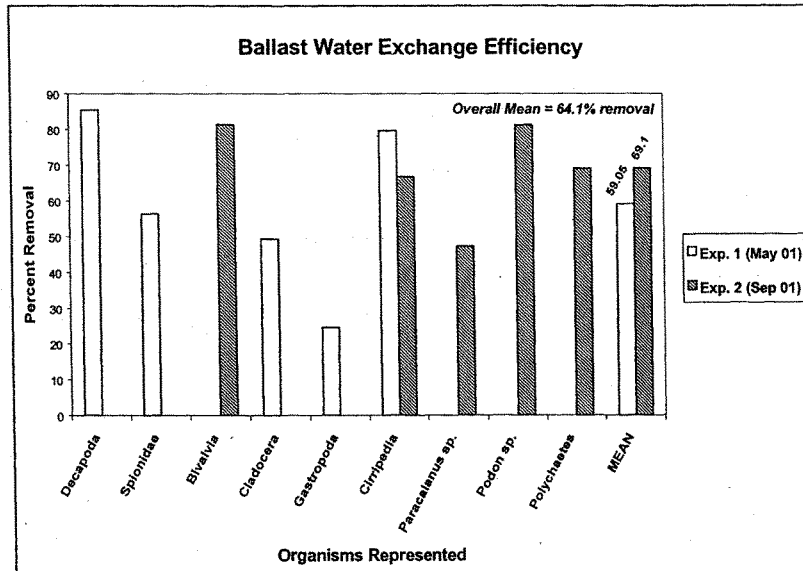


Figure 1.1. Summary of percent removal of marine organisms using ballast water exchange.

The efficacy of BWE, measured aboard the *S/T Tonsina*, was considerably lower than some proposed regulatory targets of 95 %. This level of reduction also appeared lower than that measured on other vessels, resulting perhaps from the structural complexity of the *S/T Tonsina*'s ballast tanks relative to the other vessels examined to date.

The direct comparison of BWE and ozone treatment on the same vessel is critical in evaluating the ozone treatment effectiveness. Moreover, our results (1) underscore the variation that can exist within ship type, and (2) suggest the level of "kill" needed for ozone treatment to surpass ballast water exchange aboard the *S/T Tonsina* may be lower than that for other vessels.

#### 1.4.2 Ozone Chemistry

In seawater where there is a significant concentration of bromide ion ( $\text{Br}^-$ ), ozone is catalytically destroyed with a half-life of five seconds. As expected, there was no ozone observed in any of the ballast water samples we analyzed. Therefore, ozone *per se* can be considered a good oxidant for the disinfection of marine ballast water because it is not chemically persistent.

Bromate ion ( $\text{BrO}_3^-$ ) was never detected at measurable levels in the treated ballast water, suggesting that the lower pH of the coastal water favored the formation of hypobromous acid (HOBr). Ozone and its residuals apparently did react with naturally occurring organic matter resulting in the formation of modest concentrations of bromoform in our experiments. The appearance of bromoform, and the fact that no bromate ions (or chloroform) were detected in any of the experiments, indicates that bromine (represented by hypobromous acid/hypobromite ions, or HOBr/OBr<sup>-</sup>) was formed in significant quantities during the ozonation process.

Concentrations of ozone-produced oxidants (i.e., bromine) were measured in ballast water using an electrode measurement of Oxidation-Reduction Potential (ORP), and a chemical measurement for Total Residual Oxidants (TRO). Ozonation increased ORP levels up to a plateau of ca. 700-800 millivolts (mV), which is consistent with seawater disinfection targets used by commercial marine exhibit aquaria. TRO levels exceeded limits of analytical detection (4 mg/L as chlorine equivalents) in most of the experiments on board the *S/T Tonsina*. The scientific literature suggests that even 4 mg/L TRO should exceed concentrations known to be acutely toxic (e.g., 1-2 mg/L) to many marine organisms.

#### 1.4.3 Efficacy of Ozone Treatment in Ballast Water Tanks

Figures 1.2 and 1.3 summarize the efficacy of ozone treatment for different organisms, for the different experiments, and time of ozonation at the time of sampling. Figure 1.2 summarizes the results of "killed" organisms while Figure 1.3 summarizes the total for the killed and moribund organisms. Efficacy for each organism is estimated as (a) the percent reduction in initial concentration for bacteria, microflagellates and dinoflagellates or (b) the percentage of sampled organisms that were dead or moribund for zooplankton, sheepshead minnow and mysid shrimp. The results are compared to the 64 % BWE efficacy (i.e., percent removal) as measured for zooplankton on the *S/T Tonsina* (Section 1.4.1). The percent removal for each group is shown, along with an indication (denoted by bars labeled with \*) of whether percent removal of that particular organism by ozone was greater than that of mean BWE performance on this vessel.

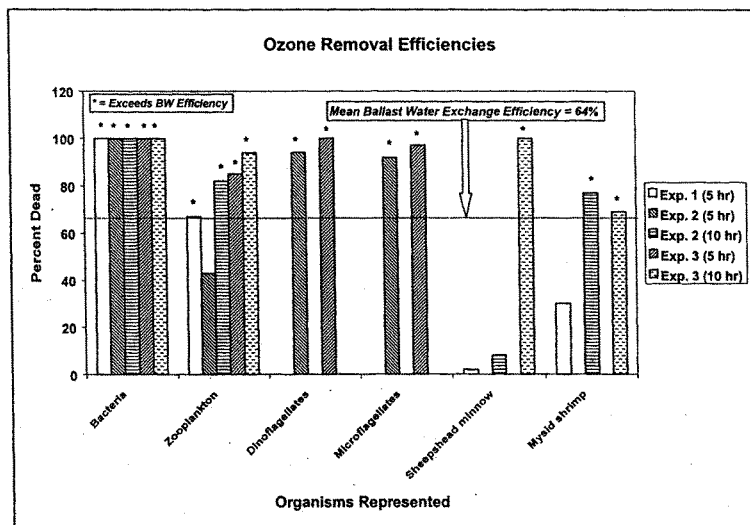


Figure 1.2. Percent mortality in ozone treatments vs. 64% mean organism removal efficiency from ballast water exchange on the *S/T Tonsina*.



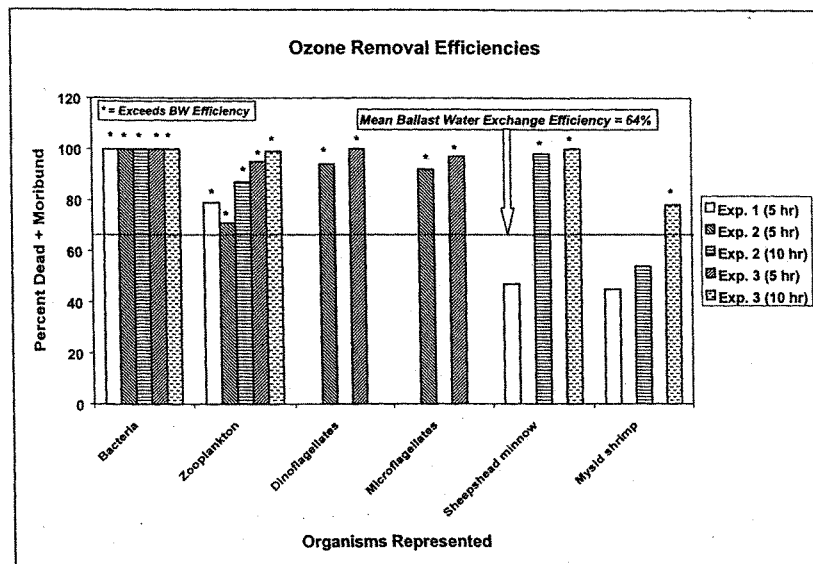


Figure 1.3. Percent dead + moribund in ozone treatments vs. 64% mean organism removal efficiency from ballast water exchange on the *S/T Tonsina*.

For the ozone treatment, the following results were observed (relative to the paired control treatment):

1. The concentration of culturable bacteria declined 99.9 %.
2. The zooplankton examined were determined to be 71-99 % dead or near death (moribund).
3. The concentration of vegetative cells for dinoflagellates and microflagellates declined 92 – 100 %. The effects of ozonation on diatoms have not yet been measured.
4. Results for larger, caged organisms were more variable. Among experiments, mortality was as follows: 2-100 % for sheepshead minnows, and 30-77% for mysid shrimp (Figures 1.2). For the sheepshead minnow and mysid shrimp, many organisms appeared moribund and may have been seriously impaired by the treatment, potentially increasing the overall effect of the ozone treatment (Figure 1.3).
5. Mortality rates for benthic organisms (e.g., amphipods and shore crabs) tended to be low. However, in contrast to the sheepshead minnows and mysid shrimp, the amphipods and crabs did not exhibit noticeable signs of stress that could result in long-term mortality.
6. The efficacy of ozone treatment generally surpassed that for BWE for bacteria, zooplankton, and phytoplankton.
7. For the larger organisms, it is presently not possible to compare the results of ozone treatment to BWE. We presume exchange would reduce the concentration of these organisms, but it remains difficult to obtain such data for large, mobile organisms.
8. Studies using known numbers of caged organisms suspended in ballast water tanks generally confirmed the level of ozone efficacy, as well as the relative sensitivity of various marine species.

STATEMENT BY THE INTERNATIONAL ASSOCIATION OF FISH AND  
WILDLIFE AGENCIES SUBMITTED TO THE JOINT HEARING OF THE COAST  
GUARD AND MARITIME TRANSPORTATION SUBCOMMITTEE AND THE  
WATER RESOURCES AND ENVIRONMENT SUBCOMMITTEE OF THE  
HOUSE TRANSPORTATION AND INFRASTRUCTURE COMMITTEE  
REGARDING BALLAST WATER MANAGEMENT AND NATIONAL INVASIVE  
SPECIES ACT REAUTHORIZATION

March 25, 2004

The International Association of Fish and Wildlife Agencies (Association) appreciates the opportunity to submit this statement to the Subcommittees regarding management of ballast water and the reauthorization of the National Invasive Species Act. The Association supports a comprehensive approach to the problem of aquatic invasive species that includes efforts to prevent the introduction of harmful invasive species to our aquatic ecosystems by managing ballast water. We believe that H.R. 1080, the National Aquatic Invasive Species Act of 2003, includes needed ballast water management provisions in a comprehensive package that also addresses other priority pathways for introduction of aquatic invasive species and the need for early detection, rapid response, control programs, and information, education and outreach programs. Together with H.R. 1081, the Aquatic Invasive Species Research Act, the two bills combine to reauthorize and improve the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 as amended by the National Invasive Species Act of 1996. The Association respectfully requests that this statement be included in the record for the joint hearing.

The Association was founded in 1902 as an organization of public agencies charged with the protection and management of North America's fish and wildlife resources. The Association's governmental members include the fish and wildlife agencies of the states, provinces, and federal governments of the U.S., Canada, and Mexico. All 50 states are members. The Association is a key organization in promoting sound resource management and strengthening federal, state, and private cooperation in protecting and managing fish and wildlife and their habitats in the public interest.

As you are aware, the State fish and wildlife agencies have broad statutory authority and responsibility for the conservation of fish and wildlife resources within their borders. The states are thus legal trustees of these public resources with a responsibility to ensure their vitality and sustainability for present and future citizens of their States. Because of our responsibility for and vital interest in the conservation of fish and wildlife resources, state fish and wildlife agencies have significant vested concerns in the prevention and control of aquatic invasive species.

Recognizing the tremendous adverse impacts that aquatic invasive species can have on the nation's fish and wildlife populations, the Association urges timely reauthorization of the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, as amended by the National Invasive Species Act of 1996. The Association supports the purposes and overall direction of H.R. 1080 and H.R. 1081 and is encouraged by Congressional efforts to address this complex issue in a comprehensive rather than a piecemeal approach. We applaud the continuing focus on partnerships and cooperative efforts to address this nationally significant problem. Because pathways for introduction of invasive species at the nation's borders are under the statutory authority of the federal government, we expect federal agencies to take a significant role in prevention strategies, but we also expect the state fish and wildlife agencies to play an integral role, as full resource management partners, in achieving the objectives of the legislation.

The Association does have the following concerns with the legislation and we look forward to working with Congress to address these concerns through the legislative process.

#### Definitions

Section 1003 of H.R. 1080 defines the terms "Aquatic Ecosystems of the United States", "Introduction", "Invasive Species", "Nonindigenous Species", "Organism Transfer", and "Species". All of these terms relate directly to one another and are necessarily broad in definition. The future interpretation of these broad definitions (such as for invasive species) cause us concern. For example, the definitions should not be so broad as to allow the law to undermine current uses of cultured fish in state fisheries programs. To be effective and to avoid unnecessary confusion, debate and possible litigation, there should be a process to identify those species currently resident in the United States that are considered invasive species. The issue of who makes the determination of what shall be called an invasive species is important and needs to include the expertise of the respective state fish and wildlife agencies. Tightening the precision of definitions is important to ensuring the success of this very important legislation and avoiding unnecessary entanglements in its future implementation. In addition, the definitions for terms common to both H.R. 1080 and H.R. 1081 are inconsistent.

#### Screening Processes and Lists

The Association is concerned that H.R. 1080 may allow importation of harmful species while the processes for screening are developed, funded, and implemented. For both the screening processes and rapid response, we believe that the states will be hard-pressed to come up with the funds to initiate local programs. The current state management plan provision in the law is evidence. After 14 years of federal ANS law there are still less than 20 of the states with approved management plans. This is a "weak-link" issue. To achieve success,

all areas of the country need to be fully involved in identification of pathways and development of screening processes and management plans.

#### Rapid Response

As written, H.R. 1080 creates a disadvantage financially for a state to have a rapid response contingency strategy. That is, the minimum federal cost share is 50 percent for states with a plan, but it is 75 percent for regional rapid response contingency strategies. The system should not penalize the states for trying to be proactive. Funding should be provided to assist states to develop state management plans in conjunction with other invasive species management plans.

#### Environmental Soundness

All forms of integrated pest management should be considered for use to ensure that the safest and most effective method to control and treat invasive species is used. The debate about what is "environmentally sound" for treatment and control techniques should not be allowed to cripple the ability of the agencies to deal effectively with an invasion.

#### Information, Education, and Outreach

Rather than a federal legislative mandate, the need for ANS warning signs at state public access sites should be assessed and coordinated through state and local groups and be incorporated into local plans. We believe that some of the provisions in the bill would be better left to processes involved with development of state management plans or other means than detailing them in the bill. We recognize that information and education strategies are very important to prevention of introductions to our states and controlling the spread of existing populations. The emphasis in the bill, however, seems disproportionately low, in comparison to some of the other categories.

#### Authorizations

Priority should be given to strategies that that focus on preventing the exposure of the country to more invasions. We concur with the finding in H.R. 1081, which states that "...efforts to prevent invasive species or eradicate them upon entry into the United States waters would likely result in a more cost-effective and successful approach to combating invasive species through preventing initial introduction." Of the nearly \$130 million authorized annually from FY 2004 through 2008 in H.R. 1080, it is not possible to accurately tell how much will be applied to prevention strategies. However, it is clear that much of the funding will go to activities that will not directly or indirectly prevent further invasions. The ecological studies and monitoring are examples of programs that may not provide much leverage on the problem. The \$30 million for state management plans is a welcome addition to H.R. 1080. However, we are concerned about where the money will come from and how it will be made available to the states. Funding should not come from current agency budgets that are being used for

the prevention, detection and treatment of invasive plant and animal species, but should be new funding that enhances and provides support for those efforts.

Thank you for providing the Association the opportunity to comment on the legislation. Our member state fish and wildlife agencies stand ready to work with our federal, state and private partners in a cooperative effort to prevent and control the spread of aquatic invasive species.

**The National Environmental Coalition on Invasive Species**

Defenders of Wildlife, Environmental Defense, Great Lakes United, International Center  
for Technology Assessment, National Wildlife Federation, The Nature Conservancy,  
Union of Concerned Scientists

Written comments regarding the March 25, 2004 hearing:

**“Ballast Water Management: New International Standards and National Invasive  
Species Act Reauthorization”**

Before the

**Coast Guard and Maritime Transportation and Water Resources and Environment  
Subcommittees**

Of the

**House Transportation and Infrastructure Committee**

Contact:

Jennifer Nalbone, Great Lakes United  
Phone: 716-886-0142  
Email: [jen@glu.org](mailto:jen@glu.org)

### **About the National Environmental Coalition on Invasive Species**

---

The National Environmental Coalition on Invasive Species (NECIS) was formed to enhance cooperation among non-profit groups working on invasive species. NECIS member organizations have more than six million individual members and supporters combined. As individual organizations, we provide scientific, economic, legal analyses and/or responsible advocacy on the critical issue of invasive species. As a coalition, we work together to promote ecologically sound policies and practices for invasive species prevention, research, control, and eradication.

### **Summary**

---

Invasers are irreparably destroying the environment and our natural heritage, costing an estimated, conservative \$138 billion dollars annually, and eroding the quality of life for citizens across the country. Preventing and controlling the spread of aquatic invasive species is not merely an environmental protection issue; aquatic invasive species must be treated as an immediate priority if the United States is to maintain the multitude of benefits its waters provide its citizens, including benefits that most individuals assume as rights, such as clean drinking water, fishing resources and recreational access.

NECIS comments are provided to help guide an expeditious and effective path forward to prevent aquatic invasive species introductions and control populations already established. Comments are provided regarding the following:

- The benefit of aquatic invasive species prevention and immediate action
- Domestic versus international (IMO) approach to regulating ballast water
- The National Aquatic Invasive Species Act
- Setting ballast water standards
- Effective and environmentally sound treatment technologies
- Funding

### **The Case for Action**

---

The constituency of interests negatively affected by aquatic invasive species is striking in its diversity: anglers, boaters, tourism industries, agriculture, hydropower facilities, municipalities and many others all have all been stung by past invasions. Aquatic invasive species cause a range of impacts, from ecological to economic. For example, aquatic invasive species are the primary cause of biodiversity loss in the Great Lakes, implicated in fish population declines in a fishery valued at over \$4.5 billion dollars. Idaho communities spend a quarter of a million dollars annually to control Eurasian water-milfoil in recreational waters. This fast-growing weed chokes shorelines and destroys habitat.



Ships' ballast water is the number one source for aquatic invasive species introductions into marine ecosystems and the freshwater Great Lakes. Since 1959, the International Association for Great Lakes Research has estimated that 72% of aquatic invaders were transported to the Great Lakes region via ocean-ships' ballast tanks. The best example of damage is that of the zebra mussel, which was brought into the Great Lakes in 1988 through ballast water. What has this diminutive mollusk done? In the first years after it arrived (1989 to 1994), Great Lakes industries and municipalities spent \$120 million to unclog water intake pipes blocked by masses of mussels. The U.S. Fish and Wildlife Service has recently estimated the potential economic cost of this single invader at \$5 billion over the next ten years within the Great Lakes region alone.

When it comes to invasive species, time is our enemy. New invaders are entering our waters through ballast water every year – we will never be certain which species will arrive and how calamitous their impacts will be – but we know they will keep coming if we do not act.

Are we better off being reactive, rather than taking steps to prevent the introduction of species like zebra mussels in the first place? We are not. There is near universal consensus that, when it comes to aquatic invasive species control, an ounce of prevention is worth a pound of cure. Aquatic ecosystems are among the most difficult natural communities in which to detect new invaders. Similarly, control programs will often require expensive and endless efforts. Preventing introductions is far more cost-effective.

A “wait and see” approach is particularly unwise, because there is evidence that the accumulation of invasive species is having unpredictable, negative effects. Each new invader that enters an aquatic ecosystem presents complex individual and synergistic effects as it interacts with both native species and other already-established invaders. For example, Lake Erie botulism outbreaks have killed tens of thousands of fish and waterfowl, and pose a potential threat to human health. These outbreaks may be occurring because birds and fish are feeding on now abundant non-native round gobies (an invasive bottom dwelling fish), which are in turn feeding on non-native zebra and quagga mussels. The non-native mussels concentrate the botulism in their biomass as they filter-feed.

The impacts of aquatic invaders on our economy and environment are clear and the role that ballast water transfer plays in bringing in new invaders is irrefutable. There is no question that action must be taken to curb introductions from commercial ships.

---

#### **Both International and Domestic Action are Needed**

The National Environmental Coalition on Invasive Species applauds the efforts of the International Maritime Organization (IMO) in taking critical first steps in preventing the movement of species in ballast tanks due across the globe. The IMO's ballast convention is a way to strengthen global mechanisms and regulations to prevent the passive transfer of aquatic invasive species via international trade. We thank U.S. negotiators who

worked for many years pursuing strong standards within the IMO ballast convention. We encourage continued U.S. leadership specifically through IMO efforts related to invasive species.

Despite its global importance, the IMO ballast convention cannot stand alone as protection for U.S. waters. Negotiating parties were well aware of this when they built guarantees into the convention to allow participating countries the flexibility set stronger domestic ballast water regulations. The IMO approach to preventing aquatic invasive species transfer is not sufficiently protective for U.S. waters. Inadequacies of the IMO ballast convention include not taking a “whole ship” approach to prevention; the establishment of weak discharge standards; and lengthy timelines for implementation pending ratification. Recalling the IMO convention’s flexibility on national measures, the U.S. should move forward immediately to set more effective and timely domestic ballast water standards than those included in the agreement.

---

#### **Pass The National Aquatic Invasive Species Act**

The National Environmental Coalition on Invasive Species strongly encourages the immediate passage of the National Aquatic Invasive Species Act (NAISA). Provisions contained in NAISA are precisely the domestic actions needed to complement the IMO ballast convention. NAISA does the following:

- Sets more effective and timely domestic ballast water standards
- Provides a more comprehensive approach to aquatic invasive species prevention and control across the country.
- Covers the geographic range and taxonomic diversity meaningful for effective aquatic invasives control.
- Supports monitoring efforts for new invaders; research and rapid response, identification and management of high-risk pathways; and, screening and regulation of potentially invasive imports.

Exemptions provided in NAISA for coastal voyages are warranted to ensure that regulation does not become burdensome on domestic boat traffic and trade that pose minimal risk of spreading invasive species. However, it is important that these exemptions do not extend to high-risk pathways and end up facilitating the spread of invasive species among different aquatic ecosystems. For example, Port Valdez in Prince William Sound, Alaska, receives the third-largest volume of tanker ballast water of all U.S. ports, and about one-half of this water is discharged directly into the Sound. A Smithsonian Institution study found thirteen non-native crustaceans, one fish, and numerous microorganisms already established in the Sound. The study also found that the similarities in temperature and salinity between Port Valdez and common ballast source waters make it likely that many species introduced to the Port through ballast water will survive. Yet, the oil tanker fleet working in Prince William Sound is currently subject to no ballast water management regulations, because existing ballast water management regulation does not apply to vessels operating entirely within the U.S.

Exclusive Economic Zone. Oil tankers are free to take on ballast water in West Coast ports such as San Francisco Bay and Puget Sound, which support large populations of economically and environmentally detrimental invasive species, travel to Prince William Sound and discharge that ballast water directly into Port Valdez. NAISA should be written to prevent the invasions that are occurring and will continue to occur through domestic trade vectors such as this one.

---

#### **Establish Ballast Water Standards**

The environmental community and the shipping industry agree completely on a critical point. The lack of a domestic ballast water standard is a significant impediment to developing ballast water treatments and technologies, for the simple reason that it is hard to achieve a goal if the goal has not been defined.

The National Environmental Coalition on Invasive Species supports the establishment of aggressive, yet achievable interim ballast water standards to encourage technology development. Standards that define the amount of living material, based on size categories, would be aligned with the approach taken by the IMO. Further, establishing domestic size-based categories, such as a 100% kill of organisms larger than 50 microns, is one potential interim standard. We cannot overstate the importance and grave need to rapidly establish effective final ballast water standards that are proven to protect national waters from ballast-mediated invasions. Indeed, after sufficient field monitoring, the 0.1-micron standard, a proposed alternative put forth by the U.S. Coast Guard in its 2003 preliminary environmental impact statement for the proposed regulatory action to establish a ballast water discharge standard, may be shown to be sufficiently stringent as a final ballast water standard.

---

#### **Encourage Effective and Environmentally Sound Treatment Technologies**

Interim and final ballast water standards set goals, but do not define how those goals are reached. Such flexibility is warranted because it encourages development and testing of diverse technological and methodological solutions. However, solutions should be constrained with respect to their environmental impacts. Requirements should be put in place to minimize adverse impacts of ballast water treatment to the structure and function of ecosystems and non-target organisms. Such requirements should include review of proposed treatment approaches by a third party such as the U.S. Environmental Protection Agency.

In particular, any proposed use of biocides must include an examination of the impact of the residual discharge of the biocide itself, as well as the discharge of any by-products of biocide-ballast tank content chemical reactions. As supported by the National Invasive Species Act, non-chemical technologies should be increasingly favored.

**Funding**

---

Federal appropriations have been inadequate and have been delivered in ways that are insufficiently flexible to address America's growing invasive species problem. In particular, more funding should be targeted toward:

- Early detection and monitoring to identify new invasions
- Rapid response capability to control newly detected invasive species
- Prevention efforts to reduce the likelihood of new invasions.
- Research to assess potential impacts of invaders, refine our understanding of pathways, and evaluate control methods
- Enforcement of regulations
- Outreach and education to prevent the spread of aquatic invasive species

We support the constructive use of economic policy tools, such as incentives, to prevent harmful invasions and to control them when they occur. This could include implementation of a fee-based approach, such as has been used successfully in the past to create the Oil Spill Liability Trust Fund.

**Conclusion**

---

The National Environmental Coalition on Invasive Species stresses the need for immediate action – time is not on our side. The threat of aquatic invasive species introductions is growing with the increase of international trade. Aquatic invasive species permanently, and often dramatically, alter the natural resources of the United States and impose continually increasing economic costs. It is imperative that we stop as many of these invaders as possible, as soon we can.

It is a tremendous responsibility and challenge to maintain the integrity of our country's resources. Your leadership on this issue will be critical in determining whether we rise to meet this challenge or fall, to the disappointment of future generations living under a sea of invasive species.



Statement Before the

U.S. House of Representatives

**Committee on Transportation & Infrastructure  
Subcommittee on Coast Guard & Maritime Transportation  
&  
Subcommittee on Water Resources & Environment**

Hearings on Aquatic Nuisance Species and H.R. 1080  
March 25, 2004

**I. The Availability of Effective Ballast Water Treatment Technology**

The Transportation & Infrastructure Committee is now considering passage of H.R. 1080, the National Aquatic Invasive Species Act. The Senate is considering this legislation and the International Maritime Organization's Ballast Water Treaty which also mandates the treatment of ballast water. Both Houses are trying to determine whether to substitute provisions of the IMO Treaty for parallel provisions of the NAIS legislation.

Consideration of both the NAIS bill, and the IMO Treaty, have been difficult because of the belief that there was no an scientifically verified solution for the invasive species problem that would enable ship owners to meet the ballast water treatment requirements contemplated by H.R. 1080, by the IMO Treaty or by pending U.S. Coast Guard regulations.

Nutech 03 has worked closely with British Petroleum, since 1998, to develop ozone injection technology that treats contaminated ballast water and kills all of the unwanted invasive species found in the ballast tanks of all ships that sail on the high seas. Nutech's equipment has been tested on the BP oil tanker *Tonsina*, a 135,000 Dead Weight Ton vessel that carries 12 million gallons of ballast water while transporting Trans Alaska Pipeline oil from Valdez, Alaska to refineries in Seattle, Washington and Long Beach, California.

*As a result of this close working relationship with British Petroleum, during the past five years, a solution to the invasive species problem has been developed. Ozone provides a scientifically effective, and economically affordable, remedy for this environmental problem. Injecting ozone into ballast water is a completely effective means of killing invasive species. Advances in ozone generator technology, during the past five years, make it possible to reliably produce quantities of ozone sufficient to treat ballast water on ships of any size.*

When initial development and testing began, in 1998, the first series of tests were conducted to determine if ballast water that had been treated with ozone would damage the hull of a ship. Tests conducted at the LaQue Corrosion Institute, in Wrightsville Beach, North Carolina demonstrated that ozonated water would not damage a ship's hull.

Nutech's ozone generating equipment was then installed on the Tonsina in the Summer of 2000 and it has undergone extensive, at-sea, testing since that time. Parallel laboratory testing has continued at the Merristone Testing Facility at the University of Washington. Both the ship board and laboratory tests have been conducted by an independent scientific and engineering team including world renowned research scientists from the Smithsonian Institution's Environmental Research Center, the U.S. Fish & Wildlife Service, the University of North Carolina, the University of Washington, Western Washington University and Northeast Technical Services of Olmsted Falls, Ohio. Copies of the Report, and its Executive Summary, are available from Nutech O3.

The ballast water task force Research Report, issued in June 2002, demonstrated that ozone injected into ballast water is an exceptionally effective means of killing invasive species *without harming the quality of the water into which the treated ballast water is discharged*. The Nutech Mark II System injected 1,800 grams of ozone, per hour, into the Tonsina's ballast water tanks through a series special ceramic diffusers attached to a distribution system of 21,000 feet of stainless steel pipes that traversed the length, width and height of the Tonsina.

As part of a cooperative testing project funded by the National Oceanic & Atmospheric Administration Nutech will test its new Mark III single point distribution system which uses venturies in place of the steel pipe distribution system. This System will be tested on additional civilian cargo freighters. Venturies inject the ozone directly into the ballast water intake pipe eliminating the need for piping the entire vessel. *This new distribution technology will reduce the cost of the overall ozone treatment technology by approximately 67 percent because it reduces the quantity of costly stainless steel pipe by 99 percent.* This will also improve the process' effectiveness because the ozone will be will be evenly distributed to all of the ship's ballast water as it is taken on board.

*The final stage testing is scheduled to begin late in 2004 or early 2005. It will be completed approximately a year from now, well before the contemplated January 1, 2006 implementation date used in H.R. 1080.* During the past 4 years of testing on the T/V Tonsina, ozone injection has been conclusively proven to be the most effective available means of killing dangerous aquatic nuisance species of all sizes and biological classifications.

The current approach of the National Aquatic Invasive Species Act is, generally, far more effective in solving the invasive species problem than is the approach of the IMO Treaty. We urge, if a choice is to be made between these two approaches to solving the problem, that the House retain H.R. 1080's current language, add the following suggested amendments and, with one exception, *not* substitute the Treaty's provisions for those now in the bill.

## II. Recommended Changes to the National Aquatic Invasive Species Act

The current language of H.R. 1080 and the IMO Treaty differ in several key respects. In many instances, the House language is preferable to the comparable IMO Treaty provisions. In one instance, the establishment of treatment technology performance standards, the IMO approach is preferable. In establishing a pilot testing program for experimental technologies, we recommend that the Coast Guard's Shipboard Engineering Test program (STEP Program) be expanded and used, in place of either H.R. 1080's approach or the even more restrictive IMO Treat technology testing program.

Therefore, we recommend that the Committee amend H.R. 1080, as follows:

- a. **H.R. 1080 requires that ships built after 2006 must have ballast water treatment equipment on board. The Treaty will not require the use of such equipment until 2009, at the earliest and, in some cases, not until 2016.**

**We recommend that, since a solution is now available, the earliest possible compliance date, i.e. H.R. 1080's January 1, 2006 date, should be used.**

**Moreover, early compliance incentives should be offered to ship owners who install approved technologies prior to the initial statutory compliance date.**

Concerns have been expressed that final at sea testing of ozone injection technology will not be completed until the Spring of 2005 and that this may not provide sufficient time for Coast Guard evaluation, and industry implementation, of this technology. Our suggestion is that the 2006 implementation date be retained with the industry given additional time to bring covered vessels into compliance, for example, until 2007. This will enable ship owners to begin planning and scheduling immediately and enable those ship owners who are willing to do so to come into compliance at an earlier date. As an incentive to do so, owners installing approved technology in advance of the final compliance date should be guaranteed that they will not have to upgrade that equipment, for the life of the ship, so long as it still meets its original certification performance standard.

- b. **The IMO Treaty uses a series of performance standards involving the removal of specified numbers of microbes from varying quantities of ballast water after treatment. The NAIS bill uses an interim percentage reduction standard.**

**We suggest using a microbes per unit of ballast water standard.**

We urge that this approach be incorporated into H.R. 1080. The overall Treaty provision makes far more scientific sense than do the interim percentage reduction requirements of H.R. 1080. Using a percentage reduction standard will still result in massive numbers of invasive species being discharged into U.S. waters even from ships that fully comply with that treatment standard. The IMO approach is substantially preferable and it ought to be incorporated into the bill.

- c. **H.R. 1080's treatment standard should mandate the removal of microscopic organisms as small as 1 or 2 microns in size. This standard should be retained.**

**We do not agree that treatment standard should be limited to removing fish and shell fish larvae no smaller than 50 microns.**

Nutech's ozone injection technology removes bacteria and viruses as small as 1 to 2 microns in size. Other technology vendors have reportedly attained similar results. That being the case, *there is no valid scientific or technology based reason for only requiring the removal of large shrimp, shell fish and similar sized larvae from contaminated ballast water.* Some of the greatest dangers to public health, and to local water supplies, such as outbreaks of cholera, are caused by invasive species substantially smaller than 50 microns in size. Technology exists now that will eliminate this danger and there is no valid reason not to mandate its use by ship owners as soon as the NAIS bill requires that they do so.

- d. **H.R. 1080 requires that all U.S. Navy ships comply with the bill's ballast water treatment requirements. The IMO Treaty unnecessarily exempts all naval ships from its treatment requirements.**

**We urge that Navy cargo ships be required to comply with the ballast water treatment requirements of H.R. 1080.**

We urge that the provision of the bill that includes the Navy in H.R. 1080's treatment requirements be retained. The Navy owns approximately two-thirds of its Sealift Command ships. The balance are either long term charters or spot market rentals. All of the commercially owned vessels will be required to comply with the Act's ballast water treatment regulations. The Navy's tanker and cargo fleet compete with those privately owned ships. There is no logical reason why the private sector ships should be placed at a regulatory disadvantage vis a vis the Navy's cargo ships that are doing the identical work.

Second, since most types of ballast water treatment equipment will represent less than one-quarter of one percent of the cost of building a typical Navy cargo ship (most combat vessels do not carry ballast water in any significant quantity) there is no sound economic reason to exempt the Navy and there are many valid environmental protection reasons to include it.

- e. **The NAIS bill contains a pilot testing/grandfather provision that allows for a reasonably large number of ships to participate. Ships having approved equipment in use as part of the program would be exempt from subsequent, more stringent regulations for up to 10 years (STEP Program). The Coast Guard's Navigation & Inspection Circular (NVIC) program grandfathers such equipment for the life of the ship or the equipment, whichever came first. The IMO Treaty only allows for a 5 year exemption of ships.**

**We urge that the Coast Guard's lifetime STEP Program be expanded and incorporated in H.R. 1080.**



First, we urge that the far more restrictive experimental testing provisions of the IMO Treaty be rejected. The IMO Treaty provisions will seriously discourage ship owners from testing new technology. They will remove most of the incentives that the NVIC creates for ship owners to install this equipment before the dates mandated by H.R. 1080.

We recommend that H.R. 1080 be amended to incorporate the provisions of the Coast Guard's Shipboard Engineering Testing Program (STEP) contained in its Navigational & Vehicle Inspection Circular (NVIC 1-04), issued in January 2004. However, we also urge that the STEP program be expanded so that as many ships and owners, as possible, are able to participate in it. The fastest means of persuading ship owners to start treating ballast water prior to the mandatory date of the NAIS bill (or of the IMO Treaty) is to provide incentives for them to do so. The STEP Program is an excellent incentive. There should be far fewer restrictions on the number of ships that may participate in it. A ship owner should be allowed to have at least as many as 15 or 20 ships, using the same or differing technologies, in the program. A ship owner should be allowed to file a single application, covering multiple ships, that will use the same technology

- f. **The Coast Guard's STEP Program, and its ballast water treatment certification program, require adequate funding. Without substantial new funding, there will be no ballast water treatment technology testing program, let alone a functioning enforcement program.**

We urge that H.R. 1080 authorize the Coast Guard to spend up to \$100 million to implement the NVIC program. The Coast Guard NVIC stated that it may not be able to fully implement the its pilot testing program due to inadequate funding. Additional funding is needed to pay for the construction of additional testing facilities and the hiring of engineering personnel to staff it. It is our understanding that these facilities will also be required to implement the testing and certification of ballast water treatment equipment the use of which is mandated by H.R. 1080. Mindful of budgetary concerns, it may be appropriate to consider decreasing the \$400 million in funding for additional research and development, as is contemplated in H.R. 1081, and to use a portion of those funds to pay for the Coast Guard's STEP Program and for its the ballast water treatment technology certification program.

\* \* \*

If additional information is required, please contact Joel C. Mandelman, Vice President & General Counsel, Nutech 03, Inc. at 2540 South Walter Reed Drive, Suite D, Arlington, Virginia 22206 or at 703 288 4694.

Scientists and engineers from the Ballast Water Task Force may also be contacted. Richard Mueller, the Chief Project Engineer, may be reached at NETSCo, at 216 533 1114. Dr. William Cooper may be contacted at the University of North Carolina, Wilmington, N.C. His telephone number is 910 962 2387.

TESTIMONY OF

TOM SHERMAN, PRESIDENT OF AQUACIDE LLC

HOUSE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE  
SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT  
SUBCOMMITTEE ON COAST GUARD AND MARITIME  
TRANSPORTATION  
MARCH 25, 2004

BALLAST WATER MANAGEMENT: NEW INTERNATIONAL  
STANDARDS  
AND  
NATIONAL INVASIVE SPECIES ACT REAUTHORIZATION

Good morning, and thank you for the opportunity to present Aquacide's views on ballast water management.

Aquacide is a ballast water engineering firm consisting of engineers and scientists with expertise in thermodynamics, fluid/gas handling, metallurgy, marine biology, naval architecture, marine engineering, biochemistry, toxicity, waste water treatment, marine law, patents and licensing. We have been involved in the invasive species problem for more than a decade, and participated in the preparation of the National Invasive Species Act of 1996.

Unless this Committee provides the spark to get Congress moving, this hearing, and the preceding IMO meeting in London will be just another set of markers in a decades long process. Hopefully, you will take action that will actually begin to stem the tide.

Since 1990 and Congress's enactment of the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA), scientists have been driving the Invasive Species train. This has resulted in the accumulation of an abundance of much needed threat data, but beyond that, little has been accomplished. The website of the National Invasive Species Council lists hundreds of databases. Other than a passing reference to Ballast Water Exchange, they are all devoted to the threat. Other databases, many of which are more extensive and include foreign sources, are similarly oriented. It is clear that, at present, the system is problem oriented.

There is a saying among engineers: "Engineers make things happen." It is time to put the mission of stemming the tide into the hands of the engineers and make it happen.

It is time to make the transition from problem orientation to solution orientation.

First, I will address the IMO Convention. It is, indeed, a useful first step in what, like ours, has been a painfully slow process. It has some useful aspects but many shortcomings. As the formal Statement by the U.S. Delegation to the Conference noted, the standards are so weak that they would do little to stem the invasion, and being so meaningless, would not " -- provide a meaningful incentive for the development of more effective treatment technologies." In addition, we believe, as do other witnesses today, that the timeline is much too slow.

Other points have been made today that invite specific attention. One is the issue of allowing an international treaty to govern what are, essentially, inland waters, namely, the Great Lakes. Another issue is the distinct possibility of an international treaty having a dysfunctional impact on our own efforts to regulate ballast discharge in our own waters. We believe that Congress must set the priorities here, and as we see it, the first priority must be to protect the waters of the United States, not those of, say, Liberia.

On balance, we recommend rejection of the Convention as presently written.

Which brings us to the National Invasive Species Act (NISA). Earlier witnesses have made points that I, too, will address. First, we agree that these regulations should govern the transfer and discharge of ballast between U.S. ports, as well as from overseas. I do not believe that Congress intends for ballast from, for example, Mobile Bay, with its unique biological and pathogenic structure, to be discharged into the waters of, say, Norfolk, with its own characteristics. This must be made clear in the regulations.

Of major importance to all concerned, but especially to the shippers, are clearly stated standards measured by agreed-to measurement protocols that, from the Regulators' point of view, are simple to administer. One approach is size (so many microns), and there are other commonly used biological measures, (which we favor), such as Biochemical Oxygen Demand (BOD) and Oxygen Uptake Rate (OUR). These biological measures are used in the field by such agencies as the EPA. The concern is the discharge of living organisms, so it seems logical to measure life rather than size. While Aquacide's pasteurization process makes it essentially indifferent to size alone, including small pathogens such as cholera, we believe that this distinction is important.

These measures should not be stated in terms subject to interpretation, like "as clean as drinking water." There are many legitimate definitions of drinking water. Also, they should not be contingent on future activity, using terms like "to be determined."

Without clearly stated standards, the ship owners cannot tell the engineers specifically what is needed, and with the costs associated with treatment, they cannot afford to be wrong.

In addition, and this issue has bedeviled legislators for quite awhile, and that is the issue of a National standard preempting State standards. Scientists will be quick to point out that San Francisco Bay has ecological problems far different from, say, Seattle. There are many other similar examples. The IMO Convention provides for differing National standards, so there is a precedent.

In the interests of full disclosure, I should point out here that Aquacide's proven thermal pasteurization technology can accommodate any known standard. The ship's Master merely selects the thermal settings to comply with the standards of his next port.

Having said that, however, we believe that there should be a single National standard. It should be demanding but achievable, using existing technology. The Interagency position tabled at the IMO conference would be appropriate. It should be an Interim Standard, and I will address Interims later.

We support a single National standard because it will elicit wider support for the Act, in that shippers shouldn't have to contend with different treatment requirements. Second, if ports set their own standards, it could initially restrict treatment technology to one, namely thermal. As far as we know, no other technology has the flexibility mentioned earlier. Since the Government rightfully advocates the development of new technology, it would be inconsistent

to set a policy that discourages these efforts. And in the long run, a stronger program will benefit all, including Aquacide.

As to who should pay for enforcement of the regulations that result from this Act, we note that there have been discussions of user fees. We like this idea but it may not be appropriate for national purposes. The Federal grant provisions of the Maritime Transportation Security Act of 2002 might provide useful precedents. In any event, we strongly recommend that resources adequate to the need be provided. The thousands of tons of unregulated ballast water being discharged into our waters every day costs our economy hundreds of billions of dollars each year, and the pathogenic impact on health is immeasurable. While the costs to shippers of treatment would amount to billions of dollars, a recent Coast Guard cost-benefit analysis of treatment costs vs. benefits to society strongly favored treatment.

It is a given that there is an abundance of scientific data on hand addressing the threat. It is also a given that scientists cannot agree on a set of standards that will begin to stem the tide. "More study is required," etc. There are too many uncertainties. The weak standards agreed to by the IMO were a compromise driven by the lowest common denominator. Another given is that Ballast Water Exchange (BWE) is no longer acceptable. Finally, we can take as a given that we should begin the process using interim standards.

With this in mind, I will lay out a course of action we believe that Congress should take now. If it really means business, this Congress will legislate demanding Interim Standards that require treatment leading to Zero Discharge. By necessity, they must be set arbitrarily because as stated earlier, there is no scientific agreement as to what the standards should be. The Coast Guard would normally define the standards, but if there is reluctance on its part to do so, then Congress must take the action. As mentioned earlier, Congress could use those tabled by the U.S. at the IMO conference.

And again, if Congress really means business here, it will mandate a demanding timeline. Proven treatment technology is available, and even with the most aggressive schedule, it will be years before this technology becomes widely operational. Proper "grandfathering," must be included to protect the shippers' substantial investments.

With Interims and a demanding schedule, the incentives will be in place. The system will be motivated and the engineers will begin to make things happen. As ships begin to operate using the best in treatment technology, lessons will be learned that may lead to follow-on Interims. The data derived from the treatment itself will help resolve the earlier scientific uncertainties. Further, treatment technology will be improved and new threats will probably be identified. It is conceivable that concerns about bioterrorism could lead to new standards.

If this Committee can move this Bill higher on the Congressional agenda, not only will you have the opportunity to stem the tide of economic damage to the country, you will also have the golden opportunity to show the public your concern for the environment.

Hopefully, this Committee and this Congress are solution oriented and will make things happen that begin, finally, to Stem the Tide.

This concludes my remarks, and again, I appreciate the opportunity to present them.

Statement by  
**The Honorable Dennis Schornack**  
**U.S. Section Chair, International Joint Commission**  
**Coast Guard and Maritime Transportation Subcommittee**  
**Water Resources and Environment Subcommittee**  
Ballast Water Management: New International Standards and National Invasive Species Act Reauthorization  
**Thursday, March 25, 2004**

**“Put the Great Lakes First”**

The International Joint Commission (IJC) appreciates the opportunity to offer our views on how best to protect the Great Lakes basin ecosystem and other ecosystems across the nation from the threat of alien invasive species in ballast water. By stopping (or at least dramatically reducing) the ballast-water mediated transfer of aquatic invasive species, we can take a huge step forward in thwarting one of the top threats to aquatic biodiversity.

I am Dennis Schornack, chair of the U.S. section of the IJC. I also represent the views of the Right Honorable Herb Gray, chair of the Canadian section because the IJC is a binational treaty organization that operates under terms of the Boundary Water Treaty of 1909. Our mission is to prevent and resolve disputes between the U.S. and Canada with respect to our shared boundary waters. In addition, under the Great Lakes Water Quality Agreement, the United States and Canada have assigned the role to the IJC to both assess the progress of the nations in Great Lakes restoration and to assist them in efforts to achieve the goal of restoring the chemical, physical and biological integrity of the waters of the Great Lakes basin ecosystem.

The IJC has spent more than 15 years making the U.S. and Canada aware of its concerns regarding the impacts of alien invasive species on the Great Lakes. In 1988, the IJC and the Great Lakes Fishery Commission (GLFC) first alerted the governments to the threat posed by the newly discovered zebra mussel that had arrived in the Great Lakes via ballast water from foreign ships. In 1990, the IJC and the GLFC issued a major report with recommendations for the governments on how best to respond to the threat of aquatic invasive species in ballast water. Now, after 15 years and expenditures of at least \$3 billion in control costs for the zebra mussel alone, the threat to both our ecology and economy is even greater than it was then.

Scientists tell us that ballast water mediated transfers of invasive species into the Great Lakes by foreign shipping are the source of tremendous ecological and economic damage, threatening the sustainability of this ecosystem. While ballast water mediated species transfers affect every port in North America, we wish to draw specific attention to protecting the Great Lakes.

The day is close at hand when the tally of non-native species in the Great Lakes will total 200 invaders. 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.

Scientists say that a new invader is being discovered roughly every eight months. Over the last two decades, virtually all of these species have arrived in the Great Lakes by way of

ballast water discharged by foreign ships when they take on cargo. And the majority of the species that have become established in the lakes were native to the Ponto-Caspian Basin of Eurasia, including the zebra and quagga mussels, spiny and fishhook waterfleas and tubenose and roundnose gobies. These invaders traveled via rivers and canals from the Ponto-Caspian to the Baltic Sea where they became established, then after hitching a ride in ballast water, became established in the Great Lakes.

What greatly concerns the IJC is that researchers are telling us is that perhaps 15 more invertebrate and fish species in the Ponto-Caspian region have the special traits to hopscotch their way from there to the Baltic to the Great Lakes where they can thrive at the expense of native species. The uncertainty of how much damage these new species might wreak upon the ecology and economies of the Great Lakes should drive us to action.

One example strikes very close to home to ten members of these two subcommittees from the states of Michigan, Ohio, Pennsylvania and New York – states that all border Lake Erie.

The near-death of Lake Erie more than 30 years ago (June, 1969) was the crisis that triggered a ban on phosphate detergents and multi-billion dollar investments in wastewater treatment improvements. It was a costly lesson, but the Lake Erie ecosystem bounced back.

But now, many scientists believe that Lake Erie is in mortal peril once again. Due to complex ecological changes exacerbated by alien invaders such as zebra and quagga mussels that wreak havoc on the lake ecosystem, threaten native species, disrupt the food web, and change critical processes that maintain a stable, healthy lake, Lake Erie is again in decline. In addition, interactions between invaders appear to be linked the steep rise in avian botulism that has killed thousands of gulls, loons, and other fish-eating birds.

That's why the Commission believes that invasive species are the most pressing problem threatening the Great Lakes. This is a borderless crisis for the Great Lakes. This committee, this Congress and this country should act and it should act now.

Canada should act as well. In that regard, I should note that they are working in earnest to have an action-oriented plan in place by the end of the year that meshes well with the objectives of NAISA for the Great Lakes as well as the two coasts we share.

Granted, there are similar problems and concerns in San Francisco Bay and other ports nationwide, but I am here with a simple message – put the Great Lakes first. Let me tell you why the Commission believes this so strongly.

First and foremost, the lakes are the single most valuable freshwater resource on the planet, providing drinking water for 30 million people and sustaining the economy of North America's industrial heartland. The Great Lakes constitute a single ecosystem shared by two countries, with a single entrance. Compared to the rest of the country or the world, the shipping situation in the Great Lakes has clear boundaries and limited variables. There are a handful of ports of origin and destination. And the number of ships, ship designs, shippers, customers and cargos is limited and could be more easily managed.

Virtually all foreign ocean-going ships bound for Great Lakes ports share the common feature of coming from a freshwater port of origin across a cold ocean to a freshwater port of destination. All must enter the Great Lakes through a single gateway – Massena, New York and Cornwall, Ontario. It is at that gate that the United States and Canada can take a stand and stop this invasion, and the IJC stands ready to help.

The first step is developing a ballast water discharge standard, and that's a key feature of the pending National Aquatic Invasive Species Act of 2003 (NAISA). In our view, any standard must be effective and enforceable. The standard must be clear, unambiguous and not open to interpretation. It must be biologically protective. And to be enforceable, compliance must be checked quickly with easy to implement methods of sampling and analysis.

The U.S. Coast Guard followed these principles in developing the standard supported by both the United States and Canada at the International Maritime Organization diplomatic conference in London last month. U.S. Coast Guard scientists can better describe the details of the standard to this committee. The U.S.-Canada standard was not completely incorporated into the February 16<sup>th</sup> IMO Convention, but it set the bar, and sent the signal that North America was serious and that the two guardians of the Great Lakes were in agreement.

That's the good news. Unfortunately, the bad news is that we don't know when the IMO Convention agreed to at the diplomatic conference will be ratified, and even if it were to be ratified today, it could take almost a decade, or even longer, for the standard to take effect. In the meantime, we can't run the risk of another species as destructive as the zebra mussel arriving in the Great Lakes. The economic and ecologic risk is just too great.

Fortunately, Article 2 of the IMO Convention also allows party states to take more stringent measures to protect critical ecosystems and to take them sooner. Both the U.S. and Canadian delegations fought for this provision and they should be commended for winning that fight.

Therefore, the IJC's advice with respect to a ballast water discharge standard is simple: Take the U.S.-Canadian standard and put it in this bill and pass it – now.

And while you are at it, allow for regions that are ready to speed up the timeline. Let the Great Lakes put implementation on a fast track!

In addition, Article 9 of the convention allows party states to sample ballast water to monitor compliance to ensure that the standard is met. That means any legislation must also include an enforcement mechanism that includes sampling.

Another key feature of the convention of great interest to the Great Lakes and to the IJC is Article 13, concerning regional cooperation, where it states:

“Parties with common interests to protect the environment, human health, property and resources in a given geographical area, ... shall endeavor, taking into account characteristic regional features, to enhance regional cooperation...”

What better place to begin that cooperative effort than in the Great Lakes – two nations, one ecosystem, with one entrance and the groundwork already prepared for a binational solution that slams shut the door to invasions.

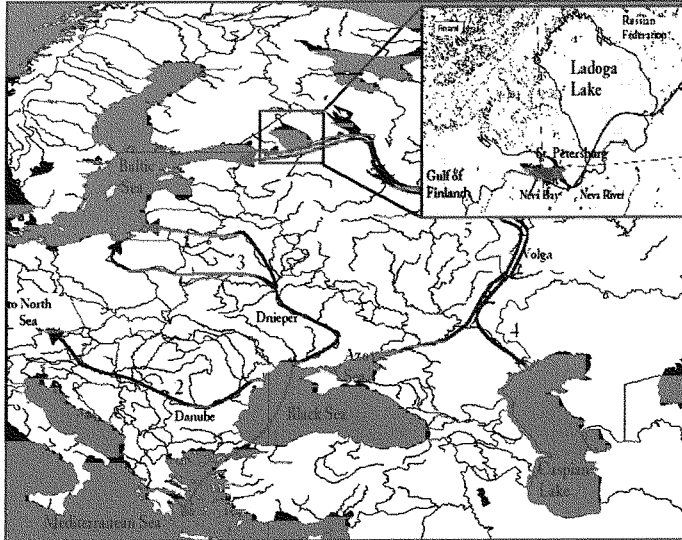
In this regard, the pending NAISA legislation provides for a reference to the IJC asking us to recommend ways to harmonize policies, rules, procedures and regulations in both countries to protect the shared waters of the Great Lakes.

Through this reference, the IJC could recommend to the governments of the U.S. and Canada how and when the ballast water discharge standard should be applied and enforced for foreign ships entering the Great Lakes.

In the Great Lakes, we have the scientific knowledge, the unique and limited set of circumstances, and most importantly, the will to work together to get this done. We are prepared to move forward, perhaps even ahead of the rest of the nation.

Discussions regarding this reference have reached the highest levels of government on both sides of the border. After all, aquatic invaders don't recognize dotted lines on the map. That means policy makers in both countries must reach across those lines to fight back. And it means that this Congress can take the first steps to put the Great Lakes first by incorporating the U.S.-Canadian standard and the IJC reference into legislation and passing it as soon as possible.





Proposed invasion corridors for the transfer of Ponto-Caspian taxa to the Laurentian Great Lakes. Corridors are considered routes and associated mechanisms that facilitate long-distance dispersal of different life stages of an array of species. A direct corridor may transfer taxa from Black and Azov sea estuaries or adjacent rivers (route 1). Four indirect corridors may facilitate the transfer of species to the Great Lakes only as secondary invasions from other waterways in Europe. These include: a corridor between the Danube River–Main Canal–RiverRhine network (MC; see text for details) (route 2); the Black Sea via the Dnieper River–Pripiat River–Dnieper–Bug Canal–either the Nemunas or Vistula Rivers to the Baltic Sea (route 3); Caspian Sea through the Volga River system, Volga-Baltic Canal, to the Baltic Sea (route 4); or Black and Azov Seas–Don River–Volga–Don Canal–Volga River and Volga-Baltic Canal, to the Baltic Sea (route 5). Canals are indicated as hatch marks on lines connecting major rivers. DBC = Dnieper–Bug Canal, a major link between Black Sea (Dnieper, Pripiat rivers) and Baltic Sea (Vistula, Bug Rivers) basins that has facilitated the transfer of Ponto-Caspian species into central and western Europe. Route numbers are identified on the map. Modified from Jażdżewski (1980).

MacIsaac, H.J., I.A. Grigorovich, and A. Ricciardi. Reassessment of species invasions concepts: the Great Lakes basin as a model. *Biological Invasions* 3: 405–416, 2001.

Statement Before the  
**U.S. House of Representatives**  
**Committee on Transportation & Infrastructure**  
**Subcommittee on Coast Guard & Maritime Transportation**  
**&**  
**Subcommittee on Water Resources & Environment**  
  
Hearings on Aquatic Nuisance Species and H.R. 1080  
March 25, 2004

**Dr. Russell Herwig, Ph.D.**  
Research Associate Professor  
School of Aquatic & Fishery Sciences  
University of Washington  
Seattle, Washington

**Jeffery R. Cordell**  
Principal Research Scientist  
School of Aquatic & Fishery Sciences  
University of Washington  
Seattle, Washington

**Jake C. Perrins**  
Research Scientist  
School of Aquatic & Fishery Sciences  
University of Washington  
Seattle, Washington

#### California Testing of Ozone as a Ballast Water Treatment on Board the *S/T Tonsina*

Previous testing on board the *S/T Tonsina* in the Puget Sound had the primary goal of conducting field scale tests of the ozone system and to determining the system's ability to remove a wide range of coastal marine organisms. The analysis of the Puget Sound data has shown ozone to be effective with increased removal of bacteria, phytoplankton, and zooplankton than that of ballast water exchange. These initial tests were to determine the efficacy of ozone but did not consider a minimal dose of ozone for similar results in the removal of bacteria, phytoplankton, and zooplankton. The general conclusions from the Puget Sound testing also suggest an increased sampling period, post treatment, to determine residual effects after the initial ozonation period.

Two additional ballast treatment studies have been performed on board the *S/T Tonsina* while at berth in California. The goals of these trials was: 1) to determine if ozone was as effective in another environment as the Puget Sound study, 2) to determine if a reduced concentration of ozone and its by-products would have a similar effect on coastal marine organisms as shown by the first trials, and 3) to increase the field study period to assess the residual effects of ozone and its by-products.

The first ballast treatment study was performed in Long Beach, California where we were able to determine that a reduced ozone dose with a total residual oxidant (TRO) levels of 3.00 and 3.95 mg/L resulted in a 99.9% removal of bacteria, and a relative >80% and >95% reduction in zooplankton. No residual testing was accomplished for this trial.

The second ballast treatment study was performed in San Francisco, California where we attempted a longer study period to assess the residual effects of ozone and its by-products. This test was to also determine minimal ozonation dose that could be replicable by the prototype venturi system design. It was decided that the ozone dose should be comparable to the Total Residual Oxidant (TRO) level of 1.50 mg/L. The testing had shown bacterial reduction of 99.9%, and a relative > 85% reduction in zooplankton during the ozonation but a rebound of both taxa types occurring within the next 24-hours of residual sampling.

## Methods and Results

### Sampling Times

Sample times were recorded before every sampling point. Each sampling location required an estimated ten minutes for each depth. For this report, only the initial time point at which the sample period began has been documented with these results. There were a total of four time points, an initial (T-0.0) period prior to ozonation of the ballast water, two intermediate periods (T-2.5, T-5.0) while ozonation occurred, and a final period (T-10.0) at the conclusion of ozonation.

Figure 1: Initial sampling time points

Sampling Times			
T-0.0	T-2.5	T-5.0	T-10.0
06:00	09:30	12:00	17:00

The sampling period of T-2.5 was initiated one-hour later than expected to allow for an increased ozone period. The ozone generator initially distributed ozone to other ballast tank sections that were not tested, and the distribution to the test area was not at optimum efficiency until 9:00 am.

### Initial Chemical Analysis

Initial chemical analysis of the ballast water was sampled at time point T-0, and included pH, salinity, nutrients, and dissolved organic carbon analysis. Previous tests in the Puget Sound determined that the pH and salinity of the ballast water remain stable during the ozonation process, and were not tested after the initial time period. All chemical analysis were performed by the same methods as the Puget Sound trials.

Figure 2: Results of the pH and salinity in the #4 port (A and B) and starboard (C and D) ballast tanks.

Location	pH	Salinity (PSU)
A-15	7.89	32.9
A-30	7.93	32.9
A-50	7.97	33.0
B-15	7.94	32.9
B-30	7.94	32.9
B-50	7.95	33.0
C-15	7.92	32.9
C-30	7.93	32.9
C-50	7.94	32.9
D-15	7.95	32.9
D-30	7.94	32.9
D-50	7.94	32.9

Figure 3: Results of dissolved organic carbon (DOC), ortho-phosphate ion ( $\text{PO}_4^{3-}$ ), nitrate ion ( $\text{NO}_3^-$ ), nitrite ion ( $\text{NO}_2^-$ ), ammonium ( $\text{NH}_3$ ), and silicate ( $\text{SiO}_4$ ) in the #4 port (A and B) and starboard (C and D) ballast tanks.

Calculated Values (mg/L)						
Location	DOC	Phosphate	Nitrate	Nitrite	Ammonia	Silicate
A15	1.197	0.0257	0.039	0.0049	0.0441	0.411
A30	0.855	0.0276	0.040	0.0048	0.0465	0.381
A50	1.070	0.0253	0.036	0.0046	0.0549	0.598
B15	0.965	0.0291	0.042	0.0048	0.0399	0.392
B30	1.014	0.0253	0.040	0.0048	0.0395	0.397
B50	1.106	0.0888	0.394	0.0028	0.0090	1.627
C15	0.918	0.1800	0.043	0.0046	0.0411	0.388
C30	0.877	0.0474	0.039	0.0047	0.0442	0.356
C50	0.865	0.0335	0.036	0.0046	0.0406	0.541
D15	1.077	0.0272	0.042	0.0048	0.0435	0.366
D30	0.843	0.0302	0.041	0.0049	0.0431	0.349
D50	0.892	0.0268	0.039	0.0047	0.0410	0.342

#### Total Residual Oxidant Analysis

The ballast water was measured for Total Residual Oxidant (TRO) at every location and time point. The same standard DPD colorimetric method was used as the Puget Sound trials, but the analysis did not involve the use of Accu-vac vacuum reaction containers. The sample was instead prepared by adding the DPD chemicals to a 10mL. The analysis was performed with the same Hach<sup>®</sup> spectrophotometer as the Puget Sound trials.

Figure 4: TRO (mg/L as  $\text{Br}_2$ ) analysis of the #4 port (A and B) and starboard (C and D) ballast tanks.

Location	T-0.0	T-2.5	T-5.0	T-10.0
A-15	0.04	0.15	0.64	3.04
A-30	0.04	0.16	0.81	2.97
A-50	0.03	0.09	0.89	2.48
B-15	0.03	0.33	1.92	3.89
B-30	0.02	0.62	1.64	3.93
B-50	0.03	0.17	1.57	3.98
C-15	0.07	0.06	0.05	0.06
C-30	0.05	0.04	0.03	0.05
C-50	0.03	0.05	0.03	0.05
D-15	0.05	0.04	0.03	0.04
D-30	0.04	0.05	0.04	0.05
D-50	0.03	0.05	0.03	0.04

### Bromoform Analysis

The ballast water was measured for bromoform, a final by-product of ozonation, with every sampling period. From the previous Puget Sound results, bromoform sampling was limited to one depth (30 ft) for each of the starboard control columns, and all depths for the experimental columns on the port side. The samples were collected in an amber 40mL VOA vial that had two crystals of the reductant sodium thiosulfate for fixation purposes.

Figure 5: Bromoform ( $\mu\text{g/L}$ ) analysis of the #4 port (A and B) and starboard (C and D) ballast tanks.

Location	T-0.0	T-2.5	T-5.0	T-10.0
A-15	No Data	<5.0	No Data	44.3
A-30	<5.0	<5.0	20.3	13.7
A-50	No Data	<5.0	<5.0	42.3
B-15	No Data	7.5	No Data	39.0
B-30	<5.0	<5.0	29.8**	8.0
B-50	No Data	<5.0	7.5	49.6**
C-30	<5.0	<5.0	8.2	<5.0
D-30	<5.0	<5.0	<5.0	<5.0

\*\* surrogate spikes were less than 70% for these analyses

### Bacterial Analysis

Heterotrophic plate counts were performed for every sample period by the same methods used in the previous Puget Sound trials. Additional samples were collected in sterile 50mL conical vials and preserved with 1.0% formaldehyde for epifluorescent microscopic and Flow Cytometry Method (FCM) analysis of the bacterial population (data not shown).

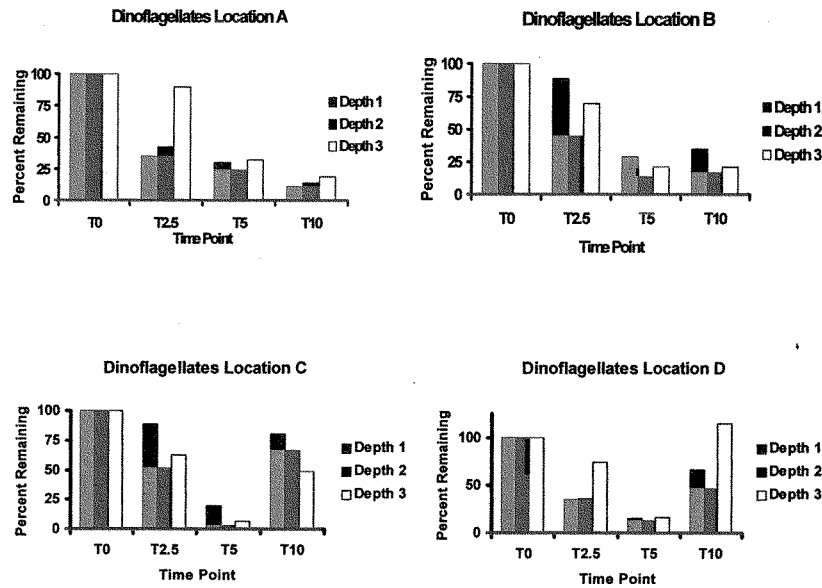
Figure 6: Enumerations of culturable heterotrophic bacteria (CFU/L) of the #4 port (A and B) and starboard (C and D) ballast tanks.

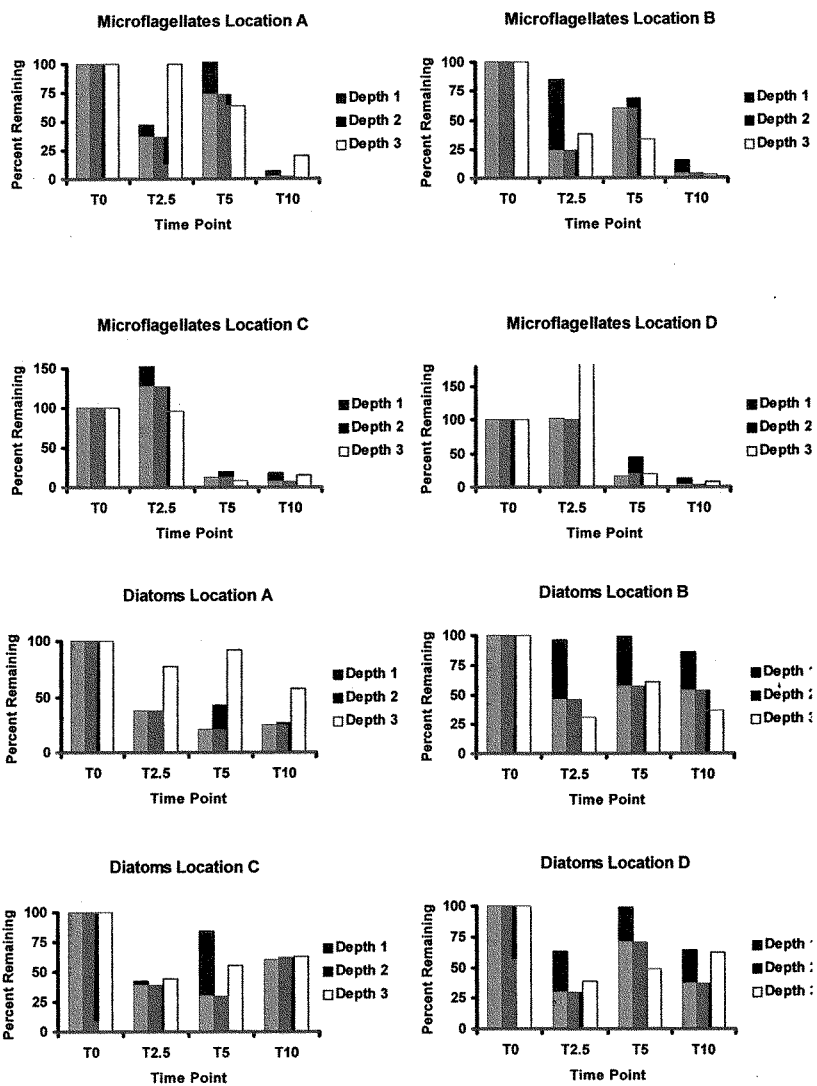
Location	T-0.0	T-2.5	T-5.0	T-10.0
A-15	$1.76 \times 10^5$	$1.00 \times 10^3$	$4.27 \times 10^2$	$7.07 \times 10^1$
A-30	$1.88 \times 10^5$	$9.44 \times 10^2$	$6.29 \times 10^2$	$1.08 \times 10^2$
A-50	$2.10 \times 10^5$	$1.05 \times 10^3$	$4.64 \times 10^2$	$2.80 \times 10^1$
B-15	$1.70 \times 10^5$	$6.29 \times 10^2$	$3.41 \times 10^2$	$4.67 \times 10^1$
B-30	$2.30 \times 10^5$	$5.60 \times 10^2$	$3.36 \times 10^2$	$2.67 \times 10^1$
B-50	$2.07 \times 10^5$	$9.12 \times 10^2$	$4.69 \times 10^2$	$3.33 \times 10^1$
C-15	$1.61 \times 10^5$	$1.65 \times 10^5$	$1.83 \times 10^5$	$1.84 \times 10^5$
C-30	$2.04 \times 10^5$	$1.85 \times 10^5$	$1.96 \times 10^5$	$2.06 \times 10^5$
C-50	$2.24 \times 10^5$	$2.32 \times 10^5$	$2.41 \times 10^5$	$1.98 \times 10^5$
D-15	$2.18 \times 10^5$	$1.97 \times 10^5$	$1.61 \times 10^5$	$1.79 \times 10^5$
D-30	$2.34 \times 10^5$	$1.94 \times 10^5$	$1.54 \times 10^5$	$1.65 \times 10^5$
D-50	$2.00 \times 10^5$	$2.22 \times 10^5$	$2.22 \times 10^5$	$1.75 \times 10^5$

### Phytoplankton Analysis

Ballast water sample collection and preservation for phytoplankton analysis were performed by the previous methods used for the initial testing in the Puget Sound. Phytoplankton analysis was performed by settling a 30mL sample for 24 hours in an Utermohl counting chamber. Twenty random fields were counted at both 160x and 512x magnification using a Zeiss inverted phase microscope. The phytoplankton enumerated were placed into one of five general taxa groups (diatoms, dinoflagellates, microflagellates, blue-green, or silicoflagellates) for data analysis. The groups blue-green and silicoflagellates did not have any statistically viable counts and were unable to be assessed for further analysis.

Figure 7: Dinoflagellate, microflagellate, and diatom analysis of the #4 port (A and B) and starboard (C and D) ballast tanks. Depth 1 = 15ft Depth 2 = 30ft Depth 3 = 50ft



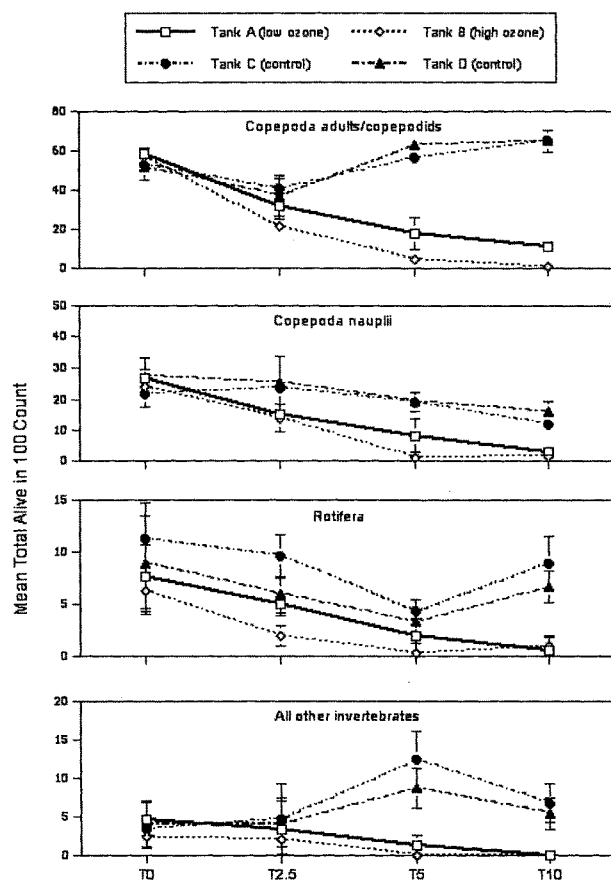




### Zooplankton Analysis

Zooplankton collection and analysis of the ballast water was performed by the same methods used in the previous testing in the Puget Sound.

Figure 8: Zooplankton live assay of the #4 port (A and B) and starboard (C and D) ballast tanks.



### Whole Effluent Toxicity Analysis

With the conclusion of ozonation treatment, an additional three 5L containers were filled with ballast water for Whole Effluent Toxicity (WET) testing. Two containers were filled from the experimental/port side of the ship with 2.5L from column A at the 30 foot depth and 2.5L from column B at the 30 foot depth. The third container was filled from the control/starboard side of the ship in the same manner from columns C and D. All of the containers were analyzed for TRO, and one of the experimental samples had the reductant sodium thiosulfate added to reduce the TRO to background levels. The samples were then shipped to ENSR for WET testing.

Figure 9: Overview of the WET tests performed with the three ballast water samples from the *S/T Tonsina*.

Test Information	
Test	Acute Toxicity under Static-Renewal Conditions
Basis	USEPA 1993
Test Date	Dec 10, 2002 @ 1600 - Dec 12, 2002
Test Length	48 hours
Test Species	<i>Mysidopsis bahia</i>
Test Concentrations	0 (control), 6.25, 12.50, 25.00, 50.00, 100.00%
Test System and Design	
Control Water	Synthetic Seawater
Test Temperature	25 ± 1 C
Test Volume	200 mL
Replicates Performed	4 replicates
Lighting	Fluorescent, 16 hours light: 8 hours dark
Biological Monitoring	Daily

Figure 10: Results of the WET tests performed with the three ballast water samples from the *S/T Tonsina*.

Sample: Control						
Initial TRO Analysis						
Initial TRO (Onboard Ship)	0.04					
TRO (Upon Arrival at ENSR)	0.00					
Testing Results	0 hours		24 hours		48 hours	
	TRO	Surviving	TRO	Surviving	TRO	Surviving
0.00 % Conc. (Control)	0.00	40	0.00	40	0.00	40
6.25% Conc.	0.00	40	0.00	40	0.00	40
12.50 % Conc.	0.00	40	0.00	40	0.00	39
25.00 % Conc.	0.00	40	0.00	40	0.00	40
50.00 % Conc.	0.00	40	0.00	39	0.00	39
100.00% Conc.	0.00	40	0.00	40	0.00	40

Sample: Ozonated						
Initial TRO Analysis						
Initial TRO (Onboard Ship)	2.98					
TRO (Upon Arrival at ENSR)	0.90					
Testing Results	0 hours		24 hours		48 hours	
	TRO	Surviving	TRO	Surviving	TRO	Surviving
0.00 % Conc. (Control)	0.00	40	0.00	40	0.00	40
6.25% Conc.	0.01	40	0.00	40	0.00	40
12.50 % Conc.	0.04	40	0.00	39	0.01	38
25.00 % Conc.	0.12	40	0.01	40	0.01	40
50.00 % Conc.	0.18	40	0.00	40	0.04	40
100.00% Conc.	0.76	40	0.03	40	0.01	39

Sample: Ozonated + Reductant						
Initial TRO Analysis						
Initial TRO (Onboard Ship)	0.04					
TRO (Upon Arrival at ENSR)	0.01					
Testing Results	0 hours		24 hours		48 hours	
	TRO	Surviving	TRO	Surviving	TRO	Surviving
0.00 % Conc. (Control)	0.01	40	0.06	40	0.00	40
6.25% Conc.	0.00	40	0.01	40	0.00	40
12.50 % Conc.	0.00	40	0.00	40	0.00	40
25.00 % Conc.	0.02	40	0.00	40	0.00	40
50.00 % Conc.	0.00	40	0.02	40	0.00	40
100.00% Conc.	0.02	40	0.00	40	0.00	40

Dr. Russell Herwig may be contacted at the University of Washington. His telephone number is 206 685 2163. Jake Perrins may be contacted at the University of Washington at 206 685 0263.