Focus: Invasive Species Threaten *the* Great Lakes

Working to Maintain & Foster Commerce While Protecting an Ecosystem

BY JOSEPH A. KEEFE

BALLAST WATER MANAGEMENT: COOPERATION WILL BE THE KEY

The concept that species from other parts of the globe such as mussels, miscellaneous fish, plants, and organisms could make their way into a particular geographical area through man's carelessness, and cause irreparable harm, is not a new one. The damage caused by these invasive species is far reaching and impacts commerce, shipping, and the general public alike. Since 1996 (started as voluntary in 1993), the effort to eradicate or at least minimize the problem of invasive species in Great Lakes waters has included a unique, mandatory ballast exchange program. The joint program, fostered by the U.S. Coast Guard and Canadian authorities, involves an exchange of ballast for inbound vessels via the St. Lawrence Seaway. Eventually, and as a direct function of the unique cooperation among industry, the general public, and environmental concerns, the battle to save the sprawling ecosystem known as the Great Lakes will involve much more.

This is by no means a regional issue. Research and development of appropriate standards is underway, here in the Great Lakes through the Great Lakes Waterway Management Forum (consisting of 26 organizations stretching from maritime shippers to U.S. and Canadian authorities), and, on a national level, in Washington. The United States Coast Guard is active in partnering the various interested parties to facilitate the scientific research that will eventually lead to a long-term solution. One of those "interested parties" is, of course, the Lake Carriers' Association (LCA), which represents the operators of U.S.-flag vessels on the Great Lakes. Even though their ships never leave the Lakes and, hence, have never introduced a non-indigenous species to the system, they have assumed one of the key, lead roles in defining the problem at hand, and are helping to develop the ultimate solution.

INVASIVE SPECIES: IMPACT AND ORIGIN

So-called "invasive species" enter the Great Lakes from a number of different sources. The Asian Carp approaching from the Mississippi and Illinois Rivers can be just as insidious as the Zebra Mussels and other fish introduced from sea-going vessels traveling to and from the Lakes via the St. Lawrence Seaway. Once introduced, any of these species can and do spread from the point of entry to any one of the Great Lakes. According to Stephen B. Brandt, Director of the Great Lakes Environmental Research Laboratory (NOAA), "Ship-borne ballast water is the most significant vector of introductions for aquatic invasive species worldwide." Research has also shown, however, that vessels declaring no ballast on board (NOBOB) may actually be a more significant contributor to the problem. The residues and slops contained within these ballast tanks - which can never be completely emptied by conventional pumping systems - also contain potentially harmful creatures and living organisms, all of which can be released when the particular vessel takes on ballast in one port and discharges it in another. But, salt water ships are only one of the many "vectors" of possible introduction. Inadvertent releases from aquariums, live bait releases, and recreational boating all contribute to the problem, as well.

The ultimate impact of invasive species is yet to be determined, and is the subject of at least six different studies now underway. Lake Erie, for example, because of its position as the most shallow of the five Lakes, is potentially at greatest risk. As a general statement, invasive species can and do clog water intakes for various industrial applications, eliminate or replace

Admiral Ronald F. Silva, "The problem of invasive species is the highest priority marine environmental issue for the U.S. Coast Guard, … He adds that while the problem is certainly not confined to the Ninth District, the Great Lakes, being a source of drinking water for 37 million North Americans, potentially have the most at stake in this regard".

native species, change contaminant and nutrient cycles, negatively affect ecosystem productivity, and impact fishing industries. It is safe to say that the problem cuts across all spectrums of society and affects industry, economies, and lifestyles alike. And, says USCG Ninth District Commander Admiral Ronald F. Silva, "The problem of invasive species is the highest priority marine environmental issue for the U.S. Coast Guard, not just here in the Ninth District, but nationwide, as well." He adds that while the problem is certainly not confined to the Ninth District, the Great Lakes, being a source of drinking water for 37 million North Americans, potentially have the most at stake in this regard.

PREVENTION: DEFINING STANDARDS / DEVELOPING PROACTIVE SOLUTIONS

Solving any problem of this magnitude will always involve compromise between all concerned parties, and this situation is no different. For its part, LCA is deeply committed to ensuring that any solution takes into account "the vast and inherent differences between foreign salt water vessels and domestically-trading Lakers." With this in mind, Jim Weakley, President of LCA, says, "Prevention of additional introductions by salt water vessels is our number one priority." He goes on to reiterate that while not one invasive species has ever been introduced by any Lake vessel, LCA remains committed to being one of the linchpins of the effort to control, and hopefully, eventually, prevent introductions of new invasive species into the Great Lakes.

As Weakley stresses, the issue of invasive species is clearly a matter of salt water traffic, involving as many as eight states, five Lakes, and the international community comprised of Canada and any number of foreign shipping companies. The focus, says Weakley, "must be on salt water traffic, and the solution, a Federal one." A worst-case scenario, he adds, is one that involves a different standard, and a solution mandated individually by eight different states, two Canadian provinces, and perhaps two different sovereign nations. A perfect example of the potential pitfalls of conflicting statutes and regulations can be found in the Federal Oil Pollution Act of 1990 (OPA90) and the myriad of individual state(s) laws, from Florida to California, Oregon and Washington, which sometime conflict with one another. And no meaningful, lasting solution can be put into place until the standard of prevention is explicitly defined. The great debate, says Weakley, centers on whether the solution applied to salt water ships should define the problem in terms of a micron based or a biological standard. According to LCA, micron based solution-testing represents only a fraction of the costs that involve the alternative, biological method. And, there are other proposed solutions, but very few which have been tested to the rigors and industrial standards fostered by LCA and its partners here in the Great Lakes.

The Great Lakes Aquatic Nuisance Species Panel - on which LCA is well represented - concerns itself with rapid response, early detection, and education of the general public and environmental groups. Through this and other organizations, LCA is working towards a viable, effective, and economical solution that can be installed on salt water vessels. Some proposed technical solutions include filtration, hydrocyclones, and even ultraviolet applications. Testing these systems in a real, industrial, shipboard environment presents its own list of challenges, however. Testing of filtration systems, with the cooperation of Great Lakes based vessels, began in 1996. Because this testing, involving filters of designs varying from 50, 100, and 150 microns, proved to be very expensive, research was transferred to a barge designed especially for this purpose. The barge testing, aptly named the Great Lakes Ballast Technology Demonstration Project, and co-chaired by LCA's Vice President of Operations, Richard W. Harkins, along with the Northeast Midwest Institute, is yielding valuable data, which will no doubt some day fit into both the defined standard for prevention and the Federal legislation and ensure that effective prevention and control of invasive species comes to pass.

Prevention has to be the first line of defense against the introduction of unwanted species. It has been documented that prevention is almost always far less expensive than the control of invasive species after their introduction. It is also true that prevention will ultimately hit the bottom line of vessel owners the hardest - even for those who do not create the problem. In 1993, the LCA wrote and introduced the first voluntary ballast water management policy designed to limit the spread of invasive species within the Great Lake basin, after they have been introduced by others. Lakers from the Canadian side and salites endorse and adhere to these rules. Although the rules are voluntary, Weakley reports 100% compliance - audited and documented - among all parties, and the policy is updated yearly and has been expanded many times. The spread of these species will inevitably occur, however, via natural pathways. For example, the Ruffe in Duluth/Superior harbor at the western end of Lake Superior is slowly making its way along the southern shores, and will likely make it to Lake Erie at some point. LCA is adamant that shipping not be a contributor to this vector, and so far, they have achieved that goal to the greatest extent possible, using management practices to do so.

There is a lot of work to be done, and research is ongoing. Richard Harkins reports that one filter system of Israeli design has shown particular promise. Efforts are now ongoing to install the filter on a FEDNAV vessel, one of the salt-water operators that ply the Lakes on a regular basis. According to Harkins, FEDNAV is the perfect platform for such a test, in that FEDNAV represents 50- 60% of the salt water tonnage that enters the Great Lakes each shipping season. The task, despite excellent cooperation from this first class operator, is easier said than done. It is also worth saying that this project is one of the few shipboard-testing initiatives occurring in the

The new regulations and laws designed to prevent, control, and, hopefully, eliminate the problem of invasive species are coming. This is certain. LCA and Jim Weakley are clearly engaged in the process, maintaining a weather eye on the process unfolding in Washington.

world today, and has received international attention from the IMO and other organizations.

Naval architects and marine engineers are now trying to devise a way to fit the filter system into the vessel's pump room, and to adapt its 1,500-gpm capacity to the vessel's 2,000 gpm pumps. Just as the first marine chronometers which allowed sufficient accuracy for determining longitude calculations were far too large for practical shipboard use, the challenge facing shippers hoping to eradicate the scourge of invasive species is to fit the solution into the cramped confines of the typical merchant vessel. (The challenge would be even greater for vessels of Laker design, as they boast ballast pumps with a total capacity of 79,000 gpm.) LCA (and others) are continuing their research while awaiting the development and definition of the final standard and requirements for compliance, so that the final technical solution can be built and put into play.


Admiral Ronald F. Silva, U.S. Coast Guard.

WHAT'S COMING - AND WHEN

The new regulations and laws designed to prevent, control, and, hopefully, eliminate the problem of invasive species are coming. This is certain. LCA and Jim Weakley are clearly engaged in the process, maintaining a weather eye on the process unfolding in Washington. When asked if he envisioned and supported a new rule that would mandate clear steps for, and improvements to, salt water vessels plying the Great Lakes, but endorse existing management practices on Lakers, he replied, "Absolutely. Senate Bill 525 defines many of these issues with regard to enclosed aquatic ecosystems, and focuses on prevention. Further, although LCA members are not part of the problem, we are a big part of the effort to find a solution. But the solution has to be something that we can live with - as shippers and as citizens. We have a vested interest in the Great Lakes." Weakley, who is also part of the Ballast Water Coalition, an organization deeply concerned with the invasive species issue, is optimistic that Senate Bill 525 (H.R. 1080 and 1081) will pass during this Congress.

PIONEERING NEW TECHNOLOGIES AND LIVING WITH THE NEW REGULATIONS

In addition to being an important commercial waterway, the Great Lakes are also the world's largest body of freshwater. The needs of the industrial economies served by LCA can and will coexist, side by side, with the ecosystem. The two are interwoven, dependent on one another for survival, and are ultimately responsible for the lifeblood of the other. Jim Weakley is clear that, "Carriers want to solve the problem of invasive species, but they can't move the technology forward until there's a standard to build to and apply to salt water vessels." LCA, he says, sees three big hurdles in implementing a mechanical, shipboard filter solution: (1.) the standard for size of the micron filter standard has to be defined, (2.) reconciliation of the gpm capacity of these filters to existing ballast pump capacities, and (3.) sizing of the equipment so that it can fit into the designs of existing (and planned) merchant vessels. Beyond this, some sort of standardization for the generic equipment required will be necessary. Only in this way can there be some economy of scale that will allow all carriers to afford the solution.

Everyone understands the reality that ballast water exchange, the current method of minimizing introduction of invasive species, is only partially effective, despite thorough enforcement and good cooperation from salt water operators. Whatever comes next absolutely has to be better, and should augment, but not necessarily replace, the current efforts. Controlling invasive species and ensuring the integrity of the waters of the Great Lakes is all-important, but none of this will be achieved without a cost. According to engineering studies commissioned by the Great Lakes Ballast Technology Demonstration Program, the cost of implementing a ballast technology solution aboard the typical merchant ship can start at approximately $500,000 for small ships and easily escalate into the millions for larger vessels. Although the absorption of these costs will be borne primarily by the ship operators themselves, the cost of doing business always trickles its way down to the lowest common denominator: industrial output and the every day consumer of finished goods.

Jim Weakley talks about "incentivizing ship owners" to implement a solution to the critical problem of invasive species. And, while this issue is not confined or indigenous to the Great Lakes, this would appear to be a logical place to start the process. Through the years, the Great Lakes shippers and LCA have together pioneered, devised, and implemented many firsts in the world marine transportation. These innovations include the first self-unloading vessels, traffic separation schemes, the first bow thrusters, marine diesel engines, and, of course, many proven and other potentially useful solutions to the problems of invasive species. There is no doubt that, whatever the final solution to this challenge entails, LCA and its members will have been an integral part of the process, and their labors an indelible part of the solution.

***Mar*Ex**