

# BALLAST exchange

<http://ballast-outreach-ucsgep.ucdavis.edu>

VOLUME FOUR ■ SPRING/SUMMER 2002

## GREETINGS

By Karen McDowell, California Sea Grant Extension Program

Welcome back to the fourth edition of the Ballast Exchange, the biannual newsletter of California Sea Grant Extension's West Coast Ballast Outreach Project. This issue includes a review of the current regulatory framework and pending changes at the international, federal, and state levels. The articles on NISA reauthorization and Caulerpa highlight the need for a holistic approach to ANS management that addresses all the vectors responsible for introducing aquatic species, including, but not limited to, ship vectors such as ballast water, hull fouling and anchor chains. We have also added a new section to the newsletter, "Ask the Editor." Please submit any questions that you might have about ballast water management and/or aquatic nuisance species to Karen McDowell at [kdhart@ucdavis.edu](mailto:kdhart@ucdavis.edu). Your questions will be answered immediately and one or more of the questions will appear in the next addition of the Ballast Exchange.

We would like to thank the National Sea Grant College Program for funding the second phase of the West Coast Ballast Outreach Project, which will include four issues of the "Ballast Exchange," and continued distribution of the "Stop Ballast Water Invasions" poster and brochure. Please contact us if you would like to receive additional copies of the poster, brochure, and/or newsletter. During this phase of the project, we will be focusing our workshops on specific topics of concern that have been identified as priorities by the Ballast Outreach Advisory Team (BOAT). Our current efforts are focused on developing a uniform strategy for dealing with coastal ballast exchange on the West Coast of the U.S. (see page 3 for more details). Please visit the project website to view updates on coming events and newly released reports (<http://ballast-outreach-ucsgep.ucdavis.edu>). We are also working on redesigning the project web site, so feel free to send us input on new items that you would like to see on the web site.

We continue to enjoy working with our many partners. We look forward to continuing our partnerships and creating new ones. Once again, we would like to encourage your active participation and feedback on the West Coast Ballast Outreach Project. We are just a fax, phone call, or email away and always appreciate any comments or suggestions.

*Karen Hart McDowell, Project Coordinator, West Coast Ballast Outreach Project*

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# WEST COAST BALLAST WATER MANAGEMENT REVIEW

By Karen McDowell, West Coast Ballast Outreach Project

## Regulatory Framework

The regulatory framework for ballast water management has changed significantly since the first issue of the Ballast Exchange was printed in Fall 1999. At the time, there was not much activity at the international level, the U.S. Coast Guard had just implemented its mandatory reporting and voluntary exchange program, and California was in the process of passing

legislation for the first state-run ballast water management program. Now, there are new developments at the international level; the Coast Guard has just submitted a report to Congress recommending a national mandatory ballast water exchange program; and there are mandatory ballast exchange and management programs in three West Coast states (Table 1).

TABLE 1 BALLAST WATER LAWS AND REGULATIONS		International Program International Maritime Organization (IMO)	Federal Program National Invasive Species Act of 1996 (NISA)
MAJOR PROVISIONS*		<p><b>Voluntary Guidelines</b> - Developed in 1993 and amended by resolution A.868(20) in 1997. Recommends open ocean exchange and other best management practices for ballast water to minimize the transfer of harmful aquatic organisms and pathogens.</p> <p><b>Circular</b> - Approved at 47th Session of the IMO's Marine Environmental Protection Committee (MEPC 47), held in March 2002. Contains design suggestions for ballast water and sediment management options in new ships.</p>	<p><b>Mandatory Reporting and Voluntary Open Ocean Exchange</b> - Under NISA, this program was implemented in July 1999. An open ocean exchange is recommended for ships that will be discharging ballast water after entering the U.S. from outside the exclusive economic zones (EEZ). An open ocean exchange should be conducted more than 200 nautical miles offshore and in water more than 2000 meters deep. (Note: Ballast water exchange is mandatory in the Great Lakes, and the information in this section does not apply to the Great Lakes Region.)</p>
	BW REPORT FORMS	There are no mandatory requirements for ballast water reporting. The Voluntary Guidelines recommend that records be kept for all ballasting operations. The Ballast water form is similar to the US federal form and the state forms.	Ballast Water Report forms are required for a ship making its first U.S. port of call after operating outside the EEZ. Reports are due to the ballast water clearinghouse, run by the Smithsonian Environmental Research Center, 24 hours before ship arrives at port.
	BW STANDARDS	Ballast water standards will be considered in the draft convention that is currently under development (see Pending Changes).	The USCG posted a notice in the Federal Register soliciting comments on proposed ballast water treatment standards on March 4, 2002 (Vol. 67(42): 9632-9638).
	COMPLIANCE		There was 30.4% compliance with the reporting requirement from July 1999 through June 2001. Among the vessels that reported, 51.2% of the ships that discharged ballast water indicated some degree of open ocean exchange. (Ruiz et al., 2001).
	PENDING CHANGES	A draft international convention for control and management of ships' ballast water and sediments is being developed for consideration and adoption by a diplomatic conference scheduled for 2003.	The USCG, as authorized by NISA, just submitted a report to Congress on the first two years of the voluntary program, recommending that the ballast exchange program should become mandatory. NISA might also be reauthorized in 2002, creating even more opportunity for change.
FOR FURTHER INFORMATION		<p>Press Briefing for MEPC 47 held in March 2002 (covering the circular and draft convention):  <a href="http://www.imo.org/Newsroom/mainframe.asp?topic_id=583&amp;doc_id=2009">http://www.imo.org/Newsroom/mainframe.asp?topic_id=583&amp;doc_id=2009</a></p> <p>Global Ballast Water Management Programme (Globallast):  <a href="http://globallast.imo.org/">http://globallast.imo.org/</a></p>	<p><b>National Ballast Information Clearinghouse:</b>  <a href="http://invasions.si.edu/ballast.htm">http://invasions.si.edu/ballast.htm</a></p> <p><b>USCG Report to Congress on the Voluntary National Guidelines for Ballast Water Management, November 2001:</b>  <a href="http://ballast-outreach-uscgep.ucdavis.edu">http://ballast-outreach-uscgep.ucdavis.edu</a></p>

\*All mandatory ballast water exchange programs have a provision for a safety exemption if the ship's master determines that the seas are too rough to complete the exchange safely.

At the international level, there are currently voluntary guidelines, and there is a draft international convention that is being developed for consideration in 2003.

At the national level, the National Invasive Species Act of 1996 (NISA) is the primary U.S. legislation currently regulating ballast water and aquatic nuisance species. The U.S. Coast Guard is the lead agency in charge of implementing the ballast water management program under NISA. Over the past 3 years, the Coast Guard has worked on implementing and evaluating a voluntary ballast water management and inspection program, cre-

ating ballast water treatment standards, and conducting research on ballast water treatment technologies. The Coast Guard recently submitted a report to Congress which charts out the Coast Guard's proposed changes from a voluntary to a mandatory ballast water management program (Table 2) (USCG, 2001).

In the interim, three West Coast states (California, Washington and Oregon) have enacted mandatory ballast water exchange and management programs in an effort to protect their waters from new invasions while the mandatory programs at the federal

### California Assembly Bill 703 (AB 703)

<p><b><u>Mandatory Reporting and Open Ocean Exchange</u></b> - AB 703 went into effect January 1, 2000, and sunsets on January 1, 2004. An open ocean exchange is required for ships that will be discharging ballast water into California waters after operating outside of the EEZ. A \$200 fee is required for each qualifying voyage (ships calling to their first California port of call after operating outside the EEZ). The fees cover the Monitoring and Inspection Program, Biological Surveys, and a Review of Treatment Technologies.</p>
<p>Ballast water report forms are required for a ship making its first call at a California port after operating outside the EEZ (including Mexico and Canada). Reports are due to the California State Lands Commission after ballasting operations are completed and before the ship leaves port. A duplicate form should also be sent to SERC to comply with federal requirements.</p>
<p>Alternative ballast water treatment is approved on a ship-by-ship basis.</p>
<p>During 2001, there was over 90% compliance with reporting and ballast exchange requirements. Most of the ballast exchange violations come from ships traveling between California and Mexico (Falkner, pers comm., 2002).</p>
<p>The program is scheduled to sunset on January 1, 2004. A new program is expected to take its place.</p>
<p><b>Program Manager:</b> Maurya Falkner, California State Lands Commission, falknem@slc.ca.gov, <a href="http://www.slc.ca.gov/">http://www.slc.ca.gov/</a></p>

### State Programs Washington Substitute House Bill 2466 (SHB 2466)

<p><b><u>Mandatory Reporting, Open Ocean Exchange, and Coastal Exchange</u></b> - Washington SHB2466 went into effect July 2000, and has been amended several times. Ships operating outside the EEZ must conduct an open ocean exchange before discharging into state waters. In addition, coastal traffic (ships not traveling more than 200 nautical miles offshore, but outside state defined common waters) must exchange ballast water at least 50 nautical miles offshore before discharging into state waters (common waters include the inland waters around Vancouver Island and Oregon).</p>
<p>Ballast water report forms are required for all ships discharging ballast from outside state-defined common waters. Unlike the other programs, ships that will not be discharging ballast water do not need to submit a form, but they do need to notify the authorities that they will not be discharging. Reports and/or notification of non-discharge are due to the Marine Exchange or Merchants Exchange, 24 hours before ship arrives at port. A duplicate form should also be sent to SERC to comply with federal requirements.</p>
<p>An interim treatment standard, 95% removal/kill of zooplankton and 99% removal/kill of phytoplankton and bacteria, has been set in Washington.</p>
<p>Since October 2001 compliance with the reporting requirement was over 90%. Compliance with the ballast exchange provision is mixed, with the majority of violations occurring with coastal traffic (Smith, pers comm., 2002).</p>
<p><b>Program Manager:</b> Scott Smith, Washington Department of Fish and Wildlife, smithsss@dfw.wa.gov</p>

### Oregon Senate Bill 895 (SB 895)

<p><b><u>Mandatory Reporting, Open Ocean Exchange, and Coastal Exchange</u></b> - SB 895 went into effect January 1, 2002. Ships operating outside the EEZ must conduct an open ocean exchange. Coastal traffic operating outside state-defined common waters must exchange ballast water before entering state-defined common waters (between 50 degrees North latitude and 40 degrees North latitude). Unlike the Washington program, there are no distance offshore requirements for coastal exchange in the Oregon program.</p>
<p>Ballast water report forms are required for all ships operating from outside state-defined common waters. Reports and/or notification of non-discharge are due to the Marine Exchange or Merchants Exchange, 24 hours before ship arrives at port. A duplicate form should also be sent to SERC to comply with federal requirements.</p>
<p>Since January 2002 there has been over 90% compliance with reporting and ballast exchange requirements (Wylie, pers comm., 2002).</p>
<p><b>Program Manager:</b> Jack Wylie, Oregon Department of Environmental Quality, jack.wylie@state.or.us.</p>

and international programs are still undergoing development (Table 1). The state and federal programs are fairly uniform with regards to ballast water reporting and exchange requirements for transoceanic traffic (although ballast exchange is currently voluntary under the federal program), but there are significant differences with regards to ballast exchange for coastwise traffic. Although some of the differences have created difficulties for the maritime industry, which now has to track which regulations are in place at each port of call; the information and experience gained from implementing mandatory programs on a smaller scale will provide invaluable information in designing effective ballast water management programs at the federal and international levels.

### Coastal Exchange

The coastwise transport of ballast water can spread aquatic nuisance species along the coastline. Washington and Oregon are especially concerned about receiving ballast water from the San Francisco Bay-Delta system, known as one of the most invaded estuaries in the world (Cohen and Carlton, 1998). Complications arise when ballast exchange is used as a management tool for coastal traffic (vessels not traveling more than 200 nautical miles offshore and in waters less than 2000 meters in depth). Some ships are unable to undergo a complete exchange during the short voyage time. In addition, there are concerns that exchanging ballast within 200 nautical miles of the coastline could inoculate the coastline with aquatic nuisance species, and/or force ships to increase their distance offshore to reduce the risk of coastline inoculation.

The three West Coast state programs have significantly different requirements with regards to coastal traffic. In an effort to create a more uniform plan, several agencies, including the West Coast Ballast Outreach Project, sponsored a workshop in March 2002. This workshop brought together physical oceanographers specializing in coastal processes along the West Coast to determine the potential implications for coastal ballast exchange. The findings of this workshop are currently being compiled into a report, which will be posted on our project website when completed. A follow-up workshop will be sponsored later this year to develop a uniform strategy for ballast exchange for coastal traffic on the West Coast.

### Treatment Technology

Ballast water exchange is still the only approved tool for ballast water management. The majority of stakeholders involved in this issue agree that open ocean exchange is only a "stop-gap solution." Alternative ballast water treatment systems and ballast water standards are still being developed (Table 1). The U.S. Coast Guard posted a notice in the Federal Register soliciting comments on proposed ballast water treatment standards (U.S. Coast Guard, 2002). The various state programs aim to adopt similar, if not identical standards, so that an approved ballast water treatment system would be accepted in all programs. In addition to the lack of treatment standards, the diverse nature of testing protocols makes it difficult to compare and evaluate treatment technologies. The Coast Guard is working with the Environmental Protection Agency's (EPA) Environmental

Technology Verification Program (ETV) to create a testing protocol for the evaluation and verification of treatment systems. The Coast Guard has also developed a program to audit the testing protocols that are currently being used to evaluate ballast water treatment technologies. The various state programs have been working closely with the Coast Guard to develop research programs that augment the development of ballast water treatment technologies and testing protocols. The Coast Guard is also participating in the development of the draft international convention to ensure that the U.S. program is compatible with the international program.

### Summary

Overall, a considerable amount of progress has been made over the past 3 years. The maritime industry, regulators, researchers, and environmental groups on the West Coast have worked closely together to develop an effective ballast water management program. The maritime industry should be commended for their proactive approach on this issue. Without the maritime industry's participation in working groups, and in experimental ballast water treatment testing programs, the West Coast and federal programs would not be where they are today. Although great strides have been made on the West Coast, inconsistencies between various programs have occurred due to the complex nature of the ballast water problem and the urgent need of the states to protect their waters from new invaders. Continued participation and coordination is needed to develop a uniform, cost-effective ballast water management program that incorporates ballast water treatment technologies. The West Coast Ballast Outreach Project will continue to develop outreach materials and work with the various stakeholders to reduce the inconsistencies that exist between various ballast water management programs on the West Coast.

### Literature Cited

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TABLE 2. Proposed timeline for the Federal Ballast Water Management Program (USCG, 2001).

Changes to the U. S. Coast Guard's Ballast Water Management Program	Notice of Proposed Rule Making (NPRM)	Final Rule
Incorporating penalties for not submitting ballast water report form	Winter 2002	Fall 2003
Mandatory national ballast water management program (including mandatory exchange)	Fall 2003	Summer 2004
Ballast water treatment standard	Winter 2003	Fall 2004
Developing protocol for approval of installation of experimental technologies on board vessels		Interim Rule: Winter 2002





## A NEW GROUP OF STAKEHOLDERS GETS INVOLVED IN THE BALLAST WATER ISSUE – BUSINESS FOR SOCIAL RESPONSIBILITY (BSR)

*BSR's Environment Program has formed the "Clean Cargo Group," which is currently made up of 14 participating companies (manufacturers and retailers), representing nearly 20% of the Top 50 U.S. containerized cargo importers. The primary goal of this group is to improve air quality and reduce the introduction of aquatic nuisance species by analyzing and developing cost-effective environmental specifications for carrier service providers.*

### Project Need

Presently, millions of metric tons in consumer goods and products are exchanged in the United States international trade market. Container and bulk ships currently carry 95 percent (by weight) of all foreign trade. More than 92,000 vessels currently ply the world's oceans, seas, lakes, and other inland waterways. Between 1983 and 1998, waterborne trade rose 70 percent worldwide and with the escalation of global trade, some analysts predict ocean vessel transport will double in the next 20 years. Despite a respectable energy efficiency ratio of per-ton-of-cargo-carried, ocean vessel transport poses significant environmental impacts in the U.S. and abroad. The situation is aggravated by the fact that ocean vessel transportation is one of the least environmentally regulated forms of transportation. Therefore, a business solution, i.e., one that is based on market conditions and economic incentives, is needed to reduce the environmental impacts of ocean vessel transportation.

### Project Goal

To address the need to develop cleaner, more environmentally sustainable product transport for both containerized and bulk shipping, BSR has formed the Clean Cargo Group, a business working group comprised of major manufacturers and retailers that rely heavily on marine transportation to import their products. The main goal of the group is to analyze and develop cost-effective environmental specifications and management steps for carrier service providers in an effort to significantly improve air quality (e.g., by reducing emissions and improving

fuel/engine efficiency) and reduce the introduction of aquatic nuisance species (e.g., by endorsing reportable process steps for ballast water exchange at sea). A parallel goal of the group is to seek these improvements in major shipping routes by targeting major bulk commodity companies in the steel, cement, grain, and coal industries. These industry sectors account for a large percentage of cargo transported in the Great Lakes, St. Lawrence Seaway, and other major commercial inland waterways.

### Participants

The brand-name companies in the Clean Cargo Group include, but are not limited to, Chiquita Brands, Del Monte Foods, Great White Fleet, Hewlett-Packard Compaq, Home Depot, IKEA, L.L. Bean, Mattel, New United Motor Manufacturing, Nike, TimberGrass, Timberland, and Williams-Sonoma.

### Expected Outcomes

The Clean Cargo Group seeks to develop market-based environmental specifications and/or management process steps through outreach: first, discussion among the Clean Cargo Group members; second, comprehensive dialogue with environmental NGO and government stakeholders; and third, comprehensive dialog with representatives from the major transoceanic shipping lines. By including environmental NGO and government stakeholders in the process, the working group will solicit the maximum number of perspectives, and by including carriers in the process, the working group seeks to ensure that the group's recommendations make business sense and are implemented as broadly as possible. Implementation of the recommended specifications and process standards will be initiated through a set of recommended guidelines and a series of future workshops.

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# INDUSTRY ON THE MOVE

# NISA 2002: COMING YOUR WAY

By Allegra Cangelosi, Northeast-Midwest Institute

*Foreword by Karen McDowell, West Coast Ballast Outreach Project: The National Invasive Species Act of 1996 (NISA) is up for reauthorization in 2002. Since there have been many changes over the past six years with respect to ballast water management and increased knowledge about aquatic nuisance species, many believe the reauthorization of NISA would help direct the ballast water management program and better define regulations and/or guidelines for other vectors responsible for the transport of aquatic nuisance species. One of the primary efforts for reauthorization is being led by the Northeast-Midwest Institute. This article summarizes some of the details of this effort. If you would like more information about this effort, you can visit the Northeast-Midwest Website (<http://www.nemw.org/biopollute.htm>), or you can contact Nicole Mays by e-mail at [nmays@nemw.org](mailto:nmays@nemw.org). It is important that stakeholders involved in this issue track efforts to reauthorize NISA and provide input while the bill is being developed.*

## Background

Congress enacted the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA) in 1990. Though the problem of non-native species introductions was even then national and international in scope, the greatest awareness resided in the Great Lakes region as a result of the zebra mussel invasion, and the bill primarily addressed Great Lakes concerns. In particular, NANPCA, which was focused on unintentional introductions of aquatic invasive species, established a mandatory ballast management program for the Great Lakes and the national Aquatic Nuisance Species Task Force.

Congress reauthorized NANPCA in 1996 with greater interest from other regions of the U.S. The reauthorization, called the National Invasive Species Act of 1996 (NISA), expanded the ballast management program to be national in scope and required that it become mandatory nationally within 3 years if the Coast Guard determines that voluntary ballast management reporting or compliance are not adequate. It also established a ballast technology demonstration program to advance the development of environmentally sound alternative treatments to ballast water exchange, and established the Western Regional Panel on Aquatic Nuisance Species, among other provisions.

While these pioneering pieces of federal legislation are the key to preventing new introductions of unwanted organisms, there are still huge gaps in our federal policies and programs governing aquatic invasive species. Some of these remaining tasks are contained in the National Invasive Species Management Plan, developed by the recently created Invasive Species Council. Regional panels of the Aquatic Nuisance Species Task Force created by NISA have also identified important gaps. In addition, smaller pieces of legislation provide additional guidance relative to the needs of specific regions.


The Northeast-Midwest Institute compiled the proposed revisions from these written sources and held a series of focus group

meetings with key stakeholder groups to further scope some of the most contentious issues to be addressed in NISA 2002. These sources provided ideas for addressing 1) analysis of all vectors or pathways of aquatic nuisance species introductions and creation of management plans for high-priority pathways; 2) technological treatment of ballast water by ships; 3) a screening policy for planned importations of live organisms; 4) early detection and monitoring and rapid responses to newly discovered infestations; and 5) outreach and education for recreational boaters, the marine industry, the aquaculture industry, and the public, among other groups. Clearly a great deal of research will be needed to support these activities.

## What Can NISA Reauthorization Do?

NISA can greatly facilitate progress in preventing and managing new introductions of aquatic invasive species on a number of fronts. While specific provisions are still being defined, the following general opportunities exist with reauthorization:

- 1. Transoceanic Vessel Movements:** Transoceanic vessels are a leading pathway for unplanned introductions of aquatic organisms to U.S. waters from abroad. Congress has already established a mandatory ballast water management program for the Great Lakes (NANPCA) and a set of guidelines to become mandatory for the rest of the nation (NISA). Over the past six years, researchers have developed new ways to improve the effectiveness of ballast water management on transoceanic ships. The current ballast water treatment standard in NISA requires that treatments used be environmentally sound and as good as, or better than ballast exchange. Because the effective result of ballast exchange is difficult to quantify and varies from ship to ship, this standard is seen as a barrier to timely progress toward more effective ballast treatment. While the best approaches to the ultimate biologically based standard are hotly debated, NISA reauthorization can establish an interim standard for treatment while BWE remains the default option, incorporate consensus terms, and provide an interim framework and deadlines to advance technological development. These actions will reduce the introductions of non-native organisms into U.S. waters while science and technology are developed to more systematically eliminate the threat.
- 2. Rapid Response:** "Rapid response" is a term used to describe the containment, control and eradication of an initial introduction of an invasive species. For aquatic systems addressed in NISA, the application may be to a foreign fish species that has been accidentally transported into our waters through a ship's ballast water or a new wetland weed that has spread from someone's goldfish pond into a treasured estuary. As we have



learned from past invasions, time is critical to an effective and affordable response. Agencies must be notified, appropriate response tools must be found, money must flow, and all this must be coordinated. There is no current process for interstate cooperation, and states will not want to provide resources to other states for controlling a species if they have already been invaded. This NISA reauthorization proposal could help ensure that federal, state, and regional authorities are capable of effective rapid response through creating a process for contingency planning and rapid disbursement of funds for federal teams (when invited by states and tribes) and entities with approved plans.

**3. Coastal Vessel Movements:** Shipping along coastlines within the exclusive economic zones (EEZ) of the United States, Canada and Mexico can disperse unwanted organisms in enclosed systems (like the Great Lakes) or can transfer native organisms to new systems (such as from the West Coast to the Gulf of Mexico) creating new infestations. Under existing law, ships in coastal trade are not required to report their ballasting activities or conduct ballast management because the only known prevention method, ballast water exchange, requires a trip to the open ocean to be effective. NISA 2002 could require record keeping on ballast operations of coastal vessel movements, allow the incorporation of requirements on coastal ships into rapid response contingency strategies, and could accelerate adoption of ballast management among ships in coastal voyages through providing incentives and a future date certain for regulation.

**4. Planned Importations of Species:** Planned importations of species pertain to non-native species brought into the U.S. from another country. Examples include organisms imported for aquaculture, live food, the pet/aquarium industry, and fish stocking. Even organisms not intended to be openly released into water bodies can and do “escape” and may be capable of becoming invasive. Under existing law, there is no uniform, systematic process for screening or regulating proposed importations of live organisms. NISA reauthorization could establish a common screening process for importations regardless of planned use, and require that the screening be carried out to identify, prohibit or condition importations of harmful organisms in advance, to the greatest extent possible.

**5. Environmental Soundness:** Under the proposed reauthorization of NISA, aquatic nuisance species will be managed and controlled using a number of methods. These methods may include everything from chemicals to mechanical and physical approaches to prevention (such as ballast treatment) and control and contain-

ment of outbreaks. In NISA 1996, Congress required that ballast treatment and dispersal barrier technology be environmentally sound, but provided little structure for the administration of this requirement. Other environmental laws pertain to the protection of waters and lands from pollution by pesticides and herbicides, but there is no focused attention to the environmental soundness of invasive species control and containment measures. NISA 2002 could help resolve this problem by assigning an agency responsibility for creating standards and a screening method for evaluating environmental soundness.

**6. Dispersal Barrier Demonstration Project Proposal:** Waterways that connect hydrologically distinct basins and water bodies can serve as pathways for the transmission of aquatic nuisance species. The Dispersal Barrier Demonstration Project, Section 1202 of NISA (1996), authorized the U.S. Army Corps of Engineers to implement “environmentally sound methods for preventing and reducing the dispersal of aquatic nuisance species between the Great Lakes-Saint Lawrence drainage and the Mississippi River drainage through the Chicago River Ship and Sanitary Canal.” The Corps recently completed construction of a barrier which will repel fish and other actively swimming organisms from moving between the Great Lakes and the Mississippi River. A monitoring program is being established and a report to Congress will be provided within 18 months to assess the effectiveness of the demonstration technology. Additional work on dispersal barrier technologies has been conducted on the Champlain Canal, which is the probable point of entry to Lake Champlain for 50% of nuisance species, including the sea lamprey, the zebra mussel, the white perch, and the water chestnut. NISA reauthorization is an opportunity to expand the dispersal barrier program to address other waterways, and to evaluate the effectiveness of the Chicago Canal barrier.

## Next Steps

Senator Carl Levin (D-MI) and Congressman Wayne Gilchrest (R-MD) have agreed to lead the effort to reauthorize the National Invasive Species Act. The committees to which the bill is likely to be referred are Transportation and Infrastructure (Water Resources and Coast Guard Subcommittees) and Resources on the House side, and Environment and Public Works, and Commerce on the Senate side. The Science Committee in the House (under the leadership of Congressmen Sherwood Boehlert (R-NY) and Vernon Ehlers (R-MI)) has been developing a research component of NISA. A reauthorization package will likely be introduced in July.

## NOXIOUS SEAWEED FOUND IN SOUTHERN CALIFORNIA COASTAL WATERS

Rachel Woodfield, Merkel & Associates

Dubbed “killer algae,” the alien seaweed *Caulerpa taxifolia* was discovered in June 2000 in a coastal lagoon in Carlsbad, California, in San Diego County. An aggressive clone of this species has already proven to be highly invasive in the Mediterranean Sea, where the governments of France, Spain, Monaco, and Italy have been unable to control its spread. The first confirmed North American occurrence of this invasive species in California has caused considerable alarm. The resulting press coverage of the issue led to discovery of a second infestation of *Caulerpa taxifolia* in Huntington Harbour in Orange County (about 75 miles north of the Carlsbad occurrence). Genetic studies have determined these two infestations to be of the same clone threatening the Mediterranean Sea. Efforts are underway to eradicate *Caulerpa taxifolia* from California and prevent further spread before the infestation reaches the magnitude seen in the Mediterranean.



Photo courtesy of Rachel Woodfield


*Caulerpa taxifolia* is a green alga native to tropical waters that typically grows to small size and in limited patches. In the late 1970s this species attracted attention as a fast-growing and decorative aquarium species that became popular in the saltwater aquarium trade. A clone of the species was cultured for display at the Stuttgart Aquarium in Germany and provided to aquariums in France and Monaco. Around 1984 this species apparently escaped or was released from an aquarium into Mediterranean waters, and rapidly spread from an initial patch of about one square yard to

over two acres by 1989. By 1997 it was reported to have blanketed more than 11,000 acres of the northern Mediterranean coastline, and in 2001 is reported to occupy over 30,000 acres. It has also been reported off northern Africa and also in Australia, where it is smothering seagrass beds in a manner reminiscent of the invasion in the Mediterranean. Genetic analysis suggests that all *Caulerpa taxifolia* plants in the Mediterranean are clones of the original, released saltwater aquarium plant.

In areas where the species has become well established, it has caused ecological and economic harm by overgrowing and eliminating native seaweeds, seagrasses, reefs, and other communities. In the Mediterranean, it is reported to have harmed tourism and pleasure boating, discouraged recreational diving, and had a costly impact on commercial fishing both by altering the distribution of fish as well as creating a considerable impediment to net fisheries. The dense carpet that this species can form on the bottom could inhibit the establishment of juveniles of many reef species, and its establishment offshore could seriously impact commercial fisheries and navigation through quarantine restrictions to prevent the spread of this species.

This alga is thought to pose a substantial threat to marine ecosystems in Southern California, particularly to the extensive eelgrass meadows and other benthic environments that make coastal waters such a rich and productive environment for fish, invertebrates, and birds. The eelgrass beds and other coastal resources that could be directly impacted by an invasion of *Caulerpa* are part of a food web that is critical to the survival of numerous native marine species including the commercially and recreationally important spiny lobster, California halibut, and sand basses. However, this threat is not exclusive to California. Aside from the likelihood that this invasive strain could thrive in other warm locales, such as the Gulf of California, the Gulf of Mexico, and the Pacific coast of Florida, cooler waters should not be ruled out as being at risk also. This seaweed has been observed to survive many months in 50° F water. Given this tolerance to cold and the remarkable adaptability that this species has displayed, it would be wise for even more northern regions to be aware of the damage that introduction of this species could cause to their native ecosystems.





According to French biologist and *Caulerpa* expert Alexandre Meinesz, this clone can grow larger, at deeper depths (in excess of 300 feet), and in colder waters than the tropical populations of the species and therefore threatens not only tropical areas, but temperate regions as well. It grows on almost any substrate and in many different energy regimes, ranging from protected bays to exposed headlands. Great monotypic stands can develop, effectively carpeting the bottom. *Caulerpa* spreads readily via fragmentation. Fishing nets and boat anchors are believed to be primarily responsible for the dispersal of the species throughout the Mediterranean.

Despite bans on its possession in France, Spain, and Australia, this organism continues to be transported and sold by the aquarium trade throughout the United States. A recent ban on a select list of *Caulerpa* species has gone into effect in California, however it is still commonly used in home aquaria.

Although delays in recognizing the true threat of the invasion in the Mediterranean make the eradication of *Caulerpa taxifolia* there unlikely, distribution of the *Caulerpa* discovered in California is restricted enough that eradication efforts have been optimistically undertaken. After exploring techniques such as dredging, hand removal, draining of the lagoon, and application of various herbicides, our biological consulting firm in San Diego, Merkel & Associates, developed and implemented a plan to treat the seaweed in situ to avoid further fragmentation and spread. Each patch of *Caulerpa* was covered with a heavy plastic tarp that was sealed to the bottom at the edges and fitted with a small “port” on top that allowed for the introduction of herbicide under the tarp. The tarp allowed for the direct treatment of the target patch, while preventing the loss of herbicide to the lagoon waters.

Although the algae appeared to have been effectively treated, the tarps were left in place to prevent the growth of *Caulerpa* from portions of it that grow in the mud and that may not have been fully treated by the herbicide application. The initial infestation has been treated in Carlsbad, with continual survey work required to detect any regrowth, an effort expected to take at least five years. A very similar eradication was undertaken in Huntington Harbour, where follow-up survey and treatment work also continues.

It is critical that the initial success of the eradication efforts undertaken do not lull the public and regulators into a false sense of complacency. The probability that there are infestations that so far have avoided detection, as well as the common occurrence of *Caulerpa* residing in aquariums, nearly ensures that this seaweed will continue to pose a threat to U.S. coastlines. Although the invasive clone of *Caulerpa* is not known to reproduce sexually, and is therefore not typically considered as an issue in relation to marine shipping and associated ballast water concerns, there is the potential for the introduction and or spread of *Caulerpa* by ship anchors. *Caulerpa* has never been documented to be attached to or spread by boat hulls, however anchors are identified as the major source of spread in the Mediterranean. *Caulerpa* can survive for many days in an anchor hold and can readily introduce *Caulerpa* to new locations. This is just one of many instances where a species is introduced into a region by one vector (in this case by aquarium release), then spread throughout the region by another vector (i.e., boat anchors). In California, regulators and researchers hope that continued early detection and removal efforts will eradicate *Caulerpa* before it spreads throughout the region.

### ***Caulerpa* Watch**

If *Caulerpa taxifolia* is observed in the wild, carefully collect a piece in a zip-lock and freeze. Note as much information as possible about the location where it was found and report it immediately to the Southern California *Caulerpa* Action Team at (858) 467-2952. For more information about *Caulerpa* visit the website <http://caulerpa.cjb.net> or E-mail: [caulerpa@rb9.swrcb.ca.gov](mailto:caulerpa@rb9.swrcb.ca.gov).

## NEW MARINE INVASIONS RESEARCH LABORATORY OPENS IN THE SAN FRANCISCO BAY AREA

By: Dr. Jeff Crooks, Smithsonian Environmental Research Center

The Marine Invasions Research Laboratory of the Smithsonian Environmental Research Center (SERC) is an international center for research on non-native species in coastal ecosystems. The lab is based at SERC headquarters, on the shores of Chesapeake Bay in Edgewater, Maryland. Recently, the Invasions Laboratory has established a West Coast lab at the tip of the Tiburon Peninsula in San Francisco Bay. This site, located at the Romberg Tiburon Center of San Francisco State University, will facilitate studies of invasions in the San Francisco Estuary and provide a base of operations for Pacific Coast research.

A primary goal of the Marine Invasions Lab is to bridge the gap between science and policy by developing the scientific understanding necessary to guide and evaluate invasive species management strategies. To this end, a variety of invasions-related projects are being carried out. Nationwide patterns of ballast water delivery and management are being assessed via the National Ballast Water Information Clearinghouse, which was created through the National Invasive Species Act of 1996. Another focus of the Invasions Lab is quantifying the rates, patterns and impacts of coastal invasions through literature, laboratory, and field analyses. In addition, researchers at SERC are assessing the magnitude and consequences of ship-mediated transfer of disease agents.

One of the largest projects underway at the Marine Invasions Research Center is aimed at generating quantitative and comparable invasion assessments across estuarine ecosystems. This is critical because even though some apparent patterns of invasion are beginning to emerge, researchers still lack the ability to make accurate comparisons across systems due to highly uneven research efforts. These invasion surveys will also provide necessary benchmark information with which to evaluate future changes in invasion patterns, such as those that are anticipated in response to ballast water management efforts. The Invasions Lab is addressing this gap in knowledge through intensive faunal surveys of SERC's two focal sites, San Francisco Bay and Chesapeake Bay, with additional information coming from multiple sites in the United States and Australia.



Fouling panels being deployed at Treasure Island in San Francisco Bay. Photo courtesy of SERC.

For this field invasion assessment, researchers are focusing on the invertebrate fouling community (e.g., barnacles, mussels, tunicates and hydroids) through the use of quantitative biological collectors (i.e., fouling panels). The biofouling community is a species-rich assemblage that is comprised of abundant native and exotic taxa, and should provide an excellent means of assessing patterns of invasion within and across systems.

In addition, fouling communities are amenable to experimental manipulation, and our current research is examining the effects of pollution on the development of these assemblages. Particular emphasis is being placed on determining the relative success of exotics versus natives under different stress regimes.

In addition to work on fouling communities, a number of other studies are underway in San Francisco Bay. Given the increasing scientific and political interest in ballast water ecology and management, the Invasions Lab is continuing studies of ballast water dynamics and is working with the Port of Oakland to examine patterns of ballast water delivery and effectiveness of exchange. This work focuses on container ships, which have received less attention than other ship types (e.g., oil tankers and bulk cargo carriers). Another project, initiated in collaboration with NOAA scientists, is addressing the spread and potential management of an invasive snail, *Littorina saxatilis*, within San Francisco Bay.

The research within the San Francisco Estuary is intended to reveal some of the causes and consequences of invasions within this heavily invaded ecosystem. It also will contribute to the general understanding of marine invasions and their management.



### Question:

Do federal or state regulations require ballast water exchange to ballast tanks that will not be de-ballasted in a U.S. port? For example, if we carry ballast water from a foreign port, can that water be kept onboard without mid-ocean exchange since it will not be discharged in a U.S. port? I just want to ensure myself that procedure and laws are followed correctly, without unnecessary emptying and refilling of ballast tanks.

*Submitted by: Master, M/V Madame Butterfly, Wallenius Lines.*

### Answer:

If you do not plan to discharge your water, then it does not need to be exchanged. This is true under the federal program (NISA 96) and all of the existing state programs.

Even though it is not required to exchange ballast water that is not being discharged, many captains/companies will exchange the ship's ballast water even if they are not going to discharge in U.S. waters. The primary reason for this is because it gives the captain/company flexibility. For example, if the ship has an unplanned change to its itinerary and/or cargo that requires the ship to discharge ballast in California waters, then the ship would be in violation of the law if they did not exchange the ballast water before discharging. The other reason to exchange ballast water is to protect the area/port where the ballast water is eventually discharged. All areas/nations are at risk for harmful aquatic organisms and pathogens, even if the nation does not have regulations for ballast water. The International Maritime Organization (IMO) has Guidelines for the control and management of ships' ballast water to minimize the transfer of harmful aquatic organisms and pathogens (adopted by resolution A.868(20) in 1997).

The bottom line is that you do not have to exchange ballast water if you are not going to discharge it into an area where it is required by law (i.e., California, Oregon, Washington, Great Lakes, etc.). IMO Guidelines recommend that you conduct an open ocean ballast exchange when possible to minimize the transfer of harmful aquatic organisms and pathogens.

Please submit any questions that you might have to Karen McDowell at [kdhart@ucdavis.edu](mailto:kdhart@ucdavis.edu). Your questions will be answered immediately and one or more of the questions will be printed in the next edition of the Ballast Exchange.

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### Regional Fish & Wildlife A.N.S Representative

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## COMING EVENTS

### **Prevention First 2002 Long Beach, CA September 10-11, 2002**

The California State Lands Commission is sponsoring this Onshore and Offshore Pollution Prevention Symposium and Technology Exhibition at the Westin Hotel in Long Beach, CA. There will be a 1/2 day session on Ballast Water Management Strategies and Equipment on September 11. Some of the other topics that will be covered are: Marine Oil Terminal Engineering and Maintenance Standards, Harbor Management Issues, Prevention and Safety through Process Management, and Homeland Security. For more information visit the web site at <http://www.slc.ca.gov/>.

### **3rd International Conference on Marine Bioinvasions San Diego, CA March 17-19, 2003**

The Massachusetts Institute of Technology (MIT) Sea Grant College Program and the California Sea Grant College Program invite you to participate in this Conference. The focus is on the incidence, effects and management of exotic species in coastal, estuarine, and marine ecosystems.



*Ballast Exchange is funded in part by a grant from the National Sea Grant College Program, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, under grant number NA66RG0477, project number AEA-2 through the California Sea Grant College Program, and in part by the CalFED Bay-Delta Program. The views expressed herein are those of the author(s) and do not necessarily reflect the views of NOAA or any of its sub-agencies.*



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## ON LINE

ANS Task Force  
<http://www.anstaskforce.gov/>

California State Lands Commission  
<http://www.slc.ca.gov/>

Global Ballast Water Management Programme  
(GloBallast)  
<http://globallast.imo.org/>

InvasiveSpecies.Gov  
<http://www.invasivespecies.gov/>

National Ballast Water Information Clearinghouse - SERC  
<http://invasions.si.edu/ballast.htm>

Northeast-Midwest Institute – Aquatic Invasive  
Species Site  
<http://www.nemw.org/biopollute.htm>

USGS Nonindigenous Aquatic Species Site  
<http://nas.er.usgs.gov/>

Sea Grant National Aquatic Nuisance Species  
Clearinghouse  
<http://www.cce.cornell.edu/aquaticinvaders/>

Sea Grant Nonindigenous Species Site  
<http://www.sgnis.org/>

Ship Operations Cooperative Program – BWM Web Site  
<http://www.socp.org/>

U.S. Coast Guard Ballast Water Program  
<http://www.uscg.mil/hq/g-m/mso/mso4/bwm.html>

West Coast Ballast Outreach Project  
<http://ballast-outreach-ucsgep.ucdavis.edu/>