



Outstanding Accomplishments in Research

Aquatic Invasive Species

Research is at the center of all National Oceanic and Atmospheric Administration services. NOAA's Office of Oceanic & Atmospheric Research (OAR) conducts research, develops products, and provides scientific understanding and leadership to support NOAA's mission to meet our nation's economic, social and environmental needs.

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Species of plants or animals not native to a particular ecosystem can have harmful effects when they "invade" the new environment. Aquatic invasive species, also known as "exotic" or "nuisance" species, threaten the health of the Nation's ocean resources and coastal and fresh water ecosystems. NOAA Research works at the local, state, national and international levels to address the aquatic invasive species problem and reduce the impacts these intruders have on the environment, commerce, and trade.

Focus on Prevention

Many aquatic invasive species arrive to new ports via the ballast water of ocean-going ships. Others are introduced by intentional or accidental releases of aquaculture species, aquarium specimens or bait. Since it's less costly to prevent an introduction than to eradicate an unwelcome species, much research is focused on technology to prevent introductions. Seeking strategies to prevent invasion through ocean-going vessels, NOAA's National Sea Grant College Program and Great Lakes Environmental Research Laboratory (GLERL) support research to develop ballast water technology and marine engineering advances to combat invasive species.

A Michigan Sea Grant researcher developed a new ship design that eliminates the need to transport ballast water. The ballast-free ship design concept replaces ballast tanks with a series of slow-flow ballast tubes, or trunks. The tubes open to the sea, ensuring constant flow so that ballast trunks are always filled with local water. This research could lead to an environmentally safer ship design.

GLERL scientists released a report that analyzed cargo ship ballast management practices and provided a detailed biological characterization of residual mud and water in ballast tanks that can hide organisms that eventually find their way into fresh water lakes. The report suggested that the risk of these hidden stowaways may be lowered with conscientious and consistent management practices,

such as flushing tanks with saltwater on the open ocean whenever possible.

Education and Coordination

The Great Lakes Sea Grant Network conducted an aquatic invasive species survey in the Great Lakes to assess and improve the effectiveness of boater education on invasive species. The survey demonstrated that public education significantly changes boater behavior, and prevents and slows the spread of plant and animal invaders. This finding has helped many states, provinces and task forces justify expending resources for boater education. Five states have agreed to adopt the survey findings and others are planning to adapt the survey for their use.



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PROTECT OUR ENVIRONMENT
DO NOT RELEASE FISH AND AQUATIC PLANTS
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Habitattitude™

Highlighted in the U.S. Ocean Action Plan, Habitattitude™ was launched by NOAA, the Pet Industry Joint Advisory Council, and the U.S. Fish and Wildlife Service, as a major public education and outreach effort called to prevent the release of non-native plants and animals. Its message: *"If you have acquired an undesirable aquatic plant or fish species for your aquarium or water garden, it is important not to release these plants or animals into the environment."*

Since 2004, the Pet Industry has supplemented NOAA's investments in Habitattitude™, through the Sea Grant program, by contributing more than \$1 million. In addition, more than 95 percent of all aquatic-pet sellers in the country have committed to participate in the program.

Early Detection and Rapid Response



Hemimysis anomala

New York Sea Grant is working to develop a rapid research response to the recent discovery of “bloody-red shrimp” *Hemimysis anomala* in Lake Ontario as part of a multi-state, binational group coordinated by NOAA’s Great Lakes Environmental Research Laboratory (GLERL). GLERL and Sea Grant are coordinating

research that is needed to determine how the *Hemimysis* will affect the Great Lakes’ food webs and fisheries, and top scientists are developing a research plan for *Hemimysis* in the Great Lakes.

The National Center for Research in Aquatic Invasive Species, hosted at GLERL, is leading an effort to coordinate early assessment of the spread of another deadly invader: viral hemorrhagic septicemia (VHS) which causes fatal anemia and hemorrhaging in many native fish species. Sampling protocols are being developed to track and eventually control this species in the Great Lakes and elsewhere.

Control and Management

Chicago waterways link the Great Lakes and the Mississippi River, providing a convenient transportation route for invasive species. Researchers are working to prevent the Asian carp, which could adversely affect every species of fish in the Mississippi River, from passing through this waterway. Illinois-Indiana Sea Grant played a critical role in the creation of a groundbreaking electric barrier in the Chicago waterways that is stopping the Asian carp in its tracks. The barrier is designed to allow water and boats to flow through, but not fish, which experience increasing levels of electricity as they move through the dispersal barrier and are compelled to turn around. An additional barrier is under development.

Willapa Bay, on Washington’s ocean coast, is the number one oyster producer in the U.S. and among the top five oyster producers worldwide. The bay is also home to oyster drills – non-native marine snails that feed on oyster flesh, causing substantial damage to the shellfish. A Washington State Sea Grant researcher collected, marked and released and later recaptured, thousands of oyster drills, supplying important information about the growth, survival and reproductive rates of these snails. This research is also shedding light on oyster drill eradication methods. Sea Grant has shared preliminary findings with oyster growers, who have been quick to adopt the suggested control methods.

PREEMINENT RESEARCH

NOAA is charged with developing a program for aquatic invasive species prevention, monitoring, control, education and research to prevent introduction and dispersal of aquatic invasive species, to disseminate related information, and to provide leadership in the coordination of federal invasive species efforts. NOAA Research leads the coordinated NOAA-wide invasive species program through leadership under two significant research, outreach, and education programs: The National Sea Grant Aquatic Nuisance Species Program and the GLERL Nonindigenous Aquatic Nuisance Species Program.

NOAA Research works at the local, state, national and international levels to address the Aquatic Invasive Species (AIS) problem and the impacts AIS have on the environment, commerce, and trade using a six-part approach: prevention, monitoring and early detection, rapid response, control and management, restoration, and leadership and coordination.

VALUE TO SOCIETY

Populations of invasive species can explode in new ecosystems, reduce the size and value of native fish stocks, and change food chains, increasing the danger to humans of toxic substances. Legislation in the 1990s recognized NOAA’s expertise and abilities to work on this growing problem and NOAA has led the way in addressing the aquatic invasive species problem, including research, interagency and international collaborations, and education and outreach efforts. NOAA’s Sea Grant Program published a report documenting research results on 22 species in 24 states, yet, with more than 160 invasive species reported from the Great Lakes and 260 from San Francisco Bay, more needs to be done.

To Learn More, Visit These Sites:

NOAA Research- Aquatic Invasive Species: http://www.oar.noaa.gov/oceans/t_invasivespecies.html

National Center for Research on Aquatic Invasive Species: <http://www.glerl.noaa.gov/res/Programs/ncrais/mission.html>

To Work or Study at OAR, Visit These Sites:

NOAA Careers: <http://www.careers.noaa.gov>

Hollings Scholarships: <http://www.orau.gov/noaa/HollingsScholarship/>

Knauss Fellowships: <http://www.seagrant.noaa.gov/knauss/>

NOAA’s mission is to conduct research, develop products, provide scientific understanding and leadership and to conduct outreach towards fostering NOAA’s evolving environmental and economic mission.