

Two if by Sea

Vol. 9 No. 1

Summer 2007

A joint newsletter from the MIT and WHOI Sea Grant Programs

In this issue

- 1 North Atlantic Right Whale Biopsies: Clues to Genetic Response to the Environment**
Researchers armed with crossbows use minimally invasive methods to study fragile whales.
- 2 Odds and Ends**
Newsworthy notes from the Sea Grant community
- 3 The Better Scallop Dredge**
Improving the design of a scallop dredge should be good news for essential fish habitat.
- 4 Protecting Coastal Wetlands and Coastal Landforms: Training the Decision Makers**
A unique partnership helps decision makers integrate scientific results with regulatory decisions.
- 5 Profile**
Roman Stocker
- 6 Publications**
- 7 Treasure Chest**
Poetry by Galway Kinnell
- 8 Netting**
A selection of marine-related web sites
- 8 Calendar**

North Atlantic Right Whale Biopsies: Clues to Genetic Response to the Environment

Judith E. McDowell, WHOI Sea Grant

The North American right whale (*Eubalaena glacialis*) is one of the most endangered whale species in the world. Once heavily exploited by whalers, right whales now number roughly 350. While no longer fished, the whales remain threatened by other human interactions, such as entanglement in fishing gear and collisions with ships. Another threat, not easily detected, is the uptake and accumulation of persistent organic pollutants (POPs) and the effects these contaminants have on the physiology of the North Atlantic right whale, especially on reproductive biology. In comparison with its South Atlantic counterpart, the North Atlantic right whale has lower calving rates and reproductive rates. Could contaminant exposure contribute to this decline in reproduction?

Many of the persistent contaminants in the marine environment, such as PCBs (polychlorinated biphenyls), dioxins and PAHs (polycyclic aromatic hydrocarbons) are fat-soluble and come to reside in the fatty tissues of marine mammals, including the North Atlantic right whale. Some of these chemicals have been characterized as endocrine disruptors; some are believed to reduce reproductive success, to interfere with developmental processes, and/or to suppress immune function. While PAHs do not bioaccumulate in marine mammals, they may have adverse impacts on the health of animals through repeated exposure and metabolic response.



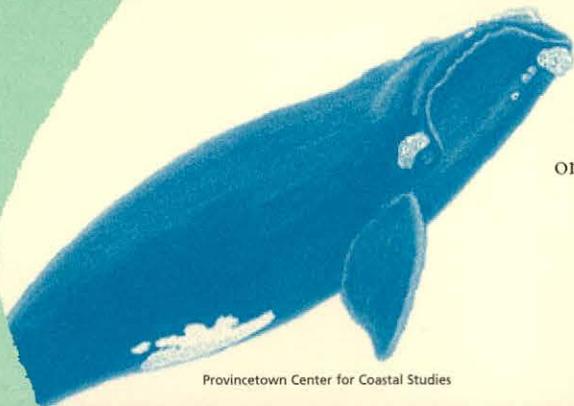
Tom Kleindinst, WHOI

▲ Joy Lapsertis with a crossbow, preparing to take a biopsy sample from a right whale.

Ethical, legal, and logistical considerations make it impossible to experiment on living North Atlantic right whales in the wild. Instead, scientists have turned to the use of biopsies, or small tissue samples, and recent strandings to obtain experimental material. What can these opportunistic samples tell us about the fragile populations of the North Atlantic right whale?

That was the question that Joy Lapsertis set out to address in her doctoral dissertation as a graduate student in the MIT-WHOI Joint Program in Biological Oceanography. Marine mammals have always fascinated Lapsertis, and when she joined the research group led by Mark Hahn at WHOI, she knew she was going to find a way to study these gentle giants of the sea. With funding from Woods Hole Sea Grant and NOAA's North Atlantic Right Whale Grant Program, Lapsertis embarked on her studies in collaboration with other scientists studying the

Could contaminant exposure contribute to this decline in reproduction?



Two if by Sea

Two if by Sea reviews the coastal and marine-related research, advisory, education, and outreach activities of the MIT Sea Grant College Program and the Woods Hole Oceanographic Institution (WHOI) Sea Grant Program. The programs are part of the National Sea Grant College Program, a network of 30 core colleges and institutions established in 1966. Operating through partnerships between academia, government, and industry, Sea Grant works to achieve a sustainable economy and environment. Sea Grant is funded through the Department of Commerce's National Oceanic and Atmospheric Administration.

We welcome your feedback. To reach us, or to request a free subscription of *Two if by Sea*, send an e-mail to 2ifbysea@mit.edu, or contact either program:

MIT Sea Grant

Bldg. E38-300, 292 Main Street,
Cambridge, MA 02139
phone (617) 253-7092; fax (617) 252-1615
Web: <http://web.mit.edu/seagrant/>

WHOI Sea Grant

MS #2, 193 Oyster Pond Road,
Woods Hole, MA 02543-1525
phone (508) 289-2398; fax (508) 457-2172
Web: <http://www.whoi.edu/seagrant/>

Editor

Andrea Cohen, MIT Sea Grant

Graphic Design

Wilcox Design, Cambridge, MA

Director, MIT Sea Grant

Chrys Chryssostomidis

Director, WHOI Sea Grant

Judy McDowell

Two if by Sea © 2007

Odds and Ends



At one training session, says MIT Sea Grant's Madeleine Hall-Arber, a fisherman discovered that his survival suits leaked. He then bought new ones not long before he found his boat taking on water. "He didn't panic because he'd had the training," says Hall-Arber. "He got the suit on and he took the training again."

Thus far, 160 fishermen have taken advantage of the training. More classes are slated for Chatham and possibly Pt. Judith, RI.

Robots on the River

NOAA Chief of Staff Scott Rayder recently joined MIT Sea Grant in hosting Robots on the River, an opportunity for some 120 students and the general public to see marine robots in action. Part of the first Cambridge Science Festival, the event featured the AUV Lab's autonomous surface craft, Katrina, powering along on the Charles. Initially created to safely and quickly collect information about pollution in Lake Pontchartrain after the devastation of Hurricane Katrina, the boat can take measurements in lakes, rivers, and calm ocean environments, running autonomously or via remote control. Students also got to try their hand at operating a Sea Perch, a simple remotely operated vehicle (ROV) that students can build and test in their classroom. And researchers from Bluefin Robotics—the company formed in 1997 by researchers from MIT Sea Grant's AUV Lab—introduced students to their AUVs as well—vehicles that conduct oceanographic research, survey the sea floor for deep ocean oil drilling, and help the US Navy locate enemy mines in sea lanes, beaches and harbors. All "wicked swift," as one student put it.



Aid for Red Tide Losses

A devastating red tide bloom closed shellfish beds from Maine to Massachusetts in the spring of 2005, prompting the Massachusetts Division of Marine Fisheries (DMF) to close over 1.3 million acres (over 75% of the Commonwealth's marine waters) in 42 coastal communities to all types of shellfishing.

In June 2006, Congress passed the Supplemental Appropriations Act for Defense, the Global War on

Terror, and Hurricane Recovery, setting aside \$5 million to assist fishermen affected by fisheries disasters declared in 2005. Maine and Massachusetts each received \$2 million to address the economic hardships of shellfish harvesters. This spring, Woods Hole Sea Grant's fisheries and aquaculture specialist Bill Walton assisted the DMF with grant writing training for affected shellfish harvesters interested in applying for these funds.

Funds will be distributed to eligible applicants based on two weighted factors, relative to other applicants: the length of time the harvester was not allowed to shellfish and the typical harvest amount for that harvester. Applications were due in April, and DMF hopes to have payments distributed by the end of this summer. For more information, see http://www.mass.gov/dfwele/dmf/programsandprojects/red_tide_relief.htm.

Model Coastal Floodplain By-law

The U.S. coastal population is predicted to expand from approximately 100 million people to 177 million by 2010. This is occurring as property losses from coastal disasters continue to skyrocket, reaching more than \$150 billion in the 1990s. Predictions of a very likely increase in storm intensity, coupled with an acceleration in the rate of sea level rise, indicate this upward trend is likely to continue.

Building on Sea Grant's model of providing state-of-the-art scientific and legal information to enhance preparedness and reduce losses of human life, property, and environmental resources from coastal natural hazards, Woods Hole Sea Grant has partnered with Barnstable County's regional planning agency, the Cape Cod Commission (CCC), and Edward Thomas, an attorney specializing in national floodplain case law, to develop a national model coastal floodplain by-law/ordinance.

The objectives of this project, which is funded by the National Sea Grant Law Center, are to research precedent-setting coastal floodplain case law, review our current scientific understanding of the physical beneficial functions of the coastal floodplain, and analyze existing model by-laws of the CCC and other groups in the nation to generate a model by-law or ordinance that is based on these legal and scientific understandings, and will be transferable nationally.

Fishermen Safety Training

With funding from NOAA, MIT Sea Grant and The Massachusetts Fishermen's Partnership have started their second year of offering free, hands-on safety training to commercial fishermen and their families. The program covers safety, fire and damage control, rescue procedures, raft deployment, flare and EPIRB use, survival suit use, Mayday calls, helicopter rescue, and an introduction to first aid.

At a training session in Gloucester in late April, some 60 fishermen practiced getting into their "gumby" suits, jumping into the water and climbing into a raft.

Participants also extinguished fires, shot flares, and used a leak kit to repair various simulated leaks. In the first aid introduction, fishermen learned how to treat cuts and infections and deal with fish poisoning. They also learned about some less obvious occupational hazards: the toxicity of many paints used to paint buoys, and the dangers of particulate matter from sanding boats and buoys.

The Better Scallop Dredge

by Andrea Cohen, MIT Sea Grant

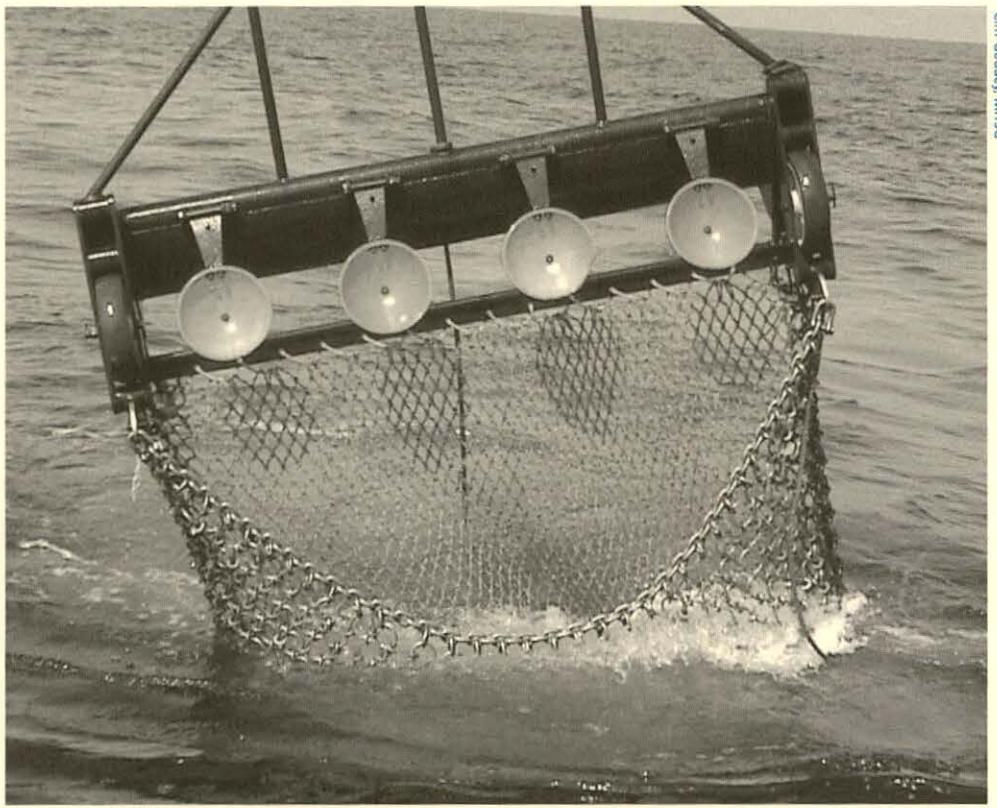
Cliff Goudey's version of the better mousetrap is the better scallop dredge. The director of MIT Sea Grant's Center for Fisheries Engineering Research is keen on building a better dredge—even though he's the first to admit that current dredges do a fine job of catching scallops, with a \$300 million industry in New Bedford alone.

What current dredges don't do, says Goudey, is take into consideration unintended consequences, such as damaging bottom habitat—a concern since the 1986 reauthorization of the Magnuson-Stevens Act introduced the issue of essential fish habitat. "By taking a rational approach and looking at how dredges actually work rather than by guessing," says Goudey, "we might be able to get better performance from them from the standpoint of catch rates, longevity and even initial cost, and at the same time reduce the negative consequences of towing a dredge."

The standard dredge used to harvest scallops consists of a heavy steel towing frame and a chain bag that drags along the sea floor behind the frame. The dredge includes a cutting bar, which has little effect on a perfectly level bottom. However, on a more typical sea bottom with sand waves or humps and valleys, the cutting bar levels the bottom so that the chain bag can scoop up scallops in its path. Yet, along with the scallops, says Goudey, other organisms living on and buried just below the surface, things biologists call "emergent epifauna," can get caught or damaged.

Is there a way to catch scallops without leveling the bottom in front of the dredge? Goudey figured that would require disturbing or lifting the scallops, in preparation for the chain bag, without physically contacting the ground. The best option for that, he decided, was exploiting hydrodynamic effects through the insertion of flow control devices. So using MIT's towing tank, Goudey experimented with devices of different shapes and sizes to see how they affected scallop shells placed on the bottom of the tank. The most promising results from those tests were implemented in a prototype dredge for fishing trials.

"We built a small dredge fitted with four 11-inch hollow hemispheres mounted at a 30-degree angle of attack and positioned close to the seabed. The shapes were mounted on pivots so that if they hit something they could deflect up out of the way," says Goudey. The hemispheres "produce a downward directed jet of water that seems to have a profound effect on scallops when they're hit by it," he explains. The dredge also rides on wheels that replace the skid plates of a normal dredge. "Essentially the scallops get caught up in the large vortices that trail this shape, and they start spinning up in the water high enough so that they'd still be suspended in the water when the chain bag came by.



Cliff Goudey, MITSG

▲ Testing the scallop dredge off of Ireland's Isle of Man.

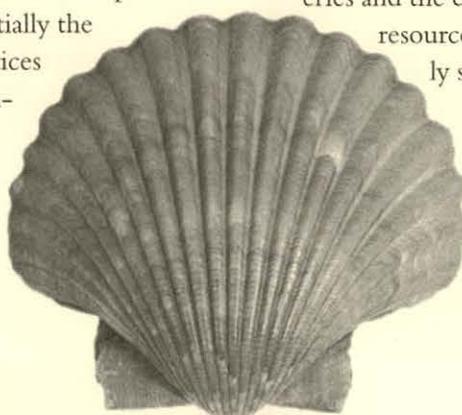
This is exactly the reaction that we were looking for," he states.

In field tests on Stellwagen Bank, the newfangled scallop dredge caught 50% to 60% of a normal catch. "We believe that with a little adjusting of the sweep chain that catch rate could become competitive," says Goudey. He also notes that cameras mounted on the dredge indicated that flow patterns seen in the ocean as the dredge was dragged along the bottom were essentially the same as those observed in the tow tank.

A talk Goudey gave at the October 2006 International Council for the Exploration of the Seas (ICES) prompted an invitation from Sam Shepherd and Michel Kaiser of the University of Wales in Bangor, Ireland to try the dredge out on the Isle of Man. So in April, Goudey shipped the dredge across the Atlantic, and then followed along for field tests funded by Ireland's Department of Agriculture, Fisheries and Forestry.

In those trials, the researchers used the dredge aboard a research vessel and a commercial scallop trawler, both with the participation of local fishermen. The dredge was particularly successful in catching queen scallops (called queenies). A lower than expected catch of larger types of scallops suggested that some simple modifications may make the dredge more effective. Additionally, the dredge caused far less damage to scallops than conventional gear, which also suggests an associated decrease in bycatch mortality. Shepherd and Kaiser hope to employ a version of the gear as part of a developing management strategy for Manx/Irish sea scallop and quenie fisheries.

"The idea of developing gear that would both benefit fisheries and the essential fish habitat that supports the resource is always a laudable goal, but not necessarily something that people jump aboard," acknowledges Goudey. His hope is that the research trials will demonstrate that improved fishing gear is good for fishermen and good for preserving the



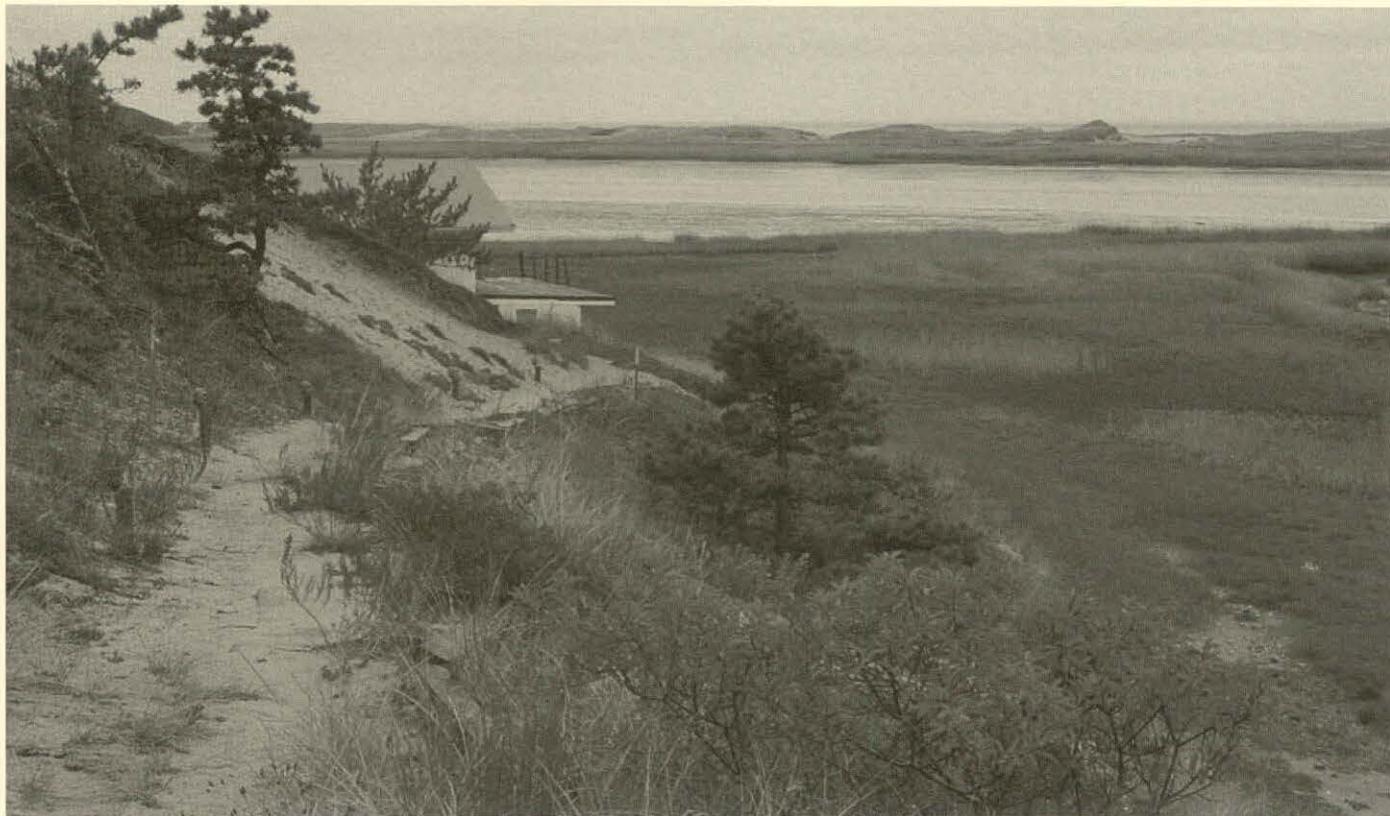
continued on page 6

Protecting Coastal Wetlands and Coastal Landforms: Training the Decision Makers

Judith E. McDowell, WHOI Sea Grant

As we drive along the shore or explore a coastal habitat, the legal complications of managing such complex systems are generally far from our thoughts. Not so for volunteer members of coastal conservation commissions who must manage fragile coastal wetland systems and meet the com-

The Massachusetts Association of Conservation Commissions (MACC) offers a course, *Fundamentals for Conservation Commissioners*, for the state's conservation commissioners. The certification course consists of eight modules that cover such diverse topics as responsibilities and



Jim O'Connell, WHOI Sea Grant

peting demands of real estate developers, builders, and naturalists. Do these commissions possess sufficient technical information to tackle such a demanding job? That is one concern that the Massachusetts Coastal Training Program (CTP), in partnership with the Massachusetts Association of Conservation Commissions, hopes to address.

The Massachusetts CTP is a partnership between Waquoit Bay National Estuarine Research Reserve (WBNERR), the Massachusetts Office of Coastal Zone Management, and Woods Hole Sea Grant. MA CTP provides training and needs assessments for coastal communities and decision makers in an effort to integrate the latest research results with coastal decision-making. One recent assessment focused on the needs of coastal conservation commissions—local groups that must make critical decisions on wetlands management. That assessment indicated that critical technical information about statutes and regulations pertaining to coastal wetlands, landforms and habitats was not readily available to coastal conservation commissions. So when the National Sea Grant Law Center sought proposals for legal research and outreach projects, Woods Hole Sea Grant viewed this as an ideal opportunity to develop a series of modules for training coastal conservation commissioners.

There are 78 coastal communities within Massachusetts; their conservation commissions are the key decision makers for managing resources such as salt marshes, shellfish beds, beaches and dunes. Under the Massachusetts Wetlands Protection Act, local commissions have permitting authority over all construction projects in or near wetlands, including coastal wetlands. The definition of coastal wetlands in the act includes coastal beaches, coastal dunes, barrier beaches, coastal banks, rocky intertidal shores, and salt marshes. Citizen volunteers with varying backgrounds and expertise usually serve on conservation commissions. Yet, they must make decisions that integrate the legal, scientific, economic and engineering complexities of each project within the context of overlapping federal, state and local regulations.

▲ Salt marsh in Wellfleet Harbor

operations for conservation commissions; open space planning, protection and management; and wetlands and wetlands permitting. There is little information, however, on unique aspects of coastal wetlands, as the course focuses mainly on issues related to fresh water habitats. As one of the 11 projects through the National Sea Grant Law Center, WHOI Sea Grant and MACC's Ken Pruitt will be adapting the existing course for coastal issues.

Some of the key issues to be included in the coastal modules are coastal development, coastal flooding and erosion, and water quality. The existing training course will be expanded to include coastal problems, a pilot web-based program and an enhanced course taught at coastal locations will be implemented. The project will also integrate the results of Sea Grant supported science and engage Sea Grant researchers in local coastal planning programs.

Additionally, the project will develop educational materials to increase volunteer board members' understanding of coastal processes and problems, such as delineating the edges of coastal resources, i.e., defining the narrow margin where coastal wetland resources abut or overlie each other. The MA CTP is developing a DVD on "Delineation of Coastal Wetlands" with funding from WBNERR that will detail the vegetation and landform characteristics that define this critical margin in coastal wetlands.

This unique partnership between the MACC, MA CTP, other state agencies and private groups will increase the capacity for better decision making in coastal communities and will help integrate the latest scientific results with regulatory decisions. The end result, we hope, will be better training and scientifically sound decisions for sustainable coastal communities.

North Atlantic Right Whale Biopsies

continued from page 1

North Atlantic right whale. One aspect of her dissertation focused on the use of skin/blubber biopsies to obtain tissue samples for comparative biochemistry and molecular characterization of contaminant susceptibility genes and other biomarker genes related to contaminant effects and physiological condition.

Many scientists have used skin/blubber biopsies in their investigations of the North Atlantic right whale. The samples of skin and blubber are taken by a small dart shot from a crossbow. The procedure is minimally invasive. Biopsy samples are no larger than a couple of inches, yet they can yield valuable information on contaminant concentrations, genetic relationships among different animals, and quantitative information on blubber condition. In the past 15 years, researchers have sampled nearly two-thirds of the North Atlantic right whale population using the crossbow dart procedure. These small samples have allowed them to identify family trees, parental-offspring relationships, sex ratio of the sampled population, and the physiological and nutritional condition of the present population. Lapsertis' data sets add information on basic toxicology and susceptibility to chemical contaminants.

Lapsertis wanted to use the biopsy samples to isolate RNA and clone cDNA encoding the North Atlantic right whale aryl hydrocarbon receptor (AHR). AHR is an important gene in determining the susceptibility of an animal to persistent organic pollutants. Previous research in the Hahn lab has shown that AHR can be used as a sensitive biomarker of contaminant response in other marine mammals and birds. With this background information in hand, Lapsertis could compare the properties of the North Atlantic right whale AHR to those of AHRs from other species of marine mammals to try to ascertain whether or not contaminants were a contributing factor to the fragility of North Atlantic right whale populations. Using biomarkers of contaminant exposure and toxicity could lead to new insights of potential toxic effects in the North Atlantic right whale.



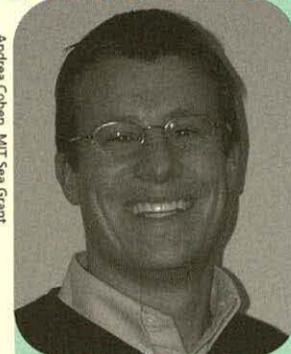
Michael Moore, WHOI

▲ North Atlantic right whale

To characterize the biochemical properties of AHR from the North Atlantic right whale, Lapsertis compared the binding affinity for dioxin with that of AHRs isolated from beluga whales, humpback whales, humans and mice. AHRs from the three species of whale share a high degree of similarity in amino acid sequences and binding affinity. The whale AHRs are distinctly different from mouse and human AHRs and intermediate in binding affinity between the high-affinity mouse AHR and the low-affinity human AHR. To approximate real-world conditions relevant to toxicological effects, Lapsertis used cell culture techniques to examine the transcriptional properties of the various AHRs. The results provide some interesting insights into how different chemical contaminants may activate toxic responses in different ways. These findings, although preliminary, could be important for understanding the relative contributions of PCBs versus PAHs to effects on North Atlantic right whale health. Further research is needed to understand how the AHRs are involved in endocrine function and reproductive biology in the North Atlantic right whale and other cetacean species.

Lapsertis will continue her research with marine mammals and the AHR receptor during summers in Woods Hole. But now her interests in toxicology and marine mammals have brought her to the classroom at Simon's Rock College of Bard in Great Barrington, Mass., where she just joined the faculty as an assistant professor. It's a bit like going home again for Lapsertis, as she graduated from Simon's Rock College in 1990 with an Associate of Arts degree before completing her Bachelor's degree in biology and marine science at Smith College. Among the various courses she will be teaching at Simon's Rock College are the biology of marine mammals and cell biology. She hopes to inspire some of her undergraduate students in continuing the work on the North Atlantic right whale by introducing them to these magnificent gentle giants.

Profile Roman Stocker



Andrea Cohen, MIT Sea Grant

The sleek orange chairs and elegantly curved desktop in Roman Stocker's office bespeak an eye for detail. That attention to smaller elements is at the heart of Stocker's research with marine microorganisms. The assistant professor in MIT's Department of Civil and Environmental Engineering was recently awarded MIT Sea Grant's Doherty Professorship to further his research into these tiny organisms, which are at the base of the oceans' food web and essential to the oceans' healthy functioning.

"We're interested in how swimming microorganisms actively respond to their environment," says Stocker, "as that strongly influences how nutrients are recycled in the ocean, and ultimately made available to other organisms."

To study fluid mechanics at very small scales, Stocker uses custom-tailored microchannel devices. Tiny channels, with typical sizes of hundreds of microns, are sandwiched between a polymer on the top and a glass microscope slide fused to the bottom. Syringes and pumps generate flows of varying speeds in the channels, allowing the researcher to create nutrient and flow scenarios mimicking those in the ocean.

"My work in microfluidics gives the biologists the ability to look at microorganisms in their environment in a manner that's impossible in the ocean, where the organisms are too small and the conditions too changeable," explains Stocker. In his Doherty-funded research, he will look at whether bacteria can find patches of high nutrient concentrations and get to them before they dissipate by diffusion or flow. If the bacteria reach the patch, they can gobble up nutrients such as carbon and nitrogen—elements initially thought to be lost from the food web. But "if bacteria can rapidly find and consume nutrients, they will be recycling them and ultimately they will be returned to the food web. These processes can totally change our estimate of the carbon cycle in the ocean," explains the researcher.

Stocker, who is gearing up for the field portion of his work, expects this research to help explain how marine microbes find food, avoid predation, and survive in a turbulent and heterogeneous world. That information may aid in fisheries and aquaculture endeavors, as well as in water quality monitoring, and our understanding of how the oceans figure in climate change.

—Andrea Cohen, MIT Sea Grant; and
Debbie Levey, MIT Dept. of Civil and
Environmental Engineering

Publications



The following publications are available from MIT Sea Grant and/or WHOI Sea Grant. For WHOI documents, write to WHOI Sea Grant, MS #2, 193 Oyster Pond Road, Woods Hole, MA 02543-1525; or call (508) 289-2398. For MIT documents, write to Publication Ordering, MIT Sea Grant, Bldg. E38-300, 292 Main Street, Cambridge, MA 02139. Requests should include your name and address and a check or money order for the amount listed, plus costs for shipping and handling (\$1.50 for domestic, \$3 for international postage). For a full listing of MITSG publications, see web.mit.edu/seagrant/publications; for a full listing of WHOISG publications, see www.whoi.edu/seagrant/Publications/Publications.html

MITSG 06-9J
00pp
\$2

Alien Species and Other Notable Records from a Rapid Assessment Survey of Marinas on the South Coast of England

F. Arenas, J. Bishop, J. Carlton, P. Dyrinda, W. Farnham, D. Gonzalez, M. Jacobs, C. Lambert, G. Lambert, S. Nielsen, J. Pederson, J. Porter, S. Ward, and C. Ward

This paper presents the findings of a rapid assessment survey for non-native species at 12 harbors along the south coast of England. Along with turning up 20 recognized non-native species, the survey indicated that dock pontoon systems in southern England are significant reservoirs of non-native species dispersed by vessels and other means.

MITSG 07-2J
16pp
\$4

Boundary Layer Separation by Lorentz Force Actuators

S. Dattarajan and Hamid Johari, Worcester Polytechnic Institute

This experimental study focused on examining the performance of an electro-magneto-hydrodynamic actuator in separation control in a weakly conductive fluid. Reprinted from the *Proceedings of the 36th AIAA Fluid Dynamics Conference and Exhibit*, June 5-8, 2006, San Francisco, CA.

MITSG 07-4J
10pp
\$2

The Colonial Ascidian *Didemnum* sp. A: Current Distribution, Basic Biology and Potential Threat to Marine Communities of the NE and West Coasts of North America

S. Bullard, G. Lambert, M. Carman, J. Byrnes, R. Whitlatch, G. Ruiz, R. Miller, L. Harris, P. Valentine, J. Colley, J. Pederson, D. McNaught, A. Cohen, R. Asch, J. Dijkstra, and K. Heinonen
Didemnum sp. A is a colonial ascidian with rapidly expanding populations on the East and West coasts of North America. Researchers present the findings of surveys from Maine to Virginia and from British Columbia to southern California.

WHOI-V-06-002
free

Coastal Hazards in Massachusetts: Discussions with Local Legislators (DVD)

James F. O'Connell, Woods Hole Sea Grant and Cape Cod Cooperative Extension

Massachusetts State Representatives Frank Hynes and Eric Turkington represent several coastal communities along the South Shore, Cape Cod, Martha's Vineyard, and Nantucket and are concerned with safety issues and preserving important coastal resources. Both legislators serve on the Massachusetts Coastal Hazards Commission and recently sat down with Jim O'Connell to discuss shoreline issues.

WHOI-R-06-003
8pp
free

DGGE-based Detection Method for Quahog Parasite Unknown (QPX)

R.J. Gast, WHOI; E. Cushman, Palm Beach Atlantic Univ.; D.M. Moran, WHOI; K.R. Uhlinger, Marine Biological Laboratory (MBL); D. Leavitt, Rogers Williams Univ.; and R. Smolowitz, MBL
QPX is a significant cause of hard clam *Mercenaria mercenaria* mortality along the Northeast coast of the U.S. It infects both wild and cultured clams, often annually, in plots that are heavily farmed. Subclinically infected clams can be identified by histological examination of the mantle tissue, but there is currently no method available to monitor the presence of QPX in the environment. This paper presents a polymerase chain reaction (PCR)-based method that will facilitate the detection of QPX in natural samples and seed clams. Reprinted from *Diseases of Aquatic Organisms*, Vol. 70, pp. 115-122.

WHOI-R-06-004
11pp
free

A Revised Late Holocene Sea-Level Record for Northern Massachusetts, USA

Jeffrey P. Donnelly, WHOI

This paper details how the author used radiocarbon-dated tidal saltmarsh deposits to construct a late Holocene sea-level history at Romney Marsh in Revere, Massachusetts, to refine the sea-level chronology for northern Massachusetts. Reprinted from *Journal of Coastal Research*, Vol. 22, No. 5, pp. 1051-1061.

WHOI-R-06-005
14pp
free

Groundwater-transported Dissolved Organic Nitrogen Exports from Coastal Watersheds

Kevin D. Kroeger, Marci L. Cole, and Ivan Valiela, Boston University Marine Program

In this paper, the authors present the results they received when they analyzed groundwater-transported nitrogen (N) exports from 41 watershed segments that comprised 10 Cape Cod watersheds to test the hypothesis that the chemical form of N exports is related to land use and to length of flow paths through watersheds. Reprinted from *Limnol. Oceanogr.*, Vol. 51, No. 5, pp. 2248-2261.

The Better Scallop Dredge

continued from page 3

sea floor. He also acknowledges that reducing the habitat impact of the dredge frame still leaves the question about the chain bag being dragged behind it.

"It's an obvious question," says Goudey. "But we have to attack one problem at a time. If we can prove that scallops can be efficiently harvested with a bottom-sparing dredge frame, then the design of the chain bag can be examined to reduce its impact. I already have some ideas."

Treasure Chest Poetry by Galway Kinnell

The Past

A chair under one arm,
a desktop under the other,
the same Smith-Corona
on my back I even now batter
words into visibility with,
I would walk miles,
assemble my writing stall,
type all day, many sheets
of prose and verse later
to blow away, while gulls,
sometimes a sightseeing plane,
turned overhead. The lean-
to of driftwood that thirty-
three-and-a-third years back
I put up on this spot
leans down all the way.
Its driftwood re-drifts.
Spray jumps and blows.
A few gulls fly that way,
a few this. One duck
whettles out to sea
in straight flight.
As for the Quonset hut
I broke into without breaking it
when the storms came, it too
has gone, swept out to sea, burned up,
buried under, torn down.
Too bad. But for me not all
that bad. For of the four
possibilities—from *me-and-it-
still-here to it-and-me-
both-gone*—this one, *me-here-
it-gone*, is second best,
and will do, for me, for now.
But I wanted to sit at the table again
and look up and see the sea spray
and beach grass happy together.
I wanted to remember
the dingy, sprouted potatoes,
the Portuguese bread, the Bokar coffee,

the dyed oranges far from home,
the water tasting of eroded aluminum,
the kerosene stench. The front
steps where I watched
the elation in the poverty grass,
when the wind blew. In a letter
that cast itself down in General
Delivery, Provincetown, my friend
and mentor warned, “Don’t lose
all touch with humankind.” One day
while all around gulls gave
exhausted screams, the wind
put a sudden sheen or flatness
like spiritual quietness across the water.
Now two waves of the North Atlantic
roll landward side by side,
converge, ripple into one,
rush up the beach, making me
jump back, and sink away under
white bubbles all suddenly
popping away at once. Here
waves slap not in time but in
evanescence, a rhythmless medium.
Mere comings, mere goings. Though now
there’s somewhat less coming
in the comings and more
going in the goings. Between
the two straggles a wandering
thread of sea litter
along the beach. So you see,
to reach the past is a snap. A snap
of the sea and a third of a century’s
gone. All nothing. Or all all,
if that sounds more faithful. But anyway
vanished. The work of
whoziwhatzit—Zeit . . . Zman . . . Chas . . .
whatever . . . Whichever
you strike with the desperate tongue coughs up
a deadened sound, as though
the thing itself were fake; or unutterable.

Galway Kinnell’s numerous books include *Strong Is Your Hold*, *A New Selected Poems*, *The Book of Nightmares*, *Body Rags*, *Flower Herding on Mount Monadnock*, *What a Kingdom It Was*, and many others. He has also translated the works of Bonnefoy, Goll, Villon, and Rilke, and has received the Pulitzer Prize, the National Book Award, and a MacArthur Fellowship. He is the Erich Maria Remarque Professor of Creative Writing at New York University and a Chancellor of the American Academy of Poets, and divides his time between Vermont and New York City.

Two if by Sea

Vol. 9 No. 1/MITSG #07-9

Summer 2007

A joint newsletter from the MIT and WHOI Sea Grant Programs

Netting

Check out these locales.

What's in Your Beach Bag?

www.beachcomberscompanion.net/

A companion to Woods Hole Sea Grant's popular Beachcomber's Companion®—the easy-to-use guide to common Atlantic coast marine invertebrates—this site can help you pack your beach bag with plenty of fun facts and web resources on beachcombing and marine invertebrates. If you don't live near the coast, or even if you do, you can go virtual beachcombing on this site! Find a critter that makes you smile? Share it with a friend by sending an e-Postcard. And, while you're there, be sure to purchase a set of waterproof marine invertebrate field cards for your next trip to the shore.

Radar Reflectors and Sea Kayaks

www.seagrants.umaine.edu/extension/coastcom/raref.htm

Do radar reflectors make kayaks more visible to vessels operating radar? Learn more about a Maine Sea Grant project that reviewed the effectiveness of a variety of commercial and homemade radar reflectors in increasing the visibility of sea kayaks on radar. Information about how radar works as well as recommendations for radar operators, paddlers, and manufacturers can be found on the site.

NOAA Celebrates 200 Years

<http://celebrating200years.noaa.gov>

During 2007 the National Oceanic and Atmospheric Administration (NOAA) celebrates 200 years of science, service, and stewardship provided to the American public by NOAA and its predecessors. There are many great stories to tell, from the

founding of the U.S. Survey of the Coast by Thomas Jefferson to the present-day activities of an agency dedicated to the protection, management, and understanding of our ocean, coasts, and skies. The site also includes information on events and activities scheduled throughout the year; a list of "Top Ten" history makers, breakthroughs, historic events, and more.

Storm Information for Coastal Officials

www.csc.noaa.gov/storm_info/

Do you know where to find storm-related data and resources on the Internet? This NOAA Coastal Services Center resource will direct you to Web sites that provide storm-related data and tools and will also guide you through the steps to obtain, display, and map storm-related data using geographic information systems (GIS).

Hurricanes in the Northeast

Learn about what to expect and how to prepare for hurricanes in the Northeast. This site also offers daily updates for Atlantic tropical weather and cyclone forecasts and advisories.

<http://web.mit.edu/seagrants/hurricanes/>

All Eyes on the Osprey

www.who.edu/science/osprey/

The seasonal occupants of an osprey nest located on WHOI's Quissett Campus are back! Last year we watched as a pair raised two young osprey—what will 2007 bring? Visit the site for live images via our web cam, updates, and information on previous seasons.

Calendar of Events

Ongoing

Coastal Decision Maker Workshops are specifically designed to inform coastal decision-makers about current science and management issues. Many of the workshops include practical information on addressing identified coastal management problems. For more information and the current schedule, visit www.coastaltraining.org/.

July 22-26, 2007

Coastal Zone '07. Portland, Oregon. The biennial Coastal Zone conference is the largest international gathering of ocean and coastal management professionals in the world. The conference theme this year will be "Brewing Local Solutions to Your Coastal Issues." See www.csc.noaa.gov/cz/.

July 23-27, 2007

National Marine Educators Association Annual Conference. Portland, Maine. This year's conference is titled "Downeast 2007: Ideas, Innovations, and Inspirations." Visit <http://gommea.org/downeast2007/>.

September 15-October 31, 2007

CoastswEEP, Massachusetts' annual coastal cleanup, is celebrating its 20th anniversary. Come join the thousands of volunteers who help make our beaches, rivers, and seafloors cleaner and safer. For more information, contact Pauline Westhaver or Dennis Leigh at 617-287-5570; email CoastswEEP@umb.edu; or see www.coastswEEP.umb.edu.

October 2-4, 2007

International Invasive Sea Squirt Conference II. Prince Edward Island, Canada. This conference will address the continuing problems associated with this invasive species of tunicates, with marine biologists and others exploring the biology, ecology, impacts, management options for control, and other relevant topics. See www.who.edu/institutes/oli/activities/seasquirt-2007.html.