WINTER 1998 VOLUME 2, NUMBER 4

Gulf of Maine Times

Promoting Cooperation to Maintain and Enhance Environmental Quality in the Gulf of

*Gulfwatch*

# Putting a little mussel into marine monitoring efforts

By Suzy Fried
*Editor*

**Gulf of Maine** — Each fall, small bands of people crunch over cobbles and mussel shells along the Gulf's coast to pull handfuls of blue mussels from their beds. Later they remove the mussels from their shells and bottle the meats. But rather than being stirred into a spicy marinara sauce, these mussels are sent to laboratories to be analyzed for trace metals and toxic organic contaminants. The results are entered into a database available to those looking for information about the Gulf's water quality.

All of this activity is overseen by Gulfwatch, the marine environmental monitoring program conducted by a committee of Canadian and US government and university scientists established by the Gulf of Maine Council on the Marine Environment (GOMC). The Council launched Gulfwatch in 1991 to collect and monitor information on the status of water quality throughout the Gulf, which has been affected by decades of development and industrialization.

"We're looking at more than human health but also the effects on phytoplankton, marine animals," and other organisms, noted John Sowles, Marine Program Director for the Maine Department of Environmental Protection, and past Co-chair of the GOMC Environmental Quality Monitoring Committee.

"Without the Gulf-wide baseline you have no regional perspective," said Project Manager Steve Jones, a microbiologist at the University of New Hampshire's Jackson Estuarine Laboratory and Co-chair of the monitoring committee. Knowing the level and distribution of certain contaminants in the Gulf's blue mussels helps scientists, government agencies, businesses, and environmental stewardship groups to develop their regional plans and programs. Along with providing baseline data, the information can also help determine if and how water quality in a particular area has been affected by a specific occurrence such as an oil spill.

Gulfwatch concentrates on collecting and interpreting the data, while making it

GULFWATCH Continued on Page 6

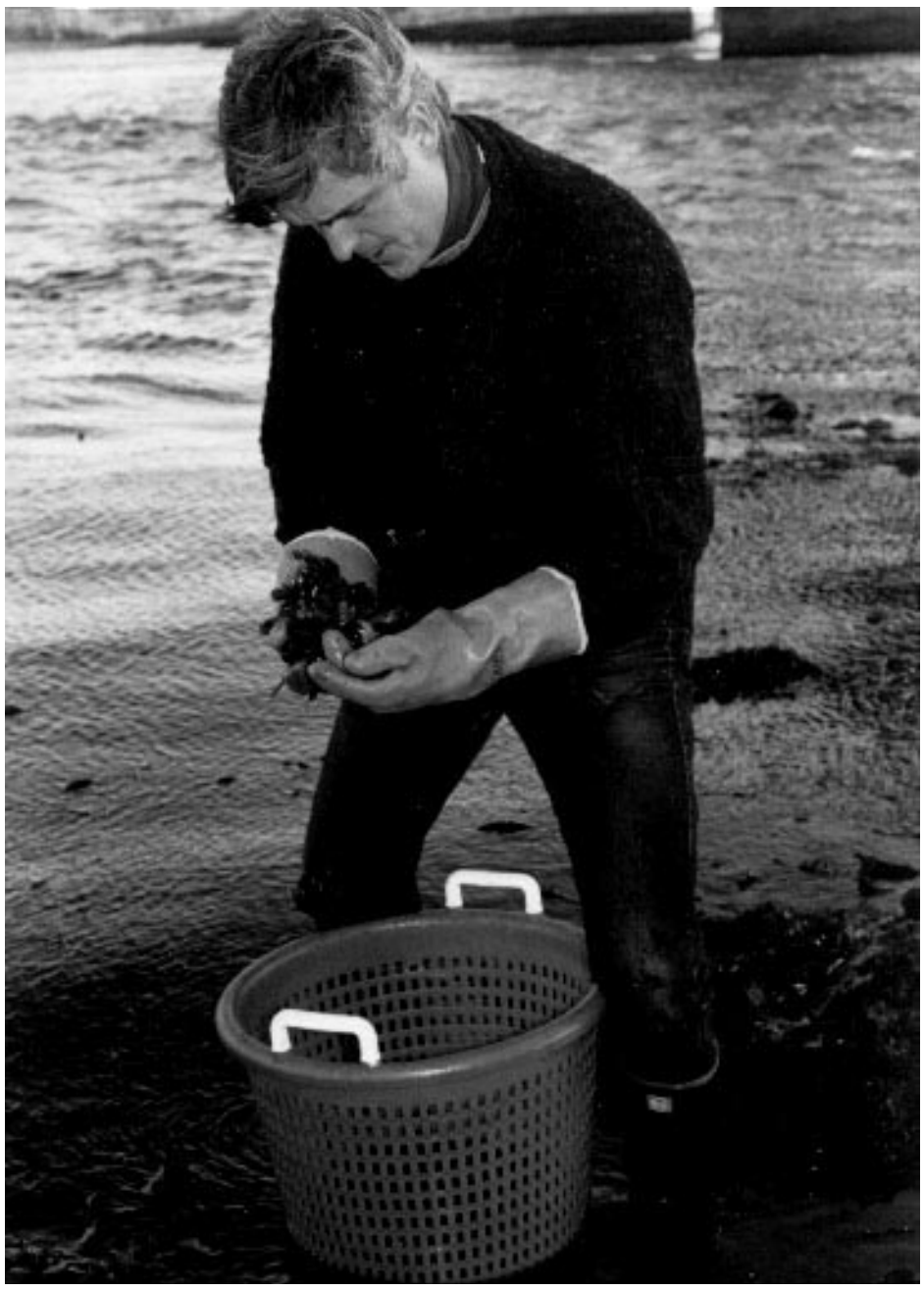


Photo: Suzy Fried/*Gulf of Maine Times*

Steve Jones, Gulfwatch Project Manager, scoops blue mussels from a mussel bed at Dover Point, New Hampshire. Since the Gulfwatch mussel monitoring program began in 1991, blue mussels at 58 US and Canadian sites throughout the Gulf have been tested for toxic metals and organic contaminants.

# Volunteer groups wading deeper into coastal water quality issues

By Suzy Fried
*Editor*

**Gulf of Maine** — Seeking funding, credibility, and volunteers, coastal water quality monitoring groups in the region are perfecting their technique, as well as branching out beyond the basics to toxic algae, habitat assessment, and other specialties.

Almost all of the approximately 30 major watersheds that feed the Gulf of Maine have at least one coastal water quality monitoring group. Their diverse members — homemakers, retirees, working people, students, parents, scientists, and others — comprise the Saturday morning brigades that troop down to coastal waters to collect samples once or twice a month.

Types of data collected on water samples vary slightly from one group to

MONITORING Continued on Page 8

CONTENTS



Gulf of Maine Council on the Marine Environment

20 PARK PLAZA

SUITE 1112

BOSTON, MA 02116

PRINTED MATTER

BULK RATE
US POSTAGE
PAID
BROCKTON, MA
PERMIT NO. 344

*Gulf of Maine Times*
Vol. 2, No. 4, Winter 1998

**Editor in Chief/Project Manager**
Anne Donovan
*Massachusetts Coastal Zone Management*
**Editor**
Suzy Fried
**Editorial Board**
Cynthia Lay
*New Hampshire Coastal Program*
Paul Dest
*Maine State Planning Office*
Alain Bryar
*New Brunswick Dept. of Fisheries & Aquaculture*
Sue Browne
*Nova Scotia Dept. of the Environment*
Andy Cameron
*Gulf of Maine Council Secretariat*
Rob Rainer
*Coastal Network of the Gulf of Maine*

The *Gulf of Maine Times* is made possible through support of the Gulf of Maine Council on the Marine Environment, a grant from the US Environmental Protection Agency, and generous donations by the New Brunswick Department of Environment, Public Service of New Hampshire/Northeast Utilities, Timberland, and the US Fish and Wildlife Service Gulf of Maine Coastal Program.

Views expressed in the *Gulf of Maine Times* are not necessarily those of the Gulf of Maine Council on the Marine Environment, the US Environmental Protection Agency, or other sponsors.

The Gulf of Maine Council on the Marine Environment was established in 1989 by the governments of Nova Scotia, New Brunswick, Maine, New Hampshire, and Massachusetts to foster cooperative actions within the Gulf watershed. Its mission is to maintain and enhance environmental quality in the Gulf of Maine to allow for sustainable resource use by existing and future generations.

Visit the Gulf of Maine Council on the Marine Environment's web site at:
http://gulfofmaine.org

This newspaper is printed on 25% post-consumer recycled paper by Boston Offset, Norwood, MA.

Layout: Gecko Graphix

*Address all correspondence, including subscription requests, to:*

**Editor**
***Gulf of Maine Times***
**20 Park Plaza, Suite 1112**
**Boston, MA 02116**
**Phone: (617) 727-9530, ext. 411**
**Fax: (617) 723-5408**
**E-mail: sfried@world.std.com**

Letters policy

The *Gulf of Maine Times* welcomes readers' letters, however we reserve the right to edit them for length and clarity. Please include your name, address, and phone number, and mail, fax, or E-mail your letters to *Gulf of Maine Times* c/o Editor. We will consider all letters for publication, but cannot guarantee that we will print and/or respond to every one.

# Gulf of Maine Council anniversary 1999 marks 10 years of collaboration to manage ecosystem

By David Keeley
*Maine State Planner*

When representatives from the five states and provinces bordering the Gulf of Maine first met in 1988 to discuss common issues affecting the Gulf of Maine, we quickly realized that although we lived in different countries and had different forms of government, we shared the same desire to wisely manage our shared marine resources. Sure, we were well aware of our differences on a range of issues — such as trade and the ownership of Georges Bank and its world-class fishery — but we were determined to overcome them.

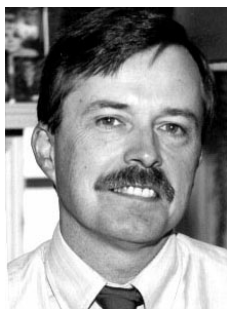


Photo: Maine State Planning Office

Given this backdrop, people from our region and elsewhere called us naive. "To think you will sort through all of this competition and find a way for Massachusetts, New Hampshire, Maine, New Brunswick, and Nova Scotia to work cooperatively is sheer folly," was one comment. Even one of our initial US government requests for planning funds was returned with negative comments.

As we all know, the pessimists have been proved wrong. It is both rewarding and inspiring to look back over the first 10 years of the Gulf of Maine Council on the Marine Environment. At a 1989 international conference in Portland, the Governors and Premiers from the states and provinces signed their first cooperative agreement, pledging to work together to manage "one of the world's most productive ecosystems." This conservation agreement called for the preparation of a 10-year natural resources action plan and formation of an international council to oversee its implementation. During this period, we have shown how two countries and five states and provinces can work cooperatively and effectively together on a range of issues and projects.

Of course, it isn't just the Council that has been working on behalf of the Gulf of Maine over the past decade. More and more people throughout the region are viewing the Gulf as an interconnected ecosystem, and are dedicating their lives to taking good care of it. We see this each year when the Council asks for Visionary Award nominations. It is overwhelming to see the number of high-quality nominations for individuals, businesses, and organizations that have committed years of effort to conserve, protect, and restore the Gulf's natural resources. People living and working in the Gulf of Maine watershed are indeed making a difference.

Despite past successes, significant challenges remain for the Council and all who care for the Gulf of Maine. Conserving coastal habitats, addressing toxic contaminants in the food chain, reducing marine debris, improving water quality, and protecting important fisheries habitat are Gulf-wide issues we must address. The Council's first 10 years have been rewarding, but we must strive to be even more effective. The eyes of the world are watching to see how our international partnership works.

# Essay: A Gulf and its people

By Matthew McKenzie
*Ph.D. Candidate, Maritime History*
*University of New Hampshire*

Take yourself out of the present for a moment. Rather than pushing paper from one side of your desk to another, imagine yourself gutting and tonguing a pile of cod on your left, and putting the cleaned fish into a barrel on your right. Replace your desk in the warm office with a running sea on the quarter, rain squalls, and a 35-foot/11-meter Chebacco plodding its way toward the southern Nova Scotia coastline beneath a lead gray sky hanging over a dark gray sea.

If you are able to envision this, you are half way towards understanding the Gulf of Maine during the first few hundred years of European habitation, before political boundaries split the Gulf's resources in two. What does exist is a ring of hills ranging from Cape Cod to the White Mountains, and continuing almost up to the Saint Lawrence River, squeaking north of the Bay of Fundy and stretching down to Cape Sable, Nova Scotia. All of the rivers running out of these hills and mountains enter the Gulf of Maine, whose waters unite the people of the Northwest Atlantic.

For the most part, the Gulf of Maine was a basin for fish, and the resource that unified people around the Gulf was fish. Europeans first came to the Gulf to chase fish. Native American people continued fishing the coastal waters and hunting whales beached in the shallow waters off Nantucket. While working these waters, people met with strangers, friends and in-laws, who by horse lived hundreds of miles from one another, but by boat, perhaps only a few hours away. Fishermen's wives worked at home managing a house and business that depended upon her far-flung family ties across the Gulf that helped her husband sell his catch and line up credit for the next season. This was a Gulf stitched together by ties between people dependent on the watershed and the sea for their existence.

Today, we see things differently. Politics has scratched lines in the water, and has put fences up on the land. Lines on the road maps divide us, where the Gulf used to unite us, as the ferry route from Portland dots off the map to a Nova Scotia somewhere past the edge of the map's margin. The highway heading south past Calais, Maine enters an area with a distinctly different color, as if to signify "here be dragons." Nevertheless, the Bay of Fundy that surrounds Grand Manan and fills St. Mary's Bay is the same water that carries that ferry from Portland to "nowhere." What earlier people of the Gulf had over us today was a more realistic vision of this body of water. Today's political boundaries ignore environmental and oceanographic realities that still unite the people of eastern New England and the Canadian Maritimes.

Whether we realize it or not, we are still closely tied to the Gulf, as much as the fisherman who gutted fish in the Chebacco boat two hundred years ago. We still go to the Gulf to find life, to escape life, and for a shrinking number of us, to make our lives. As we strive to manage and protect this common resource, we would benefit from remembering how people perceived the Gulf before the dividing lines were drawn. Perhaps the best way to remember is to pull out a chart of the Gulf of Maine, and think like a fish.

**The *Gulf of Maine Times* wishes you a happy holiday season!**

**Missing a back issue?**

Visit the *Gulf of Maine Times* on line.
www.gulfofmaine.org/times

## Help us update our mailing list...

Title_____
First name _____Middle initial _____ Last name_____
Company/agency/organization _____
Department _____
Street address _____
City/town_____ State/province_____
Zip/postal code _____ Country _____
Phone _____ FAX _____ E-mail _____

Please check the appropriate box below.
❑ Please add my name to your mailing list.
❑ Please change/correct my address as noted above.
❑ Please see that my name is on your mailing list only once.
❑ Please remove me from your mailing list (please tell us why). _____
_____
❑ Please add additional subscribers to your mailing list.
***Attach names and addresses if necessary.***

1298

**Tell us more about you**
Age: ❑ Under 14 ❑ 14-21 ❑ 22-45 ❑ 46-65 ❑ Over 65
Gender: ❑ Male ❑ Female Location: ❑ US ❑ Canada ❑ Both ❑ Other
Profession, volunteer affiliations, etc. (check all that apply):
❑ Policy maker ❑ Planner ❑ Researcher ❑ Scientist ❑ Educator ❑ Student
❑ Regulator ❑ Business person ❑ Reporter/writer/publisher ❑ Economist
❑ Fisherman ❑ Library staff ❑ Tourist to the Gulf of Maine
❑ Recreational user of the Gulf of Maine ❑ Recreational mariner
❑ Professional mariner ❑ Elected official
❑ Local government staff ❑ Federal government staff ❑ Tribal government staff
❑ Local government manager ❑ Federal government manager
❑ Tribal government manager
❑ Environmental organization manager
❑ Environmental organization staff ❑ Environmental organization volunteer

**Send to: Editor, *Gulf of Maine Times*,**
**20 Park Plaza, Suite 1112, Boston, MA 02116**

# Sylvia Earle to dive deep into Stellwagen Bank in July '99

By Suzy Fried
*Editor*

**Plymouth, Massachusetts** — Each year, thousands of people see the surface waters of Stellwagen Bank, off the coast of Massachusetts, from the deck of a vessel. But next July, Sylvia Earle — one of marine science's most accomplished researchers and a passionate advocate for the marine environment — will take a much deeper look than most at the Gulf's only US National Marine Sanctuary, as part of a five-year series of Sustainable Seas Expeditions.

The series of deep water dives into each of the US's 12 National Marine Sanctuaries is being undertaken by the National Geographic Society (NGS) and the National Oceanographic and Atmospheric Administration (NOAA) to conduct deep-water exploration, and to raise public support for ocean conservation. The NGS and Stellwagen Bank web sites will provide reports from the expeditions, which are scheduled to begin in California in April. Dives are to be made into Stellwagen Bank in July 1999 and again in 2000.

According to NOAA, the project "has the potential to produce significant scientific discoveries and extraordinary educational experiences for millions of vicarious participants, and the data gathered will provide stronger foundations for marine research and conservation policies."

Using a small, maneuverable submersible called DeepWorker, built by Nuytco Research Ltd. in Vancouver, British Columbia, Earle will lead underwater expeditions to photographically document each sanctuary's plants and animals. The subs will enable expeditioners to dive deeper than conventional diving gear would allow — down to 2,000 feet/about 600 meters.

"We have only four months a year to cover all the sanctuaries," Earle said at an October 19 talk at the Massachusetts Institute of Technology (MIT) in Cambridge, noting that another goal of the project, "is to establish permanent, fixed stations we can return to repeatedly." She described the opportunity to undertake the sanctuary expeditions as a fortunate alignment of interests, technological developments, and available funding.

A $5 million grant from the Richard and Rhoda Goldman Fund and $775,000 from the National Geographic Society are supporting the project. Earle's Oakland, California-based company, Deep Ocean Exploration and Research Inc. (DOER), is providing operational and logistical support. Other collaborators include the US Navy, which, along with NOAA, is providing ships needed for the expeditions; the National Aeronautics and Space Administration; the Monterey Bay Aquarium Research Institute; the Mote Marine Laboratory; the Center for Marine Conservation; SeaWeb; and the Jason Foundation.

## Unknown territory

Full exploration of the ocean is long overdue, according to Earle who asserted, "We're still just at the Lewis and Clark stage of exploration, even in our own back yards." The expeditions into the National Marine Sanctuaries are just a piece of what remains to be investigated, she maintains.

Unlike many sanctuaries that have not been subject to deep-water exploration at all, Stellwagen Bank — at about 656 feet/200 meters deep — is relatively shallow, and has been researched quite a bit, according to Sanctuary Manager Brad Barr. "We probably have some of the most studied places. We've been to the deepest portions with manned submersibles and remotely operated vehicles," he said, noting that "major mapping projects" and undersea research to characterize fish habitat have already taken place at Stellwagen Bank. But, he said, "There's a lot we don't know despite the fact that we've done quite a bit of work. We hope Sustainable Seas will help us raise the profile of some of the issues we're working with."

Specific goals for the Stellwagen expeditions will include documenting the impact of fishing and other human activity on the bank, and studying the deep rock reef habitat where redfish live. Barr said researchers in California are studying the same fish and the expeditions will "give us a sense of whether some exchange of research data would be valuable."

Earle told the MIT audience that she is working with sanctuary managers to develop the instrumentation and methods necessary to monitor "basic characteristics of water" such as temperature and salinity, which she described as "things we've collected for years at the surface," but not in the ocean's depths. "There will be quite a bit of preliminary work," that will be done before the Stellwagen dives, according to Barr, including scouting dive sites and setting up ship-to-shore connections for telephone and live video links.

## Denizen of the deep

The Sustainable Seas Expeditions will return Earle to a world in which she feels quite at home. She has spent most of her career conducting research, much of it underwater, leading more than 50 expeditions, totaling 6,000 hours under the ocean's surface. In 1970 Earle led the women's Tektite expedition, sponsored by the US government, in which a group of scientists lived in an enclosed habitat on the ocean floor 50 feet/15 meters below the surface. The expeditioners conducted two weeks of intensive underwater research, unhindered by the daily decompression routine required when making deep water dives from the surface, although they did have to undergo the process at the end of their mission.

In 1979 Earle set the still-unbroken record for the deepest untethered dive — 1,250 feet/381 meters — which she made off the island of Oahu in a specially pressurized suit. She also holds a record for a 3,000-foot/914-meter dive in a one-person submersible called Deep Rover, owned by Nuytco Research Ltd.

Earle's company, DOER, has provided consulting and support services for remotely operated vehicles and submersible operations including developing specialty cameras and manipulator arms that can gather evidence from the underwater world. Earle describes this as a far cry from hanging a bucket or net over the side of a vessel to bring up bits and pieces of the ocean floor that researchers then have to piece together and decipher. But, she told the MIT audience, no matter what the capabilities of a high-tech robot investigating the deep, "there is no substitute for the human presence on the spot when we can pull it off."

In the early 1990s, Earle served as NOAA's chief scientist. And, not surprisingly, she has written numerous publications, including her 1995 book, *Sea Change*.

## Aquatic advocacy

Along with Earle's impressive resume, her ability to raise public awareness about marine systems lies in her infectious passion for the ocean and her drive to educate others about its importance. Her expertise, eloquence, and enthusiasm have led to her appointment by the National Geographic Society as its 1998 Explorer in Residence. *Time* magazine named her "Hero for the Planet" in its October 5 issue.

Earle's affinity for the ocean budded as she grew up on the coast of New Jersey, and fell in love with "the critters" that she encountered during hours and hours spent at the seashore. When her family later moved to Clearwater, Florida, her interest only intensified. Her irresistible curiosity drove her to build a life and career devoted to understanding marine systems, even as she raised a family of her own, and continues as she watches her three young grandsons develop their own curiosity about their world.

Though enamored of the ocean's animal life, botany is Earle's specialty. She believes that understanding plants, which feed and shelter other organisms, is key to understanding the system in which they live. She has made a lifelong project of cataloging every species of plant living in the Gulf of Mexico.

The ocean, according to Earle, "is at risk because we can't see it. We need to invest in trying to understand the nature of the place." She believes that as people learn more about how the marine world works, they will realize humans are a part of that system, not separate from it. This realization, she explained, is important to understanding that our use of marine resources has to take into account their role in the survival of the entire marine system — and the planet. But while Earle is concerned that people have waited a long time to consider these issues, she said, "our cultures are finally realizing that, while the sea is resilient, it's not infinite."

Photo: Natalie Fobes/National Geographic Society

Sylvia Earle, the National Geographic Society's "Explorer in Residence" has spent thousands of hours under the ocean's surface. In early 1999 she'll begin a five-year series of deep water dives into the United States' 12 National Marine Sanctuaries, making initial dives at Stellwagen Bank in Massachusetts in July.


Photo: Neil G. McDaniel

Newtsub DeepWorker 2000, a submersible developed by Nuytco Research Ltd. in Canada, will be used during the Sustainable Seas Expeditions, allowing exploration of the ocean down to 2,000 feet/610 meters.

**Follow the Sustainable Seas Expeditions on the Web!**
Visit the Stellwagen Bank National Marine Sanctuary web site at www.nos.noaa.gov/ocrm/nmsp/nmsstellwagenbank.html and, starting in early 1999, the National Geographic web site at www.nationalgeographic.com/

# Large lobsters lure Pew fellow Bob Steneck to ocean floor

By Suzy Fried
*Editor*

Photo: Bridget Besaw Gorman

Bob Steneck started his underwater research at the age of 10, using a home-made air reservoir inflated with a bicycle pump. In the years since then, his fascination with the ocean's depths has increased, as has the sophistication of his equipment. Sacks filled with air have been replaced by high-tech SCUBA gear and miniature submarines.

**Walpole, Maine** — Some of marine scientist Bob Steneck's research adventures sound like script ideas for vintage B movies — the kind with trailers narrated by overwrought announcers promising, "You'll scream in horror as giant lobsters attack submarines!"

In fact, Steneck was once inside a small research submarine charged by a 20-pound/nine kilogram lobster. The pilot was worried, but there were no dents. Another time, he nearly lost a thumb-wrestling match with a burly specimen determined to remain in its underwater burrow. Giants? Maybe not. But what they lack in size they seem to make up for in...well, crabbiness.

A professor in the University of Maine School of Marine Sciences, Steneck studies lobsters of all sizes in the Gulf of Maine, describing himself as an "ecologist who works on the distribution and abundance of organisms and what makes them tick." And yes, he does like to eat lobsters as well as scrutinize them.

## A lifetime underwater

Steneck counts the hours he's logged in scuba dives over the years in the thousands, and they have included thrillingly close encounters with sharks and other impressive residents of the deep. Even so, during his first dive in a small research submarine (or submersible) in 1984, he says, "I was more giddy than useful as a scientist."

Steneck's high-tech equipment is a world away from the kind of underwater gear he used in his youth. A childhood fascination with water drew him into scuba diving in 1960 at age 10. Diving mostly in local lakes in New Jersey, Steneck used a home-made air reservoir inflated with a bicycle pump. "I'd stay down until I'd get headaches," he recalls.

During college, Steneck's interest turned from freshwater systems to the ocean. Immediately after graduation he began working with the Smithsonian Institution studying coral reefs in the Caribbean, living, at that time, in the pontoon of a trimaran sailboat.

Steneck focused his master's degree research on Maine's famous rocky coastal habitat. Then, following one more stint in the Caribbean, he completed a Ph.D. in ecology and evolution in the department of Earth and Planetary Sciences at The Johns Hopkins University in Maryland, finishing early to return happily to Maine in 1982 for a job that opened at the University of Maine's Darling Marine Center in Walpole.

"Sailing is probably the one thing I do that isn't goal oriented," says Steneck. He and his wife Joanne, an attorney, let the wind determine their course when they take their 30-foot sailboat *Physalia* out to explore the coast of Maine. What's *Physalia*? "It's the genus of the Portuguese Man of War which is an unfortunate common name for a beautiful invertebrate predator that uses the wind as its sole means of locomotion," he explains.

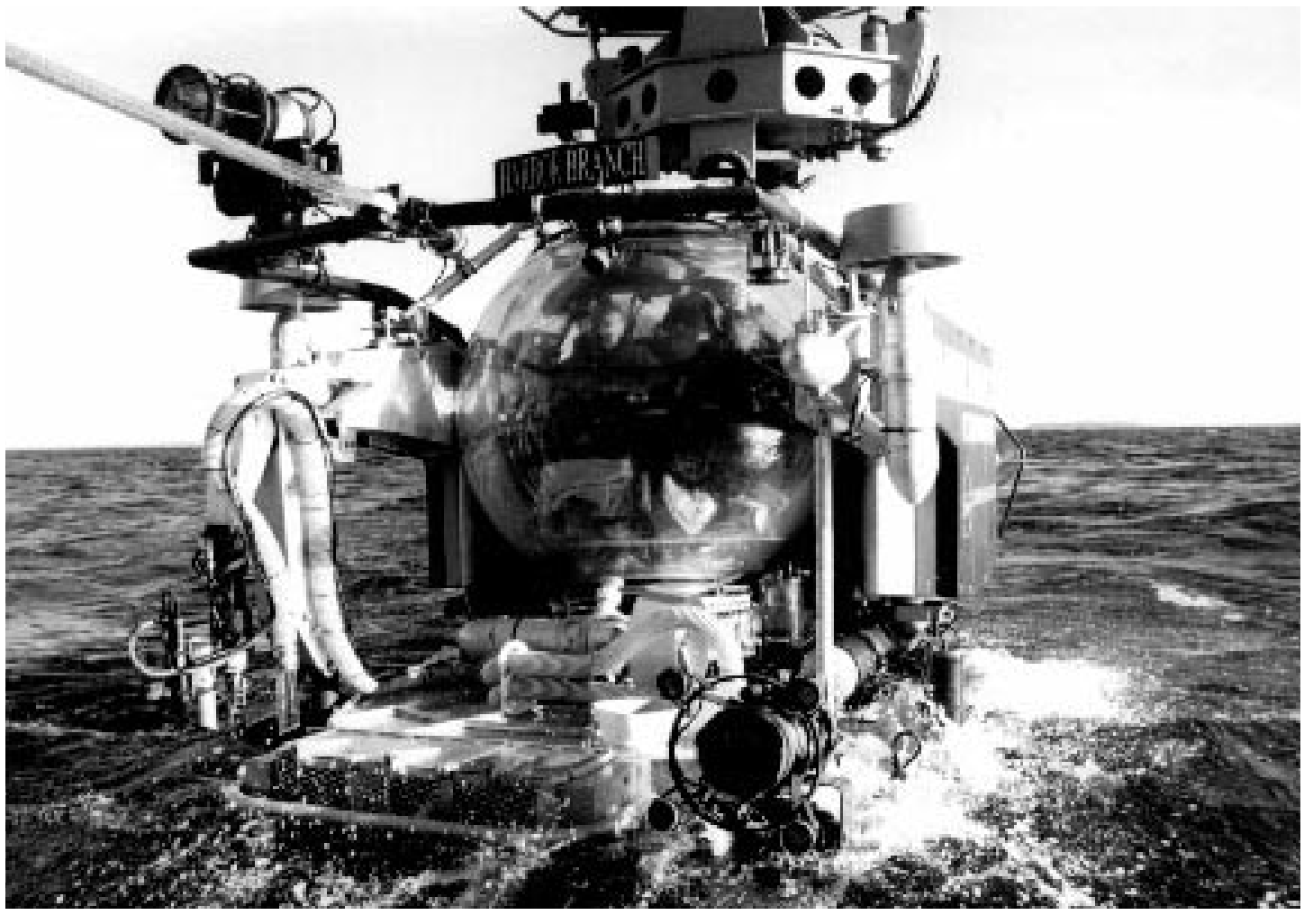


Photo: Bridget Besaw Gorman

Researcher Bob Steneck has used submarines provided by Connecticut-based Harbor Branch Oceanographic Institute to search for Maine's lobster brood stock. The National Undersea Research Program funds his submarine expeditions to deeper waters than can be explored using conventional SCUBA equipment.

## Where baby lobsters come from

Steneck and the graduate students who work with him are studying the Gulf's lobster population — brood stock lobsters in particular — in the hope of learning where the fishery's future lies. For the last century, fishery managers have warned that lobsters are being overfished. But in recent years, harvesters have questioned how the population can still be considered to be in danger when their catches are bigger than ever. A record 23,000 tons/20,866 tonnes were landed in Maine in 1997.

Lobster catches in Maine dipped last summer, but, Steneck said in November, "It might be a little early to know if there will be a real dip throughout the Gulf of Maine." In the fall, an infection sickened and killed Maine lobsters on a daily basis. Were these just blips in lobster livelihood, or signs of something serious to come? "It's essential to know if fluctuations [in lobster populations] are oceanographically or environmentally controlled, or the result of overfishing" to understand the status of the fishery, Steneck says.

Managers maintain that too many lobsters are being harvested before they are old enough to reproduce, jeopardizing the future of one of the Gulf's most important fisheries. Lobsters are roughly six to nine years old when they reach legal size for harvesting, but are unable to reproduce throughout most of the Gulf of Maine until they are about nine or ten years old.

"I can't speak to the risk [though] I think we are all concerned about overfishing," says Steneck. Even so, he adds, "Nobody doubts we've seen huge expansion in lobster populations in recent decades." He hypothesizes that a popula-

Photo: Suzy Fried/*Gulf of Maine Times*

Lobster harvesting regulations vary throughout the Gulf of Maine. In the Northwest Atlantic US, harvesters who catch egg-bearing lobsters often cut a v-shaped notch into the lobster's tail to identify it as brood stock — a signal to subsequent harvesters to release it, whether or not the lobster is bearing eggs at the time. This particular egg-bearing lobster, caught during a federal groundfish survey trawl and subsequently released, is likely to have been bitten on the tail, rather than v-notched.

tion of long-lived and prolific brood stock lobsters is living in the Gulf's deep waters such as those east of Penobscot Bay.

Steneck believes that the eastern Maine coastal current may be carrying the lobster larvae that hatch in those waters into shallower coastal areas to the west. "I suspect it may be the larvae superhighway for the settlement we're seeing in western Penobscot Bay."

## Research is all wet

Steneck and his graduate students collect data during sampling sessions aboard lobster boats; on thousands of scuba dives; and during some 70 dives to date at sites throughout the Gulf of Maine in small two- to four-person submarines hired primarily from the Harbor Branch Oceanographic Institute. Funding for the submersible dives comes from the National Oceanographic and Atmospheric Administration's National Undersea Research Program.

Submersibles can explore parts of the ocean floor that federal trawl surveys avoid because of gear conflicts with lobster traps.

When a lobster is spotted from inside the submersible, a camera mounted on the sub transfers the image to a video screen on which lasers produce dots that are a known distance apart. These provide scale so the lobster's image can be measured to within about .16 inches/four millimeters of accuracy, according to Steneck.

"Lobsters are particularly good study organisms because they are curious and aggressive," usually emerging from their burrows to fend off invaders. At the least, a claw is likely to protrude from the lobster's burrow. By measuring the claw, scientists can estimate the lobster's carapace length (distance from eye-socket to base of tail), according to Steneck.

Although the Maine Department of Marine Resources plans to incorporate his sea sampling information into its database, Steneck maintains, "We don't really have a good means of getting that information in the regulatory process to date as far as I can see." For now, he is working to bring his findings directly to people who harvest lobsters, and who, under a recently established co-management process, decide how to conserve the resource.

A fellowship awarded to Steneck last summer by the Pew Fellows Program in Marine Conservation will help with his efforts "to bring the best available ecological research to fisheries questions and communicate [the results] to industry. The money goes to the graduate students [who] are out with harvesters taking data, learning the trade, communicating with them, answering their questions, having workshops," he explains.

## Involving lobster harvesters

Scientists and the lobster fishing industry need to collaborate to fill information gaps in state and federal research, says Steneck. "It's pretty obvious to me that some of the disconnect that exists with scientists and lobstermen has to do with [the fact that] the fishery manager developing the law has to consider how to manage the stock over its entire range," which, in the case of the Atlantic lobster fishery, extends from Canada to North Carolina.

Within that huge region, the lobster's distribution and abundance can vary dramatically, resulting in creation of a region-wide policy that seems appropriate in some areas, but inappropriate to those fishing in another. "I think the ecological approach that I've been taking turns out to be a scale that most of the lobstermen understand pretty well," he says.

Most lobster harvesters support the concept of fishing at sustainable levels, and are very willing to help scientists gather data, says Steneck. "When I got started back in the 80s I was warned by colleagues that, 'this is a difficult bunch.' They were wrong." It was simply that, in the past, lobstermen had not been encouraged to participate in research, he says.

Last fall, Steneck brought some lobstermen down to the ocean floor in a submersible for a rare opportunity to see the underside of their fishing grounds. They helped Steneck choose dive sites that were likely to be home to brood stock lobsters, and their excitement prodded Steneck to remember the exhilaration of his own first trips to the bottom of the sea. "There certainly are times when all of a sudden it strikes me: I'm staring at a portion of the planet that no human has ever seen before and probably never will again. It's a needle in a haystack 150 miles [240 kilometers] offshore. It's a little like going to the moon. Everyone knows it's there but few people get a chance to go."

*You can E-mail Bob Steneck at steneck@maine.edu for more information on his research.*

Photo: Katie Fagan

Bob Steneck, a lobster researcher at the University of Maine School of Marine Sciences, is one of two 1998 Pew fellowship winners there.

# Pew fellowships are funding fishery fact-finding forays

Bob Steneck and colleague Les Watling, both professors at the University of Maine School of Marine Science's Darling Marine Center, received 1998 fellowships from the Pew Fellows Program in Marine Conservation that will help fund their research into sustainable fishing.

The Pew organization announced the awards last summer in conjunction with the New England Aquarium.

Steneck's award will support his efforts to promote collaboration among science, industry, and fisheries and to infuse solid science into management decisions made in the lobster and urchin fisheries in Maine.

Watling's award will support his work to assess and compare the impact of mobile fishing gear, specifically bottom-trawling gear, on the benthic habitats in three diverse regions of the US.

An initiative of the Pew Charitable Trusts in partnership with the New England Aquarium, the Pew Fellows Program annually awards ten $150,000 fellowships to recipients of diverse backgrounds who contribute to advancing solutions in fisheries conservation, marine pollution, coastal management, and marine ecosystem conservation.

GULFWATCH *Continued from Page 1*

available to other scientists who evaluate its implications for public health and the health of the ecosystem.

## Bill of health

Regulations enacted in the US and Canada in recent decades have helped cut back on the amounts of some toxic materials entering the Gulf's coastal waters. But certain substances do not decompose, and even if their use in agriculture or industry has been banned or restricted, quantities that entered the environment years ago can remain there. These substances cling to marine sediments, and can continue to be ingested by organisms in the ecosystem, making their way through the food web.

Blue mussels are an indictor of substances in the water that are potentially harmful to the marine ecosystem, and the animals that live there, including humans who eat fish. Mercury, polychlorinated biphenyls (PCBs), and other toxic and persistent substances biomagnify through the food web. Mammals and predatory fish concentrate the highest levels of toxic substances in their tissues, because they eat more organisms.

According to a report released by Gulfwatch in September, covering the years 1991-1996, the program has found that some sites that were thought to be relatively clean, in fact, had higher than expected levels of contaminants. Contaminated waters can inflict financial and quality-of-life losses on communities whose identities and economies have been based on fishing, shellfishing, and tourism for generations.

But the contaminant situation in the Gulf is far from bleak, according to Gulfwatch. The five-year report states that, while some levels of certain toxic trace metals and organic contaminants are high enough to be of concern, particularly in areas of the Gulf with high human populations, few contaminant levels measured between 1991 and 1996 exceeded US or Canadian federal health limits.

## Sentinel species

Gulfwatch tests mussels for certain heavy metals and organic compounds that scientists know or suspect can affect the health of humans and other organisms (see box, "Gulfwatch toxic contaminants"). Some of these substances — heavy metals such as iron and zinc, for example — can occur naturally in the environment. "The question isn't whether you're going to find them, but in what form or concentration and in what environmental media," said Sowles, explaining, "Metals can exist in a variety of forms and the different forms may have different effects." To test for the separate forms of the metals would be "extremely expensive," so Gulfwatch measures total amounts of lead, mercury, and so forth, he said. "This is the standard way worldwide to do this. Most risk values are based on total metal," according to Sowles.

Consuming tiny amounts of some of these metals is necessary for human health. But in certain forms, concentrations, and quantities, they can become poisonous. Often their levels in the environment are increased as a result of industrial or manufacturing processes, combustion, and incineration — the same sorts of processes that have introduced toxic organic compounds into the Gulf's waters.

While other marine environmental monitoring programs use species such as lichens, corals, snails, seabirds, or whales, Gulfwatch uses the blue mussel as a "sentinel species" because it is readily found throughout the Gulf, it is easy and inexpensive to collect and process, scientists are well-versed in mussel biology and physiology, and because mussels are suspension feeders that pump large volumes of water, concentrating the chemicals the water contains in their tissues. Because mussels stay in one place, the accumulation of chemicals found in them can be assumed to be representative of the chemicals present in the water they inhabit.

Gulfwatch samples mussels at a total of 58 US and Canadian sites Gulf-wide near the mouths of major river basins, in areas densely populated by humans, at centers of industrial activity, and at points where wastewater is discharged. Some sites, called "reference sites," are in relatively uncontaminated areas. Monitoring them helps scientists track natural levels of certain toxic substances and the spread of pollution resulting from human activities.

Mussels are collected in the fall, after they have spawned, because changes in their biochemistry caused by spawning can skew test results. They are also not collected within a few days of a storm. Turbid waters may contain higher concentrations of a particular substance than usual, resulting in readings not truly representative of the mussels' usual environment.

**For more on Gulfwatch visit www.gulfofmaine.org/council/monitoring.htm**

At each site, samplers collect four batches of about 50 mussels each. Most of the mussels are native to that site, but some are transplants — clean mussels that are placed in "cages" that are actually plastic mesh bags or baskets tethered to a buoy and suspended a meter above the ocean floor for 60 days to evaluate the effects of their short-term exposure to those waters.

Several labs are involved in analyzing the mussel tissue including Environment Canada's (EC) regional lab in Moncton, New Brunswick; the State of Maine Health and Environmental Testing Lab in Augusta; and commercial laboratories such as Axys Analytical Services Ltd. in Sydney, British Columbia.

The Gulfwatch program samples its monitoring sites every three years (about 16 sites per year), with the exception of five "benchmark sites," where sampling takes place annually. Each of the Gulf's five jurisdictions — Nova Scotia, New Brunswick, Maine, New Hampshire, and Massachusetts — has one benchmark site.

## Looking for answers

Gulfwatch scientists assert that the key to the program's usefulness is longevity, and that the three-year sampling cycle won't reveal any trends for at least 10 years. While data collected so far can help with localized short-term planning, Peter Hennigar of EC's Environmental Protection Branch and Co-chair of the monitoring committee, urged caution in drawing conclusions about contaminant levels measured in mussels and their relation to environmental health. "Further research is needed to understand the degree of risk toxic contaminants and their levels pose to the Gulf's ecosystem," he said.

What Gulfwatch scientists do believe is that very few Gulfwatch sampling stations contain mussels with contaminant concentrations high enough to be detrimental to the mussels' health. They say this is important because of the mussels' value as a food source for numerous species in the Gulf. On the other hand, the danger that contaminant levels in mussels pose to the wildlife that eat them is largely unknown, said Hennigar. Wildlife scientists now fear that populations of certain mussel-eating seabirds may be declining in the Gulf, he said.

Aside from "isolated occurrences of acute human poisonings," there is little information available on how eating chemically contaminated shellfish can affect human health, according to the Gulfwatch report. Scientists are also unsure of the combined effects of toxic substances on organisms.

Gulfwatch found that generally, levels of contaminants increased near human population centers, and that levels escalated from northern to southern sampling sites.

In Boston's inner harbor, levels of the toxic metal lead exceeded US Food and Drug Administration human health "alert levels," but are not yet at levels requiring regulatory action, according to Gulfwatch researchers. Alert levels of PCBs were exceeded at seven Massachusetts, one New Hampshire, and one Maine site, warranting further investigation. Use of PCBs was curtailed in the 1970s out of concern that they can cause cancer.

As public awareness of toxic contamination grows, some scientists predict use of some toxic materials will decline in the region. How soon this happens will depend to some extent on the alternatives available — not just in the Gulf region, but also in other regions near and far from which contaminants ride into the Gulf on air and ocean currents.

## Part of the picture

Other monitoring efforts are also ongoing in the Gulf. In combination with these efforts, Gulfwatch is "contributing a small but vital part to ecosystem-wide monitoring of the Gulf," according to the program's organizers. Canada once ran a similar program, called National Mussel Watch, which covered the Canadian east and west coasts and Maritimes. The program began in 1991, but was funded for only five years, said Amar Menon, head of Environment Canada's shellfish section for the Maritime region.

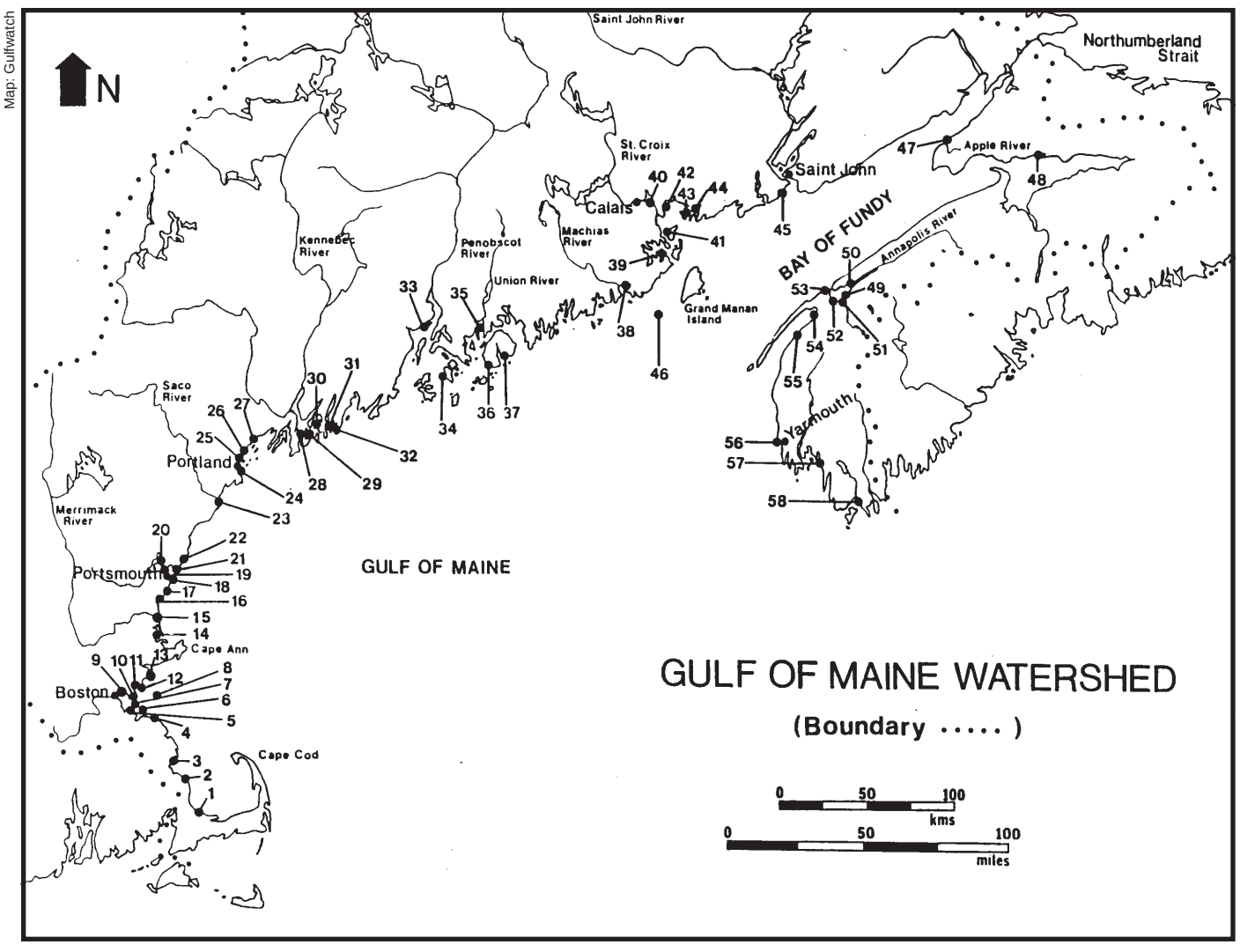
For a complete picture of water quality in the Gulf of Maine, Gulfwatch organizers say their information should be used in conjunction with the US National Oceanographic and Atmospheric Administration's National Status and Trends (NS&T) Mussel Watch. According to Jones, that 12-year-old program has served as a model for Gulfwatch, though NS&T samples mussels at different sites, except for two. Also, NS&T collects mussel samples during the spring, while Gulfwatch collects mussels in early fall.

Because of these different methodologies, information contained in the two databases can't be compared so much as it should be combined to provide a more complete picture of the Gulf, said Jones, asserting, "To connect them we need to process and analyze their samples with our methods." This would require additional funding, he noted.

Financial support for Gulfwatch has come from the Gulf of Maine Council on the Marine Environment, Environment Canada, the US Environmental Protection Agency, the US National Ocean Service of the National Oceanic and Atmospheric Administration, and the state of Maine. Environmental officials in New Hampshire, Massachusetts, and Maine recently committed to funding Gulfwatch analysis in their states.

Also, groups and organizations will sometimes fund add-ons to Gulfwatch's usual sampling schedule. State, provin-

Map: Gulfwatch




Locations of Gulfwatch stations in the Gulf of Maine

cial, local, and federal agencies; academic institutions; and non-governmental organizations have made in-kind contributions such as sample processing, data compilation and analysis, and report writing.

Gulfwatch organizers describe the program's fiscal picture as continually in flux. "You can get samples and archive them until you have money for analysis," but the samples are meaningless until they are analyzed, said Jones.

Gulfwatch scientists anticipate that demand will increase for the program's sampling results as the marine aquaculture industry grows and aquaculturists look for uncontaminated sites. They also foresee a need to expand the Gulfwatch program to include more contaminants, such as microbial pathogens, as the public becomes concerned about other substances believed or known to affect human health. But any expansion of the program would require more funding.

## Results at work

Pointing out the practical applications of their program, Gulfwatch organizers note that government agencies in the US and Canada use Gulfwatch data to develop environmental management plans and policies, and to meet federal reporting requirements. State agencies have used the data in drafting pollution reports required by the US Congress under the Clean Water Act. Government agencies in Canada and the US have used them in making sanitary survey reports to determine whether it is safe to harvest and eat shellfish; developing licensing requirements for industrial discharges; developing nonpoint source pollution controls; and issuing dredge disposal permits and assessing disposal sites.

Gulfwatch also plays a role in assessing the effects of specific activities on water quality, such as discharges from sewage treatment plants and paper mills, and of environmental accidents such as oil and chemical spills. Samples collected after spills and compared with baseline data can show how a spill has affected water quality. Samples taken after cleanup efforts are under way help track the degree of environmental recovery taking place and help with the development of wildlife protection guidelines.

Amar Menon of EC's shellfish section said his office has used Gulfwatch data for the last five years in evaluating whether shellfish beds there are suitable for harvesting. "We do our own bacteriological analysis [and] use their information to get an idea of the chemical contamination in some of the shellfish areas," he said.

Canadian Wildlife Service researchers are using the data to study the effects of contaminants on sea ducks that eat blue mussels, and in a program that monitors wildlife for the presence of the chlorinated pesticide DDT in their tissues.

Researchers in Canada are also using the data to assess rising concerns about endocrine disrupters — substances known to affect the glands, such as the thyroid, pituitary, and adrenal glands, that regulate the body's functions.

Gulfwatch has also found a place in natural resources assessment and management. Data from the program were used in "finding what problems we have," said New Hampshire Estuary Project Director Chris Nash. And, he said, "It probably will be used if toxics monitoring becomes part of our monitoring plan." Also in New Hampshire, as part of a new partnership to protect water quality in the Great Bay Estuary, that state is funding increased Gulfwatch monitoring in the Great Bay and in Hampton Harbor.

Growers of shellfish, finfish, and sea vegetables in Nova Scotia and Maine have used Gulfwatch data to find clean sites for hatcheries and growout facilities. And, according to the Gulfwatch five-year report, "In general, the entire fishing industry (oceanic and aquaculture) has relied on Gulfwatch data to assure the public that monitoring of marine environmental quality is being performed."

## Community collaboration

Along with providing information to government agencies and private businesses, Gulfwatch has recently begun collaborating with community-based environmental organizations on some projects. Hennigar established a link between Gulfwatch and two New Brunswick community-based groups. The groups contributed funding to Gulfwatch so that it could augment its Fall 1998 analysis to include issues of concern to their communities. "The object of this and future collaborations is to enhance environmental monitoring in the Bay of Fundy/Gulf of Maine by helping to address local and community environmental concerns," said Hennigar.

Photo: Rob Livingston/New Hampshire Department of Environmental Services

Scientists use the blue mussel *(Mytilus edulis)* as a sentinel species to detect the presence of contaminants in the Gulf's coastal waters because the mussels are abundant throughout the Gulf, easy and inexpensive to collect and process for analysis, sedentary, and because they are suspension feeders, which means they pump large volumes of water.

"Gulfwatch expanded their parameters in tissue analysis to include aquaculture biocides," which are chemical compounds used to kill sea lice and other parasites, said Susan Farquharson, Executive Director of Eastern Charlotte Waterways in Saint George, New Brunswick. "We paid for the lab analysis for those parameters," and volunteers from the organization also helped collect mussels and process them for lab analysis, she said.

Atlantic Coastal Action Program (ACAP)-Saint John also joined in this fall, contributing money to cover the cost of collecting and analyzing mussels at two new sites in Saint John Harbor, said Executive Director Sean Brilliant. The funding comes from an Environment Canada program that allows ACAP groups to collaborate with an EC scientist — in this case, Peter Hennigar. Said Brilliant, "It's an opportunity to have a few water quality monitors trained in mussel sampling and take part in a Gulf of Maine initiative and at same time it allows us to get some valuable data" that the group can use in studies of its own.

Several groups have used Gulfwatch as a model in developing their own monitoring programs. According to Gulfwatch organizers, these include the Canadian Department of Fisheries and Oceans, US Fish & Wildlife Service, the US National Estuaries Program, and the Casco Bay Estuary Project in Maine.

According to Jones, Gulfwatch has documented information on the region's water quality that can help agencies and organizations all over the Gulf with their management and restoration efforts. "Little was known on a regional basis about toxic contaminants in the Gulf" before Gulfwatch began, notes the five-year report. Jones adds, "What we found are things that are not that surprising but are incredibly useful as a backbone for a lot of stuff now."

# Gulfwatch toxic contaminants

| Contaminant | Sources | Gulfwatch findings | Health effects |
|---|---|---|---|
| **Heavy metals:** aluminum, cadmium, chromium, copper, iron, lead, mercury, nickel, silver, zinc | Naturally occurring elements that do not break down or degrade. Natural levels augmented by use in industrial and manufacturing processes and in products such as batteries, gasoline, paints, pesticides, and pharmaceuticals. Enter coastal ecosystems via wastewater discharge, runoff, mining, combustion, incineration, and via direct contact with water (in the case of antifouling paints used on vessels). | Distribution of most metals relatively uniform throughout the Gulf. Levels at or near natural levels for most of Bay of Fundy. Mussels in Boston's inner harbor and Portland Harbor contain highest concentrations of lead. Some high lead concentration levels also found at some of the northern Gulf sites. | In certain concentrations, some metals can affect neurological, reproductive, developmental, cardiovascular, kidney, and liver health in humans and other animals. Many heavy metals suspected or known to cause cancer. |
| **Chlorinated pesticides** | DDT, chlordane, heptachlor, and other chlorinated pesticides once widely used in agriculture and forestry. Use of DDT restricted in US and Canada since early 1970s. Enter coastal ecosystems via runoff and disposal. Old releases persist in sediments. | Levels decrease from south to north along the Gulf's coast. Despite extensive use of DDT in Maine and New Brunswick in 1950s and 60s, levels found there not as high as expected. | Can cause numerous immediate and long-term illnesses, including cancer. Affect reproductive systems of vertebrates. |
| **Polychlorinated biphenyls (PCBs)** | Used to cool electrical capacitors and transformers and as heat and pressure resistant lubricant. Use curtailed in 1970s due to concerns about health effects. Enter coastal ecosystems via point and nonpoint sources. | Concentrations decrease from south to north along Gulf's coast. No concentrations in mussels exceed federal human health tolerance levels or levels considered protective of wildlife. Several sites do exceed USEPA screening values for possible human health concerns. | Scientists disagree over degree of danger to humans posed by PCBs. Classified as probable human carcinogens on the basis of animal tests. Reproductive, neurological, immunological, endocrine, liver, and other health effects are suspected for humans and other species. Toxicity of certain PCBs are similar to the highly toxic 2,3,7,8-dioxin. |
| **Dioxins and furans** (part of PCB family) | Byproducts of chemical manufacturing processes including incineration, metals refining, combustion, manufacture and bleaching of paper, and herbicide production. US government has banned herbicidal products containing dioxin and regulates it under the Clean Water Act. Enter coastal ecosystems via direct discharge, combustion, and incineration. | As of 1998, mussels at 32 Gulf sites have been tested. Levels decrease from south to north along the Gulf's coast and are below Canadian health limit for highly toxic 2,3,7,8-dioxin. No equivalent US federal health limit exists. Summed toxicities of dioxins, furans, and planar PCBs at some sites exceed a proposed Canadian guideline for protection of birds and mammals. | Scientists disagree over degree of danger to human health posed by dioxins. A variety of health effects have been observed in animals. Growing scientific evidence suggests much of the toxicity in aquatic ecosystems is due to dioxins and similar contaminants. |
| **Polycyclic aromatic hydrocarbons (PAHs)** | Come from petroleum and its refined products. Enter coastal ecosystems as a result of wood, coal, and petroleum combustion. | Most highly concentrated and frequently detected in southern part of Gulf and near population/industrial centers. | Due to their toxicity, 16 PAHs are on EPA's priority pollutant list. Suspected human carcinogen and immune system suppressant. Suspected to affect health of other species in ecosystem. |

MONITORING
*Continued from Page 1*

another according to each group's particular concerns, but most often include weather conditions at the time the water sample is collected; temperature; salinity; the plant pigment chlorophyll; bacteria such as fecal coliform and E-coli; dissolved oxygen; alkalinity and acidity; and water clarity, or turbidity.

Threats to coastal water quality vary somewhat within the Gulf region and, as a result, monitoring groups differ in their specific concerns, which can range from nonpoint sources such as leaky septic systems to point discharges of sewage and other effluents. Many groups are concerned about fecal coliform and other bacteria, which can contaminate shellfish beds and clam flats. Some groups are looking for toxic phytoplankton — microscopic algae that can cause paralytic shellfish poisoning, resulting in illness or death in humans. Others have begun to incorporate chemical compounds and nutrients into their testing protocols.

Group organizers say that funding sources and strategies also differ somewhat among these groups, as do relationships with government agencies. The differences are partly related to whether the group is located in the US or in Canada. Add to all of these factors the distinct personality of each group, and generalizations become risky.

What these groups do have in common is an interest in knowing what is affecting their coastal waters. With the support of regional organizations that help them coordinate their resources via workshops, newsletters, web pages, conference calls, and electronic mail, they trade information on subjects from sampling techniques to organizational issues such as volunteer recruitment, public outreach, and growth.

## Networks support volunteers

Coordinating much of this information-sharing is the Coastal Network of the Gulf of Maine, a loose affiliation of grassroots groups, government agencies, and other interested parties working (with financial support from the Gulf of Maine Council and other funding sources) to help coastal water quality monitoring groups undertake and promote their work. Former interim facilitator Rob Rainer said the network hopes to develop personnel exchanges among groups and government agencies so they can share expertise. The network also wants to help the groups use the Internet to promote their work and share their data.

Other support systems are also in place or are developing around the Gulf for coastal water quality monitoring groups. Massachusetts provides technical and financial support through several programs that address watershed issues, including a grant program that provides $250,000 a year to volunteer monitoring programs statewide.

Serving as a clearinghouse for 20 water quality monitoring groups in Maine, the University of Maine Cooperative Extension offers training materials, workshops, and technical and organizational backing, said Esperanza Stancioff, Director of the Clean Water Program for Extension. "The ownership and impetus and energy is at the local level. We just provide support," she said.

Extension and the Maine Coastal Program at the State Planning Office collaborate under the name Clean Water/Partners in Monitoring to co-sponsor an annual monitoring fair for Maine and New Hampshire that Stancioff said is attracting a Gulf-wide audience. The State Planning Office also publishes *Ripple Effect*, a newsletter for monitoring groups. And the state's Partners in Monitoring program allies local high schools, conservation commissions, land trusts, river watershed associations, and other community groups on water quality issues.

The University of New Hampshire Cooperative Extension also supports volunteer monitoring, offering workshops and training, and facilitating partnerships with research organizations, according to Extension Specialist Jeff Schloss and Ann Reid, Coordinator of the citizen monitoring group, Great Bay Watch, for the UNH Extension.

But organizers of support systems say groups working in the field need even more help. "We can't offer the amount of technical assistance we'd like to," said Kathleen Leyden, Policy Development Specialist at the Maine State Planning Office. "We really need to ante up with the resources on the state level and provide better support and technical assistance to these groups. There's only so far you can stretch volunteer capacity."

## Funding and other challenges

While coastal water quality monitoring groups on both sides of the border patch together funds from similar sources — government, foundation, and corporate — several organizers pointed out that, in the US, more money is distributed. This is partly because there are larger, more numerous, and more established funding sources, and partly because citizens groups have been part of the environmental landscape for a longer period of time. Rainer noted that Canada's smaller population has kept water quality problems on a smaller growth scale than in the US, and, as a result, fewer groups have formed in Canada to address such issues.

Canada's Atlantic Coastal Action Program (ACAP) provides seed money for community-based environmental groups. But organizers of these groups — including the Clean Annapolis River Project (CARP) in Nova Scotia, and ACAP-Saint John and Eastern Charlotte Waterways in New Brunswick — note that they have to seek most of their funds elsewhere. The federal ACAP program does, however, facilitate substantial in-kind and technical support from government agencies, said CARP Program Director Steve Hawboldt.

The Gulf of Maine Council, comprising US and Canadian members, has provided more than $100,000 to volunteer water quality monitoring efforts throughout the Gulf over a three-year period, supporting their work because it supports the Council's own goals to protect and restore coastal and marine resources, including shellfish habitats.

Friends of Casco Bay (FOCB), based in South Portland, Maine, was similarly able to "piggyback" onto the Casco Bay Estuary Project's action plan, said FOCB Citizen Stewards Coordinator Peter Milholland. The estuary project is a "large, ongoing funder" for FOCB, which, in return, provides the long-term monitoring called for in the estuary project's plan, he said.

Coastal water quality monitoring groups also say funding sources are attracted to groups that are known and supported in their local communities. Stancioff said success stories, such as the opening of "thousands of acres of clam flats" in Maine that have been found, through monitoring, to be clean, also tend to encourage financial support.

"Funders are more likely to give more funding if they see an overall sense of purpose and direction and strategy and progression," added Lissa Widoff, Project Director at the Maine Community Foundation and the founder and original facilitator of the Coastal Network of the Gulf of Maine. Even so, said Hawboldt, "For groups like ourselves I would argue that money is not the limiting factor, the limiting factor is how creatively you can think."

Groups need only a few hundred to a few thousand dollars a year to support actual monitoring activities, say some organizers. "Finding and keeping volunteers who are consistently interested and excited about their work," presents more of a challenge to coastal water quality monitoring groups, Leyden asserted, emphasizing their importance by noting, "The only data that exists for some of these embayments is data that's volunteer generated."

Photo: Suzy Fried/*Gulf of Maine Times*

Ann Reid, Coordinator of Great Bay Watch, a citizen monitoring group on the New Hampshire seacoast, collects a water sample in Hampton Harbor. Great Bay Watch is working with state agencies to monitor water quality in shellfish harvesting areas

Stating that, "Some volunteers have been with us since our pilot project seven years ago," Milholland credits that longevity to the FOCB program's flexibility. Volunteer monitoring group organizers say letting volunteers learn and do more also keeps them interested.

## Phytoplankton program grows

To appeal to volunteers' interest in specializing, and to help Maine address its concerns about toxic algae, the University of Maine Cooperative Extension and the Maine Department of Marine Resources (DMR) developed the Maine Phytoplankton Monitoring Program.

The program has about 80 volunteers and is continuing to grow, said Coordinator Wendy Norden. "You know what I think really makes this program, is that the data is used right away," she said, noting that water sample analyses are faxed to DMR to be entered in the database the day they are collected. "It's an exciting field. They're adding a lot to the scientific community," Norden said of the volunteers involved in the program.

"We would like to see [the program] grow by a couple of groups each year," said Paul Anderson, Director of DMR's Public Health Division. "We've been trying to get the aquaculture industry involved in this. Some of these toxic algae can wreak havoc in aquaculture. Some have been known to kill finfish, and then there are the obvious health problems with shellfish," he said.

Earlier this year, the Maine Outdoor Heritage Fund provided a grant to hire Norden as full-time coordinator. Funding for the program has also come from the US National Oceanographic and Atmospheric Administration and the US Food and Drug Administration. DMR provides in-kind resources, as do other agencies, such as Extension.

Stancioff believes that DMR's use of volunteers in its water quality monitoring programs and regulation of shellfish resources shows that data produced by volunteer monitoring groups is "gaining respect" in the scientific community.

Anderson said he is confident in the ability of properly trained volunteers to produce accurate data that DMR can use to classify shellfish growing areas. "We can train a quality volunteer to do as good or even better work than many scientists would want to admit," he said, noting that using volunteers allows agency staff to work on other projects that do require more specialized expertise. "There are some checks and balances in the system but the end result is we're making better use of the government's money by having volunteers contribute some of the effort," Anderson said.

In pursuit of credibility, some US water quality monitoring groups are implementing the US Environmental Protection Agency's (EPA) Quality Assurance Program Plan (QAPP), a quality control program. "Once you have that approval, the data can be used by other state, federal, and local agencies for evaluating the health of the bay," said Milholland, noting that FOCB has been operating under an EPA QAPP for six years. Stancioff said Extension has been working with four groups to develop QAPPs using an EPA-approved template.

## Widening perspectives

The possibilities for expansion in volunteer coastal water quality monitoring are countless, according to Stancioff. "There are so many things out there that could be done that volunteers can assist with." Monitoring of intertidal habitat, eelgrass habitat, biological monitoring, monitoring toxic substances in stormwater runoff, pursuing the sources of contamination, and developing more aggressive public education campaigns are among the new directions being considered or pursued by volunteer coastal water quality monitoring groups throughout the Gulf.

But traditional monitoring remains in high demand. "Scientists, researchers, and agency biologists can't be in all of these places at the same time," said Stancioff, noting that data collected by volunteers "can enhance current monitoring efforts and can also identify areas that researchers can concentrate their efforts on." Just as importantly, she said, through volunteer monitoring, "People are becoming engaged and becoming stewards of their own environment and solving their own problems."

### Resources for volunteer water quality groups

Brochure/map identifying Bay of Fundy/Gulf of Maine watershed monitoring groups:
Contact the Clean Annapolis River Project via E-mail at carp@nstn.fox.ca or call (902) 532-7533.

Several publications about environmental monitoring:
Contact the University of Maine Cooperative Extension Knox-Lincoln County office.
In Maine call 1-800-244-2104. Outside of Maine call (207) 832-0343.

Photo: Clean Annapolis River Project

# Organizations with a Gulf-wide outlook proliferate

**Gulf of Maine** — As the Gulf of Maine Council prepares to celebrate its tenth anniversary, numerous other organizations are also working to address Gulfwide issues relating to a sustainable marine environment, many in partnership with one another. Here is a sampling.

**Bay of Fundy Ecosystem Partnership**
**http://is.dal.ca/aczisc/fundy/boFEP**
A grassroots partnership of community groups, resource users and managers, scientists, coastal zone planners, First Nation groups, businesses, government agencies, commercial interests, and academic institutions, BOFEP formed in 1997 to promote understanding of the dynamics of the Bay of Fundy marine and coastal ecosystems, and to conserve this northernmost segment of the Gulf of Maine by linking science and community initiatives. BOFEP forms partnerships to promote the ecological integrity, vitality, biodiversity, and productivity of the Bay of Fundy ecosystem in support of coastal communities. The group is developing a "Virtual Institute" — a geographically dispersed, adaptable, responsive, and inclusive network linking all partners who share BOFEP's principles.

*Contact Graham Daborn via E-mail at fundy@acadiau.ca or phone (902) 542-2201; or Barry Jones via E-mail at barryj@gov.nb.ca or phone (506) 444-5749.*

**Bigelow Laboratory for Ocean Sciences**
**www.bigelow.org**
Founded in 1974, the lab is named for oceanographer Henry Bryant Bigelow who conducted extensive research in the Gulf of Maine in the early part of the century. Located in West Boothbay Harbor, Maine, it is a private, non-profit research institution that receives a major portion of its research funding from the US government. The lab studies and promotes understanding and stewardship of the oceans through research and education. Its research programs focus on topics including lobster ecology and toxic marine organisms that threaten commercial seafood industries. Bigelow develops educational programs for students of all ages.

*Contact Annette DeCharon via E-mail at adecharon@bigelow.org or phone (207) 633-9600.*

**Coastal Network of the Gulf of Maine**
Formed in 1993 as a network of water quality monitoring groups in the Gulf of Maine, the Coastal Network has since expanded to become a grassroots cooperative of government and non-government organizations involved in any and all forms of environmental monitoring throughout the Gulf. The network includes groups using community-based science to understand and ensure the health of the Gulf of Maine ecosystem. By staging workshops, developing manuals, and working in partnership with universities and numerous other organizations, including the Gulf of Maine Council, the coastal network facilitates the exchange of ideas, information, techniques, and technologies with a focus on community-based science, environmental monitoring, Gulf-wide communications, and capacity-building.

*Contact Alison Evans via E-mail at aevans@fox.nstn.ca or phone (902) 426-7774.*

**Collaboration of Community Foundations for the Gulf of Maine**
Formed in 1992, this organization is a collaborative of six community foundations, each serving regions within the Gulf of Maine. In a role beyond and including traditional grant making activities, CCF focuses on environmental and economic sustainability of the ecosystem by working with key constituencies throughout the region — including non-profit groups working on fisheries, water quality, marine conservation and sustainable community issues (see Gulf Log story, "Grants available for fisheries projects," page 10). Current projects include the Community Fisheries Project, providing grants and technical assistance to community-based fisheries groups; and an Internet networking project with the Gulf of Maine Aquarium and the Conservation Law Foundation.

*Contact Lissa Widoff via E-mail at lwidoff@igc.org or phone (207) 382-6553.*

**Global Programme of Action Coalition for the Gulf of Maine**
Created as a result of the North American Free Trade Agreement (NAFTA) in the interest of conservation, protection, and enhancement of the North American environment, the Commission for Environmental Cooperation (CEC) selected the Gulf of Maine as a candidate site for a pilot project to implement the 1995 Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA). CEC then supported establishment of the GPA Coalition for the Gulf of Maine (GPAC), which is taking action to reduce pollutants and protect and manage habitat in the Gulf of Maine.

*Contact Katie Ries, GPAC US Co-chair, via E-mail at kries@ocean.nos.noaa.gov or phone (301) 713-3078, ext. 171; or Joe Arbour, GPAC Canadian Co-chair, via E-mail at joe.arbour@ec.gc.ca or phone (902) 426-1701.*

**Gulf of Maine Aquarium**
**octopus.gma.org**
Incorporated in 1968, the Portland, Maine-based Gulf of Maine Aquarium teaches people about aquatic environments and facilitates marine research. Aquarium staff have traveled to 150 Maine towns to deliver more than 3,000 programs for 110,000 students. Over the past four years, the aquarium has developed an on-line capacity to deliver classroom-tested learning activities to every classroom with World Wide Web access. Currently, the organization is working with the herring industry to develop the hardware, software, and protocols to use commercial herring vessels as platforms to survey coastal herring spawning stocks.

*Contact Penny Robinson via E-mail at penny@octopus.gma.org or phone (207) 772-2321.*

**Gulf of Maine Council on the Marine Environment**
**www.gulfofmaine.org**
The Gulf of Maine Council is an international body brought together in 1989 to foster cross-border cooperation among Canadian and US government, academic, and private groups on implementing sustainable management strategies for the Gulf, which extends from Cape Cod to the Bay of Fundy. The Council's five major goals are to protect and restore regionally significant coastal habitats; to restore shellfish habitats; to protect human health and ecosystem integrity from toxic contaminants in marine habitats; to reduce marine debris; and to protect and restore fishery habitats and resources. It has provided funding to groups around the Gulf working toward these goals, and has sponsored forums on topics including natural gas development in the Gulf and threats to endangered North Atlantic right whales.

*Contact Megan Trites-Tolson via E-mail at tritesml@gov.ns.ca or phone (902) 424-1764.*

**Gulf of Maine Institute Without Walls**
Project developers are seeking support to form an international learning community to promote long-term sustainable stewardship for the Gulf of Maine. The GMIWW would address the need for innovative, engaging, and effective approaches to educating youth about the Gulf, and the need to create an environmentally literate and coastal zone-sensitive population. It would foster a network of electronically-linked innovative educational programs coordinated with local universities, public school districts, and community based environmental organizations, using the Gulf as a common learning and teaching resource.

*Contact John Terry via E-mail at jterry@fox.nstn.ca or phone (902) 648-2897.*

**New England Aquarium**
**www.neaq.org**
Open since 1969, Boston's New England Aquarium is a self-supporting nonprofit organization dedicated to research, education, and conservation. More than 1.25 million visitors — including 13,000 members — visit the aquarium's more than 70 exhibits annually. Aquarium projects include right whale research, eelgrass meadow restoration, fishing gear impact mitigation, bycatch studies, lobster rearing technique development, marine mammal rescue, and public education on the fisheries crisis. Its Conservation Department conducts forums, develops short-format educational films, and works with stakeholders on fishery and conservation issues.

*Contact Patrice Farrey via E-mail at pfarrey@neaq.org or phone (617) 573-0748.*

**Northwest Atlantic Marine Alliance**
Formed in 1995 to promote community-based marine resource management, NAMA is working under an innovative model of institutional change to unite those interested in marine resource use, focusing their collective expertise on restoring the Northwest Atlantic marine ecosystem so that it can support diverse uses. The Saco, Maine-based nonprofit organization is working to create partnerships between commercial fishermen, scientists, universities, and the private sector on research and technology issues.

*Contact Captain Craig A. Pendleton via E-mail at nama@lamere.net or phone (207) 284-5374. Call toll free 888-320-4530.*

**Regional Association for Research on the Gulf of Maine**
**www-nml.dartmouth.edu/rargom/rargom.html**
RARGOM, formed in 1991, is a Gulf-wide association of US and Canadian research institutions including public and private universities and colleges, private and government laboratories, state and federal resource management agencies, and not-for-profit educational institutions. The association also has a formal collaborative agreement with the Gulf of Maine Council on the Marine Environment. RARGOM strives to advocate and facilitate a coherent program of regional scientific research, maintain scientific quality, and provide a communication vehicle among scientists, government agencies, and the public.

*Contact Eugenia Braasch via E-mail at braasch@dartmouth.edu or phone (603) 646-3480.*

**USFWS Gulf of Maine Program**
The US Fish & Wildlife Gulf of Maine Program, located in Falmouth, Maine, was established in 1991 as part of the federal agency's Coastal Ecosystems Program. Its constituents include land-use decision makers in other federal, state, and local agencies; national and statewide conservation groups; local land trusts; and landowners. The program works through hundreds of voluntary partnerships to restore and protect nationally important habitat in the Gulf of Maine watershed, and has played a key role in protecting more than 12,000 acres and restoring 1,300 acres in the last five years.

*Contact Lois Winter via E-mail at lois_winter@fws.gov or phone (207) 781-8364.*

# Canada to seek comment on right whale proposals

SLIDE OF RIGHT WHALE

Photo: New England Aquarium

**Canadian whale watchers get a look at an endangered North Atlantic right whale.** Public consultations on Canadian recommendations for increasing the endangered North Atlantic right whale population will take place in New Brunswick and Nova Scotia in February 1999. The Canadian Right Whale Recovery Team met November 17 to draft its recommendations. Scientists believe approximately 300 right whales now live in the North Atlantic. While they are no longer hunted, they are subject to numerous threats including collisions with vessels, entanglement in fishing gear, and loss of habitat.

# GULF LOG

## Calendar

### Georges Bank Review public hearings

Public hearings relating to a decision on whether to extend a Canadian drilling moratorium on Georges Bank off of southwestern Nova Scotia will take place in January in Yarmouth, Shelburne, Lunenburg, and Halifax. For more details visit www.ycn.library.ns.ca/georges/ or call (from Canada) 1-800-370-2282 or (from outside Canada) (902) 424-0858.

### National Conference on Marine Bioinvasions

This conference takes place January 24-27, 1999 at the Massachusetts Institute of Technology (MIT), Cambridge, Massachusetts, sponsored by the MIT Sea Grant College Program. Visit http://massbay.mit.edu/exoticspecies/conference.html or E-mail exotics@mit.edu for information.

### National Ocean Sciences Bowl

The Nor'easter Bowl, a competition for northern New England high schools, will take place February 13, 1999 (snow date February 20) at the University of New Hampshire (UNH) in Durham. Sponsored by UNH, University of Maine, Bigelow Laboratories, University of New England, and the Consortium for Ocean and Research and Education, the contest has space for 16 teams. Visit http://marine-program.unh.edu/NOSB-99.html or call Sharon Meeker or Barbara Maurer at (603) 749-1565.

### Coastal GeoTools '99

*Coastal GeoTools '99: Exploring Spatial Technologies for the Coastal Resource Management Community* takes place April 5-7, 1999 in Charleston, South Carolina, sponsored by the National Oceanographic and Atmospheric Administration Coastal Services Center. Deadline for registration is March 1. Visit www.csc.noaa.gov/GeoTools99 for more information.

### UNH summer program

*Oceanography and Coastal Processes for K-12 Teachers*, a course open to northeast US educators who are minorities or who have minority students in their school, will be offered July 7 - 24, 1999 at the University of New Hampshire. The all-expenses-paid course includes several days of applied computer technology, and is sponsored by the New Hampshire/Maine Sea Grant Program, UNH Cooperative Extension, and others. For more information, call Sharon Meeker or Barbara Maurer at (603) 749-1565.

### CZ '99

*Coastal Zone '99 — The People, The Coast, The Ocean: Vision 2020* takes place July 24-30, 1999 in San Diego, California. Visit omega.cc.umb.edu/~cz99 or E-mail Chantal Lefebre at cz99@umbsky.cc.umb.edu or fax (617) 287-5575 for more information.

**Are we on your list?**

If your group is working on Gulf stewardship or related issues, we want to know about it. Add us to your mailing list. See masthead for Editor's mail, fax, and E-mail information.

Photo: Sue Browne/Nova Scotia Department of the Environment

Young festival-goers learn about Gulf of Maine marine habitats at the Fish Aid Festival eco-village in Yarmouth County, Nova Scotia, last August.

## Fish Aid numbers low, enthusiasm high

**Yarmouth County, Nova Scotia** — Despite heavy-hitting headline performers such as Bruce Cockburn, Fish Aid, a musical arts and crafts festival held in Chebogue August 14-16, floundered financially due to low turnout. Organizers said a little more than half the crowd needed to cover costs attended the festival each night.

Conceived as a fund raising and public awareness event for marine research on Nova Scotia's east coast, the festival featured local and international performers and an "eco-village" with displays from environmental agencies and grassroots groups.

Organizers say promotion of the festival did raise awareness of the importance of marine research, and that they hope for more financial success in 1999, when a future Fish Aid festival may take place in a more populated area, perhaps near Halifax.

## Youth Conference seeks volunteers for event

**Saint John, New Brunswick** — The second *Coastal Zone Canada 2000 Youth Conference*, to take place here in September 2000, is seeking youth volunteers ages 16 to 26 years to organize the event.

The first youth conference took place in Victoria, British Columbia last fall and resulted in creation of the Youth Coastal Action Network, or Youth CAN, whose objectives include youth education, empowerment, and development of the year 2000 youth conference.

To participate or for more information, contact Maxine Westhead, Youth Conference Chair, via E-mail at westheadm@mar.dfo-mpo.gc.ca or phone (902) 426-4215.

## MA seeks ban on coastal boat sewage dumping

**Boston, Massachusetts** — Seeking statewide designation as a No-Discharge Area (NDA), Governor Argeo Paul Cellucci is urging the US Environmental Protection Agency (EPA) to support the Commonwealth's efforts to protect its coastal waters from boat sewage.

NDAs are federally-approved, state-designated areas where the discharge of all boat sewage is prohibited. Outside NDAs, boat sewage can be released after it is treated using either grinding, chemical, biological, electrical, or incineration methods. Treatment helps to control bacteria and other organisms, but does not eliminate them. Disinfectant chemicals can be toxic.

In an October 7 letter to EPA Region 1 Administrator John DeVillars, Cellucci stated, "I believe that seeking a statewide NDA designation is the natural next step towards enhancing the protection and stewardship of Massachusetts coastal waters." The state's Office of Coastal Zone Management (MCZM) submitted a formal application to EPA in early November.

Under the Clean Water Act, states may apply to EPA to request that a water body be designated as an NDA. Requests are evaluated by the EPA Regional Administrator to determine if the water body meets NDA criteria. For the designation to be approved, EPA must determine that an adequate number of pumpout facilities exist for boaters.

MCZM notes that 126 boat pumpout stations located along the Massachusetts coast enable boaters to properly dispose of boat waste, and that communities can apply for grants to help pay for construction of pumpout facilities or purchase of pumpout boats.

Several Massachusetts communities have already sought and obtained NDA designation in an effort to protect shellfish beds, bathing beaches, and boating areas.

For more information including a complete list of pumpout facilities available in Massachusetts, visit the MCZM homepage at www.magnet.state.us/czm/ or call the MCZM Information Line at (617) 727-9530, ext. 420.

## Grants available for fisheries projects

**Gulf of Maine** — Six community foundations in the Gulf are jointly offering grants of up to $4,000 each for projects undertaken by local non-profit organizations, community associations, or civic groups to serve coastal fishing communities.

The Collaboration of Community Foundations for the Gulf of Maine (CCF) is seeking proposals for community-based initiatives that address the ecological, economic, and social impacts of the continued decline of commercially important fish and marine species in coastal communities of the Gulf of Maine. Collaborative approaches to local and regional fishery issues and cross-community strategies are of particular interest to CCF.

The grants are being offered as part of a two-year small grants and technical assistance program. Grantees will have the opportunity to participate in learning institutes designed to serve their organizational needs and facilitate networking, peer learning, and cooperative strategies across the region. Grantees will also receive on-site technical assistance in Internet technology to assist them in developing regional approaches and networks. Regional projects promoting cooperation on Gulf-wide fisheries issues will also be supported.

Proposals are requested that: promote sustainable fisheries and ecological management or restoration of marine resources; increase community self-reliance while working toward relief of the social impacts of the fishery crisis; promote sustainable development of marine resources; provide organizational development and leadership training assistance for civic and social organizations serving fishing communities; use Internet technology for improved communications and networking, outreach, and education; and increase public awareness about Gulf fishing communities and their maritime heritage through educational programs and cultural events.

For additional information, contact: in New Brunswick and Nova Scotia, Chris Gordon at Fundy Community Foundation (506) 529-4896; in Maine, Lissa Widoff at The Maine Community Foundation (207) 667-9735; in New Hampshire, Angela Matthews or Racheal Stuart at the Greater Piscataqua Community Foundation (603) 430-9182; in Massachusetts North Shore and Mass Bays, Cindy Rizzo at The Boston Foundation, (617) 723-7415; and on Cape Cod, Sharon Leighty at the Community Foundation of Cape Cod (508) 362-3040.

## New label helps ID recyclable batteries

**Washington, DC** — A new label, approved last summer by the US Environmental Protection Agency (EPA), will make it easier for consumers to identify recyclable nickel-cadmium (Ni-Cd) batteries and to locate their nearest battery recycling collection site.

"These batteries contain cadmium, a heavy metal that can be harmful to public health and the environment if not disposed of properly," said EPA Administrator Carol M. Browner. "Recycling used Ni-Cd batteries prevents cadmium from harming our lakes and streams and polluting the air we all breathe," she said.

Most discarded trash is sent to a landfill or incinerator. Heavy metals such as cadmium can leach directly from landfills into soil, groundwater, and surface water. When incinerated, heavy metals are concentrated in the ash byproduct, which is also disposed of in landfills.

Heavy metals can also enter the atmosphere by way of the incinerator's smokestack and then — in a process called atmospheric deposition — fall back to earth, landing directly on water bodies, or entering them via runoff. Once in surface waters, heavy metals can enter the food chain. In sufficient quantities, cadmium can cause serious illness in humans, including cancer (see story on Gulfwatch and toxic contaminants, page 1).

More than 20,000 retail outlets nationwide collect recyclable rechargeable batteries commonly used in products such as cellular phones, video cameras, power tools, and laptop computers. The newly approved label, developed by the Rechargeable Battery Recycling Corporation (RBRC), will be displayed on nickel-cadmium rechargeable batteries and depicts a battery surrounded by three chasing arrows with the word "recycle" above it. The label also includes a consumer contact number (1-800-822-8837 in the US), which will provide information to consumers on how and where to recycle their used Ni-Cd batteries.

# Council Currents

## News from the Gulf of Maine Council on the Marine Environment

Photo: New Hampshire Coastal Program

New Hampshire Senator and former Governor Judd Gregg (right), an original signer of the cross-border agreement that formed the Gulf of Maine Council on the Marine Environment, succeeded in winning approval for a $500,000 appropriation for the Council in the recently passed US Federal budget. A resident of Rye, New Hampshire, Gregg participated in that town's coastal cleanup with local Girl Scouts last year.

## GOM Council receives $500,000 appropriation

**Washington, DC** — The long-awaited passage of the 1999 Omnibus Appropriation Bill by federal legislators in October resulted in a $500,000 line item appropriation for the Gulf of Maine Council.

New Hampshire Senator Judd Gregg pushed for the funding, which he initially proposed at $2 million over three years. As former Governor of New Hampshire, Gregg was one of the original signatories to the agreement that formed the Gulf of Maine Council (GOMC) in 1989. The organization works to foster cooperation among Canadian and US government, academic, and private groups on implementing sustainable management strategies for the Gulf, which extends from Cape Cod to the Bay of Fundy.

"We've been working very closely with Senator Gregg and his staff, and I'm pleased that the review of the Council's efforts to date has resulted in the conclusion that this is an effort worth pursuing," said Council member Jeffrey Taylor, who is also Director of New Hampshire's Office of State Planning. "Bringing international partners together is clearly the way to do business when it comes to working on behalf of a sustainable Gulf of Maine. This funding will help us continue to do that effectively," Taylor said.

## GOMC seeks nominations for first Longard award

**Halifax, Nova Scotia** — Nominations for the Gulf of Maine Council's first annual Art Longard Award will be accepted in early 1999. The award will be presented at the Council's June 1999 meeting in Yarmouth, Nova Scotia to a volunteer who makes a special contribution to the Gulf of Maine.

The Council voted last year to create the award in memory of Art Longard, who passed away December 20, 1997 following a battle with cancer. He served as Nova Scotia's long-time representative on the Gulf of Maine Council's working group; was an employee of Canada's Department of Fisheries and Oceans; and was Director of Policy, Planning and Coastal Resources for the Nova Scotia Department of Fisheries. He had a personal affinity for the sea as well, and was known as a passionate sailor.

For more information, contact Megan Trites-Tolson at the Gulf of Maine Council Secretariat via E-mail at tritesml@gov.ns.ca or call (902) 424-1764.

## GOMC focuses on Georges Bank

**Halifax, Nova Scotia** — A forum on the transboundary environmental considerations related to petroleum development on Georges Bank was a major feature of the Council's semi-annual meeting in Halifax November 19 and 20.

GOMC Secretariat Andrew Cameron of Nova Scotia's Department of Fisheries and Aquaculture described input from panel and audience members as "informative, passionate, and civilized."

During its meeting, the Council also agreed to form a committee to address the interaction of aquaculture and the environment; discussed implementation of the Global Programme of Action Coalition action plan; and reviewed results of the *Out of the Fog* workshop, sponsored jointly with the New England Aquarium.

Cameron noted that the Council's attempts to encourage First Nations and Native American observers to attend the meeting were unsuccessful, though an indigenous member of the staff at Fisheries and Oceans Canada met with the GOMC Working Group earlier in the week to discuss more effective ways to recruit their participation.

## Gulfwide cleanup nets tons of beach debris

**Gulf of Maine** — A total of 11,500 participants collected and tallied 76 tons/69 tonnes of beach debris from 373 miles/600 kilometers of coastline during a Gulfwide beach cleanup in honor of the International Year of the Ocean. Canadian cleanups took place during the summer, while US efforts occurred in the fall.

US participants in the Gulfwide event numbered 8,000 and Canadian participants numbered 3,500, according to Meinhard Doelle of the Clean Nova Scotia Foundation, a nonprofit environmental organization that has organized the Canadian Beach Sweeps throughout all of the Maritime provinces for nine consecutive years. Approximately 500 of the Canadian Gulf participants came from a single community environmental organization, Atlantic Coastal Action Program-Saint John, he said.

The composition of the waste "hasn't changed very much," said Doelle, except for two noteworthy differences along the Canadian coastline: the percentage of paper trash has dropped and the quantity of beverage containers found was cut in half.

Marine debris data collected during this year's Gulfwide coastal cleanup will support the Gulf of Maine Council's efforts to reduce marine debris, which can harm wildlife and people.

## Workshop focuses on advancing info exchange

**Boston, Massachusetts** — A discussion of methods for enhancing electronic communication in the Gulf of Maine drew 65 participants to a workshop organized jointly by the Gulf of Maine Council and the Boston-based New England Aquarium.

*Out of the Fog: Furthering the establishment of an electronic environmental information exchange system for the Gulf of Maine* took place November 4-6 at the Aquarium and the Massachusetts Institute of Technology (MIT). Representatives of organizations working on Gulf of Maine issues addressed current Gulf of Maine information systems and integrated information systems. Participants also discussed funding options for projects that will be developed to improve electronic communications among scientists, teachers, resource managers, and others throughout the Gulf. Sessions included hands-on computer sessions.

Workshop organizers plan to form an action committee to address electronic communications issues, according to Maggie Mooney-Seus of the New England Aquarium.

The forum was funded by the Cabot Family Charitable Trust and the National Oceanographic and Atmospheric Administration. Other sponsors include the Canadian Department of Fisheries and Oceans, the Collaboration of Community Foundations for the Gulf of Maine, the Gulf of Maine Council, the Maine Department of Marine Resources, the Maine State Planning Office, Massachusetts Coastal Zone Management, MIT Sea Grant, and the Regional Association for Research on the Gulf of Maine.

# Resources

## New undersea poster goes "down under"

A map and poster that focuses on the landscapes, geology, and biology of the Gulf of Maine has been published as part of the International Year of the Ocean celebration. Called the *Undersea Landscapes of the Gulf of Maine*, the poster's concept and text were developed by Robert Steneck of the University of Maine School of Marine Sciences and Joseph Kelley of the Maine Geological Survey. The project was coordinated by Paul Dest of the Maine State Planning Office. For a copy contact (in the US) Massachusetts Coastal Zone Management, (617) 727-9530, ext., 420; Cynthia Lay, New Hampshire Coastal Program, (603) 431-9366; or Paul Dest, Maine State Planning Office, (207) 287-5305; (in Canada) Tim Hall at (902) 426-4116.

## Mr. And Mrs. Fish on the 'Net

A new web site at www.mrandmrsfish.com features Mr. and Mrs. Fish, who have, for 20 years, traveled throughout the world teaching about life in the sea. In 1993-94, the pair received the Gulf of Maine Council's Visionary Award for their work with young children in the Gulf region. A resource for all ages, Mr. And Mrs. Fish perform humorous yet highly educational shows about how life works in the waters of the Gulf of Maine.

## Restoration database

*A Coastal Wetland Restoration Database* includes information on approximately 100 tidal marsh restoration projects, more than 100 freshwater impoundments in Canada, and several innovative projects aimed at restoring seagrass and tidal flats. The database also includes information on more than 400 potentially restorable tidal marshes, representing more than 2,000 acres/809 hectares. Visit gulfofmaine.org and click on Our Library/Regionally Significant Coastal Habitats/Coastal Habitat Restoration to view or download the database and related report. If you have new information on a restoration project to add to the database, or if you have questions, contact Susan Snow-Cotter at Massachusetts Coastal Zone Management, (617) 727-9800, ext. 210.

## Hometown stewardship

The US Environmental Protection Agency (EPA) has created a home page at www.epa.gov/ecocommunity designed to promote Community-Based Environmental Protection. The CBEP web site provides information on tools, financial resources, case studies, publications, and documents, and provides links to related sites. EPA has also launched an Internet web site at www.epa.gov/ceis that will allow citizens to easily obtain up-to-date, comprehensive, accurate environmental information about their communities simply by entering a zip code. Volumes of EPA air, water, toxic substances, and waste information are available from the site, which also features links to specific subject area EPA web sites.

## NS natural history

*Natural History of Nova Scotia, Volumes 1 and 2* organizes biophysical and land use information into topics, habitats, and ecozones using text, graphics, maps, and pull-out charts. The information is applicable throughout the Gulf of Maine. Order through the Nova Scotia Museum via E-mail at educ.nsm.doucetat@gov.ns.ca or by calling 1-800-632-1114 or (902) 424-7344. There is a charge for this publication.

## Watershed management course

The University of British Columbia has developed an interactive CD-ROM on integrated watershed management, as well as a graduate level course on this subject delivered via the disk, an Internet bulletin board, and E-mail. The CD covers watershed management in an interdisciplinary manner using state-of-the-art multi-media computer techniques, offering the opportunity to study urban, rural, agricultural, forestry, groundwater, and surface water pollution problems. The distance learning course, available over the Internet, lasts 14 weeks during which students make use of the CD and the expertise of course instructors. Visit www.cstudies.ubc.ca/dipcert/watersh1.htm for more information on the CD and course, including fees.

The *Gulf of Maine Times* is made possible in part by generous donations from:

New Nouveau Brunswick
Environment/Environnement

Public Service of New Hampshire
The Northeast Utilities System

U.S. Fish & Wildlife Service