NH Sea Grant

Program Guide 2004

Sea Grant
New Hampshire

The NH Sea Grant College Program provides support, leadership and expertise for university-based marine research, extension and education. A component of NOAA's National Sea Grant College Program and based at the University of New Hampshire, it is one of 30 programs throughout the nation promoting the understanding, wise use and stewardship of our coastal resources.

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NOAA

National Oceanic and Atmospheric Administration

U.S. Department of Commerce

University of New Hampshire

UNH Regains Sea Grant College Status

The 20th of August 2003 was a great day in the 35-year history of NH Sea Grant. On that day, UNH was named Sea Grant College and the program became the NH Sea Grant College Program. Our celebration of this event was undimmed by the fact that UNH had enjoyed Sea Grant College status (in partnership with the University of Maine) for over 25 years.

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photos by Doug Prince/UNH Photographic Services

Vice Admiral Conrad Lautenbacher, Undersecretary of Commerce and NOAA Administrator (left), joined in the ceremony with UNH President Ann Weaver Hart, myself, and Ronald Baird, Director of the National Sea Grant College Program. Our sense of accomplishment was heightened by the wholehearted participation of our numerous stakeholder groups, represented in the ceremony by Wendy Lull, President of the Seacoast Science Center, Inc.

With the perspective that time can bring, I would add a personal comment that UNH's return to Sea Grant College status brings a wonderful sense of accomplishment and pride to the entire program staff. With an average seniority of eight years, ranging from two to 24 years, the NH Sea Grant staff are dedicated, collegial and – above all – committed to Sea Grant. Our celebration of UNH's new status was a very happy day for all of us.

On behalf of the NH Sea Grant College Program staff, I invite you to share in our sense of accomplishment. And in addition, I hope you will use our new status to encourage, inspire and expect even more from NH Sea Grant in the future. We look forward to continuing to work with you, to meet your needs and help you respond to new opportunities, to learn from you, and to share our future successes with you. As always, I look forward to hearing your comments and suggestions.

Very sincerely yours,

Ann Bucklin

Professor and Director

UNH Vice President for Research and Public Service Donald Sundberg speaks at the ceremony. Seated are (left to right): UNH President Ann Weaver Hart, NOAA Administrator and Undersecretary of Commerce for Oceans and Atmosphere Vice Admiral Conrad Lautenbacher, Legislative Assistant for Oceans and Environment for U.S. Senator Judd Gregg (R-NH) Nancy Ragland Perkins, National Sea Grant College Program Director Ronald Baird, Seacoast Science Center President Wendy Lull, Sea Grant National Review Panel Chair Peter Bell, and NH Sea Grant Director Ann Bucklin.

At a reception hosted by the Institute for the Study of Earth, Oceans and Space, Jim Murray, National Sea Grant College Program Assistant Director for Outreach and Program Leader for Extension, samples blue mussels from the UNH Open Ocean Aquaculture project. The OOA effort grew from several NH Sea Grant-funded research projects. Today it raises flatfish and mussels eight miles offshore and deep below the ocean's surface. The project provides mussels for 11 restaurants in Portsmouth, N.H., as well as to a major local fish market.

Nancy Ragland Perkins (left), Legislative Assistant for Oceans and Environment for U.S. Senator Judd Gregg (R-NH), talks with Ellen Goethel, a local marine biologist and educator.

Research

Development of a General Protocol for Characterizing Subtidal Oyster Reefs Using Remote Sensing Techniques

Raymond Grizzle, Jackson Estuarine Laboratory, UNH, Durham, NH 03824 603.862.5130, ray.grizzle@unh.edu
Semme Dijkstra, UNH Center for Coastal and Ocean Mapping; Brian Smith, NH Fish and Game Department

Eastern oyster (*Crassostrea virginica*) populations have been declining in many areas along the East Coast for years. Effective oyster management has been hindered by the lack of a means to effectively and economically obtain information on oyster distribution and abundance. This research team plans to remedy that situation by assessing the effectiveness of newly developed acoustic, visualization, videographic and GIS-based technologies for characterizing subtidal oyster reef habitat and developing a protocol for noninvasive habitat evaluation.

Analyzing 19th Century Fisheries Records to Determine the Historical Abundance and Distribution of Gulf of Maine Cod

W. Jeffrey Bolster, Dept. of History, UNH, Durham, NH 03824 603.862.3016, jbolster@cisunix.unh.edu
W.B. Leavenworth, Andrew Cooper & Karen Alexander, UNH Dept. of Natural Resources

While most agree that the Gulf of Maine cod fishery is in crisis, none of the stakeholders know very much about the historical nature of the Gulf's cod population or about its productivity over the long term. To address this, a team of UNH maritime historians, biostatisticians, marine ecologists and policy experts will reconstruct cod population dynamics for the mid-19th century using data obtained from fisheries logbooks and other records. Data sets compiled from these sources are suitable for analysis using modified fisheries stock assessment models, generating metrics for cod population size in numbers of fish, total biomass and average fish size.

Environmental Controls on Shrimp Recruitment Dynamics

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Patrick Ouellet, Dept. of Fisheries and Oceans, Canada; Daniel Schick, Maine Dept. of Marine Resources

This research project is part of a collaboration among US and Canadian researchers to study environmental controls on recruitment dynamics of the northern shrimp (*Pandalis borealis*) in the Gulf of Maine and coastal waters of eastern Canada. Dramatic fluctuations have occurred in the abundance of these shrimp over the past 50 years. In order to understand these fluctuations, the researchers are studying the growth and survival of the shrimp during their early life stages. This work will provide tools for the management of this important fishery.

Sex Determination and Reversal in the Black Sea Bass

David Berlinsky, Dept. of Zoology, UNH, Durham, NH 03824 603.862.0007, david.berlinsky@unh.edu
Theodore Smith, South Carolina Dept. of Natural Resources

The Black Sea Bass has enormous potential for aquaculture due to its high consumer value and limited seasonal availability. For the past five years, this research team has been working to determine the best methods for culturing this species. This research project focuses on two problems that must be addressed before commercial-scale aquaculture can begin: controlling precocious puberty in males and preventing sex reversal of female broodstock.

Sustainable Integrated Finfish/Nori Aquaculture for Bioremediation and Production of Food and Biochemicals

Christopher Neefus, Dept. of Plant Biology, UNH, Durham, NH 03824 603.862.1990, chris.neefus@unh.edu
George Nardi, Great Bay Aquaculture, Portsmouth, NH

While aquaculture is a valuable growth industry in the US and around the world, concerns linger about the environmental consequences of nutrient loading of coastal waters from uneaten fish food and from excreted metabolic waste from fish. These researchers are working to address that concern in land-based aquaculture operations by using the excess nutrients to produce a commercially valuable seaweed species. Their work will determine appropriate fish-to-nori biomass ratios and result in the preparation of a business model for the implementation and operation of the system.

Larval Trematode Communities as Indicators of Wetland Ecosystem Health

James Byers, Dept. of Zoology, UNH, Durham, NH 03824 603.862.0006, jebyers@cisunix.unh.edu
Todd Huspeni & Mark Torchin, Marine Science Institute, UC Santa Barbara

This research team is working to develop an efficient, holistic method of assessing whether a marsh system is significantly degraded by analyzing the structure of digenetic trematode parasites within the marsh community. These parasites make good indicator species because they use several hosts to complete their complex life cycles. Thus, the researchers believe that variation in parasite diversity and abundance directly reflects variability in environmental quality and the abundance and density of the parasites' host populations.

Sustaining the Urchin Fishery

Foreign demand transformed green sea urchins from a menace into a profitable fishery, but a lack of regulations led to its decline. With funding from NH Sea Grant, several UNH researchers have been working to bring the fishery back.

Urchins have always lived in the Gulf of Maine, but in the early 1980s their numbers suddenly surged as many of their predators declined due to overfishing.

Hungry urchins even invaded lobster traps to feed on the bait inside. And they weren't easy to remove – Larry Harris's scarred hands are proof. Harris, a UNH professor of zoology, has studied the creatures for 20 years. He says not only did urchins clog up traps, their voracious appetites also drove lobsters out of shallow waters.

"Urchins turn the sea bottom into a bare, rocky surface covered with green pincushions," says Harris. "Most of the things we associate with kelp beds – fish, lobster, crabs, seaweed – disappear. There's no place to hide and very little to eat."

Commercial fishermen soon turned the bother into a boon by harvesting the urchins and selling them to Japan, where the gonads are considered a delicacy and used in sushi. But by 1993 the fishery was in decline, having peaked before regulations could be developed to govern it.

Harris says now the only way to save the urchin fishery is to develop a hatchery system where urchins are cultured until they reach a suitable size, then released in the ocean. However, urchins raised in crowded inland hatcheries often grow at different rates, making it difficult to time their release.

To solve this bottleneck, Harris has been working to develop a suitable growing container that can be used in open water. The most successful design is a large, suspended mesh pouch that allows water to move freely through the bag, providing natural algae for the urchins to eat. In fact, the bags provide such an appealing habitat that wild urchins settle in them, too. An unexpected finding, Harris says this means the wild urchin population could receive a boost.

Another difficulty with raising urchins is that the timing of their reproductive systems means that young urchins are usually released in the ocean during the summer, when hungry predators abound. UNH researchers Charles Walker, professor of zoology, and Michael Lesser, associate professor of zoology, addressed this problem by tricking the urchins.

Shorter days in the fall trigger wild urchins' reproductive cycles. By manipulating the amount of light hatchery urchins receive, Walker and Lesser have been able to induce reproduction at different times during the year. This means that urchins can be released in the ocean during the winter, when most predators are less active.

Harris, Walker and Lesser have all worked extensively with urchin harvesters who are using their techniques. They hope that together they can develop a sustainable urchin fishery in the Gulf of Maine, one that supports a healthy urchin population as well as harvesters' livelihoods.

Extension

Marine education

The **UNH Marine Docent Program** is the backbone of NH Sea Grant's marine education efforts. Now in its 25th year, the program boasts 170 volunteers who introduce and explain the marine environment to 15,000 people each year through its SeaTrek educational programs. Marine education specialist Sharon Meeker is hoping to reach even more by working with 4-H staff at UNH Cooperative Extension to develop a new marine curriculum called "4-H Goes to Sea," where 4-H students will explore watersheds, estuaries, rocky shores, salt marshes and the open ocean.

Water quality

Led by coordinator Ann Reid, the **Great Bay Coast Watch** volunteers monitor 26 sites around the Great Bay Estuary for basic water quality and phytoplankton. Local, state and federal organizations and agencies use the Watch's database for researching point source pollution in coastal areas and to assess eutrophication of coastal waters. The Watch has also partnered with the NH Department of Environmental Services to monitor the city of Dover's storm drain system. During the summer volunteers check drain pipes at 100 sites in the city for levels of storm water runoff, the most common cause of water pollution. In addition to NH Sea Grant, the Watch receives support from UNH Cooperative Extension, the NH Coastal Program and the NH Estuaries Project.

Fisheries policy

As the New England fishing industry faced challenging times, NH Sea Grant, along with Sea Grant programs in Connecticut, Maine and Rhode Island, presented a fisheries-related workshop series to provide current scientific and real-life results from various management practices as a foundation for future fisheries policy discussions. Extension educator Rollie Barnaby organized the workshops, which addressed bycatch, marine protected areas and property rights in fisheries management. Through speaker presentations, case studies and audience/panel discussions, the workshops provided a forum for education and discourse.

Fishing gear

NH Sea Grant Extension has been helping commercial fishermen learn more about conservation-oriented fishing gear. Extension specialist Pingguo He hosted a workshop to help show fishermen how to improve the selectivity of their gear and promote conservation during commercial trawling. With funding from the Northeast Consortium, commercial fishermen traveled to Memorial University of Newfoundland to discuss new innovations in gear design with federal and state fisheries officials, as well as with other Sea Grant extension specialists from the Northeast.

Managing Growth in Coastal Communities

New Hampshire is the fastest growing state in New England, expanding by about 19,000 people every year. Most of this growth is occurring in the southern part of the state, where people have migrated to the Seacoast region. As open space is gobbled up for homes, businesses and roads, farms and forests are paved over. This can reduce groundwater replenishment and increase polluted runoff into fragile rivers, streams and bays.

To help communities facing rapid growth manage their natural resources and retain their distinct characters, a group of regional, state and federal organizations formed the Natural Resources Outreach Coalition (NROC), part of the National Nonpoint Education for Municipal Officials (NEMO) Network. Extension specialist Julia Peterson has worked with the group since 1997, specifically addressing risks that growth poses to water resources.

NROC's assistance begins with an informational presentation to the community. Using GIS maps and georeferenced data, each presentation is tailored to depict the current status of the community's natural resources, as well as to introduce strategies to protect them. After the community determines its most pressing needs, NROC provides assistance over the next year in setting goals, strategic planning, grant writing and implementing specific projects.

One successful collaboration was with the city of Dover. Peterson worked with a public education and outreach committee to host a series of "Growing Greener" workshops for city officials and the public, focusing on strategies to protect open space and minimize impacts of development. The well-attended workshops were cited as instrumental in decisions later made by the Dover Planning Board to manage residential growth and enhance natural resource protection through changes in the city's zoning ordinances and subdivision regulations.

"NROC helped us channel our efforts," says Joyce El Kouarti, a Dover resident and one of the coordinators of the workshops. "Although there were boards and volunteers already working on projects related to growth, it wasn't until we worked with NROC that we started working together."

Communications

The following products are available from NH Sea Grant Communications:

The Great Bay Coast Watch 2002 Annual Report (UNHMP-AR-SG-03-21) A. Reid, S. Meeker, C. Dolan, A. Perkins, B. Pagum and K. Diamond. $13.

Aquaculture: Opportunity or threat to traditional capture fishermen (UNHMP-JR-SG-03-2) R. Barnaby and S. Adams. Reprinted from ***World Aquaculture***, March 2002. $1.

Porphyra birdiae sp. nov. (Bangiales, Rhodophyta): A New Species from the Northwest Atlantic (UNHMP-JR-SG-03-12) C. Neefus, A. Mathieson, A. Klein, B. Teasdale, T. Bray and C. Yarish. Reprinted from ***Algae***, 17(4): 203-216, 2002. $1.

Microbiology of summer flounder Paralichthys dentatus fingerling production at a marine fish hatchery (UNHMP-JR-SG-03-11) S. Eddy and S. Jones. Reprinted from ***Aquaculture***, 211: 9-28, 2002. $1.

Offshore Culture of Blue Mussels (UNHMP-V-SG-03-13) Produced by NOAA/UNH CINEMAR, this 15-minute video illustrates the techniques being used to grow and harvest blue mussels off the coast of NH. $5.

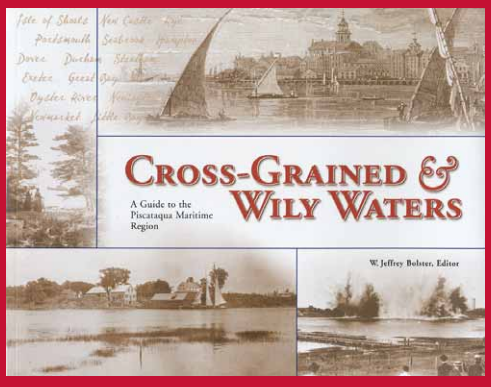
The 2003 Tech 797 Ocean Project Reports:

Submarine Test Capsule (UNHMP-TR-SG-03-18) R. Conrad, W. Gillard and K. Soucy. This project team studied the dynamics of a test capsule designed to be launched vertically from a submarine and how the addition of an appendage to the capsule impacted those dynamics. $13

Marine Invasive Species in the Gulf of Maine (UNHMP-TR-SG-03-17) L. McKillop, A. Pywell and M. Toran. In order to better understand the process of bioinvasion, this project evaluated several species that have been successful in colonizing the Gulf of Maine and the characteristics of the Gulf that have contributed to that success. $4.

Mini-Baja Water Propulsion and Floatation (UNHMP-TR-SG-03-20) A. Gariepy, J. McDonald, T. Sawayer and J. Calaguiro. This report covers the design and testing of a propulsion and flotation system for an all-terrain vehicle. $4.

Offshore Wind Energy Powered Fish Feed Buoy (UNHMP-TR-SG-03-19) A. Pelletier, A. Ganly, D. Parker, G. George, J. Gagne and P. Perrinez. This team designed a remotely controlled, self-powered buoy capable of storing and delivering a week's supply of food to 200,000 mature fish being raised in offshore aquaculture pens. $10.

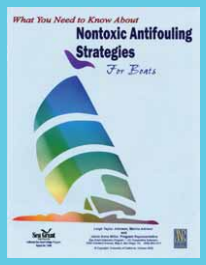


Cross-Grained & Wily Waters: A Guide to the Piscataqua Maritime Region

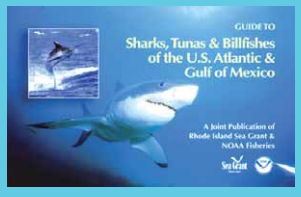
W. Jeffrey Bolster, Editor. (ISBN 0-914339-65-6) This well-illustrated book contains about 75 essays by historians, anthropologists, journalists, museum professionals, science educators, literature scholars, architects, economists, mariners and others with a special knowledge of, and love for, the Piscataqua region. Its editor is the James H. Hayes and Clair Short Hayes Chair in the Humanities at UNH.

"From the slow moving waters at the upper reaches of Great Bay to the pounding surf on the rocky Isles of Shoals, the Piscataqua region is a unique mixture of history, architecture and natural environments. This book defines the region. It brings the people and events that shaped it into focus by telling the story of an intricate landscape and a mighty river." — U.S. Senator Judd Gregg

Recent publications from around the Sea Grant network



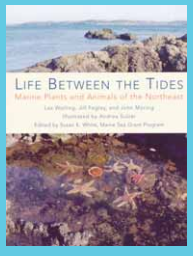
What You Need to Know About Nontoxic Antifouling Strategies for Boats
Prepared by Leigh Taylor Johnson and Jamie Anne Miller of the California Sea Grant Extension Program, this booklet reviews the environmental problems caused by copper-based boat bottom paints and reports on the latest in environmentally friendly antifouling strategies. While this publication will be of interest to the boating community at large, it is specifically intended for government agencies, policy-makers, and managers of marinas, ports and harbors. The booklet is free from California Sea Grant. Please contact Gretchen Frederick at gfrederick@ucsd.edu or 858.534.4446.



Guide to Sharks, Tunas & Billfishes of the U.S. Atlantic & Gulf of Mexico
A collaborative effort between Rhode Island Sea Grant and the National Marine Fisheries Service, this compact, waterproof, full-color, spiral-bound guide is designed to be used in the field by fishermen, scientists, educators and the general public. It contains photos of 44 species as well as a description, information on distribution and habitat, and notes regarding similar species. It is available for $25 from RI Sea Grant. Please contact Jean Gallo at 401.874.6842 or jgallo@gso.uri.edu for more information.

The Dune Book Produced by Spencer Rogers of NC Sea Grant and David Nash of NC Cooperative Extension, this 28-page book is a comprehensive report on the importance, preservation and management of sand dunes. While some of the contents are specific to the North Carolina region, there's a lot of information for anyone with a need to know more about the role dunes play in coastal dynamics. The book is available from NC Sea Grant for $5. Please contact Sandra Harris at 919.515.9101 or harriss@unity.ncsu.edu.

Guide to Exotic Species This attractive, concise brochure identifies 14 of about 40 marine exotic (introduced) species that may be found along the New England coast, including sea anemones, seaweeds, mollusks, crabs, ascidians and barnacles. Produced by MIT Sea Grant at part of their Hitchhikers Project, it also includes a few native species to illustrate traits that distinguish native from exotic species. It is available free of charge from NH Sea Grant Communications.



Life Between the Tides: Marine Plants and Animals of the Northeast
Edited by Susan White, communications coordinator for Maine Sea Grant, and published by Tilbury House Publishers in Gardiner, Maine, this 128-page book includes invertebrates found in coastal waters, salt marsh vascular plants, seaweeds of the nearshore area, and fishes found in tide pools and salt marshes. It is an outgrowth of a very popular book, **Guide to Common Marine Organisms Along the Coast of Maine**, published by Maine Sea Grant in 1998. The book costs $15 and can be found in most bookstores in the region or ordered from Tilbury House.

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This publication is made possible by the National Sea Grant College Program of the US Department of Commerce's National Oceanic and Atmospheric Administration under grant NA16RG1035 to the New Hampshire Sea Grant College Program.

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UNHMP-PG-SG-04-01

www.seagrant.unh.edu

Colonists began settling at the site of Portsmouth, New Hampshire, as early as 1623, and it remains the state's hub of maritime activity. The artwork on the cover was taken from an 1877 panoramic map of Portsmouth drawn by J.J. Stoner of Madison, Wisconsin. It is part of the map collection at the U.S. Library of Congress Geography and Map Division, where reproductions can be obtained or downloaded in digital format.
http://memory.loc.gov/ammem/gmdhtml/