Shipworms Bore the Maine Coast

The common shipworm, *Teredo navalis*, has bored through wooden oyster trays in the Damariscotta River, destroyed oak pilings in Belfast Harbor, and invaded floats and docks as far north as Stonington. These voracious creatures are unwelcome new arrivals to Maine’s working waterfront and may, unfortunately, be here to stay.

Dr. Kevin Eckelbarger, DMC Director, is the local shipworm expert, having done his M.S. degree on their reproductive biology at California State University during the late 1960’s. He says “there’s no way to stop ’em!” Once shipworms have penetrated wood they don’t leave, so the only way to prevent their destruction is to use non-wood products for pilings and floats.

*Teredo navalis* is really a clam with a greatly reduced shell and a long worm-like body. Planktonic *Teredo* larvae settle out of the water column onto wood. Using its bivalve shell like a drill, it bores into wood — often just above the surface of the sediments. Here it secretes a calcium carbonate lining and grows to adulthood. As adults, these hermaphroditic creatures reproduce by the millions.

This summer Eckelbarger and Danielle Rioux, an undergraduate in the marine science program at the University of Maine, will survey damage and conduct field and laboratory studies to learn more about the animal. Among topics of interest are how quickly it breeds in Maine waters and how rapidly it attacks wood. An immediate goal is the development of a slide or video program for public educational purposes.

Studying Coral Reefs in the Indo-Pacific

Dr. Bob Steneck spent the past nine months on sabbatical in the tropical Indo-Pacific Ocean studying coral reef ecosystems. Working with several colleagues, he studied the reefs of Australia (the Great Barrier Reef), Papua New Guinea, Indonesia, Guam and Palau. From September to May, Bob participated on several research cruises, logged more than 200 dives and identified coralline algae on over 900 specimens. His primary foci were on the roles of herbivory, the mechanisms of coral recruitment on living reefs, and on the long-term patterns of stability evident in fossil reefs.

*Dr. Bob Steneck diving on a coral reef.*
Bob’s primary sabbatical host was Dr. Terry Hughes of James Cook University, a coral reef biologist who focuses on ecology and biodiversity. Using huge cages they excluded herbivorous fishes from sections of a reef to learn how these fish affect the reef community. They found that the “caged” reef was characterized by abundant seaweed (macroalgae) and dying coral and concluded that grazing fish limit the growth of macroalgae, thereby allowing the coral community to thrive. Thus, if grazing fish populations decline in the Indo-Pacific as they have in the Caribbean, the Great Barrier Reef may begin to look more like Caribbean reefs which are dominated by macroalgae and have low coral cover.

Collaborating with Dr. Terry Done of the Australian Institute of Marine Science, Bob quantified the distribution and abundance of crustose coralline algae at sites along 700 km of the Great Barrier Reef. It is generally believed that crustose coralline algae induce metamorphosis and settlement of corals, yet Bob found the dominant corallines to be devoid of newly settled corals. He did however find a cryptic variety of coralline that was a wonderful nursery habitat for settling corals. In fact, over 60% of the major reef building corals settled on this one crevis growing coralline algae. He does not yet know if the coralline attracts settling larvae or if the larvae that settle on this species survive while those settling elsewhere die.

Bob also studied the fossil reefs of Papua New Guinea. These terraced structures are calcareous remains of ancient reefs that have been episodically uplifted above sea level over the last 300,000 years. In Papua New Guinea, Bob collaborated with Dr. John Pandolfi, a paleobiologist at the Smithsonian Institution who specializes in fossil coral reefs. The two researchers examined the fossil reefs, quantifying coral and coralline algal assemblages of the past and comparing them to present day reef communities. With this information Steneck and Pandolfi will reconstruct ancient reef habitats and past environments. They hope to use this information to determine if the structure of reefs today are within the range of variation seen in the fossil record.
Recent Publications


Midcoast Stewards

The DMC provided classroom and lab space for a group of 23 local residents participating in the Midcoast Stewards Program.

Modeled after a similar program in the Penobscot Bay region of Maine, the Midcoast Stewards Program educates citizens about conservation issues that affect the land, waterways and coastlines of midcoast Maine, and encourages them to participate in local projects that will benefit the the natural and human communities of the region.

Participants in the Midcoast Stewards Program go through a rigorous training session. They learn about the geology and the cultural and natural history of the area through classroom discussion and field trips to beaches, forests and farms. They also learn about water quality monitoring and explore such issues as sustainable agriculture, sustainable fisheries, aquaculture, tourism and sprawl.

In exchange for this 80-hour course, participants agree to volunteer 30 hours of service to local conservation efforts of their choice — cultural history, land trusts or watershed organizations. The Darling Marine Center is pleased to offer classroom and lab space to the program because it provides the midcoast area with a team of volunteers committed to stewardship.
North American Echinoderm Conference
Darling Marine Center • University of Maine
August 22-26, 2001

The 4th North American Echinoderm Conference (NAEC) will be held August 22-26, 2001 at the DMC. This four-day conference will be a great opportunity for echinoderm biologists from a broad array of fields to exchange their recent research findings in a stunning location. The event will feature keynote addresses by Drs. John Pearse, Paul Tyler, Craig Young and John Dearborn as well as sessions of oral and poster presentations.

Complete conference information including travel information and registration material can be downloaded from the DMC web site at http://server.dmc.maine.edu. If you would prefer to receive this material in printed form, please contact Linda Healy at lhealy@maine.edu or by phone at 207-563-3146, extension 200.

Scallop Project Update

In the Summer 2000 issue of Making Waves we featured an article about a scallop spat collection project in which our resident Sea Grant Extension Agent, Dana Morse, is participating. A year later, we are happy to report that the project has been very successful both in terms of industry support and scallop survival and growth.

Spat collected in the fall of 1999 are now 18 months of age. These scallops spent the winter in cages in the Damariscotta River Estuary. Despite cold temperatures, the scallops experienced very little mortality and actually managed to grow 2-5mm. These scallops now measure more than 55mm in size.

Thanks to increased participation and leadership in the project by the industry sector, more spat was collected in the fall of 2000 in the Deer Isle/Stonington region of Downeast Maine. It is estimated that the number of spat collected reach into the millions. Fishermen in the Saco Bay area were also successful in their 2000 efforts, and have begun work in reseeding and population counts in that region.

This summer, various means of rearing the juveniles will be tried. Some will be caged at the DMC and monitored for growth, while others will be tagged and released in Penobscot Bay as part of a reseeding project. An additional set will be reared in a raceway nursery system.

We’ll keep you posted with the results!

DMC to Become Incubator Site

The Maine Aquaculture Innovation Center (MAIC) has recently been awarded $750,000 by the State of Maine’s Department of Economic and Community Development to establish an Aquaculture Advanced Technology Development Center (AATDC). The funds will be used to build three aquaculture incubator sites in Maine, one of which will be located at the DMC. The other two will be located further downeast in the towns of Franklin and Eastport.

The purpose of the AATDC is to accelerate the early stage development of aquaculture-technology based businesses along the Maine coast. The incubator sites will provide relatively low-cost space, equipment, administrative and management services to start-up companies that do not yet have the capital necessary to develop new products or technologies.

The DMC will receive $150,000 to build a 600 square foot addition to the Flowing Seawater Laboratory. This dedicated incubator space will provide ready access to DMC laboratory equipment. It will be managed by the DMC and made available to entrepreneurs participating in the AATDC program.

For more information contact Michael Hastings at the Maine Aquaculture Innovation Center, 207-581-2263.
**Hi-tech Fish Finding**

Hydroacoustics are used by both scientists and commercial fishermen to locate stocks of Atlantic Herring in the Gulf of Maine, the Gulf of St. Lawrence, and on Georges Bank. Herring are fished commercially in these waters and the catch from the Gulf of Maine brings in almost $5 million annually. Herring are primarily used for lobster bait, but also for human consumption and to make fish meal.

In March, scientists and fishermen from coastal New England and Maritime Canada, and a representative from the company that manufactures the hi-tech equipment met at the DMC to discuss how they were using hydroacoustics to study the size and reproductive strength of the herring stock.

DMC researcher Dr. Phil Yund presented data collected by the Gulf of Maine Aquarium that shows a correlation between herring distribution and oceanographic parameters such as temperature and phytoplankton abundance. Using hydroacoustic surveys to find the fish, and satellite imagery data of sea surface temperature, he was able to conclude that the greatest abundance of herring are found along temperature fronts.

Scientists from Canada’s Department of Fisheries and Oceans reported that they use hydroacoustic surveys to augment data gathered in more traditional trawl surveys to assess herring stocks in the Gulf of Saint Lawrence and around Newfoundland.

Researchers from Woods Hole and NMFS conduct hydroacoustic surveys of Georges Bank with a dedicated survey vessel and are working toward being able to convert the signal intensity to biomass of herring.

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**Icelanders Meet with UMaine Researchers at DMC**

Mr. Arni Mathiesen, the Minister of Fisheries for the Government of Iceland, met with researchers at the Darling Marine Center in March. The Minister and his party traveled to Maine after attending the Boston Seafood Show where Mr. Mathiesen presented the keynote address.

Iceland has had great success over the past 25 years in managing their fish stocks for current returns and future sustainability. The island nation’s sustainable fisheries management system relies heavily on scientific data and cooperation between government and the fishing industry.

Using cod, Iceland’s most valuable fish, as an example, Mathiesen explained how government officials set catch levels based on scientific data estimating fish stock size. Since 1995, the fishing industry has been allowed to catch only 25% of the fishable stock annually. However, this 25% has grown from 220,000 metric tons per year to an estimated 350,000 metric tons. Since the controlled catch allows more adult fish to remain in the sea to spawn, they have seen a dramatic increase in juvenile cod populations.

The Minister’s party came to the DMC to learn more about the UMaine’s School of Marine Sciences; both the academic program and the research program. They toured the research laboratories and met with a dozen researchers from the University’s School of Marine Sciences.

When asked what he hoped to accomplish on his trip to Maine, Mathiesen described his travels as a “fishing trip” — “I’m testing the waters to see what opportunities they may hold.” Mr. Mathiesen hopes to find and develop ways in which Iceland and the United States can exchange ideas and techniques for managing sustainable fisheries and developing aquaculture, as well as collaborate on ecosystem studies and global climate change research.
GMF Develops Guide to Nature Trails

GMF Board member Joe Mallory has compiled a 36-page Trail Guide to the walking trails the group has developed on the DMC property. The guide complements the permanent markers found along the trail that identify plants, geologic formations, and interesting marine and shoreline habitats.

The guide is beautifully illustrated by the work of two local high school students. Junior Eric Brackett and sophomore Dan Hanafin produced 35 line drawings of plants along the trail under the guidance of Barbara Neeson, art instructor at Lincoln Academy.

The trails, known as the Merriam Nature Trails, are used in the GMF’s K-12 program with local schools, but are also open for the enjoyment of the general public.

Development of the trails and publication of the “Trail Guide” was made possible by generous contributions from GMF members, local businesses, and interested citizens of the area. Contributions are still needed for maintenance, development of bridges over wet areas and making parts of the trails wheelchair accessible. If you have not been contacted and wish to contribute to this project, please call Mel Fuller at 563-1192.

GMF’s Summer Lecture Series

Each summer the Gulf of Maine Foundation hosts a Wednesday evening lecture series at the Darling Marine Center. The weekly event draws on the expertise of scientists, historians, novelists, and photographers and covers a wide variety of marine and maritime issues and events.

Lectures are held at 7:30pm in the Kresge Classroom and are open to the public. Lectures are free to GMF members. A $4 donation is requested for non-members.

July 11
The Birds of the Maine Coast.
Joe Mallory, Gulf of Maine Foundation

July 18
Science Education in the High School.
Tom Ford, Science Source.

July 25
Why is the Ocean Blue (Green or Red)?
The use of color to study phytoplankton in the sea.
Dr. Mary Jane Perry, Professor, DMC

August 1
Contaminated Salt marshes: Using modern biology to remedy the problems.
Dr. Marc Fischer, Skidaway Institute of Oceanography, Savannah, GA.

August 8
Desalination: History and Present Status.
James Birkett.

August 15
Geology of the Pemaquid Region.
William Marshal.

GMF Docents Give Tours of the Darling Marine Center in July and August

Wednesdays at 1:30pm • Fridays at 10:30am
Marine Science Comes to Life for Teacher and Kids

Two local non-profit organizations, the Pemaquid Watershed Association and the Gulf of Maine Foundation, teamed up this spring to teach teachers and third grade students about marine life at the DMC.

The Pemaquid Watershed Association (PWA) arranged a teacher training workshop that was taught in part at the DMC. Twenty teachers gathered at the DMC after school and boarded the Center’s research vessel. Out in the river, they sampled the marine life with plankton tows and bottom trawls. Back at the lab they learned how to use microscopes and identify their catch under the tutelage of Professor Emeritus Dr. Bernie McAllice. Evening lectures described the geology of sand beaches and the human history of the area. A subsequent training session brought teachers back to the DMC to learn more about seaweeds, aquaculture and the critters of the intertidal.

The Gulf of Maine Foundation (GMF) helped local third grade teachers who participated in the training session plan field trip activities and bring their students to the lab. When all was said and done, almost 150 third grade students visited the lab in May.

The 3rd graders participated in a “research cruise” under the guidance of Captain John Higgins and graduate student Anne Simpson. Using a small tow, they sampled hard and soft bottoms to see which animals lived where.

The kids also conducted a survey of the animals in the intertidal zone with the help of Bernie and Jean McAllice, and graduate student Heather Uhden. They discussed the adaptations each animal has for living where it does in the intertidal.

A third activity, lead by Sea Grant Extension Agent Dana Morse and graduate student Carolyn Skinder, explored the harvests of the sea. The third graders learned about aquaculture. They identified seaweeds and made pressings, talked about how seaweeds were gathered and that seaweeds are present in toothpaste and milk shakes.

The PWA presents annual workshops like this in response to teacher’s requests. They workshops are aligned with the Maine Learning Standards and are free to all teachers in the area. This year’s workshop was made possible by a grant from the Davis Foundation.

The Gulf of Maine Foundation’s K-12 Education Coordinator who works with teachers and schools to bring students to the DMC for hands-on marine science experiences.

One thing’s for sure... our future scientist know how to have fun!
The new Marine Culture Laboratory (MCL) is really coming along! From the outside it’s a funky looking building with lots of neat angles. The exterior siding of grey and teal is now complete. The walk-in experimental chambers are in and finishing touches are being made to the floors, lab benches and counter tops. In the classroom, wires are being pulled for the ITV hook-up.

Many college groups took advantage of DMC facilities this spring. Pictured above is Northeastern University’s East-West Program lead by Drs. Sal Genovese and Geoff Trussell with the help of Patrick Ewanchuck. Pictured left is Dr. Herb Wilson’s Invertebrate Zoology class from Colby College sorting through a soft sediment trawl aboard the RV Ira C.

Dr. Gary King received the Outstanding Research Award, from the College of Natural Sciences, Forestry and Agriculture, University of Maine. Gary is a faculty member associated with both the School of Marine Sciences and the Department of Biochemistry, Microbiology and Molecular Biology. The award highlights his accomplishments in the field of microbial ecology.
Over the past two years, faculty members Pete Jumars and Larry Mayer have served on a 40-member national committee to map out the most important and promising new opportunities in ocean sciences for the next two decades. This report, entitled "Ocean Sciences at the New Millennium", has just been published and is being distributed. It is intended to serve as an important foundation for planning at the National Science Foundation, as well as other agencies.


Pictured above: This year’s Nor’easter Bowl winners represented Conval High School from Conval, NH. The winners enjoyed a weekend at the DMC, which included field trips to various coastal habitats, laboratory workshops and a sampling cruise aboard the R/V Ira C.

The Nor’easter Bowl is a regional National Ocean Science Bowl competition. The Conval team took second place at the national competition held in Washington DC. Congratulations to a wonderful bunch of young adults!

Pictured above and right: The annual School of Marine Sciences Graduate Student Mini-Symposium was once again held at the DMC. During this two-day event, over 40 graduate students majoring in oceanography, marine biology and marine policy at the University of Maine presented their thesis research. There were 24 oral presentations and 17 posters featured, all professionally done! After the event everyone let loose and enjoyed a waterfront BBQ and ice cream fest.
The Louise Dean Library Fund

Although Lou Dean now enjoys retirement, she resides just down the road from the Center and is still a regular participant at DMC functions. What better way to honor her 30 years of service to DMC Library users than contributing to the Library Fund? Your gifts to the Fund will impact a great many people who depend on the Library’s resources as they pursue their degrees and conduct their research.

According to founding Librarian Louise Dean, the DMC Library had very humble beginnings. In 1966 it occupied just four shelves of the canning closet in the basement of Mr. Darling's residence (the present Administration building). Today, the Library occupies the main floor of the Horse Barn, and is arguably the Center's most important facility. It is used extensively by resident faculty and graduate students, and by many visiting investigators, visiting colleges, summer interns, and Semester-By-the-Sea undergraduates.

The Library currently houses over 13,000 books and journals including 135 serial titles covering biology, chemistry, ecology, geology and oceanography. Approximately half of the serials are unique holdings within the state. However, due to overcrowding, about 30% of the Library’s holdings are in storage, and there is limited study space or room for additional computers. Though the DMC Library is supported by the Fogler Library on the Orono campus, it receives only limited funding for basic operations.

This year the Center is seeking funds from the National Science Foundation (NSF) to expand and modernize the Library. Our goal is to double the current first floor space so that all journal and book holdings can be housed together, and to renovate the 2nd floor of the Horse Barn to create a student Computer Center and an ITV-equipped conference room.

To complement the proposed NSF funds and honor its founding librarian, the Center is seeking broad support from alumni and friends to establish the LOUISE DEAN LIBRARY FUND. This fund will be used to enhance the Computer Center, an ever important aspect of all libraries in the 21st century. Support will be sought from alumni and other donors annually.
DMC Alumni Day
Registration Form

Please return this registration form with payment by July 1, 2001 to:

Linda Healy
Darling Marine Center
93 Clark’s Cove Road • Walpole, ME 04573

Name: _____________________________________
Address: _____________________________________
___________________________________
___________________________________
Phone: _____________________________________
e-mail: _____________________________________

I’m interested in:
❑ Touring the new dorm/labs
❑ Boat ride aboard the R/V Ira C.
❑ Pitching a tent in the DMC field

Lobster bake orders
Steak or chicken is available. Please note how many of each.

___ Lobster ___ Steak ___ Chicken ___ Vegetarian

# adult meal tickets _____ x $20 = $ ______
# child meal tickets (14 and under) _____ x $10 = $ ______

Total due $ ______

# Free hot dog dinners (6 and under) ______

Payment:
❑ Check payable to the University of Maine
❑ Visa/MasterCard # _____________________________
Expiration date: _______
Signature: _________________________________________
It's been 36 years since Ira C. Darling established the Center, 10 years since Dr. Kevin Eckelbarger took the helm, and 6 years since the last alumni gathering — it’s time for a party!

Festivities will begin at 2:00 pm on Saturday, July 21, 2001 and will include facility tours, boat rides on the new research vessel, volleyball, a lobster bake, and an evening slide show history of the Darling Center in our new dining hall.

The afternoon’s activities are free. The evening lobster bake costs $20/person ($10/child 14 and under). It will be the real thing — lobsters steamed in rockweed over a wood fire, mussels, clams, corn-on-the-cob, drawn butter, desserts and beverages are all included. Grilled steak, chicken or vegetarian option will also be available. Children under 6 can get a free hot dog dinner.

Slides and photos — if you’ve never experienced one of Kevin’s slide shows your in for a real treat. Please send us slides and photos of your time at the DMC by June 30th. Be sure tell us who is in the picture and roughly when it was taken. All will be returned.

Contact Linda Healy at lhealy@maine.edu or 207-563-3146, ext. 200, with questions, or the names and addresses of DMC alums with whom you are still in contact.

Alumni Day Registration Form on page 11