American Lobster Settlement Index Celebrates 25 Years

As larvae, American lobsters (*Homarus americanus*) are planktonic, floating in the surface waters and rising to the currently as they grow. After 4-6 weeks, postlarval lobsters settle out of the water column and take up a benthic existence amongst cobble and rocks. Can that yearly pulse of baby lobsters become an early warning system for future trends in Maine’s most valuable fishery? This is the question Dr. Rick Wahle has been asking for most of his career and the answers may lie in the America Lobster Settlement Index (ALSI).

In 1987, using a technique called “airlift suction sampling,” Rick and a team of SCUBA divers “vacuumed” cobble habitat at several locations in coastal Maine revealing large numbers of newly settled young-of-year lobsters along with older juveniles that had to date eluded quantification. In subsequent years, Rick and collaborator Lew Ince (also now at the DMC) began monitoring eight sites on Maine’s outer coast to evaluate the coupling of a lobster’s planktonic larval supply and settlement to the seabed. These first surveys expanded south to Rhode Island and north to Newfoundland to include over 100 sites that are now surveyed annually as part of the ALSI collaborative of marine resource agencies and fishermen contributing to this unique international monitoring effort.

Research Award is a Sign of Great Things to Come

Dr. Douglas Rasher received the prestigious Mercer Award from the Ecological Society of America. First awarded in 1948, the Mercer Award is given each year for the World’s most outstanding ecological research paper published by a researcher under the age of 40. Now a postdoctoral research associate at the DMC, Rasher received the 2014 Mercer Award for his eye-opening study on Fiji’s coral reefs he conducted as a graduate student at the Georgia Institute of Technology. The work shows that a diverse collection of grazing fish is essential to keep coral reefs clean and free of harmful seaweeds that quickly outcompete baby corals for space on the reef. Clean reefs are healthy reefs that are better able to recover from hurricanes or other disturbances. The results provide further insight for the management and conservation of coral reefs.

Joining the ranks of such prestigious ecologists as E.O. Wilson, Jane Lubchenco, Robert MacArthur and Joseph Connell makes the award that much more meaningful to Rasher, who explains, “Over the past half century, many well known ecologists received this award for publishing what are now considered “classic” papers; these studies shaped who I am as a scientist and how I view the natural world. That makes receiving this award very personal and special to me.”

In his accolades to Rasher, Dr. Bob Steneck, notes “some awards are for a lifetime of achievement—for a job well done. Others are bellwethers of great things to come.” The Ecological Society of America’s Mercer Award is clearly in the latter camp. Rasher’s receipt of the Mercer Award is an indication of “great things to come.”

The award-winning research paper “Consumer diversity interacts with prey defenses to drive ecosystem function,” can be read at esajournals.org/doi/abs/10.1890/12-0389.1

DMC Proud Partner in Sustainable Aquaculture Initiative

UMaine announced the launch of the SEANET program thanks to a $20 million National Science Foundation EPSCoR (Experimental Program to Stimulate Competitive Research) grant. The August announcement won the accolades of Senators Susan Collins and Angus King, and Representatives Mike Michaud and Chellie Pingree; all noted the benefits of this funding to our state, to our working waterfronts, and to our workforce. Through SEANET, the University expects to hire 20 graduate students, 3 faculty, and up to 3 postdoctoral fellows with some expected to be resident at the DMC. SEANET is a multi-institutional, public-private partnership led by UMaine, in collaboration with the University of New England. “This project is inherently about how to make aquaculture sustainable in Maine, both socially and environmentally,” says Dr. Damian Brady, Assistant Director of Research for Maine Sea Grant and a lead investigator in SEANET. “The Damariscotta River Estuary will be a region of focus for the project.” The Damariscotta River estuary is the home of shellfish aquaculture in Maine and “has long been a model for the rest of the state about how to integrate education, research and industry,” notes Dana Morse, Extension Associate for the Maine Sea Grant College Program at the DMC.

The DMC was founded in 1965 and the National Sea Grant College Program was established in 1966. When Dr. Herb Hidu was hired in 1970, he spearheaded research on the cultivation of blue mussels and oysters. And just around the corner from the DMC, in Clarks Cove, Ed Myers established the first aquaculture lease in 1974. In subsequent years, such local institutions as Dodge Cove Marine Farm, Pemaquid Oyster Company, Mook Sea Farm and Golden Point Oyster Company, to name a few, were established by UMaine students. “The DMC’s role over time is exemplary of what could be accomplished with the SEANET program,” says Morse. “The application of science to an industry, the integration of that industry with the community, and both the educational and workforce training that comes along with it—the DMC got this started in Maine.”

When asked if this funding will attract more students, Morse says, “It’s a great opportunity for students to get involved in the DMC and the SEANET program and make great contributions to the science.”

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The Ship That Held Up Wall Street

In January 1982, construction was about to begin on the Ronson Ronson's latest real estate development at 175 Water Street in Lower Manhattan when archaeologists at the site discovered the remains of a very old ship. Dr. Warren Riess and Shelli Smith were called in to survey the site and gather the most significant artifacts before— ...to excave the “Ronson ship.”

In his latest book, *The Ship That Held Up Wall Street*, Riess recounts the discovery, excavation and preservation of the Ronson ship, and the questions and curiosities that puzzled a team of historians, archaeologists and scientists for 30 years. The ship is now believed to be the Princess Carolina, a colonial era merchant ship built in Charleston, South Carolina. As the only ship remains of its kind to be discovered, it provides us with a wealth of information about colonial America. Artifacts and the bow timbers from the Ronson ship site are at the Maritime's Museum in Newport, Virginia.

The Ship That Held Up Wall Street can be purchased online at major bookstores and at warrenriess.com/books. Autographed copies are on sale at Maine Coast Book Shop in Damariscotta, Maine; the perfect holiday gift.

A Distinguished Maine Professor

Mary Jane Perry, Professor of Oceanography and Interim Director of the DMC, was bestowed the 2014 Distinguished Maine Professor award. Presented by the University of Maine Alumni Association, the award is recognition of outstanding achievement in the university’s mission of teaching, research and public service.

Mary Jane is an internationally recognized researcher, gifted teacher and dedicated mentor to young scientists. She is known for her ability to effectively provide students with the necessary knowledge for understanding, but also to instill the skills and curiosity that motivate them to teach themselves.

A widely published researcher, Perry’s papers are often at the forefront of new developments and ocean discipline, opening doors for future investigations. She is a research pioneer in the study of ocean optics and ocean biology, and the use of autonomous underwater gliders for remote ocean measurements.

Mary Jane joined the UMaine School of Marine Sciences faculty in 1999, and was named interim director of UMaine’s Darling Marine Center in 2013. Since 2000, her research has brought more than $7 million to the University of Maine in sponsored funding.

Perry was elected an Oceanography Society Fellow in 2010. She received NSF’s Creativity Award in 2009 and 2003, and is one of three invited plenary speakers for the 2014 Ocean Sciences Meeting, the largest and most important gathering of aquatic scientists in the world.

Caribbean Coral Reefs Find New Balance

Dr. Bob Steneck was part of an international study recently published in the journal Proceedings of the Royal Society B that highlights the delicate balance that exists between bioerosion and carbonate or limestone production on coral reefs.

There is new evidence from Caribbean coral reefs that rates of erosion from excavating sea urchins and parrotfish have declined over the past several decades. As these groups decline from disease or overharvesting, the balance is tipped. Coral reefs may be persisting and growing more because of the reduction of eroding animals than due to the vigorous limestone production of reef corals.

Steneck notes that “marine ecosystems continue to surprise us both here in Maine and in the Caribbean because the cast of characters and the climate both keep changing.”


Publications of research conducted at the DMC and submitted by talented investigators


Van der V, C.L.C. Bell, L. Marth, C. German, B. John, M. Cleland, M. Vindelazo, D. Azoto, B. van der V, C.L.C. Bell, L. Marth, C. German, B. John, M. Cleland, M. Vindelazo, D. Azoto, B. John, M. Cleland.

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Diving Publications & Accolades

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DMC Day  Interim Director Mary Jane Perry called “all hands on deck” and instituted a new tradition: DMC Day. Faculty, Staff, and students pitched in. Some donned work gloves to pull weeds, clear trails and plant flowers, while others dipped brushes into gallons of white paint to freshen up the Plume, Cow Barn, Horse Barn and Pumphouse. The afternoon concluded with a grand potluck BBQ.

Oyster & Pumpkin Festivals

Children of all ages enjoy meeting their underwater neighbors in the Gulf of Maine. Lili Pugh and undergraduate students bring touch tanks to many local festivals including the Pemaquid Oyster Festival and PumpkinFest.

The Pemaquid Oyster Festival celebrates the oyster, sustainable working waterfronts and our local marine environment. Festival proceeds support the Edward A. Myers Marine Conservation Fund which in turn supports marine education and marine conservation. For over ten years, the fund has enabled local teachers to bring their K-12 students on field trips to the DMC.

PumpkinFest is a week-long celebration of all things pumpkin—with a marine spin, believe it or not! Scuba divers carve pumpkins underwater while mariners compete in a giant pumpkin regatta. And so a touch tank is not so out of place along the waterfront.

Coastal Cleanup

Team DMC scoured Pemaquid Beach collecting over 30 pounds of trash. The effort was spearheaded by Lisa Ouellette and took place in September, during Maine Coast Week.

Maine’s coastal cleanup campaign is the largest volunteer event in the state and coincides with the Ocean Conservancy’s International Coastal Cleanup®. In addition to collecting trash and marine debris, volunteers inventory their haul and submit their tally to the Ocean Conservancy’s Trash Index.

Since its inception in 1986, the trash index has identified hot spots of ocean trash, marked unusual trash events and raised awareness of the global marine trash problem. Annual reports of the trash index are available at oceanconservancy.org.

Legislative Visits

A group of Maine legislators toured the DMC in June to learn more about the role of UMaine research, partnerships and education in the overall marine economy. Marine economy-related research topics included UMaine commercial fisheries, Gulf of Maine buoys monitoring and aquaculture. The legislators and UMaine marine researchers and students were joined by local business owners.

This year’s Agricultural Council of Maine (AGCoM) tour highlighted midcoast Maine and included seaweed farming. During the tour, participants visited shellfish farms on the Damariscotta River and the aquaculture research facility at the DMC—home of Maine’s oyster industry. AGCoM tour participants included 33 state legislators, University of Maine System Chancellor, Jim Page, and Ed Ashworth, Dean of UMaine’s College of Natural Sciences, Forestry and Agriculture.

Team DMC has been showing up at a variety of local events. A highly spirited group, Team DMC shares their enthusiasm, creativity and knowledge of marine issues with the Pemaquid Peninsula community. Go Team!
Volunteers calibrate the data sondes in the DMC’s Mitchell Classroom with guidance from Dr. Larry Mayer. Photo by Peter Mitholland, Friends of Casco Bay.

Kathleen Thornton at work on the Shimadzu analyzer.

New Protocol for TN

In recent years, government, academic and nonprofit groups concerned with the health of estuarine ecosystems have come to realize the benefit of monitoring sea water nutrient levels. Most are turning to total nitrogen (TN) analysis.

TN is made up of organic nitrogen in particulate and dissolved form, as well as inorganic forms of nitrogen, such as nitrate and ammonium, all of which can enter an estuary from anthropogenic sources. High TN concentrations can lead to high levels of phytoplankton growth which, in turn, may cause a harmful lack of oxygen in the water. TN measurements can aid in locating high anthropogenic inputs to an estuary from anthropogenic sources. High TN measurements can aid in locating high anthropogenic inputs to an estuary from anthropogenic sources. The downside of TN analysis was that the EPA-approved methods for the determination of TN produce large amounts of hazardous waste. Kathleen Thornton of the Biogeochemistry Laboratory has found a better way. She developed a new protocol that utilizes a Shimadzu TOC VCHP analyzer and uses no harmful chemicals and produces no hazardous waste. The Maine DEP Bureau of Land and Water Quality approved the new method for use in Maine estuarine monitoring on February 7, 2014. The method has been used by several estuarine monitoring groups during the summer 2014 field season (see article on MCOA, above). It is hoped that this new TN protocol will be approved for broader use as it eliminates the risk to laboratory workers of exposure to harmful chemicals and it produces no hazardous waste, protecting the environment and reducing disposal costs.

Last year, the Damariscotta River Association (DRA) and six other citizen groups (Medomak Valley Land Trust, Kennicott Estuaries Land Trust, Friends of Casco Bay, Sheepscot Valley Conversation Association, Georges River Tidewater Association, and Rockport Conservation Commission) decided that their impact on the region would be magnified if they got together and monitored their estuaries with the same equipment, the same techniques, and at the same time. They created the Maine Coastal Observation Alliance (MCOA) whose mission is to monitor and promote the health of Maine estuaries via sharing equipment, sampling, methods and expertise. The alliance thus started covering estuaries from Casco Bay to Rockport.

Sarah Gladu, DRA Director of Education and Environmental Monitoring, was key in establishing the MCOA and is president of the organization. Gladu said recently, “The partnerships of the monitoring organizations and DMC staff to form MCOA and quickly work towards the development of this year’s pilot monitoring project is an outstanding accomplishment. It bodes well for the long-term sentinel capacity of these coastal citizen-scientist groups to gather and analyze data, creating useful information for the region’s communities.”

This group quickly won some funding from the Davis Foundation, Maine Sea Grant and Maine’s Department of Environmental Protection in 2014 to start a collaborative program of estuarine measurements during the summer and fall when estuaries are especially susceptible to issues such as oxygen loss or acidification due to excess nutrient loading.

DMC personnel including Ivona Cetinić, Karthy Thornton, Jeff Range and Larry Mayer worked with MCOA’s citizen scientists to establish sampling protocols and calibrate instruments, as well as help with analyses, logistics and data management.

Scallops on the Half Shell

Could scallops be the next great boon to the aquaculture industry in Maine? Sea Grant Extension Agent Dana Morse hopes so and for the last 15 years (on and off) has worked to make it happen.

Sea scallops (Placopecten magellanicus) are a commercial fishery in Maine, but they have been an aquaculture species in Japan since the 1950s and in Atlantic Canada since the ‘70s. Dana was first introduced to farm-raised scallops on a trip to Japan in 1999 and since then he has partnered with fishermen, shellfish growers, CEI (a Community Development Corporations in Maine), Maine Department of Marine Resources (DMR) and colleagues overseas to bring the new industry home. Scallop larvae (spat) are ‘caught’ in September, using seed collectors that resemble an onion bag filled with plastic mesh. The collectors stay out until the following May-July, at which point the young scallops are about 10mm and are put in bottom cages. If all goes well a 2.5-inch “Princess” scallop is ready for the half shell market in about 10 months—faster than any other shellfish in Maine. Dana and the scallop growers are testing various grow-out techniques. Though bottom cages seem to be the best fit for the new industry, some growers are experimenting with a Japanese technique whereby the scallop gets a small hole drilled in its “ear,” and are then threaded onto specialized lines which are hung vertically in the water column.

A mixture of fishermen and shellfish growers are involved in the project, perfecting spat collection and testing grow-out techniques. Regulatory hurdles have been resolved through the expertise and support by the Maine Dept. of Marine Resources, and marketing strategies are being carried out by the growers. Funding from the Maine Aquaculture Innovation Center (MAIC) will help with the next step, to ramp up production techniques to ensure they meet demand. With continued luck and success farm-raised scallops from Maine could be seen in fish markets and on restaurant menus in 2015!

Read more about the sea scallop, its life history, commercial fishery and current aquaculture efforts at the Sea Grant webpage seagrant.umaine.edu/resources-for-shellfish-growers/species/scallop.
Graduate Degrees Confirmed in 2014

**Nathan Briggs** successfully defended his doctoral dissertation titled *Using Temporal Variability in Optical Measurements to Quantify Phytoplankton Production, Particle Size and Aggregation during the North Atlantic Spring Bloom*. Working with Dr. Mary Jane Perry, Nathan developed novel ways to study the huge data sets gathered by bio-optical sensors on autonomous gliders and floats. Using data collected during a three-month research cruise off the southern coast of Iceland in 2008, Nathan estimated the amount of carbon transported as aggregates of phytoplankton called “marine snow” from the surface to the sea floor following the annual North Atlantic Spring Bloom.

In February, Nathan begins a postdoctoral fellowship with Dr. Hervé Clausette at the Laboratoire d’Océanographie de Villefranche. Clausette operates a global fleet of “bio-optical floats.” Using the data collected by the floats and the techniques he developed for his Ph.D., Nathan will estimate carbon sequestration rates and correlate these rates to the physical, chemical and biological properties of seawater around the world. He hopes that a better understanding of the movement of carbon into the deep ocean will improve climate projections and our knowledge of deep-sea ecosystems.

**Steve Auscavitch** received a master’s degree in Marine Biology for his research on the biogeography of deep-sea benthic communities in the Southern Ocean, the least explored marine environment on Earth. Working with over 1,900 digital images from the Drake Passage collected in 2008 and 2011 aboard the RV Nathaniel B. Palmer by Dr. Rhian Waller, his thesis advisor, Steve found megafaunal similarities that strongly correspond to distinct Southern Ocean water masses. However, two seamounts, Sars and Interim Seamounts, had unique faunal communities. This work highlights how little is known of seamounts in remote areas of the Southern Ocean and how critical they are for understanding global deep-sea biogeography.

Steve’s thesis is titled *Biogeographic Patterns Among Deep-sea Benthic Megafaunal Communities Across the Drake Passage*. He will continue to study the ecology of deep-sea corals when he enters a Ph.D. program this spring at Temple University working with Dr. Erik Cordes.

**Jenn McHenry** completed dual master’s degrees in Marine Biology and Marine Policy working with Dr. Bob Steneck and Dr. Teresa Johnson. Her thesis, *Abiotic proxies for benthic megafaunal assemblages in the coastal Gulf of Maine: A template for ocean planning?*, showed that abiotic factors such as depth, substrate and oceanographic processes can be used as proxies to model species structure, biomass and diversity of benthic assemblages. She believes using abiotic proxies could allow localized, rapid and inexpensive ROV surveys to be scaled up and used for ocean planning, environmental impact studies, offshore wind siting, climate change monitoring and ecosystem-based fisheries management.

Jenn now works at the NOAA Northeast Fisheries Science Center in Sandy Hook, NJ, studying outer continental shelf ecosystems, offshore wind energy siting/impacts and essential fish habitat for valuable benthic species (like black sea bass) with Dr. Vince Guida and Dr. Tom Noji.

AAUS-OWUSS Intern

Katy Newcomer, a recent graduate of Williams College with a B.A. in Environmental Biology and Marine Studies, spent four months at the DMC with Dr. Herve Clausette. Clausette operates a global fleet of “bio-optical floats.” Using the data collected by the floats and the techniques he developed for his Ph.D., Nathan will estimate carbon sequestration rates and correlate these rates to the physical, chemical and biological properties of seawater around the world. She hopes that a better understanding of the movement of carbon into the deep ocean will improve climate projections and our knowledge of deep-sea ecosystems.

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Katy plans to pursue a career in benthic coastal ecology and science diving. She is currently at the New England Aquarium working as an outreach educator and aquarist.

**Extending the Lowes Cove Time Series**

Over the last decade, qualitative surveys have repeatedly suggested that species diversity in Lowes Cove has declined. To see if that was indeed the case, Darron Kriegle, Madison Leary, Sabrina Pearson, Melissa Hoffman and Dr. Rhian Waller were enlisted to replicate a survey of the benthic macrofauna in Lowes Cove that had previously been conducted in 1979 and 1996. The project will satisfy their Capstone requirements, and their summer internships were supported through the generosity of the John H. and Bethel B. Dearborn Trust.

Lowes Cove is the intertidal mudflat that bounds the Darling property to the south. The first survey of the cove was conducted as part of a clam flat dynamics study funded by Sea Grant to Dr. Les Watling, Dr. Larry Mayer, and Dr. Franz Anderson of UNH. The second survey was conducted 18 years later, when then graduate student Martin Thiel repeated the survey to determine if the mats of green algae overgrowing Lowes Cove at that time were affecting the macrofauna. The results of his work can be read at bedim.cl/publications/hydrobia175.pdf.

With Larry, Kevin and Rhian as their Capstone advisors, Madison, Melissa, and Sabrina collected sediment cores at 56 stations along 10 transects that crisscross the cove in June and August. The cores were sieved and specimens were preserved for sorting. Upon returning from a semester in Australia, Darron jumped in to help sort samples and identify the animals. While in residence during the fall SSB program the four undergrads analysed organic matter and sediment grain size in the biogeochem lab, data necessary to compare Lowes Cove with other estuarine mudflats. Results are expected by the spring of 2015.
Dr. Peter Jumars

Dr. Peter Jumars has been in residence at the DMC since he joined the University of Maine School of Marine Sciences (SMS) in 1999. His research interests range from polychaetes to biourbanization, biomechanics and small-scale fluid dynamics. In addition to research and teaching, Pete’s professional career has included stints as an Office of Naval Research Program Officer, Editor-in-Chief of Limnology and Oceanography, and president of the Association for the Sciences of Limnology and Oceanography. This year he received the Outstanding Research Award from UMaine’s College of Natural Sciences, Forestry and Agriculture.

Pete credits his 10th grade biology teacher and 11th grade English teacher with forging his scientific career. One taught him to think like a biologist, the other how to enjoy writing. At the University of Delaware he ventured into mosquito research, but changed tack to focus on marine science after helping to culture thecosome pteropods—sea butterflies—in a laboratory one summer. During graduate school at Scripps Institution of Oceanography Pete first focused on zooplankton ecology, but settled on a Ph.D. project studying the small-scale spatial structure of benthic deep-sea species diversity. Pete studied polychaete taxonomy under Olga Hartmann and Kenneth Fauchald and gained an enduring appreciation of statistics from Bill Fager.

Beginning in 1975 and for almost 25 years, Pete held a faculty position at the University of Washington (UW). During that tenure he developed a modus operandi to research that continues to serve him well: “Identify an important problem, review past work on it, and ask why progress has not been faster.” He usually finds one or more missing ingredients: lack of theory for prediction, lack of field observations, or lack of laboratory or field tests. “Addressing these shortcomings often yields rapid progress.”

Pete’s research at UW focused on deposit feeding as a pervasive process affecting the environment on all scales, including the global. General themes were the effects of organisms on sediment transport and vice versa. The work with sediment transport gave him an appreciation for small-scale fluid physics and a deep acute interest in biological-physical interactions. Pete found that physics provided the needed equations, i.e., quantitative constraints, to understanding organism form and function.

The connection that eventually brought Pete and his wife, Mary Jane Perry, to the DMC gelled at a 1985 workshop on the ecology of marine deposit feeders, when he had the opportunity to interact intensively with Larry Meyer. Within a few years the two were Co-PIs seeking chemical kinetic constraints on the process of deposit feeding. They learned that digestive fluids of deposit feeders are much like modern laundry detergents, including both surfactants that strip hydrophobic materials from sediments and enzymes that cleave the large molecules, with the hydrolysis products being concentrated proteins. This discovery shed light on how hydrophobic pollutants and metals enter marine animal food webs.

Studies on the diel migration of mysids and the interaction of phytoplankton cell shape and fluid dynamics have all been rewarding, but it is the research conducted with Ph.D. student Kelly Dorgan on the mechanics of animal burrowing that Pete describes as “the most satisfying” since arriving at the DMC. His research MO held true. Previous studies of burrowing did not incorporate the physical properties of sediments. By analogy Pete points out, “Nobody would dream of analyzing swimming without the constraints imposed by water density and dynamic viscosity.” Colleagues Bernie Bosdraux and Bruce Johnson, Dalhousie University, had just described how bubbles rise or “burrow” through sediments by crack propagation. The finding led Pete and Kelly to the idea that worms, with bilaterally symmetric, may also rely on crack propagation to burrow through marine sediments. The work is also a rich source of puns on “ground-breaking” or “earth-shattering” results and “wise cracks” made by worms.

After 15 years at the DMC Pete is still involved in multiple projects with students and colleagues at UMaine and across the country. Pete revisited a project from his postdoc days with Kristian Fauchald that culminated in a complete review of polychaete feeding biology. With co-PI Sara Lindsay, UMaine’s SMS, and Kelly Dorgan, now at the University of South Alabama’s Dauphin Island Sea Lab, he revised the treatise again. The work will appear in the journal Annual Review of Marine Sciences in 2015 and is available online now at doi: 10.1146/annurev-marine-010814-020907. The online appendix swelled to 350 pages and will be posted at Annual Reviews by the end of the year (currently available at umaine.edu/marine/people/sites/pjumars/preprints/DietReduxA.pdf). Two other projects focus on fluid mechanics. One examines the inhalant siphon flows created by benthic animals with Ph.D. student Kevin du Clos at the DMC and John Criminal at the University of Colorado, Boulder (see Making Waves 2013, online at dmc.umaine.edu). The other study aims to observe, analyze and describe the vertical transport of phytoplankton in and around dissipative vortices, a project that builds on research recently completed with Lee Karp-Boss, UMaine SMS, and Lisa Fauci of Tulane University. The current project is a collaboration with Evan Varrano at UC Berkeley.

Teaching has also been rewarding for Pete. His favorite course is Design of Marine Organisms. His goal for the undergraduate students in this class is to have them involved in thinking about fluid dynamics every day as they observe phenomena such as the flutter of leaves and scour marks around trees in the snow. Pete also teaches a professional skills class to incoming graduate students covering the ethics of science, scientific writing, graphics standards, society membership, and designing a career path. His pet focus in the course is the creative side of science, which he argues can be taught and learned as effectively as creative writing.

Pete offers a wealth of information on his website; reprints, preprints, class materials and philosophy of science all available at umaine.edu/marine/people/sites/pjumars. He’s posted individual essays on choosing a graduate school, the process of doing science and common pitfalls. Students considering or pursuing an advanced degree in the sciences will find the essays a rich source of insight, which Pete emphasizes is not to be taken as the authoritative way to “do science,” but rather encouragement to develop one’s own philosophy.
Phytoplankton Under Arctic Ice

Dr. Mary Jane Perry spent the month of August with an international team of 40 scientists, 1,100 kilometers above the Arctic Circle. They were aboard a Korean icebreaker, the R/V Araon, to study the biogeochemistry and primary production of the Marginal Ice Zone (MIZ).

As a result of the warming climate, the Arctic has experienced notable changes in recent years. The sea ice is thinner and its aerial distribution much less. Though this may eventually lead to new shipping routes across the Arctic Ocean, it is already altering the timing, magnitude and location of plankton blooms that support the entire polar food webs.

With funding from the U.S. Office of Naval Research, Mary Jane and colleagues from the University of Washington used autonomous and robotic technologies to study the retreat of sea ice in the Beaufort Sea. Small submersible gliders equipped with multiple sensors deployed at the MIZ yielded a comprehensive look at the distribution and abundance of phytoplankton under thin and melting ice.

By understanding the dynamics of what’s actually happening at the ice edge and scaling up those processes to match the seasonal changes of that ice as seen from above, the scientists hope to fully access how the changing ice patterns will affect the primary productivity in the changing Arctic.

Read more at the Marginal Ice Zone Program website: apl.washington.edu/project/project.php?id=miz.

Ocean Optics XXII

Mary Jane Perry and Ivona Cetinić reported on MIZ and SABOR projects at the biennial ocean optics conference in Portland, Maine, in October 2014. The meeting drew over 400 people from 38 countries. UMaine professors Emmanuel Boss and Fei Chai, and graduate students Nathan Briggs and Alison Chase were also among the conference presenters. Mary Jane Perry was the co-chair of the conference and Ivona Cetinić was on the organizing committee.

Spectacular Deep-Sea Corals in the Gulf of Maine

Cold-water corals have been known to exist in the deep submarine canyons and seamounts of the North Atlantic since the 1800s, having occasionally made their way to the surface in fishing nets. Scientists have studied the biology and ecology of these creatures in the Gulf of Maine for over 40 years, but this summer researchers found them on the Schoodic Ridges in greater numbers and in greater diversity than ever before.

DMC personnel, past and present, were part of a team that discovered the spectacular deep-sea coral. Dave Packer, who received his master’s degree at the DMC in 1988 and is currently a marine ecologist at the Northeast Fisheries Science in Sandy Hook, NJ, was co-chief scientist for the two-week cruise aboard the Research Vessel Connecticut. Dr. Peter Auster, their colleague at the University of Connecticut, was the other chief scientist at sea and Steve Auscavitch, who completed his master’s in June of this year, was also on board. DMC Associate Research Professor Dr. Rhian Waller was involved in the expedition from shore.

Using Knuckler, a remotely operated vehicle (ROV) equipped with video and still cameras and robotic arms, the team explored multiple sites in the Gulf. On Schoodic Ridges, at depths near 650 feet, they found steep vertical walls up to 40 feet tall covered with sea fans, Primnoa (Red Tree) corals, and harboring countless other species of invertebrates and fish. Some of the specimens were over 6 feet tall, and may be hundreds, or even thousands, of years old!

The magnitude of their importance to the overall Gulf of Maine ecosystem is still poorly understood, but we do know from other systems that deep-sea coral habitats are host to diverse communities of marine flora and fauna.

By measuring the optical qualities of seawater, the transmission and reflectance of light, scientists can quantify the distribution, abundance and seasonality of phytoplankton in the ocean. Satellites collect optical measurements of the ocean, but particles in the atmosphere muddle the signal. To get a more precise view of the ocean from space, scientists need to develop new ways to subtract the atmospheric effect inherent in satellite data and to see deeper into the ocean.

Phytoplankton absorb carbon dioxide and support the marine food web at the global scale. By understanding the optical properties of seawater, scientists can quantify distribution, abundance and seasonality of phytoplankton in the ocean. Satellites collect optical measurements of the ocean, but the atmosphere is a significant source of error due to scattering and absorption effects.

The SABoR team is working together to develop next-generation tools that, Ivona predicts, “will change forever how we study the oceans.” The ability to measure phytoplankton from space will revolutionize our understanding of how phytoplankton absorb carbon dioxide and support the marine food web at the global scale.

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50th Anniversary Celebration

The Darling Marine Center marks its 50th anniversary in 2015 and plans are under way for a summer-long celebration. Weekly seminars will be held in June and July for the general public with topics ranging from the history of marine labs in general and the history of the DMC in particular, to Damarscottas's oysters, Maine's lobsters, maritime history, coral reefs and deep-sea research. These seminars will lead up to a gala 3-day celebration August 6, 7 & 8.

Thursday, August 6th will be a reunion day for DMC “alums” including grad, undergrads, SBSers, interns, faculty and staff.

Friday, August 7th will be another day for DMC alums featuring a science symposium highlighting where we are now, and how we got here.

Saturday, August 8th will be a full-day open house at the DMC to which the public is invited.

Director Search

The University of Maine is seeking applications for the position of Director of the Ira C. Darling Marine Center. The link for the job can be found at umaine.hiretouch.com (keyword Darling). The Interim Director and Chair of the Search Committee, Dr. Mary Jane Perry, is available to provide additional details about the Center. Please contact her via email: perrymj@maine.edu.

The recent National Academy of Sciences report, “Enhancing the Value and Sustainability of Field Stations and Marine Laboratories in the 21st Century” (July 2014), does an excellent job in laying out the challenges and opportunities for marine labs. The report and ancillary materials can be downloaded from: http://dels.nas.edu/Report/Enhancing-Value-Sustainability/18806

Giving

Ira C. Darling donated his beloved farm to the University of Maine in 1965 establishing the Ira C. Darling Marine Center. He also created the largest Trust in UMaine history and established two charted professorships. George Willett, the Kresses Foundation and Professor John Dearborn and his wife Bethel also made significant contributions that generously support the DMC and its programs. These and other gifts have made valuable additions to the DMC’s mission. With your help we can ensure Ira’s legacy for the next 50 years.

If you would like to make a donation, you can do so by sending a check made payable to the University of Maine and designate “Darling Marine Center” on the memo line. Please mail the check to:

Elizabeth Erickson
Office of University Development
101 College Avenue
Orono, ME 04473

Online donations can be made using the University’s Development Office secure giving site umaine.edu/development/give-now. Click on College of Natural Sciences Forestry and Agriculture and scroll down to Darling Marine Center.

If you would like to discuss giving options with our development officer, please call Liz Erickson at 207.581.1151.

Thank You!

dmc.umaine.edu

The DMC has a new website and a new URL! Be sure to visit the new site and add it to your list of favorite bookmarks—check back often for details about our 50th anniversary!

We’re on Facebook, too!

facebook.com/DarlingMarineCenterUMaine

2015 UMaine Accredited Courses at the DMC

Undergraduate and graduate opportunities abound at the DMC. Intensive May term and summer courses, and the residential Semester By the Sea (SBS) program engage students in courses that use the Gulf of Maine and the Damarscottas River Estuary as the primary classroom. All courses are open to students from other University of Maine System campuses and outside institutions.

May-term & Summer Courses

Full course descriptions and registration information are available at dmc.umaine.edu/education/may-term-summer-classes.

✦ MATLAB for Marine Science
Dr. Damian Brady • May 13-29

✦ Science Communication Product Development
Annette deCharon • May 13-26

✦ Introduction to Research Diving
Christopher Rigaud • June 8 - July 29

✦ Techniques in Shellfish Aquaculture
Dr. Chris Davis • June 8-12

✦ Techniques in Marine Mammal Ecology
Dr. Kintina Caimmer • June 8-19

Summer Workshops

dmc.umaine.edu/education/summer-workshops

✦ Calibration and Validation for Ocean Color Remote Sensing
Dr. Emmanuel Boss and Dr. Mary Jane Perry

✦ Particle Flow Interaction Workshop
Dr. Lee Karp-Boss • June 22-26

✦ Natural Science Illustration Workshop
David Wheeler • June 15-19

Semester by the Sea 2015

Lectures, labs and field trips revolve around the tides during the fall semester. Motivated students keenly interested in the marine realm will find SBS an invaluable experience.

✦ SMS 350 - Marine Ecology
Dr. Bob Steneck

✦ SMS 352 - SBS Undergraduate Seminar
Dr. Rhiann Walker & Dr. Kevin Eckelberger

✦ SMS 480 - Biology of Marine Invertebrates
Dr. Kevin Eckelberger

✦ SMS 482 - Human Impacts on the Ocean
Dr. Larry Mayer

✦ SMS 491 - Marine Fisheries Ecology
Dr. Rick Wahle

✦ SMS 491 - Zooplankton & Ichthyoplankton
Dr. Jeff Runge

✦ SMS 491 - Introduction to Research Diving
Chris Rigaud

✦ FFTY 316 - Archaeology of Shipwreck Sites
Dr. Warren Riess

✦ Capstone/Independent Research

The Estuarine Oceanography class aboard the R/V Ira C.