

Impact

News From VIMS

STUDY SHOWS RESTORED OYSTER REEF WORTH ITS WEIGHT IN NUTRIENTS

A study led by VIMS researcher Lisa Kellogg shows that a restored oyster reef can remove up to 10 times more nitrogen from Chesapeake Bay waters than an unrestored area nearby, providing additional evidence that reef-restoration can contribute to efforts to improve water quality in the nation's largest estuary.

The study was the feature article in the April 22nd issue of *Marine Ecology Progress Series*. Co-authors are Jeff Cornwell, Michael Owens, and Ken Paynter of the University of Maryland Center for Environmental Science.

To date, the justification for restoring oysters to Chesapeake Bay has focused on their capacity to clear the water, provide habitat for their own young and for other species, and to sustain both watermen and seafood lovers.

The new study, says Kellogg, reveals another potential benefit of restored oyster reefs—their ability to remove nutrients from the water. Input of nitrogen and phosphorous from fertilizers, wastewater treatment plants, and other sources is one of the main reasons for impaired water quality in the Bay, with reduction and

removal of these excess nutrients a key goal of Bay restoration efforts.

“Our study showed that a successfully restored oyster reef can remove significant levels of nutrients from the water column,” says Kellogg. “We found that annual denitrification rates at the restored site were enhanced by an order of magnitude and that rates in August were among the highest ever recorded for an aquatic system. It’s important to recognize, however, that the density of oysters on the reef we studied far exceeds current success criteria for oyster-reef restoration.”

UPCOMING EVENTS

Summer Public Tours @ VIMS
Fridays: 10:30am - 12:00pm
Call 804-684-7846 for reservations.

Inside to Seaside
June 7, 14, 20, 22, 26, July 20,
Aug. 17 - Reservations required/
Space is limited.

Discovery Lab: Sport Fishing
Tuesday, June 11th
Register online:
<http://www.vims.edu/discoverylabs>

4th Annual Dinghy Poker Run to benefit VIMS at Dare Marina
June 15th - 9:00am - 3:00pm
Call Bill Walsh at 800-554-4581 for more information.

After Hours Lecture: The Costs and Benefits of “Fracking”
June 27, 7:00pm

Visit www.vims.edu/public

EXPERTS CALL FOR NETWORK TO MONITOR MARINE BIODIVERSITY

A team of ocean experts led by VIMS Professor J. Emmett Duffy has called for creation of a national network to monitor the diversity of marine life, a key bellwether of ocean and human health.

Their appeal, published in the April issue of *BioScience*, says such a network could be established with modest funding within five years. To be most effective, the authors say, it would monitor biodiversity at all biological levels, from microscopic genes to regional ecosystems. It would also link observations of biodiversity to the physical factors controlling sea life such as water temperature and water quality, and be flexible enough to detect and track emerging issues as environmental conditions change.

They envision a network with sites along both the East and West coasts of the United States, with other nodes focusing on the deep sea and coral reefs. A U.S. network would complement regional

efforts already underway in the European Union, New Zealand, and elsewhere.

“We depend on ocean life for food, livelihoods, and half the oxygen we breathe—no matter how far inland we live,” says Duffy. “We know the ocean is sick and getting sicker but we don’t even have a finger on the pulse, so to speak, so we’re not sure how bad it is or how to cure it. Our paper offers a plan for regular check-ups to keep sea life healthy.”

Marine biodiversity is key to ocean health and human well-being. Images courtesy of Gustav Paulay and Steve Haddock.



CLASS PROJECT INSPIRES RESEARCH ARTICLE IN *ECOLOGY*

A study that began as a class project is now a peer-reviewed research article in *Ecology*, the flagship journal of the Ecological Society of America. The article was co-authored by VIMS graduate students Jonathan Lefcheck, Matt Whalen, Theresa Davenport, and Josh Stone, along with VIMS Professor J. Emmett Duffy.

Duffy teaches the Evolutionary Ecology course that inspired the students to pursue



Amphipods like this were one of the animals used in experimental manipulations of prey diversity. Photo by Matt Whalen.

SCIENTIFIC SURVEY SHOWS DIP IN BLUE CRAB POPULATION

The latest scientific survey of Chesapeake Bay's blue crab population—conducted by VIMS and the Maryland Dept. of Natural Resources—brings mixed news that may lead to a slight tightening of commercial harvest restrictions.

The annual winter dredge survey shows that the overall abundance of blue crabs dropped from 765 million in 2012 to 300 million in 2013. This was because the number of juvenile crabs plummeted from 581 million to 111 million.

Mr. Jack Travelstead, head of the Virginia Marine Resources Commission, says “This is disappointing, but it is not a disaster and not without precedent. Crab spawning naturally fluctuates and can be impacted by wind, tide, weather, and increased predation on juvenile crabs by other species.”

The good news is that spawning-age females increased from 95 million to 147 million, well above the scientifically established threshold of 70 million.

One possible factor for the drop in juvenile crabs was an unusually large influx of juvenile red drum into warm Bay waters last summer.

Professor Rom Lipcius, head of the dredge survey at VIMS, says “There’s a good chance that these fish had an impact on last year’s record year class. Puppy drum are opportunistic feeders and will target high-density food sources, and juvenile crabs last year were found in high densities.”—*John Bull, VMRC*

their research question: whether it’s better for an animal to have a mixed diet or instead stick to a single favorite prey item. Their answer? “The evidence for the nutritional benefits of diet mixing is pretty weak,” says Lefcheck. “That suggests that diet generalism isn’t strongly favored by the inherent physiological benefits of mixing food types, but is more likely driven by ecological and environmental influences on consumer foraging.”

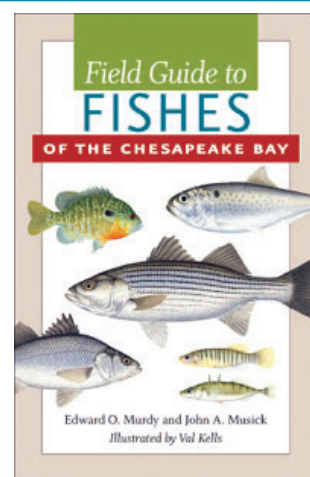
The authors agree the project was a uniquely valuable alternative to

conventional lecture classes. “They conducted research and followed it all the way through to publication,” says Duffy, “learning by experience how to deal with many of the same challenges as research scientists.”

“It shows the work produced in your classes can impact the field,” says Lefcheck. “It’s a neat illustration of students going after a question that they find interesting but that isn’t necessarily directly related to their dissertation research.”

FIELD GUIDE TO CHESAPEAKE BAY FISHES NOW AVAILABLE

The *Field Guide to Fishes of the Chesapeake Bay*—co-authored by VIMS Professor Emeritus Jack Musick—is now available on-line and in stores, including the VIMS Gift Shop. The 346-page field guide—co-authored by Dr. Ed Murdy of the National Science Foundation—describes the biology and ecology of all the Bay’s 211 fishes, while noted marine science illustrator Val Kells provides full-color illustrations. Musick notes that most of the species records are based on specimens in the Nunnally Ichthyology Collection at VIMS, and that “many of these specimens were collected in the course of VIMS’ ongoing trawl and seine surveys.”



LAKE AWARDED PRESTIGIOUS THATCHER PRIZE

Dr. Sam Lake, who recently earned his Ph.D. degree from the School of Marine Science at VIMS, was awarded the 2013 Thatcher Prize for Excellence in Graduate and Professional Study during William & Mary’s commencement ceremony on May 12th.

The Thatcher Prize, the highest award for a graduate or professional student at William &

Mary, was created in 2000 in honor of W&M’s 21st Chancellor, Margaret, The Lady Thatcher, who died this past April 8.

Lake was recognized for his exemplary blend of scholarship, character, and leadership, including his outstanding contributions to all facets of VIMS’ mission of research, education, and advisory service.

A marine ecologist, Lake balances traditional fieldwork with cutting-edge computer modeling. His adviser, VIMS Professor Mark Brush, describes Lake’s doctoral research as “comprehensive, interdisciplinary, and novel,” focusing on the scientific understanding and societal



Dr. Sam Lake (R) receives the Thatcher Prize from W&M President Taylor Reveley during the commencement ceremony.

implications of low-oxygen “dead zones” in coastal waters.

Lake’s passion as a scientist also involves teaching, both as a teaching assistant for a field-intensive course taken by all new VIMS students, and as a GK-12 Fellow at Yorktown High School. He has also been a leader in VIMS’ Graduate Student Association and discussed

graduate-student concerns with Virginia Education Secretary Laura Fornash during her visit to VIMS in 2012.

Outside of VIMS, Lake has served as a mentor for teachers at a NASA educational workshop, and on committees of the international Coastal and Estuarine Research Federation and the Atlantic Estuarine Research Society.

“Sam brings the very best of William & Mary to the wider community,” said W&M President Taylor Reveley during commencement. “His impressive record extends beyond the walls of any classroom, making him a great ambassador for VIMS and the College.”

VIMS FILLS FACULTY AND ADMINISTRATIVE POSITIONS

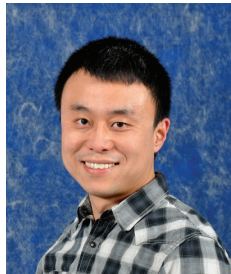
VIMS has begun to fill a number of new faculty positions made vacant by unfilled retirements during the budget reductions that began in 2008.

Dr. Andrew Wargo arrived at VIMS in October from a joint post-doctoral fellowship at the University of Washington and the Western Fisheries Research Center. His research focuses on infectious diseases among salmon and related fishes, with a focus on rainbow trout. His work has implications for managing viral diseases both within fish farms and in hatchery stocking programs.



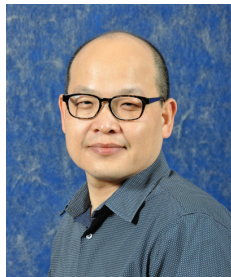
Dr. Andrew Wargo

Also arriving in October was Dr. Donglai Gong, following a two-year post-doctoral fellowship at the Woods Hole Oceanographic Institution. Gong is a physical oceanographer who uses gliders and moorings to study the movement and properties of coastal waters.



Dr. Donglai Gong

Dr. B.K. Song arrived at VIMS in January from the University of North Carolina at Wilmington.



Dr. B.K. Song

Song comes to VIMS with a grant from the National Science Foundation to study how nitrogen cycling by oysters and oyster reefs impacts the net health of coastal ecosystems.

On the administrative front, VIMS has named Dr. Mark Luckenbach as its new Associate Dean for Research and Advisory Services, effective June 1st. Luckenbach replaces Dr.



Dr. Mark Luckenbach

Roger Mann, who is returning to his faculty position after nearly 10 years of administrative service to VIMS and the Commonwealth.

VIMS Dean and Director John Wells says, "Mark brings considerable administrative experience from his 20-plus years as Director of VIMS' Eastern Shore Lab, as well as expertise in marine research and service on numerous scientific and advisory boards at the state, regional, and national levels. I'm confident that Mark will lead the research and advisory programs at VIMS with great pride, skill, and wisdom."

BAY'S UNDERWATER GRASSES DECLINE FOR THIRD YEAR

An annual aerial survey led by VIMS researchers reveals that Chesapeake Bay's underwater grasses declined 24% between 2011 and 2012, approaching lows last reported in 1986. This third year of decreasing grasses is the cumulative result of unfavorable growing conditions since 2009.

The survey results show that the Bay had 48,191 acres of grasses, down 14,892 acres from 2011 estimates. Underwater grasses are critical to the Bay ecosystem, and an excellent measure of water quality in the estuary. Healthier waters can be supported by upgrades to wastewater treatment plants and better management practices by farmers and homeowners.

VIMS Professor Robert "JJ" Orth, who coordinates the annual Bay-wide survey, says "It's been a rough few years for Bay grasses. In 2010, the unusually hot summer caused some grasses to die back in the lower Bay. 2011 brought a wet



VIMS researcher broadcasts eelgrass seeds in the seaside bays of Virginia's Eastern Shore.

spring and muddy conditions during the early growing season and a fall with two major storms that decreased water quality again. Between these factors and warming waters, the Bay's grass beds face an uphill challenge."

Nick DiPasquale, Director of EPA's Chesapeake Bay Program, says "We have both cause for concern and encouragement; while the declines are worrisome, there are still some signs of resilience in the Bay. It's good to see the Susquehanna Flats remaining hardy and exciting to see emerging beds in the James River. However, this year's data is a sobering reminder of how imperative it is to continue our restoration efforts."

WHAT IS A "SNOWPOCALYPSE?"

In January 2012, a series of epic snowstorms dumped up to 18 feet of snow across Alaska's panhandle. VIMS Professor Steve Kuehl now awaits word on a proposal to further investigate whether river runoff from this so-called "Snowpocalypse" left a signature in nearby seafloor sediments, and if so, what the long-term record of such events might say about the area's fast-changing climate.

"We talk about climate change and extreme weather events," says Kuehl, "but what happened in this case was over the top, even for an area of Alaska that's used to heavy snows. They had to call out the National Guard to get people out of their houses in Cordova—it was extraordinary."

Kuehl's study, initially funded by a

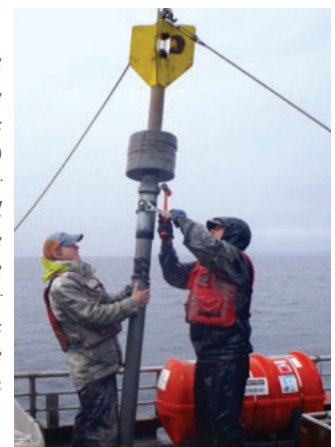
"Rapid Response" grant from the National Science Foundation, builds on seminal work by fellow VIMS Professor John Milliman. Milliman's research has shown that small mountain rivers—such as the Copper River of Alaska's panhandle—carry a disproportionate amount of sediment to the global ocean.

Kuehl notes that last year's unprecedented snowfall in southeastern Alaska was related to climatic factors that have been cited as a harbinger of present and future climate change.

"These climate drivers have likely influenced the past positions of the Aleutian Low, and hence year-to-year variations in Copper River discharge," says Kuehl. "Coring of seafloor sediments

may thus give a long-term record of the changing Arctic climate."

VIMS graduate student Eric Miller (L) and professor Steve Kuehl (R) prepare to core seafloor sediments in Prince William Sound, Alaska.



SCIENTISTS CONTRIBUTE TO “BAY BAROMETER”

A team of VIMS researchers joined with officials from the Chesapeake Bay Program and other agencies to announce the release of the latest *Bay Barometer*, CBP’s annual report on Bay health and the status of long-term Bay restoration efforts. The bottom line, according to the 2012 report, is that continued restoration actions and success in pollution reduction give cause for optimism, while scientific indicators continue to reflect the reality of an impaired Bay ecosystem.

CBP is a regional partnership that includes the U.S. Environmental Protection Agency; the states of Maryland, Pennsylvania, Virginia; the District of

Columbia; and participating citizen advisory groups.

Scientists at VIMS play a large role in CBP’s research and monitoring efforts, with programs such as the Winter Blue Crab Dredge Survey, the Seagrass Monitoring and Restoration program, the American Shad Monitoring program, and the Juvenile Seine Survey contributing the data needed to track the health of the Bay and its marine life. Numerous VIMS faculty also serve on the Bay Program’s

Scientific and Technical Advisory Committee and its Goal Implementation teams—the bodies that CBP uses to ensure that its management decisions are based on the best available science. VIMS scientist Kirk Havens is one of two Governor’s appointees to the Scientific and Technical Advisory Committee, where he serves as vice chair.

To read the 8-page *Bay Barometer* in full, visit www.chesapeakebay.net.

VIMS FACULTY RECOGNIZED FOR ACCOMPLISHMENTS

VIMS faculty continue to be recognized for their many accomplishments in research, education, and advisory service.

Thomas Murray, Associate Director for Advisory Services at VIMS, was presented with a Recreational Boating Access Award from the Boat Owners Association of the United States (BoatUS) in March during the 2013 National Working Waterfronts and Waterways Symposium in Tacoma, Washington. Murray—who also serves as Extension Program Leader for Virginia Sea Grant—was recognized for his commitment to keeping the nation’s waterfronts at work for recreational boating, and championing water-

dependent businesses and industry that drives local economic development.

VIMS Professors John Graves and Robert “JJ” Orth were selected in April as recipients of 2013 Plumeri Awards for Faculty Excellence at the College of William & Mary. The awards—established with a generous gift from Joseph J. Plumeri II ‘66, D.P.S. ’11—bestow \$10,000 to 20 recipients each year in recognition of exemplary achievements in teaching, research, and service. Award recipients can use the funds for research, summer salaries, or other stipends associated with scholarly endeavors, with the ultimate intention of enhancing faculty-student interactions.



VIMS professor Carl Friedrichs explains how wind speed and direction can affect the development of low-oxygen dead zones in Chesapeake Bay during the Bay Barometer press conference.

VIMS | **WILLIAM & MARY**
VIRGINIA INSTITUTE OF MARINE SCIENCE

Virginia Institute of Marine Science
P.O. Box 1346
Gloucester Point, VA 23062-1346

www.vims.edu/impact