



PARTNERSHIP AIMS TO REDUCE POLLUTION FROM “MICROPLASTICS”

When it comes to plastic “litter,” scientists are starting to realize that what you can’t see—tiny bits of polyethylene or polypropylene called “microplastics”—likely pose a greater threat to marine ecosystems than visible items like soda bottles.

Now, a \$60,000 grant from the Virginia Innovation Partnership will help VIMS professors Kirk Havens and Donna Bilkovic develop a biodegradable replacement for one of the two main sources of microplastic—the “microbeads”

found in scores of household products such as toothpaste, sunscreen, shampoo, and soap. Microplastics also form from the breakdown of larger pieces of plastic trash.

They’ll collaborate on the project with Drs. Jason McDevitt, Director of W&M’s Technology Transfer Office, Charles Bott of the Hampton Roads Sanitation District, and David Holbrook of the National Institute of Standards and Technology. The project was recognized with an Innovation Award during the latest TechConnect-National Innovation Summit in Washington, D.C.

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Researcher Kory Angstadt prepares microbeads in the laboratory at VIMS.

UPCOMING EVENTS

Discovery Lab: Mad Lab

Tuesday, October 22, 6-8 pm

Register online: <http://www.vims.edu/events>

After Hours Lecture: Ocean Plastics

Thursday, October 24, 7pm

Dr. Kirk Havens of VIMS explores pollution by plastics in the ocean, and a potential solution to one part of the problem.

Tack Faculty Lecture Series:

From Plankton to Planet

Tuesday, October 29th, 7 - 8:30pm

Kimball Theatre, Williamsburg
 VIMS professor Debbie Steinberg will use photos and video from research cruises to Chesapeake Bay, Antarctica, the Amazon plume and the Sargasso Sea to reveal a startling and beautiful world filled with animals stranger than science fiction. Expect audience interaction, including some mysteries of the deep!

Visit www.vims.edu/public

STUDY SHOWS “DEAD ZONE” IMPACTS CHESAPEAKE BAY FISHES

A 10-year study of Chesapeake Bay fishes by VIMS researchers provides the first quantitative evidence on a bay-wide scale that low-oxygen “dead zones” are impacting the distribution and abundance of “demersal” fishes—those that live and feed near the Bay bottom.

The affected species—which include Atlantic croaker, white perch, spot, striped bass, and summer flounder—are a key part of the Bay ecosystem and support important commercial and recreational fisheries.

The study, published in the May issue of *Marine Ecology Progress Series*, was authored by Ph.D. student Andre Buchheister along with VIMS colleagues Chris Bonzek, Jim Gartland, and Dr. Rob Latour.

All four are involved in VIMS’ Chesapeake Bay Multi-Species Monitoring and Assessment Program (ChesMMAP), an ongoing effort to track and understand

interactions between and among fishes and other marine life within the Bay ecosystem.

Buchheister says, “This is the first study to document that chronically low levels of dissolved oxygen in Chesapeake Bay can reduce the number and catch rates of demersal fish species on a large scale.”

The team’s findings are based on an exhaustive study of the distribution and abundance of late juvenile and adult fishes caught and released in trawl nets during 48 sampling trips between 2002 and 2011, the largest quantitative assessment of the bay-wide demersal fish community ever conducted. The sampling took place at 3,640 ChesMMAP stations throughout the mainstem of Chesapeake Bay.

The value of the ChesMMAP dataset extends beyond the current

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NEW VIMS/LAW SCHOOL CLINIC MAKES A SPLASH

Workshop participants cite flooding report as blueprint for state action

Sea-level rise is an incremental process with major long-term impacts. Heavy turnout at a September 13th conference on coastal flooding suggests that Virginia's outlook on the issue is taking a similar trajectory, with years of local meetings and projects now building to the groundswell needed to initiate a state-level response.

The daylong conference, *Adaptive Planning for Flooding and Coastal Change*, drew a capacity crowd of more than 230 elected and military officials, attorneys, scientists, legal scholars, business leaders, and concerned citizens to William & Mary's School of Education. It was organized by the Virginia Coastal Policy Clinic, a partnership between VIMS and the W&M Law School, with funding from the Virginia Environmental Endowment and Virginia Sea Grant.

State Senator and conference speaker John Watkins, a long-time advocate for a statewide response to coastal flooding, noted that an earlier conference on the issue drew a much smaller crowd. Now, he says, "It is time for state government to say there is a problem, and that we need to address it."

Dr. Carl Hershner, conference co-host and Director of VIMS' Center for

Coastal Resources Management, echoes those sentiments. "We were very pleased with the outcome of the conference," he says. "It provided the background—and we hope motivation—needed for state engagement in these issues."

Virginia Secretary of Natural Resources Doug Domenech, who introduced the Conference and its goals, says, "Sea level is rising at 8 inches per century globally, and in Virginia we have to add subsidence. Our coastal communities are feeling the problem, and the administration is ready to be a partner with the General Assembly in what comes out of this workshop."

One of those outcomes, announced by Watkins, is a plan to establish a joint legislative sub-committee of representatives from around the Commonwealth—urban, rural, Hampton Roads, southwestern and Northern Virginia—to draft "a comprehensive plan for how we address this going forward."

Watkins and numerous other conference speakers praised VIMS' 2013



VIMS graduate student Ike Irby (R) discusses flooding issues with fellow conference attendees.

report to the General Assembly—*Recurrent Flooding Study for Tidewater Virginia*—as a bellwether for informing legislators and priming action in future assembly sessions. Watkins says the report and a subsequent visit to Tangier Island by the Senate Finance Committee, "really brought the problem home for me."

PRIVATE SUPPORT MEANS FIVE MORE YEARS OF POPULAR SUMMER CAMPS

Since 2009, nearly 500 children have attended 25 summer camps at VIMS. The program—initiated by a gift from an anonymous donor—allows local children to swim, splash, fish, and crab their way to becoming stewards of Chesapeake Bay. Now, camps will be continuing for another five years thanks to the anonymous donor and Ron and Bonnie West through the Ronald West Family Foundation. They have committed a total of \$150,000 to further the program which consists of a series of five week-long day camps hosted by staff from the Chesapeake Bay National Estuarine Research Reserve at VIMS.



3rd- and 4th-graders—known as the "Bay Buddies"—enjoy fishing and crabbing while learning about marine debris in Chesapeake Bay.

Dead zone, continued from page 1

study. "Our work provides a 10-year frame of reference that can be used to evaluate future large-scale changes in the composition, distribution, and abundance of the Bay's demersal fish community," says Latour. "Continued monitoring will be critical for detecting how the Bay ecosystem responds to continued stresses from fishing, development, and climate change. It's an essential component to a successful management strategy for the marine resources of Chesapeake Bay and the coastal Atlantic."



Andre Buchheister and Jason Romine prepare to sort the trawl-net catch during a ChesMMAP cruise on Chesapeake Bay.



Three "Bay Buddies" watch as a pufferfish they caught while seining in the York River puffs up right before their eyes.



A camper fishes for crabs in the York River.

EXPLORING THE OCEAN WITH *TITANIC* DISCOVERER

VIMS alumna Bethany Smith (MS '08), a teacher at the Chesapeake Bay Governor's School for Marine & Environmental Science, sailed this summer on a 17-day expedition to the Gulf of Mexico and Caribbean Sea as part of the 2013 Nautilus Exploration Program.

The Program, founded in 2008 by *Titanic* discoverer Bob Ballard, gives participants an opportunity to conduct research from Ballard's ship of exploration, the E/V *Nautilus*, and use its cutting-edge communication systems to offer a "telepresence" to explorers on shore.

Smith joined the Nautilus Corps of Exploration as one of 20 Educators at Sea. These teachers—along with 27 students—hailed from schools, universities, and science centers in 21 states and 5 countries.

"The program allowed educators to participate in ocean exploration while it

was happening," says Smith. "I hope my participation helped my students and our community become more familiar with these 'big blue spaces.'"



Bethany Smith with the ROV Hercules, one of the two robotic subs used during the expedition.

GOVERNOR APPOINTS PAIR TO STATE ADVISORY BOARD

Governor Bob McDonnell has re-appointed VIMS Professor Roger Mann and alumnus A.J. Erskine (MS '03) to another three-year term on the Commonwealth's Aquaculture Advisory Board.

Mann, who brings to the Board more than 30 years of research into shellfish ecology and restoration, says "intensive oyster culture in Chesapeake Bay offers enormous opportunities for economic growth, but it also poses unusual biological and management challenges. As oyster aquaculture continues to expand in Virginia, we continue to work with local oyster farmers and resource managers to develop best management practices that will optimize oyster growth and profitability while sustaining ecosystem health."

Erskine—Aquaculture Manager and Field Scientist for Bevans Oyster Company and Cowart Seafood Corporation—says, "significant industry investment combined with sound science from our academic partners will result in profitable and sustainable oyster aquaculture in Chesapeake Bay."

VIMS' most recent survey of oyster and clam farming in Virginia shows these activities had an economic impact of more than \$81.2 million and provided 925 jobs in 2012. Harvested products are available at restaurants, farmers' markets, and through agricultural cooperatives throughout the state.



VIMS welcomed 19 new graduate students in late August, bringing total enrollment in William & Mary's School of Marine Science at VIMS to 91 students.

Microplastics, continued from page 1

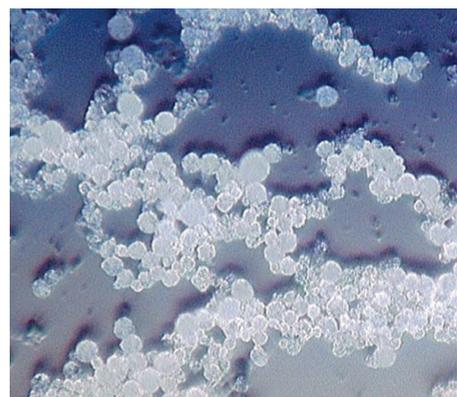
"Microplastics have become a big concern in the world's oceans and estuaries," says Havens. The particles are small enough to be eaten by a diverse group of organisms, and, once ingested, "these compounds and anything they've absorbed can be magnified up the food chain."

Havens says his team's goal is to develop and market microbeads that will biodegrade quickly, within septic tanks, wastewater treatment plants, and smaller tributaries, before they ever reach the Bay. "It's a proactive approach to reducing microplastic pollution," says Havens.

VIMS Professor Rob Hale is also working on microplastics, using a

\$400,000 NOAA award to study how they might take up or release chemical additives. In a recent *Bay Journal* interview, Hale says, "Depending on their size and composition, plastics may release previously bound-up chemicals into the water as they break into particles. At the same time, limited research suggests the changing composition of the smaller plastic bits may make it easier for them to absorb other chemicals that may be in the water." Tests have shown that some small plastic particles readily take up persistent organic pollutants such as polychlorinated biphenyls (PCBs).

"When something comes along and eats [a piece of microplastic]," Hale adds,



Microbeads created at VIMS. Each bead spans a few millionths of a meter. ©Jason McDevitt.

"they have basically ingested a pill of chemicals." To date, scientists have found evidence of ingestion of microplastics by marine worms, tiny crustacean grazers like amphipods, and filter feeders like mussels and barnacles.

STUDENTS COMPLETE INTERNSHIPS AT VIMS

VIMS continued its long tradition of offering opportunities in hands-on marine research to high-school and college students this summer, as 24 accomplished interns completed in-depth projects with faculty, staff, and student mentors.



2013 REU (Research Experience for Undergraduates) students at VIMS. From L: Martin Wong (Johns Hopkins Univ.); Hannah Ehrmann (Gettysburg College); Will Sweetser (William & Mary); Brittany Peachey (Grove City College); Chris Lynum (Univ. of Wisconsin); Nina Jackson (Humboldt State Univ.); Nicol Parker (Adrian College); Mary Chang (William & Mary); Marc Hammond (Univ. of Massachusetts Amherst); Lauren Kelly (Florida Institute of Technology); John DeRosa (Univ. of Georgia); Caitlin Seppi (Univ. of Maryland); and Alma Ramirez Velez (Universidad Metropolitana).



2013 Governor's School students. From L: Jennifer Radcliff, Kacey Hirshfeld, Garnett Swain, Andrew Huh, Heather Landes, and Madeleine Guyant.



2013 Eastern Shore Lab Summer Interns. From L: Daniel Lassiter, Rachel Seaman, Emilee Dize, Shane Taylor, and Sarah Puchalski.

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