Dye Helps Predict Potential Dispersal of Non-native Oyster Larvae

Swimmers and boaters may have seen what appeared to be a “red tide” in several areas of Chesapeake Bay this summer and fall. But instead of a potential menace to the waterway, the red patches were part of a study designed to further enhance biosecurity of non-native oyster trials.

“Each of the red patches resulted from the release of about 30 gallons of rhodamine dye into the water,” says project leader Dr. Roger Mann. Mann, Dr. Kenneth Moore, and other VIMS researchers tracked the dye patches to help predict where tidal currents would carry larval oysters in the unlikely event that any of the non-native oysters now deployed in seafood industry trials successfully reproduce.

The first release took place in July near Crossroads Aquafarms & Chessie Seafood and Aquafarms on the York River at Yorktown. Additional dye studies took place at three other sites selected to provide a broad range of tidal conditions and salinity: Seafabs Inc., at Milford Haven in Mathews County in September, Shores & Ruark Seafood Inc., on the Rappahannock River near Urbanna in October, and near Kinsale on the Yeocomico River in mid-November.

Karen Hudson and Missy Southworth transfer rhodamine dye onto a VIMS research vessel in preparation for a dye release experiment on the York River. The dye will help show how tidal currents might disperse oyster larvae.

Researchers Release Juvenile Blue Crabs

Hatchery-reared animals may help restore the Chesapeake’s ailing crab fishery

VIMS researchers continue to release hatchery-reared blue crabs into the York River in a collaborative effort to determine whether such efforts could be used to enhance Chesapeake Bay’s historically low blue crab stocks.

The population of female blue crabs in Chesapeake Bay has declined more than 80% during the last ten years.

The VIMS research team, led by Drs. Rom Lipcius and Rochelle Seitz and Mr. Jacques van Montfrans, released 11,540 juvenile crabs into shallow York River coves in June. Maryland scientists released a similar number of juvenile crabs into the Rhode River, which empties into Chesapeake Bay near Annapolis. Together, the 23,000 crabs represent the largest single experimental release of juvenile blue crabs ever attempted to test the feasibility of stock enhancement for the species.

The release program is a collaborative effort between VIMS, the University of Maryland’s Center of Marine Biotechnology (COMB) in Baltimore, and the Smithsonian Environmental Research Center (SERC) in Edgewater, Maryland. It complements efforts to reduce the harvest of adult crabs through the establishment of blue crab sanctuaries.

The ongoing trials are designed to determine the optimal time and place for releasing juvenile crabs. Because the ultimate success of the trials depends on factors such as crab size, food availability, predation, cannibalism, water temperature, and salinity, the researchers spent the summer months studying crab survival in relation to these parameters. They also studied whether hatchery crabs would survive as well as those collected from the wild.

The VIMS team released another 4,017 hatchery-reared crabs into York River coves in October and November. The fall release was designed to test whether high rates of predation and cannibalism observed during the summer might decrease in autumn as adult crabs and finfish such as Atlantic croaker leave the coves to migrate downstream.

Analysis of the recent experimental data indicates that fall releases are indeed more successful. “During the summer, tethered crabs survived only about a day on average,” says Seitz.

The hatchery crabs were reared at COMB by Drs. Yoni Zohar and Odi Smora, who have spent the last several years overcoming previous obstacles to raising blue crabs in captivity, including cannibalism. Drs. Anson Hines and Eric Johnson of SERC have directed the Maryland enhancement efforts and provided support for the VIMS component.

Before each release, Lipcius, Seitz, and their staff collect the crabs from SERC, where resident and VIMS scientists have already completed the laborious task of tagging each of the

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Annual Wetlands Workshop Explores Isabel’s Impacts

Wise use of tidal wetlands in Virginia relies on the decisions of a diverse group—including waterfront owners, local wetland boards, and marine contractors.

In July, VIMS’ Center for Coastal Resources Management provided citizens and elected officials with an opportunity to learn about the latest in tidal-wetlands science by hosting their annual Tidal Wetlands Workshop.

Workshop leader Tom Barnard notes that “the event provides a unique opportunity for attendees to enrich their understanding of wetlands ecology and management through presentations, discussion, and ‘hands-on’ field exercises.”

Fellows Earns Berth at EPA Conference

VIMS graduate students Paul Bradley, Kristin France, and Heidi Geisz have received a prestigious fellowship from the U.S. Environmental Protection Agency and attended the EPA Graduate Fellowship Conference in Washington, D.C. in October.

The trio attended the conference to present their research, learn about federal employment opportunities, and network with federal scientists, congressional representatives, and other fellows.

The conference website noted that the event “provides an opportunity for EPA to engage some of the nation’s most promising young adults in meaningful interaction and discussion around some of today’s emerging environmental science and policy challenges.”

The students won the highly competitive fellowships as part of EPA’s Science to Achieve Results (STAR) program. The fellowships support masters and doctoral students in environmentally related fields for up to three years. The Agency awards approximately 100 fellowships per year, from more than 1,000 applicants around the nation.

For his dissertation research under advisor Dr. Deborah Bronk, Bradley is comparing nitrogen-uptake patterns in phytoplankton and bacteria from estuarine, coastal, and oceanic ecosystems. His work could have significant implications for nutrient management strategies in estuarine and coastal waters.

France is studying how changing regional biodiversity affects local diversity and ecosystem function. This information is critical for conserving diversity and managing essential ecosystem services in light of habitat fragmentation, non-native species introductions, and climate change. Her advisor is Dr. Emmett Duffy.

Geisz is investigating persistent organic pollutants in Antarctic seabirds. Her work will help inform policy change regarding pollutants such as BDEs currently produced and used in the U.S., and shed light on the impacts of pollutants such as DDT on fragile Antarctic ecosystem. Her advisors are Drs. Hugh Ducklow and Rebecca Dickhut. Ducklow manages the National Science Foundation’s Long-Term Ecological Research program at Palmer Station in Antarctica.

For more information on the STAR fellowship program, visit http://es.epa.gov/ncer/fellow/

This year’s workshop focused on issues raised by Hurricane Isabel.

VIMS emeritus professor Dr. John Boon explained how sea-level rise in Hampton Roads helped boost Isabel’s storm tide to within an inch of the level reached during the much stronger “Storm King” hurricane of 1933, and how continued sea-level rise will likely aggravate coastal flooding during future storms.

VIMS coastal geologist Scott Hardaway reported on Isabel’s impact on the local shoreline, as well as on coastal structures such as bulkheads, piers, and marinas.

During a morning field session participants learned to identify species of fresh and salt-water plants that help delineate tidal zones, and observed the effects of tidal range on wetland jurisdictional areas. A seining session allowed participants to get their feet wet while learning about the natural history of Chesapeake Bay’s shallow-water inhabitants.

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juvenile crabs. The tags, which consist of a tiny wire inserted into leg muscle, allow researchers to track the crabs despite repeated molting of the external skeleton. Researchers can easily identify a tagged and recaptured crab by passing it across a metal detector. Each of the crabs was also tagged with a dye visible through the transparent exoskeleton of the swimming legs.

After transporting the crabs to VIMS in iced coolers, the researchers released the animals into a shallow, muddy cove in the Catlett Islands (a pristine salt marsh habitat owned and managed by the Chesapeake Bay National Estuarine Research Reserve at VIMS), and another cove in Indian Field Creek, a pristine habitat under the protection of the Naval Weapons Station.

“Linking our scientific enhancement efforts with the federal protection and relatively pristine nature of many military installations may produce a favorable set of conditions for growth and survival of juvenile blue crabs,” notes Lipcius.

The current research builds on experiments during 2003 in which Lipcius, Seitz, and van Montfrans moved young crabs from York River and Tangier Island grass beds into the same Catlett Island coves. High survival rates among these transplanted crabs showed that the coves contain far fewer crabs than they are capable of supporting.

“Last year’s experiments suggest that the ecosystem is below its carrying capacity, and that the blue crab is limited by recruitment, not resources,” says Lipcius. In other words, low crab numbers aren’t due to a lack of food, but to a shortage of young crabs.

“That’s why enhancement using hatchery-reared crabs seems like a viable method for restoring the Chesapeake’s blue crab population,” says Seitz.

In addition to Lipcius, Seitz, and van Montfrans, the release efforts were aided by VIMS graduate students Russ Burke, Dave Hewitt, Deb Lambert, Chris Long, and Bryce Brylawski; and staff members Mike Seebo, Katie Knick, and Kristie Erickson. REU college interns Francisco Soto Santiago and Nicole Rohr and Governor’s school students Ian Keene-Babcock and Jenny Geldermann also assisted with the June release.