# Virginia MARINE RESOURCE BULLETIN

Virginia Sea Grant College Program
Virginia Institute of Marine Science
College of William and Mary
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Nearly every science teacher I've met has a story about how a field trip to the beach, a visit to an aquarium, or an investigation of pond life at the local park turned the classroom's most reluctant learner into a curious and motivated young scientist. Educators and parents know that children are keenly interested in learning about the natural environment. We also know they are concerned about the fate and management of the Earth's vital marine resources. But children have little contact with the scientists and managers who are making great progress in understanding and stewarding those resources.

As current president of the National Marine Educators Association, I represent over 1100 professional educators who are dedicated to "making known the world of water, both fresh and salt." Marine educators know first-hand the magic that happens when students begin to understand the science and experience the beauty of the ocean. We believe that ocean sciences should be an integral part of every student's basic science education. Unfortunately, most students receive little if any in-depth classroom instruction in ocean sciences during their K-12 classroom years. High school earth science courses include oceanography concepts to varying degrees, but in most states fewer than 30% of students enroll in earth science. Oceanography is sometimes offered as a high school elective course, but these programs are not widely available and only a few students are able to take advantage of them.

We need to strengthen the role of marine science in school programs. It is critical for everyone to understand the importance of the marine environment and why we literally can't live without it. The ocean is more than a home for sharks and whales and pretty coral reef fishes, it's more than a place to swim during summer vacation. It's 75% of the Earth's surface! Oceans are a major driving force in the machinery of our planet. Without an understanding of the role the oceans play in atmospheric science, biological and ecological systems, and human enterprise, no student can claim to be scientifically literate, regardless of the level of the rest of his or her education in science. If there is no emphasis on ocean sciences in a school's curriculum, the school cannot claim to be adequately educating students about the world in which they live.

Fortunately for those of us living in the Commonwealth of Virginia, ocean sciences education is well established in many of our schools, and exciting opportunities for new programs are on the horizon. In this issue of the *Bulletin*, you'll learn about a few of the many ways that VIMS and the Virginia Sea Grant Program bring together students, teachers, adult learners, marine scientists, and the marine environment. We invite you to become a participant in marine education programs in your community, and help us "make known the world of water."

*Vicki Clark*
*Virginia Sea Grant Marine Advisory Program, Virginia Institute of Marine Science*
*President, National Marine Educators Association, 2001-2002*

Virginia
MARINE RESOURCE
# BULLETIN

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Sea Grant Virginia

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# Recruiting Marine Scientists for the Future

By Sally Mills

Since the "Year of the Ocean" was first declared nearly two decades ago, public fascination with the world oceans has been rekindled by coverage of deep-sea explorations and the promise of treasures that might await us there. We hear scientists and political leaders characterize the oceans as the next frontier – alluding to its potential to provide foods and medicines to a burgeoning human population. On any given news day, however, stories emerge about coastal marine fisheries and their habitats in a state of decline. And we are only beginning to examine what's going on in the hinterlands – in the deeper waters offshore. Awareness that we have created huge problems for the coastal marine environment, about which we have only rudimentary knowledge, leads to growing uneasiness. At the very least, it underscores the importance of marine science as a discipline of study for all ages.

Against this backdrop we read and hear about falling K-12 test scores nationwide in mathematics and sciences – the building blocks of knowledge for approaching ocean understandings. Linked to such trends, across the country shortages are occurring among math and science teachers. This phenomenon forces school districts to place teachers outside of their field of study, or area of endorsement.

Mirroring national trends, the state Department of Education estimated over 660 openings in teaching positions in upper level science and math at the start of

the 2000-2001 school year. Their report continues, "Over time, the shortage of mathematics teachers has increased and is now identified as one of the most severe shortage areas in Virginia."

Trends like these are unsettling to those of us interested in building a strong constituency for marine science education throughout the K-12 experience. Are we on a collision course heading for trouble?

**Taking stock in Virginia public classrooms**

Any effort to improve the study of marine science among Virginia K-12 students must first begin with an understanding of the existing frameworks within public education. Several structural supports quickly become clear, most notably, the Virginia "Standards of Learning." The standards have become as basic a part of daily school life as the morning announcements and lunchroom gossip, and drive virtually all instructional planning by teachers and administrators. At certain grades, passage of SOL tests represents the line in the sand that students must cross over if they want to proceed to the next level.

While a great deal of disagreement exists over the impact of SOLs upon the classroom, many would say the standards are in much better shape today – and they continue to evolve. All science standards, for example, are under review right now, according to James Firebaugh who specializes in science curriculum at the middle school level statewide. And while teachers complain about the high stakes of SOL achievement, Mr. Firebaugh would argue that, over the years, they have become more broadly stated in an effort to encourage instructional flexibility.

Ann Regn, who directs the Office of Environmental Education at the state's Department of Environmental Quality, would agree. "The SOLs are not intended to be prescriptive. They are conceptual in nature and highly flexible." She goes on to explain, "Looking at middle school life science, for example, the standards are very broad themes but they could be covered by looking at any specific ecological system."

While it's true that the standards currently *allow* for marine studies, marine educators say they do not specifically *encourage* such studies – leaving the impression that marine science is a peripheral frill falling outside the mainstream of what a teacher is supposed to cover. This is unfortunate, because marine science can be effectively used to approach many SOLs when incorporated into the regular curriculum.

An activity found in *Your Backyard Classrooms*, "Sand Shakes and Mud Pies," offers a perfect example. By collecting sediment samples in wet habitats, students discover relationships between sediment size and various environmental factors. The activity addresses a suite of science and math SOLs in fourth through eighth grades and can be performed at many of Virginia's state parks.

When asked how marine science courses fare among electives offered at high schools across the state, Ms. Regn stresses that – like other upper-level courses – they must be demanded from the bottom up, at the school district level. Mr. Firebaugh and other science administrators agree. "If someone is pushing for it, or if a particular teacher has an interest, you will see a marine science course offered," he says. He adds that many factors affect this. School budgets, the size of the school district, student interest, and teacher qualifications all play a part.

There are, of course, other forces at play affecting the delivery of marine science to K-12 students in Virginia. Teachers who participate in Sea Grant workshops and courses represent a small fraction of those who *might* engage in such in-service activities, and who might use marine studies to improve scientific literacy. Those who do attend speculate that other teachers may not feel adequately prepared to keep pace with the higher-level science and math skills involved – because they do not have the academic background or are teaching outside their area of expertise. Others attribute it to lack of confidence or comfort in outdoor activities, especially if heat and insects are part of the experience.

On a more fundamental level, reluctance to introduce marine science in the K-12 classroom may have more to do with considerations such as time and money.

Delving into a new course, or unit, requires tremendous preparation time on a teacher's part. And funds – even at the $250-500 level – to pull together science kits and reserve a bus for an outdoor study unit can be difficult to obtain.

*Piquing children's curiosity in marine life at an early age is key to sustaining their interest later on.*

**Tapping into resources**

Still, some teachers are uncovering innovative methods to bring marine science to life. Cathy Roberts, who teaches in a financially strapped school district, admits that textbooks still represent the major source of information for classroom teaching in her middle school. She explains that many science textbooks are published in Texas (where a great number of school textbooks are sold), and she finds that coastal issues of relevance to her students are therefore hard to find. Ms. Roberts overcomes this handicap by using locally published books and materials picked up at in-service workshops, and by supplementing with field activities (see inset).

A 4th and 5th grade science teacher in the West Point public school system agrees that textbooks can only take you so far. David Lancucki supplements his classroom text with regional books and other publications, recommended by his colleagues. Web-based resources are used for lesson planning and to present content – such as that called for in science standard 5.6, an investigation of the ocean environment. As part of the investigation, basic marine food webs are studied. The topic literally comes to life when Mr. Lancucki takes his students to a nearby marsh to seine for critters, perform benthic studies, and characterize the habitat first-hand.

Fortunately, for those who are teaching marine studies in public schools in Virginia, good materials are easier to come by. A number of engaging curriculum guides focusing on marine science have been published within the broader realm of environmental education in the past 10 years by a host of public and private sources. And Sea Grant marine educators have built a suite of programs for teachers who want to learn more about marine science – especially those who wish to bring marine science to their classroom students but lack the resources or knowledge to do so.

To meet the growing demand for electronic media via the World Wide Web, in 1998 the Virginia Sea Grant (VSG) educators developed the "Bridge" – a website designed to help teachers quickly locate sound, data-rich marine science resources for use in the classroom. Access to such data by the K-12 student was not possible, even as recently as 5 to 8 years ago. When used discriminately, web resources and interactive, computer-based learning programs represent powerful tools that can help one prepare for and augment classroom and field studies.

**Using the environment as a learning tool**

In tandem with the rapid growth of Internet technology and its access in public schools, a growing body of evidence across the U.S. supports learning outside the classroom walls – what is currently referred to as "environment-based education." The premise is straightforward: use the environment more broadly as a learning tool. The approach emphasizes the integration of subject matter across disciplines, problem-based and issue-based learning experiences, and team teaching, among other things. Environment-based education has been shown to improve student motivation, academic achievement across the board, and the advanced study skills needed for career preparation and life-long learning.

Ms. Regn sees Virginia schools beginning to use the environment as a unifying, or integrating, theme of study – and she can think of no better place for it to happen. "This is where we should be headed in Virginia, using the resources available in the coastal zone. We're so fortunate to have these treasures at our back door. We have a great opportunity to make coastal studies real."

You needn't tell that to Kevin Goff. Mr. Goff teaches science at Essex High School, and field study represents an important component of his instructional approach. In his experience, students respond better to outdoor, hands-on study. "A lot of kids are motivated by marine science. They love to get wet and muddy! They also keep field notebooks and collect data." He reflects, "I think field exercises help them internalize the information better. They remember it longer, and even if they forget specific facts, they'll still have a general appreciation and understand broad concepts about the natural world years from now."

**Filling the information void**

Even if teachers are willing to take the plunge and their school district supports the idea of team teaching and environment-based education, when it comes to incorporating marine science, there still exists a disconnect of information flow. When that happens, who steps in?

"More and more, *scientists* are being called upon to take the place of schools. They are the primary source of information," asserts Vicki Clark, a marine educator with Virginia Sea Grant.

Lee Larkin, who led creation of the Bridge web site, agrees, "In science education, in general, we're being told to involve scientists more. But we need partnerships to do that. It's much easier said than done. There are huge cultural differences in those communities and bridges need to be built."

Thanks to a promising collaboration between VSG educators and VIMS faculty, those bridges already have strong footings. A one-week course offered during the summer at the Wachapreague laboratory on the Eastern Shore gives secondary science teachers the chance to live and breathe marine science directly from VIMS staff and faculty members.

Dr. John Graves, who chairs the Fisheries Department at VIMS, is one of several professors who have become actively involved. Having worked with high school teachers for a number of years, Dr. Graves appreciates the opportunity to magnify his teaching efforts. "So many things we do, the public cannot really identify with. But this is tangible. It's that 'Oh, wow!' factor. We're offering a real service that no one else is filling."

*(continued, page 9)*

*Secondary teachers who participate in marine science workshops become part of a marine educators network.*

# Resources for the Classroom & Beyond

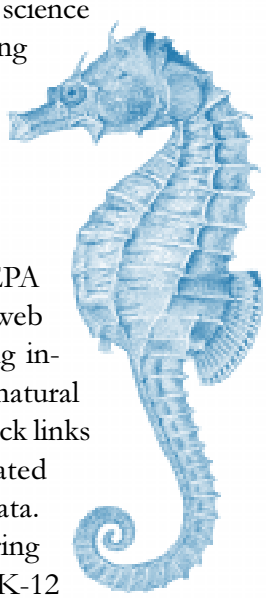
**Teaching Materials:**

- The Blue Crab in the Chesapeake Bay – Hot off the digital press, a new CD-ROM features information on the biology, ecology, and fishery of the blue crab, the most beloved crustacean in the Bay region. The CD complements an ongoing education program on blue crab ecology that includes research-based teaching materials and workshops. Available from Virginia Sea Grant, 804-684-7170.
- Oyster Reef Communities in the Chesapeake Bay – As part of a multi-faceted education program launched in 1998, an interactive CD-ROM has been published for use in the classroom. Among its many features are illustrations on oyster biology, reef ecology, the fishery, and restoration efforts. Available from Virginia Sea Grant, 804-684-7170.
- Watershed Action for Virginia's Environment – Developed by the Chesapeake Bay Foundation, this curriculum guide provides students and teachers with the tools necessary to investigate their local environment. The guide employs an integrated approach to teach students about complex, environmental issues and thus promotes higher-order thinking skills. Available from the Chesapeake Bay Foundation, (804) 780-1392.
- Virginia's Natural Resources Education Guide – Published by the Virginia Resource Use Education Council, the guide offers an overview of the state's natural resource base and classroom activities that support SOL implementation at the elementary level. Available online; go to: www.vanaturally.com.

**Field Study:**

- Chesapeake Bay National Estuarine Research Reserve, Virginia – Offers a series of field trips on the York River, for middle and high school students investigating water quality and marsh habitats. Also new this summer, a 5-day field trip investigating blue crabs; sponsored by local Rotary clubs. Contact the program leader at (804) 684-7526.
- Chesapeake Bay Foundation – Offers class and field workshops and assorted canoe trips on Virginia rivers. Contact the Virginia office at (804) 780-1392.
- Virginia's State Parks, Your Backyard Classrooms – Representing a collaboration of several natural resource agencies across the state, this curriculum guide was first published in 1990 and contains a wealth of information about natural resources found within Virginia's Chesapeake Bay watershed. *Your Backyard Classrooms* is chock full of classroom and field activities that can be accomplished in 1-2 hour time segments and match SOL implementation. Call the Virginia Department of Conservation & Recreation, (804) 786-4388.
- Virginia Marine Science Museum – A terrific source of information about marine science and a fun way to spend the day getting excited about Virginia's marine environment. Contact the education director at (757) 437-4949.

Virginia Naturally
Linking Virginians to the Environment
www.VaNaturally.com



**On the World Wide Web:**

- ChesSIE – Supported by the EPA Chesapeake Bay Program, this new web site is devoted to educators seeking information about the ecology and natural history of the Chesapeake Bay. Quick links provide access to quality Bay-related education resources and online data. The site provides a venue for sharing information and connecting with K-12 classrooms. Go to: www.bayeducation.net.

▯ The Bridge – A clearinghouse of marine science information and teaching resources organized into content areas corresponding to those often used in classroom teaching. A "Data Tip of the Month" integrates current, credible marine science data available online with classroom exercises that illuminate how such data are used in real-life situations. Go to: www.marine-ed.org/bridge.

▯ Virginia Naturally – A compendium of resources available to help Virginians link to their natural environment. Site contains links to educational materials, opportunities to volunteer, upcoming events, and a comprehensive directory conveniently searchable online! Go to: www.vanaturally.com.

▯ Mid-Atlantic Marine Education Association – An organization of people whose common goal is to improve education about all aspects of marine and aquatic environments. Visit their web site at: www.mamea.org.

**Student Programs:**

▯ Outlook on Ocean Science – Graduate students in the School of Marine Science at VIMS bring this program to high schools in the Tidewater area. These 90-minute sessions combine a general overview of marine science career opportunities, with hands-on activities that illustrate the many facets of marine science study. The OOS program typically reaches 20-40 high school classes each year. Contact Virginia Sea Grant, (804) 684-7735.

▯ Governor's School Program – Since 1985, a partnership with NASA/Langley Research Center has brought students to the VIMS campus for five weeks each summer. While here, students work directly with a VIMS faculty member, assisting with a research project underway. Through lab and field exercises, students begin to appreciate the multi-disciplinary nature of marine science. Check the VIMS web site, www.vims.edu/adv/ed/gs, for more information.

*(over)*

*The "Outlook on Ocean Science" program brings marine science graduate students to high schools across Tidewater, and offers kids a real-life assessment of what marine scientists do.*

- Virginia's Blue Crab Bowl – This academic competition for high school students alternates between the VIMS/William and Mary and Old Dominion University campuses. Each year, the Bowl draws 16-20 teams from across the Commonwealth, who participate in a full day of rapid-fire questions in round robin, double-elimination format. Winners of the regional bowls proceed to the National Ocean Sciences Bowl each spring. Go to: www.vims.edu/bcb.

**Teacher Training:**

- Summer Workshops – Join other educators from the state for one-day workshops held at VIMS. Programs change each year and feature expert speakers and lab visits. This year's workshop highlights the biology and ecology of sharks in the Chesapeake Bay. Go to: www.vims.edu/k-12.
- Summer Course – Held at the VIMS Wachapreague laboratory on the Eastern Shore, this course combines hands-on, field activities with classroom lectures. Secondary science teachers join faculty and staff from the Institute and immerse themselves in marine science for 6 nights and 5 days. Two graduate credits in marine science are awarded upon successful completion of course work and test. Go to: www.vims.edu/k-12.

Stay tuned for additional information about new opportunities for field studies. Through a collaboration between the Virginia Resource Use Education Council and others, natural resource educators plan to bring "Meaningful Bay or Stream Outdoor Experiences" to all K-12 students statewide as part of the Chesapeake 2000 Agreement education goals. Information will be posted on the ChesSIE web site: www.bayeducation.net.

Sea Grant
Virginia

## Blossoming Outdoors

A teacher in the City of Portsmouth relies heavily upon curriculum materials developed by the Chesapeake Bay Foundation and by Virginia Sea Grant. Cathy Roberts has become something of an icon for innovative teaching methods both in the built classroom and beyond, in the outdoor classroom. She admits that much of what she's been able to accomplish is only possible because her middle school has adopted team teaching. Five teachers use an interdisciplinary approach to reach 130 seventh graders at the William E. Waters Middle School. Ms. Roberts introduces a study unit about the Chesapeake Bay each fall, which drives many other programs throughout the ensuing school year. The seventh graders brainstorm projects they'd like to accomplish and lean on community partners to succeed.

One year, students raised wild celery in the classroom (a submerged aquatic grass indigenous to the Chesapeake Bay), and later planted it in the Chickahominy River. This year's students are tackling redhead and eelgrass for planting in other rivers. The projects are rich in interdisciplinary and inquiry-based learning. The approach has gained the attention of school administrators and parents, who are relishing the positive payouts. One student, for example, who struggled with school and had a history of behavior problems, was so turned on by the team teaching style and outdoors learning that he went from being in and out of trouble and missing lots of school days, to a year of perfect attendance. According to Ms. Roberts, "The hands-on, environmental learning – that non-traditional approach – really appeals to some kids."

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He continues, "I ask myself, what am I giving back to the community? As marine scientists, we need to be concerned with who's training teachers. We have the expertise, so let's use it!"

Such connections help marine science teachers (who are often the only such teacher at their school) fight feelings of isolation. "Our program helps teachers establish links with researchers and then make links with others in the area. We're facilitating a network here," notes Dr. Graves.

**Looking ahead**

While there are many encouraging signs of progress, access to marine science study throughout the K-12 experience remains inequitable. A K-12 student is more likely to be exposed to an oceanography or marine biology course if living east of Richmond, where teachers can more readily attend an in-service workshop and benefit from a strong marine education support network. Students working at the gifted as well as remedial levels are also more apt to be offered a marine science class or unit – because it is perceived as more engaging than other, traditional branches of science.

In the final analysis, it is up to parents and educators to request inclusion of marine studies throughout the K-12 curriculum from their local school district, and to push for their continued funding. And though great strides have been made, better teacher preparation and more marine-oriented teaching materials are needed if we are to move away from reliance upon research scientists to fill the information void.

Fortunately, more and more graduates of marine science programs are making education their career choice. Several recent graduates of the Institute have gone on to become high school science teachers. Indeed, the paradigm of scientists pursuing *research only* is very slowly eroding, exposing alternative career options.

Kevin Goff, who returned to teaching after completing his Masters degree at VIMS, represents one who made that connection. "I wanted the education necessary to write a marine science textbook. In my years of teaching, I haven't found a good one for high school programs." Mr. Goff goes on to explain that high school texts are different than college texts, that they are often sold as part of a larger package that includes a lab manual, lab and field activities with worksheets, and teacher aids such as transparencies and resource lists. A marine science textbook for high school use is currently on his "to do" list.

Mr. Goff represents one of many committed teachers who suggest that Virginia is well poised to enhance its leadership in K-12 marine science education. With over 10,000 miles of tidal shoreline and 14 state parks within 50 miles of the coast, the natural resource base can handily accommodate K-12 field study. Such experiences can be reinforced by Chesapeake Bay and marine resource materials already in place, and by quick and easy access to scientific data online, now available at the touch of a few keystrokes.

But if we are to continue building a strong constituency of future marine scientists, we must find a way to attract and retain qualified math and science teachers while strengthening the financial support we provide our entire public school system. We must find a way to close the gap between public rhetoric and public funding.

In spite of the challenges presented by teacher shortages and the burden of SOL implementation, Sea Grant educators forge ahead and continue to build strong alliances within the K-12 education community. Communication between K-12 educators and marine scientists has never been stronger, and it continues to resonate. Clearly, marine scientists play a critical role in the provision of accurate information. But professional marine educators, who've provided the link between scientists and teachers for the past two decades and who do much of the legwork to make those connections pay off, remain an essential part of the communication spectrum.

# Life-long Learning Outside the Classroom

By Sally Mills

Educating adults about Virginia's marine environment and helping various constituents make informed decisions about the use of its resources remain cornerstones of the Marine Advisory Program. In fact, the provision of advisory services to Virginia's seafood industry and other clients was first mandated by Virginia's General Assembly when the Institute was established in 1940.

Virginia Sea Grant serves as the primary vehicle to deliver these services at VIMS, and assistance most often comes in the form of education and technical assistance. As advisory specialist Mike Oesterling characterizes it, "We are all educators, but our clients differ – from school teachers to industry groups." Along that client spectrum could be included local and state resource managers, elected officials, recreational fishermen, conservation groups, the media, and many others. But unlike more traditional education settings, adult outreach and education in marine topics frequently takes place in a processing house, on the deck of a boat, in a banquet room, or in a commercial kitchen.

*Chefs participating in the seminar series bring a wealth of knowledge about seafood nutrition and safety to their audience.*

**Seafood education**

Seafood continues as a popular menu item for home and restaurant dining and nutritional guidelines recommend seafood as an important component of a healthy diet. However, the general public and foodservice professionals are often confused by media reports and misinformation on seafood safety, quality, and availability. Consumers need reliable, up-to-date information about seafood topics in a useful and timely manner.

Marine educators have responded through a seafood education program that offers a series of educational events throughout the year. Program participants are treated to expert advice by participating chefs and marine scientists who take part.

First introduced in 1987, seafood seminars educate participants

about seafood preparation, nutrition, species biology, fisheries, aquaculture, and other topics. The seminar series continues to grow in popularity, and attendees are now chosen through a lottery system.

Each fall, a Chefs' Seafood Symposium held in cooperation with the Virginia Chefs Association directly targets the needs of foodservice professionals. The program is accredited by the American Culinary Federation, and participants receive ACF certification credits. Among the many beneficiaries of the information presented are culinary students who travel from the tidewater and central regions of the state. The event provides updated information on seafood topics through cooking demonstrations by nationally recognized chefs and technical presentations by marine scientists.

Finally, a seafood section of the Marine Advisory Program web site (www.vims.edu/seafood) keeps readers up to date about upcoming events and provides links to other sites with information about seafood nutrition, recipes, fisheries updates, and resources for educators.

*Adult education frequently occurs at conferences in large banquet rooms, such as this presentation at the Southeast Marine Trades Expo in December 2001.*

**Commercial clients**

Reaching out to those who make their living in the waters and bays of the Commonwealth is the work of advisory specialists, who like to think of themselves as opportunists. "We look to effect change, to improve the livelihoods of our clients, to answer questions and solve problems," says Michael Oesterling, continuing, "The bottom line: we concentrate on applied research."

He goes on to say that in some situations advisory specialists don't always follow accepted scientific methods. That is because the client – in this case, an industry contact – is considered a partner in the effort and viewed as the expert with ultimate knowledge. When working with business operators, getting results is foremost on everyone's mind.

Advisory specialist Bob Fisher uses the example of the horseshoe crab to illustrate this point. "When we got involved, commercial conch fishermen were looking for a way to reduce their impact on the horseshoe crab. They could see the handwriting on the wall. They knew crab restrictions were coming," he adds. Fisher took what he knew about the use of the crab as conch bait and worked on practical solutions to reduce the volume of bait required. The result: a bait bag that fits into the live well of a conch boat and cuts horseshoe crab use by half or more.

Fisher considers this a good first step, but ultimately, would like to find an alternative bait for the fishery. He has experimented with the cow-nose ray and a combination formed bait, but is still searching for the perfect substitute.

Another example, cobia, illustrates staff ability to assist in new product development. "We were looking at the big picture and saw an opportunity to help the finfish aquaculture industry, which was fledgling at the time," says Oesterling. "There were knowledge gaps. We began to look at candidate species across Virginia and identified the cobia as a potential subject for aquaculture. The closer we looked, the more it appeared a good candidate," he adds. Today, the cobia aquaculture effort spans the entire southeast region of the United States, and scientists in many universities collaborate on cobia research.

While advisory specialists seek to solve problems, they are quick to point out that the answers are sometimes not what the client wanted to hear. "Sometimes our work benefits industry, and sometimes not," cautions Oesterling.

His work in the soft-shell crab fishery is a perfect case in point. For the past 15 years, Mr. Oesterling has helped commercial crabbers build a profitable business out of this resource niche. He and other fishery experts have been instrumental in all aspects of development, including facility design, harvesting, and seafood safety protocols. Today, several small businesses consider this help the push that put them over the top. But a number of detractors – from scientists to watermen – feel the soft-crab harvesters have put other segments of the blue crab fishery at risk.

It's all part of the territory, according to Oesterling. Both the soft-shell crab and cobia ventures were opportunities that were not necessarily brought to him by the seafood industry. Rather, he saw an opportunity to help someone make a living, or find a new way of doing business. In that respect, he compares his work to that of an agricultural extension agent, emphasizing, "We help people make money – that's the bottom line."

**Connecting information and data with users**

For Tom Murray, an economist with the Marine Advisory Program, connecting people with the information they need to make good business decisions is all in a day's work. Murray has been helping local government staff and resource managers better understand the dynamics that drive the marine trades sector in various localities. Many times, his efforts help both public and private clients assimilate the volume of information already available, through data analysis and interpretation. In some situations, clients don't have the technology or background to perform such analyses on their own.

Business opportunities and challenges in the marine industry are, by nature, broad-based. This sector of the economy currently faces similar expansion considerations throughout much of the southeast. At an industrial trades expo held this past winter in Charleston, Murray and other organizers were able to recruit expertise from around the country, to speak to attendees from Virginia south to Florida. Projects could be discussed at a larger scale, allowing for savings in effort and expense.

"We're able to leverage the broadest base of resource people, bring them together and look at issues of importance to local businesses," says Murray. "Issues such as water quality and marina expansion are not unique to state jurisdictions, for example, and lessons can be shared from one state to another."

Right now, Mr. Murray is working on an economic analysis of the Atlantic Intracoastal Waterway as it flows from Virginia to Florida. The study will quantify the current economic activity and impacts of the waterway to the region, and then compare likely economic outcomes under two theoretical maintenance scenarios. Virginia Sea Grant is partnering with four other Sea Grant programs to generate the economic data needed and conduct regional economic impact models. "Working at a large regional scale can help you see the benefits of partnering with other states and do a better job at identifying infrastructure needs. That allows you to grow your business," Murray says.

Other projects take him to the water as an advisor and consultant to small entrepreneurs and working watermen. The Fishery Resource Grant Program, for example, solicits ideas from those in the commercial fishing sector – experts who may not have the financial resources to try out a new way of doing business. That work is especially gratifying when the idea succeeds in saving money, time, and fishery resources.

Indeed, a healthy fishery represents the bottom line in any marine advisory program conducted within Virginia's coastal zone. Balancing marine resources with the needs of millions who have chosen coastal Virginia as their home will no doubt keep Sea Grant specialists busy for years to come.

# Reaching Out to Watermen & Their Families

By Charlie Petrocci

It's not often that you see commercial fishermen and aquaculturists sharing common ground on both resource-related issues and management concerns. But this is what occurs each year for the several thousand watermen and aquaculture practitioners from the Mid-Atlantic region when they gather at the annual East Coast Commercial Fishermen's and Aquaculture Trade Exposition.

Hosted each year by the Maryland Watermen's Association, the trade show was once again held in Ocean City's convention center. Even though it was Super Bowl weekend, the trade show was attended by nearly 6,000 participants. Joining commercial watermen from the region were visitors coming from as far away as West Virginia, Pennsylvania, and New Jersey. "It seems the show gets better each year and we're proud to host it," said Larry Simms, a commercial fisherman and president of the Maryland Watermen's Association.

The show traditionally kicks off Friday evening with a gala seafood reception held in the nearby Sheraton Hotel. Here, commercial fishermen and aquaculture practitioners get a chance to rub shoulders in a casual setting, discuss mutual interests and problems in their respective fields, and try both farm-raised and wild harvested regional products. One of the highlights of the gala is the raw bar, which this year featured both the indigenous Chesapeake Bay oyster *(Crassostrea virginica)* and the Asian oyster *(Crassostrea ariakensis)*. Connoisseurs thus had a chance to compare both products. The Asian "oyster bar" was co-sponsored by the Virginia Marine Resources Commission, which is interested in introducing the Asian oyster into the Chesapeake Bay on a trial basis.

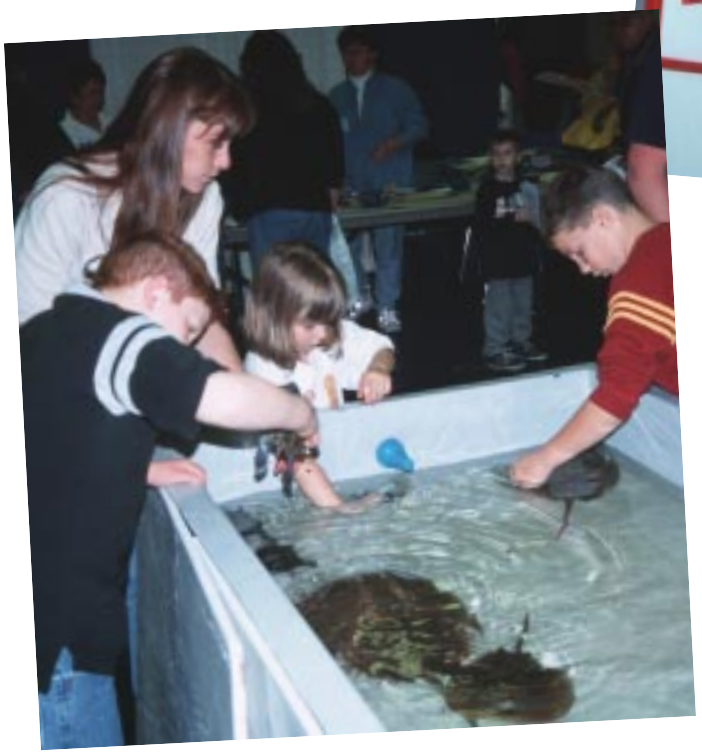
The main floor of the show featured aquaculture and commercial fishing related products and gear. Everything from boats, engines, netting, cages, and filter systems were on display from various manufacturers. So there was plenty of opportunity for visitors to see and discuss new and improved fisheries products with both their makers and distributors.

A focal point of the trade show each year is the tremendous assortment of educational seminars organized and conducted by Sea Grant extension programs, representing several Mid-Atlantic states. These programs target both the commercial and aquculture industries.

"This year we had a great lineup of programs," said Virginia Sea Grant marine specialist Bob Fisher of VIMS. "The hot topics this year were blue crabs and oysters, so of course we hosted several seminars on regulatory concerns for those industries. We had a number of soft shell crab producers and commercial watermen at the blue crab program. Overall I think all the seminars were well attended. It's a great time for us to interact with people of both the aquaculture and general seafood industry from a broad region of the country and get input on what their interests and needs are," he added. Maryland and Virginia Sea Grant have coordinated the seminar series for many years.

The blue crab program, *Increasing East Coast Blue Crab Produc-*

*Educational exhibits and an afternoon full of adventure draw more and more children to the Watermen's Expo each year. The relaxed atmosphere and hands-on activities seem to promote learning for all ages. Left, a demonstration of how hot and cold temperatures affect air pressure. Below, kids test their tonging skills and enjoy a close-up view of a horseshoe crab, while the "Sturgeon General" visits the exhibit floor.*



*tion*, featured several marine specialists as speakers. Presenters gave up-to-date information on what's being done to manage the blue crab for future stock enhancement. "The blue crab industry is an important issue right now, as new regulations are seeking to stabilize stocks. It's a significant industry for this region, so we expected to see a good turnout for this program," said Doug Lipton of Maryland Sea Grant.

Another seminar, *Is There An Oyster in Our Future*, focused on the region's oyster industry. Speakers for this program included those who have worked with the Asian species, Crassostrea ariakensis, and they discussed field trial results in a Virginia pilot project, as well as industry and resource management positions regarding the potential problems and benefits of bringing in a new oyster species. This may be a hot regional topic for some time to come.

A second oyster program titled the *Oyster Aquaculture Project* highlighted the Chesapeake Bay Foundation's project testing aquaculture techniques for potential use in commercial operations. "My wife and I came to the show to learn about oyster gardening and I wanted to pick some gear and information on new crab regulations. This is a good one-stop-shop weekend getaway for us," said Butch Holgren a commercial waterman from Virginia.

There was also a presentation on the new *Virginia and North Carolina Fishery Resource Grants Program*, which includes funding for innovative aquaculture and commercial fisheries ideas among private enterprise.

"This is an exciting outreach program for Sea Grant focusing on the commercial fishing sector. So far we have sponsored over 30 innovative projects through the program, and we look forward to future proposals," said Murray.

Additional programs offered to the public included *Financial Management in Growing A Business,* which covered proper business finance, which is crucial to any fisheries endeavor. *Problems and Pitfalls in Starting A Business* covered tips on success and failure in aquaculture business. This seminar included ideas on how to buy and transport fish, design and operate your system, and keep you in the black as you develop a business in raising and selling fish. The program *Putting Pieces Together - How Your System Works* was a presentation on buying and/or building a recirculating system. Topics included an overview of required components, how they work, and their importance to life support and survival of the fish. The program titled *Keeping Fish Safe: Fish Health Management for A Successful Business* featured fish health experts who talked about biosecurity, and keeping your system and fish free of disease.

*What's Hot? New Species to Watch* gave listeners the latest technology and species information in order to stay ahead of the competition and meet the demands of a growing domestic and international market. Specialists covered yellow perch, bluegill, cobia, flounder, and several other species that are currently being tested for market and technology viability. "I attended this program since as a commercial waterman, I wanted to know what fish have been in demand and what the competition is. I learned quite a bit and now realize that even farmed raised fish have their market problems as well," said Vernon Jones of Accomack County, Virginia.

Another popular offering each year is the Junior Watermen's Program, which provides a variety of "hands on" activities. The most visited attractions: those that allowed kids and their families to interact on such things as using traditional oyster tongs, making crab pots, and casting fishing rods. A pile of squealing kids could always be found around the live touch tank, which held a variety of critters, including blue crabs, horseshoe crabs, and terrapins. Another fun activity was the Duck Calling Competition, which gave young waterfowlers a chance to compete in duck and goose calling skills – a part of the area's cultural heritage and identity.

The 28th annual Commercial Fishermen's and Aquaculture Trade Expo once again proved a great success. "This show offers both commercial fishermen and aquaculture practitioners the opportunity to get together and see applied technology products firsthand and talk directly to the manufacturers. It also gives them the opportunity to learn about industry challenges and concerns from

## Kids & Parents... Learning Together

In addition to keeping fishermen and other marine trades people up-to-date about the latest technology and equipment innovations, the annual fishermen's expo reaps many other, more subtle benefits according to Betty Duty, who has managed the show for the past 22 years. Watermen use the event to reconnect with their peers, and in many cases, it's the only time they get to do so throughout the year. They also get away for the weekend with their families – a rare commodity considering the long days and weeks they typically spend on the water.

It is this family phenomenon that prompted Sea Grant educators in Maryland and Virginia to put together a program that would be both fun and educational for children and spouses who tag along. A large room near the seminars upstairs is transformed into a colorful assemblage of activity stations that blend history, art, and science.

"The kids program was a success from the beginning!" notes Betty Duty, adding, "We have no behavior problems. The kids are totally involved."

She is quick to share other observations, pointing out that adults often stay with the children and learn along with them. Perhaps it is the fun and casual setting they like. Grown-ups find it less intimidating to sneak a peek under a microscope or guess the answer to a seafood safety question at their child's side.

"I've heard from many parents how good it was to learn with their kids. And the kids love the incentives, like the t-shirts. They get to learn while they earn," she gleams.

If the young smiling faces and bags of goodies leaving the building are any indication, she is absolutely right.

the professionals of various Sea Grant state extension programs," said Bob Fisher of VIMS. These open gatherings of seafood suppliers and producers, whether representing wild resources or cultured, are few and far between. It proves the groups share common ground in trying to produce quality products in the most efficient manner they can.

# New Publications

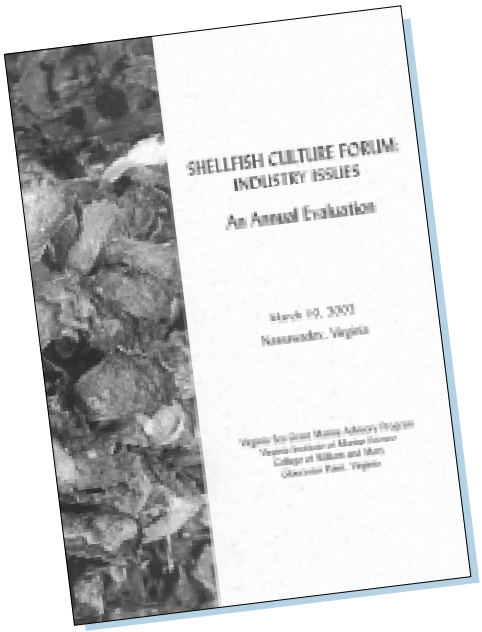
*Catch and Release in Marine Recreational Fisheries: Symposium Proceedings*

Catch and release fishing has a long history in freshwater fisheries management, but it is still evolving as an effective tool to significantly enhance marine recreational fisheries. In part due to the relatively short history of strict marine angling regulations, a conservation ethic based upon catch and release is still far from being consistently practiced across the marine angling community. Hindering wide acceptance of the practice by recreational anglers is the reality of heavy commercial fishing pressure on most species targeted. This raises concerns about the potential gains made from catch and release fishing, whether practiced on a regulatory or voluntary basis.

Addressing the rapidly changing issues of marine catch and release fishing, the proceedings of the *National Symposium on Catch and Release in Marine Recreational Fisheries* (J. Lucy and A. Studholme, editors), will be published this summer. The publication includes the majority of presentations discussed by 130 participants at the December 1999 meeting hosted in Virginia Beach by the Virginia Sea Grant Marine Advisory Program at VIMS. That meeting was a cooperative project of Sea Grant Marine Advisory/Extension Programs from Virginia, New York, North Carolina, Georgia, and California. Other sponsors included federal/state fisheries agencies, recreational fisheries conservation groups, and the fishing tackle industry.

Overview presentations reveal the complexity of accurately defining the many aspects of catch and release in the marine fishing world. Peer-reviewed research papers address growing efforts to measure and assess release mortality in today's saltwater recreational fisheries. Full-length papers, complimented by 20 condensed summaries of speaker and poster presentations, examine how catch and release currently factors into marine fisheries management - for both the fish and the anglers pursuing them. Release mortality research, including circle hook evaluation, is presented for a wide range of species: striped bass, red drum, speckled trout, flounder, Chinook salmon, tuna, and billfish among them. Sub-lethal stress problems associated with catching, handling, and releasing fish, as well as fish tagging concerns, are addressed. Equally important, differences in human behavior and cultural preferences related to catch and release among diverse segments of the marine angling community are discussed.

A hardcover publication (350 estimated pages), the book will be available by mid-late summer through the American Fisheries Society's (AFS) Publication Office. Advance orders will be accepted, both through the AFS web site (www.fisheries.org/Publications.shtml), and by telephone (678/366-1411; fax 770/442-9742). Costs are $50 per copy (list price) or $35 per copy for AFS members.




A new publication, "Shellfish Culture Forum: Industry Issues," is available from Virginia Sea Grant. The report encapsulates the discussion that occurred among shellfish growers during a meeting in March 2002. Among the many topics highlighted are: the cultivated clam pilot crop insurance program, user conflicts occurring in Eastern Shore tributaries, SAV grow-out areas, diseases, and regulations affecting shellfish culture.

Contact Angie Gardner at (804) 684-7170, or by e-mail to agardner@vims.edu, to request a copy.

## More on the subject of environment-based education:

While the publications listed here are not brand new, they offer a good starting point for learning about environment-based education. Both reports are available on-line:

- *Using Environment-based Education to Advance Learning Skills and Character Development.* Washington, D.C.: The North American Association for Environmental Education and The National Environmental Education & Training Foundation, 2001.
  Go to: www.neetf.org/Education/index.shtm.

The premise behind environment-based education is straightforward: use the environment more broadly as a *learning tool*. This type of education emphasizes interdisciplinary integration of subject matter and team teaching, among other things. According to this report, "Environment-based education's emphasis on higher-order thinking has already been shown to increase academic achievement in reading, math, science, and social studies. Its focus on the immediate environment and the local community makes learning relevant, interesting, and compelling. When learners are engaged, both achievement and discipline improve, thus helping to create safer schools."

- Lieberman, Gerald A. and Linda L. Hoody. *Closing the Achievement Gap, Using the Environment as an Integrating Context for Learning.* Poway: Science Wizards, 1998.
  Go to: www.seer.org/pages/GAP.html.

This report, prepared by the State Education and Environment Roundtable, is the story of the schools, teachers, and students who are involved in implementing EIC programs (using the Environment as an Integrating Context for learning). It presents the results of a nationwide study; describes the major concepts and assumptions underlying EIC; explores a range of successful EIC programs across the United States; identifies the major characteristics of successful EIC programs; and analyzes the implications of EIC-based education for student learning and instruction.

# Announcements

## WELCOME ANGIE!

Virginia Sea Grant welcomes Angie Gardner, Publications Outreach Specialist for the Marine Advisory Program. She will maintain the publication databases for the department and fill information and literature requests.

Angie recently moved from Canton, Ohio to Hayes, Virginia, where her husband accepted a new job. She looks forward to exploring the many creeks and bays near her new home with a fishing pole in hand.

## CONGRATULATIONS

to Ph.D. student, Todd Gedamke, who received the *Thurlow C. Nelson Award* at the 2001 National Shellfisheries Association annual meeting in Mystic, Connecticut. The Nelson Award is given to a graduate student of research for the outstanding oral presentation representing a distinctive and valuable contribution to shellfisheries science. The presentation, "Integrating Vessel Tracking, Catch Data and Depletion Models to Estimate Commercial Scallop Dredge Efficiency," was authored by Todd Gedamke and Dr. William DuPaul, who leads the Advisory Service Program at VIMS.

## SHADFEST DRAWS A CROWD

River enthusiasts of all ages joined the Mattaponi & Pamunkey Rivers Association in May for the first-ever "ShadFest," held at the Pamunkey Indian Reservation. Educational and artistic exhibits brought attention to the importance of all anadromous fish to coastal river systems. An overview of ongoing state restoration programs and trends in shad landings was given by Dr. John Olney of VIMS. Virginia Sea Grant participated as a partner in this community initiative.

Throughout the day, visitors were treated to tours of the Pamunkey fish hatchery, canoe rides, fly-fishing demonstrations, and other attractions. The event culminated with a colorful parade of shad-costumed kids making their way from the museum to the boat ramp. At the water's edge, children named their adopted fingerlings (raised in the hatchery) and watched as Assistant Chief Warren Cook released them into the river.

# WE NEED YOUR HELP!

## The Good...

Between 5,000 and 10,000 sea turtles enter the Chesapeake Bay each spring/summer when sea temperatures rise. The majority are either juvenile loggerhead or Kemp's ridley sea turtles using the Bay seasonally as a feeding ground, but green, leatherback, and hawksbill sea turtles are also found within Virginia waters. All are protected under the Endangered Species Act.

Since 1979, the Institute has served as the Commonwealth's center for the monitoring, study, and conservation of endangered and threatened sea turtles within state waters. Approximately 250 to 350 sea turtles strand here each year, most of them juveniles. Stranding activity peaks in May and June, and again in October when the turtles leave the Bay to travel south. At the stranding center, sick or injured sea turtles are treated and rehabilitated before release back into the wild.

If you find a live or dead sea turtle, please call one of these numbers:

- (804) 684-7313 – Turtles found between the James River and the Maryland line; or
- (757) 437-6159 – Turtles found on the Eastern Shore or south of the James River.

## the Bad, and the Ugly.

The Virginia Institute of Marine Science (VIMS) continues to offer a bounty on rapa whelks collected in Chesapeake waters at a rate of $5 per LIVE animal. Whelks must be alive at the time that they are given to VIMS personnel. A bounty of $2 will be paid for each dead rapa whelk or empty rapa whelk shell. The VIMS rapa whelk bounty program is an effective method for VIMS scientists to estimate the abundance of this animal and map its distribution in local waters. Please visit the VIMS rapa whelk web site (http://www.vims.edu/mollusc/research/merapven.htm) to learn more about rapa whelk research at VIMS.

If you think that you have found a rapa whelk, please call the VIMS Rapa Whelk Reporting Line at (804) 684-7361. Please be sure to leave a contact name and phone number so that we can return your call. If at all possible, please keep the animal ALIVE in seawater. A VIMS staff member will return your call and arrange to pick the whelk(s) up from you at your convenience.

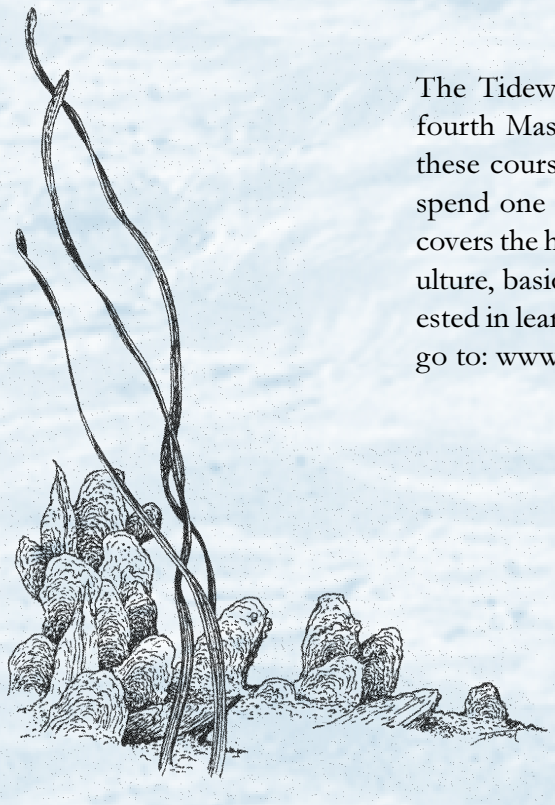
TEACHERS,
TAKE NOTE:

Aquaculture in the Classroom

July 17-19, 2002
The Hotel Roanoke & Conference Center
Roanoke, Virginia

This workshop is specifically designed for middle and high school agriculture and science teachers who wish to use recirculating aquaculture technology as a science-based approach to interdisciplinary studies. The course demonstrates how teachers can integrate fishery biology, chemistry, engineering, horticulture, microbiology, and veterinary medicine into a recirculating aquaculture curriculum. All workshop instructors are recognized experts in their respective scientific disciplines.

For more information, go to: www.conted.vt.edu/aquateach.htm, or contact Dr. George Flick at (540) 231-6965.



The Tidewater Oyster Gardeners Association (TOGA) announces its fourth Master Oyster Gardeners class, to be held in late June. During these courses, students meet for full days of class and lab sessions and spend one day working in the oyster hatchery on campus. Class work covers the history of the oyster fishery in Virginia, worldwide oyster aquaculture, basic oyster biology, shellfish diseases, and more. If you are interested in learning more about TOGA or would like to attend a future class, go to: www.oystergardener.org.

A Request for Proposals has been issued for the Virginia Fishery Resource Grant Program. Proposal applications are due no later than July 15, 2002 for project implementation in the fall. For more information or to request an application form, contact Dianne Roberts at (804) 684-7173.

## Your Attention, Please,

The *Virginia Marine Resource Bulletin* is about to get a facelift! The next issue will mark the beginning of a new direction in both format and delivery. Magazine coverage will shift to a topical arrangement of stories – enabling us to focus on more timely events and research applications. In addition, many of you will have the option of converting your subscription to an electronic document. By choosing to read the *Bulletin* online, you will help us cut production costs as well as paper flowing into Virginia's waste stream.

If you wish to continue your subscription in paper form, simply do nothing. If, however, you'd prefer to read the *Bulletin* online, send an e-mail to our subscription department to: agardner@vims.edu. Be sure to provide your mailing address as it now appears on the back of the magazine. We will notify you when new issues – and other Virginia Sea Grant publications – are posted on our web site.

There will be a short break in *Bulletin* coverage as our staff gear up for these changes. In the meantime, you will find all back issues of the magazine online through the library at VIMS. Simply go to: www.vims.edu/GreyLit/SeaGrant.html.

Thank you for your continued interest and support,
Sally Mills, Editor

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