

The Crest

Current Issues in Coastal Ocean and Estuarine Science

VIMS Dedicates Kauffman Aquaculture Center

VIMS dedicated its new Kauffman Aquaculture Center in a ceremony at the Topping, Virginia facility in April. Guests of honor included NOAA Chief Administrator Conrad Lautenbacher, Virginia Secretary of Natural Resources W. Tayloe Murphy, Jr., and Susan Magill, Rector of William and Mary.

The Kauffman Aquaculture Center (KAC) was specifically designed to

enhance and extend the work and facilities of VIMS Aquaculture Genetics and Breeding Technology Center (ABC). The General Assembly established ABC in 1995 to explore and promote the development of aquaculture in the Commonwealth.

The Kauffman Center lies 30 miles north of Gloucester Point on a tributary of the Rappahannock River

known as Locklies Creek. Construction of the \$1.4 million Center was funded through a challenge grant by Boots and Jack Kauffman, with matching grants provided by Mr. Matthew T.

Blackwood; the D. Keith Campbell Foundation for the Environment, Inc.; Mr. and Mrs. Weston F. Conley, Jr. and Family; Dominion; the Elis Olsson Memorial Foundation; Mr. and Mrs. E. Claiborne Robins, Jr.; Mr. and Mrs. James E. Rogers; and the Smurfit-Stone Container Corporation.

ABC Director Dr. Stan Allen notes that "the Kauffman Center significantly expands the scope of aquaculture research at VIMS by providing a facility that was specifically designed to hold both native and non-native species in quarantine." Initial use of the facility will focus on studies of the



Kauffman Aquaculture Center in Topping, VA

Report Bolsters VIMS Agenda

Close parallels between VIMS programs and recommendations in the recent U.S. Ocean Commission report confirm the Institute's bearings

A long-anticipated report on national ocean policy calls for a shift in research emphasis toward fields of study long championed by VIMS scientists, including ecosystem-based management, ocean-observing systems, biodiversity studies, and whole-watershed approaches to coastal decision-making.

Other recommendations in the report bolster VIMS' long-standing mandate to provide policymakers and the public with unbiased scientific information, and support the Institute's on-going efforts to build collaborations with other marine science institutions.

"We were gratified to see the similarities between the commissioners' recommendations and our own programs," says VIMS Dean and Director Don Wright. "We were also pleased with the Commission's call to bring funding for marine research to the level it deserves."

The report notes that coastal watershed counties generate five trillion dollars in economic activity each year, one half the U.S. gross domestic product. It estimates that an annual investment of \$3.2 billion is needed to

help stave off the threats posed by continued degradation of ocean and coastal environments, and recommends payment through a trust fund composed of federal revenues from oil and gas development. Federal oil and gas revenues total approximately \$5 billion annually.

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native oyster *Crassostrea virginica* and the non-native oyster *C. ariakensis*.

The facility features four separate laboratories that were each purpose-built to protect Chesapeake Bay and its living resources from disease, parasites, and the unintentional introduction of non-natives:

Oyster Isolation Laboratory—This room is designed to hold recently

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*Kauffman Center**continued from page 1*

imported non-native species in quarantine from the rest of the facility and the external environment. Quarantine is maintained through use of a re-circulating seawater system whose effluent is subjected to temperatures high enough to kill any living contaminants. The room also operates at air pressures lower than its surroundings to prevent the unlikely release of any airborne pathogens, and is underlain by an impermeable membrane to prevent discharges to groundwater. Leak detectors further minimize the possibility of any groundwater leakage. This room can be entered and exited only through a decontamination area. This lab is named in recognition of a gift

from the Keith Campbell Foundation for the Environment.

Health Certification and Reproductive Containment Laboratory—This room is designed to further minimize disease concerns and to prevent spawn from any experimental oysters from entering the Bay. Residence in this room is restricted to second-generation oysters, a constraint that prevents the propagation of any disease or parasites that might be present in imported oysters. These second-generation oysters are certified disease-free according to protocols set forth in the Aquatic Animal Health Code, a set of internationally agreed standards established by the Office International des Epizooties. OIE is the official arbiter of the World Trade Organization for living animal products, including wild or aquacultured marine animals (VIMS is an OIE reference lab). Effluent from this room's re-circulating seawater system is treated with ozone to kill any spawn it may contain. This lab is named in recognition of a gift from the Weston Conley, Jr. Family.

Natives Laboratory—This "reverse quarantine" room is designed to keep native oysters from being exposed to MSX and Dermo, two diseases that have devastated wild oyster populations in Chesapeake Bay. Maintenance of disease-free specimens of the native oyster *C. virginica* is important in light of on-going breeding and restoration efforts for this species. Isolation is accomplished using a flow-through seawater system equipped with high-efficiency filters. This lab is named in recognition of a gift from the Smurfit-Stone Container Corporation.

Operations and Analysis Laboratory—This lab will be the "nerve center" for the facility. It will hold equipment for monitoring water quality in the seawater systems on the main floor and for assessing the condition of animals held in quarantine. Digital connections to sensors elsewhere in the facility will allow the Center manager to monitor many systems remotely. Because almost all tanks in the Center are "closed" systems that use re-circulating seawater, it is important to monitor their metabolite levels, which indicate the health of the biological filters. This lab is designed for future addition of cryopreservation capabilities, which will allow for long-term storage of frozen sperm for breeding purposes. The lab is named in recognition of a gift from Dominion Corporation.

The remainder of the building is devoted to equipment for algal culture (to produce the algae that are needed to feed oysters in a re-circulating seawater system), mechanical systems, and a small lobby area with educational displays describing the Center's work.

Public access to the working parts of the facility will be limited due to biosecurity concerns.

Allen predicts that the Center's unique design and capabilities will within five years make it a worldwide magnet for investigators seeking to explore and exploit new genetic resources for shellfish. Says Allen, "The Center will serve as a resource for conserving rare genetic material, in the form of live animals and their genes, and provide genetic resources for creating a new kind of aquaculture



VIMS researcher Dr. Mark Luckenbach (with oyster) discusses the merits of the Kauffman Aquaculture Center with (from L) Virginia Secretary of Natural Resources W. Tayloe Murphy, Jr., VIMS Dean and Director Dr. Don Wright, Mr. Jack Kauffman (for whom the facility is named), and Vice Admiral Conrad C. Lautenbacher, Jr., Chief Administrator of the National Oceanic and Atmospheric Administration.

industry for Chesapeake Bay. It will also aid efforts to repopulate the Bay with oysters."

VIMS began construction of the Kauffman Aquaculture Center in May 2002. Architectural services were provided by Gregory Brezinski of A2RCI Architects in Yorktown. The structure was built by Dobson Construction of Newport News.

Isabel Recovery in Full Swing

Like many of its neighbors, VIMS is still working to restore, replace, and rebuild areas hit by Hurricane Isabel in September. The storm destroyed all three of VIMS' research piers, claimed 18,000 sq ft of workspace, and displaced 34 scientific and support personnel.

"We've made a great deal of progress this spring," says VIMS Director of Facilities Management Joe Martinez. "The finfish aquaculture building, submerged aquatic vegetation greenhouse, and sea turtle greenhouse are all operational. The seawater distribution system, required for research support, is back up and running as well."

"The Teaching Marsh and Maritime Forest were open again for the public in May, just in time for Marine Science Day and public tours," adds Public Relations Coordinator Susan Maples. "We owe great thanks to CCRM [Center for Coastal Research and Management] staff for their efforts to re-

plant the vegetation that was lost to the storm and to re-landscape the area."

Reconstruction of VIMS' new piers will be completed by the end of June. Replacement windows for Chesapeake Bay Hall are scheduled to be installed by mid-July.

"While some buildings are still waiting to be repaired, most of the reconstruction needed for continued research has been completed," says Martinez.



Construction crews have been using a barge-mounted crane to help rebuild the VIMS Ferry Pier, which was destroyed by Hurricane Isabel on September 18, 2003.

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Mann Urges Congress to Enact Ballast Water Standard

Dr. Roger Mann, Acting Director for Research and Advisory Services at VIMS, testified before the U.S House of Representatives in March concerning newly proposed international standards for managing invasive species in the ballast water of seagoing vessels.

Mann contended in testimony before the subcommittees on Coast Guard and Maritime Transport and Water Resources and Environment that the proposed International Maritime Organization (IMO) standards don't go far enough toward keeping non-native marine species out of Chesapeake Bay and other U.S. waters.

Mann argues for a standard that would require incoming

ships to kill 100% of ballast-water organisms larger than 50 microns. A micron is one millionth of a meter. A typical human hair is about 100 microns across.

"A 50-micron standard is sufficiently small to control all the life stages of most marine macro-organ-



Photo courtesy freefoto.com.

The ballast water needed by large vessels to provide stability when unladen poses a serious ecological threat when released.

isms, including eggs and larvae," says Mann. He contends that this standard could be met through existing technologies.

Most importantly, says Mann, quick adoption of a clear and quantifiable standard would jump start efforts to refine and develop technologies for improving ballast-water treatment.

Mann says that existing technologies could readily provide treatment that is more effective than traditional practices such as mid-ocean exchange, but that they are being kept from the marketplace by the lack of a consistent standard. Potential treatments include deoxygenation, filtration, heating, and dosing with ultraviolet light.

"We need to establish a clear standard so that entrepreneurs can move forward with research and development of methods to treat ballast water," says Mann. "The lack of a consistent, quantifiable standard keeps shipping interests and venture capitalists from investing in existing or new equipment due to concerns that a future standard may render it obsolete."

The proposed IMO standards would limit the population of organisms larger than 50 microns to about 10 organisms per cubic meter of water. Populations of organisms between 10 and 50 microns would be reduced to 10 per milliliter.

The IMO regulations, which would not take full effect until 2016, would allow vessels to meet these standards by exchanging their ballast tanks in mid-ocean. Current IMO guidelines encourage this practice but have no provisions for enforcement.

Mid-ocean exchange of ballast water is the traditional method used to help keep aquatic stowaways from invading foreign ports, but recent studies question its effectiveness.

Chesapeake Bay is the largest single recipient of ballast water on the East Coast. Norfolk alone receives more than 9,000,000 metric tons of ballast water per year, from 48 foreign ports. Release of ballast water and other human activities have introduced more than 160 non-native organisms to the Bay, including the Rapa whelk, the zebra mussel, and the Japanese shore crab.

Mann is an internationally recognized expert on non-native aquatic species and has provided advice on invasive-species issues at all levels of government. He has been studying the Rapa whelk since it first appeared in Chesapeake Bay in 1998.

The House requested Mann's testimony in light of its re-authorization of the 1996 National Invasive Species Act (NISA), which like the current IMO guidelines encourages mid-ocean exchange or equivalent measures on a voluntary basis. The Coast Guard, which is charged with monitoring the voluntary program, recently conducted a survey that showed the voluntary program is not accomplishing the objectives of NISA and should be made mandatory.

Mann admits that current technologies do not guarantee the exclusion of smaller phytoplankton and toxic dinoflagellates that cause red tides. But, he says, "We shouldn't be handcuffed by the search for ultimate control tools while good, although perhaps not perfect, technology is within grasp to address the ecological problem at hand."

For more information on the IMO's Global Ballast Water Management Programme, visit <http://globallast.imo.org>

—by Cory Staryk and David Malmquist

Graves Receives Faculty Award

VIMS Professor Dr. John Graves has received the state's highest honor for professors. Graves was one of 11 statewide recipients of the 2004 TIAA-CREF Outstanding Faculty Award presented by the Commonwealth of Virginia.

Also receiving the honor was Professor Chi-Kwong Li of William and Mary's mathematics department. William and Mary is the only college or university in the state to have two faculty members recognized. The General Assembly and governor created the award in 1986. Winners must demonstrate a record of "superior accomplishments in teaching, research, and public service."

Graves and Li were honored January 21 during a ceremony in Richmond and a luncheon at Gov. Mark Warner's Executive Mansion. The recipients receive a specially designed plaque and a \$4,000 award.

"Our faculty members are truly the heart and soul of the College and their commitment to academic excellence is what makes William and Mary a unique educational experience for all our students," said William and Mary Provost P. Geoffrey Feiss. "Through their tireless efforts in all aspects of higher education, John Graves and Chi-Kwong Li have both gained the ultimate respect from their colleagues and students. William and Mary is extremely proud to have them represent the College in such a prestigious honor."

Graves came to VIMS in 1990. He serves as both a professor of marine science and chair of VIMS' Department of Fisheries Science.

An internationally recognized leader and scholar in the field of fisheries genetics and marine science, Graves has received more than \$3 million in research grants or contracts, published research findings in major scientific journals, and made presentations on his research around the world.

Since 1995, Graves has also served as chair of the U.S. Advisory Committee to the International Commission for the Conservation of Atlantic Tunas. Over the past eight years, Graves has helped the commission establish historic rebuilding plans for



Governor Mark Warner (R) presents Dr. John Graves with the SCHEV outstanding faculty award while State Senator H. Russell Potts (far L) and SCHEV Chairman Dr. Carl N. Kelly look on.

stocks of western Atlantic bluefin tuna, North Atlantic swordfish, and blue and white marlin.

Graves' students compliment him for his challenging courses and dedication to their own professional development. In addition to his work at VIMS, Graves has developed a series of courses in marine science for high school teachers and has also volunteered several times to teach an introductory biology course, "Principles of Biology: Organisms, Ecology & Evolution," to undergraduates at the College's main campus.

"My courses are rigorous, but I try to make them fun," Graves said. "I put a great deal of effort into teaching, and I expect as much back from my students. I believe that learning is a very personal process and that the role of an instructor is to inspire students to learn."

Graves earned his bachelor's degree in biology from Revelle College at the University of California, San Diego in 1975. He earned his Ph.D. in marine biology from Scripps Institution of Oceanography at the University of California, San Diego in 1981.

VIMS Study Provides Foundation for UN Report

A study by VIMS Professor Dr. Robert Diaz on the causes and consequences of marine "dead zones" forms the basis for a key chapter in the 2003 Global Environment Outlook (GEO) Year Book. The Year Book is an annual review of environmental milestones by the United Nations Environment Programme (UNEP).

The 2003 GEO Year Book identifies the continued 'fertilization' of the ocean and consequent growth of oxygen-starved "dead zones" as a key emerging issue that governments must urgently address.

UNEP issued the 2003 edition of the Year Book during the 8th Special Session of the Governing Council and Global Ministerial Environment Forum, which met in Jeju, Korea in March.

Diaz is a world-renowned expert on nutrient pollution and the effects of low oxygen levels on bottom-dwelling

organisms. In 1995, he wrote a seminal article on the topic in *Oceanography & Marine Biology Annual Review*. The chapter in the 2003 GEO Year Book draws heavily on the findings of a more recent Diaz paper on dead zones, which will be published later this year in an Environmental Protection Agency report. VIMS graduate student Janet Nestlerode also contributed to the EPA report.

Dead zones occur when and where pollution by excess nutrients triggers low oxygen levels, making it difficult or impossible for fish, marine mammals, oysters, and other marine creatures to survive. The economic costs associated with dead zones are unknown, but predicted to be significant on a global scale.

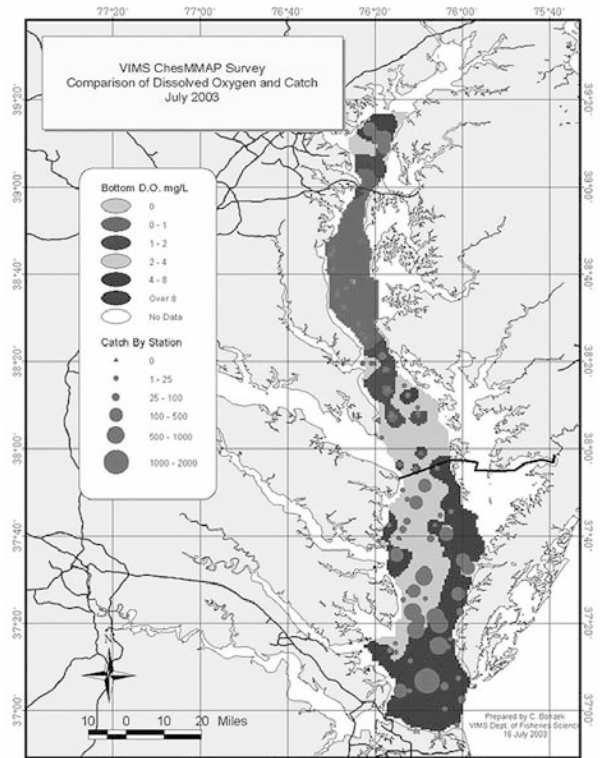
Diaz notes that the number and size of dead zones has doubled every decade since the 1970s, and that about

150 such zones now exist in the world's oceans and seas. They range in size from a few hundred acres to more than 25,000 square miles, about the size of West Virginia. A dead zone that developed in the Chesapeake Bay during July 2003 covered about 250 square miles. Some of the earliest recorded dead zones were in Chesapeake Bay. The most well known dead zone is in the Gulf of Mexico. Its occurrence is linked to nitrogen fertilizers brought to the Gulf by the Mississippi River.

Diaz argues that dead zones are fast becoming a bigger threat to fish stocks than over-fishing, a conclusion that the GEO report echoes. He and other experts also warn that global warming, with its likely increase in rainfall, may aggravate the problem. Diaz cites a modeling study showing that a doubling of carbon dioxide would double rainfall across the central US, increasing discharge from the Mississippi River by 20%. The model predicts that increased nutrient inputs from a stronger Mississippi would

decrease dissolved oxygen levels in the northern Gulf of Mexico by 30-60%.

The GEO Year Book project was initiated in response to the requirements of the UN's Agenda 21 on sustainable development and to a 1995 UNEP Governing Council decision.



Data from VIMS' ChesMMAP survey illustrate the large dead zone (upper dark area) that developed in Chesapeake Bay in the late summer of 2003.

Businesses in Marine Trades Willing to Pay for Training

A recent VIMS survey shows that marine businesses in the Mid-Atlantic states are ready to support a regional training and certification program for their employees.

Seventy-three percent of marine businesses in the region believe industry certification of workers is necessary, and 51% say the need for basic vocational training is just as important, according to the survey of 300 marine firms from North Carolina to New Jersey.

The certification training most in demand is for outboard and diesel mechanics, followed by fiberglass and electrical technicians, according to Thomas J. Murray, marine business specialist at VIMS.

"Just about everybody seems to agree there is a need for certification for existing employees," Murray says. "It standardizes what the consumers get." The survey results also show broad interest in ongoing vocational training, though consensus here is weaker, he says.

Some 320 marine businesses in the Chesapeake Bay region of Virginia, North Carolina, Maryland, and Virginia responded to the survey. Those businesses included 211 boatyards and marinas, 131 marine service and support companies, 102 boat and motor dealerships, 70 boat brokerages, and 27 boat and equipment manufacturers.

Altogether, the companies employ 5,765 full-time and 1,142 part-time workers.

The businesses reported 470 workforce vacancies last January and February when the surveys were taken, underscoring that in the Chesapeake as elsewhere, trained marine tradesmen are in short supply.

"Without an adequate pool of qualified employees, the industry cannot continue to grow and the entire coastal economy will suffer," Murray says in a report covering the survey results.

The survey was undertaken through the Northern Neck Planning District Commission, with grants from the U.S. Department of Agriculture and the Virginia Department of Community Development.

Murray says the commission is working on a strategy to train and certify more marine workers and encourage more marine business in the Tidewater region. It plans to develop a regional training program on Virginia's Northern Neck. The program would target its training at businesses in North Carolina, Virginia, Maryland, and New Jersey. Murray says Gov. Mark Warner also has identified the marine industry, along with health care, for future development.

—by Jim Flannery (This article was excerpted from the May 2004 edition of "Soundings: Trade Only.")

Assembly Names Library for Hargis

Virginia Governor Mark Warner signed a bill designating the VIMS library the William Jennings Hargis, Jr. Library in an April ceremony at the Capitol. The bill was introduced by Delegate Harvey B. Morgan (R-98th District).

Dr. Hargis led VIMS for 22 years, a period longer than any other director, and one marked by the greatest growth in staff, budget, and facilities. Hargis received the Virginia Life Achievement in Science award in 2003, and VIMS' Lifetime Achievement award this year.



From L daughter Susan Hargis King, Dr. Hargis and his wife Marcia, Governor Warner, Delegate Morgan, and VIMS Dean and Director Don Wright. For more on Dr. Hargis' Lifetime Achievement award, visit www.vims.edu/topstories

Researchers Link Beach Erosion to Ice Age Channels

If Outer Banks beachgoers give any thought to ice, it's probably a wish to have more in their coolers. But a new study by VIMS researchers shows that ice plays a much greater role on the Outer Banks than just a means to beat the heat.

The study, conducted by VIMS marine geologist Dr. Jesse McNinch and graduate students Grace Browder and Jennifer Miselis, indicates that Outer Banks beaches likely owe their very shape and behavior to now-buried river channels that formed during the last Ice Age.

Browder presented the team's findings during a recent meeting of the Geological Society of America.

The research extends an earlier VIMS study of Outer Banks beaches.

During that study McNinch discovered a transient phenomenon in which short stretches of sandy beach suffer severe erosion during storms, then quickly refill with sand. These "erosional hotspots" are of great interest to the Army Corps of Engineers and other shoreline management agencies, as they can damage seawalls, hinder beach replenishment efforts, and disrupt military maneuvers.

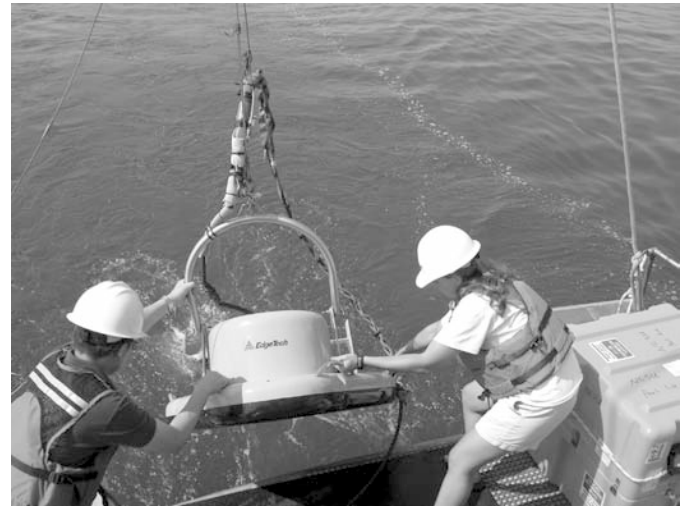
McNinch's current research is to better understand the geologic factors that control hotspot formation. It's based on his previous discovery that hotspots are commonly associated with bends in the offshore sand bars that normally parallel Outer Banks beaches. During storms, these bends act like open gates that allow large

waves to pound and quickly erode the shore.

The new research helps explain what causes the bends. Using side-scan sonar, (which uses "acoustic shadows" cast by seafloor objects to map the sea bottom), McNinch and his team discovered that the bends typically occur near where gravel patches interrupt the otherwise sandy seafloor. They then used a high-resolution "chirp" sonar system to "see" beneath the seafloor—and found that the gravel continues beneath the surface in the shape of a stream channel.

The researchers hypothesize that the channels formed during the last Ice Age, when sea level was lower and streams coursed across what is now beach and shallow sea floor. As the ice sheets melted and sea level rose, the gravel-filled channels were buried beneath a thin layer of beach sand.

The team's next challenge is to understand how a buried stream



Dr. Jesse McNinch (L) and graduate student Grace Browder deploy a "chirp" sonar device to map the geology underlying the Outer Banks seafloor.

channel can affect the behavior of overlying sediments and sand bars. "One idea," says McNinch, "is that groundwater follows these buried channels, and is somehow affecting the behavior or characteristics of the sediments."

Funding for the work is provided by the three-year grant from the Army Research Office. The study area stretches along the barrier-island beaches of southern Virginia and northern North Carolina.

Heritage Tourism Workshop Draws Local Businesses

VIMS' Virginia Sea Grant program, the Virginia Foundation for the Humanities, and the Eastern Shore Chamber of Commerce held a workshop on April 29th in Wachapreague to help Eastern Shore businesses identify and capitalize on marketing the region's unique cultural heritage. More than 35 people attended the "Heritage Tourism Marketing" program, representing various travel-related businesses such as motels, restaurants, B&B's, campgrounds, kayak outfitters and eco-tour guides, and real estate agencies.

The informal program was designed to educate owners and employees of the hospitality and travel service sectors about the marketing opportunities associated with maritime traditions.

Speakers included experts in Eastern Shore maritime history, architecture, commercial fishing, farming practices, and cultural heritage.

"This was a good opportunity for tourism-related businesses to learn first-hand about the region's distinct heritage and become aware of the growing interest in heritage travel. A business with better-informed employees always becomes a better business," said program sponsor Dr. Bill DuPaul, who heads the Sea Grant Marine Advisory Program at VIMS.

Workshop evaluations from participants were excellent, and all attendees expressed interest in future programs of this nature.

—by *Charlie Petrocci*

Recovered Tag Provides Data Windfall

A pop-up satellite tag attached to a white marlin off Venezuela in Fall 2003 by a VIMS research team was retrieved in Aruba by a beachcomber in late March.

"It's pretty amazing when someone actually finds one of these tags, considering all they go through" says David Kerstetter, who conducts the tagging research along with advisor Dr. John Graves and fellow graduate student Andrij Horodysky.

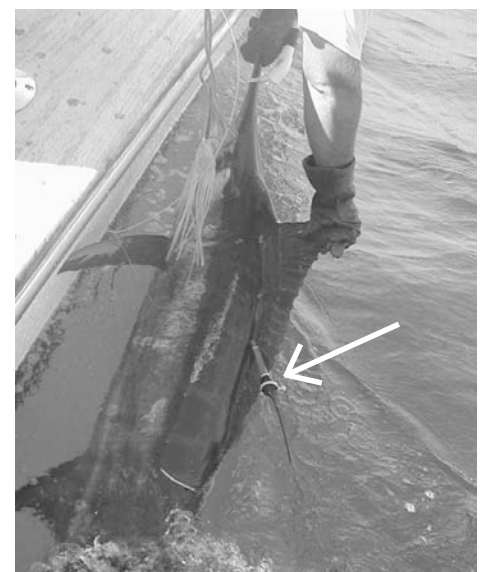
The tags log the habitat preferences of white marlin and their rate of survival following release by anglers. They gather behavioral and geographic information for days to months at a time, then automatically release, float to the surface, and transmit the stored data via satellites to scientists on land.

Although these tags represent a significant technological leap, they are not without limitations. One drawback is that satellite data streams typically only transmit about 60% of the information that a tag stores.

The recently recovered tag transmitted only 19% of its more than

9,000 archived data points to the satellites. However, the researchers have successfully downloaded 100% of the data after the tag was returned.

"That's why physically recovering a tag is such a windfall," says Kerstetter. To date, 3 of the 70 tags deployed by Graves' team have been recovered.



A researcher releases a white marlin tagged with a pop-up satellite tag (white arrow).

ATTENTION: High School Biology & Marine Biology Teachers!

A three-day course, "*The Application of Molecular Markers in Marine Science*," will be offered **July 12-14** at the VIMS campus in Gloucester Point. Through lab and classroom activities taught by VIMS faculty, teachers will explore how developments in molecular genetics and bioinformatics have spawned exciting techniques used in marine fisheries science. Topics to be covered include the use of molecular markers for analyses of stock structure, forensic identifications, and screening fish and shellfish for disease organisms.

Emphasis will be on professional development as well as activities that can be transferred to the high school classroom. Topics will correlate with Biology standards and AP Biology content.

Enrollment is limited to 12, and a basic understanding of genetics is required. One graduate credit in marine science will be offered (optional). For more information, contact Susan Haynes at shaynes@vims.edu or Vicki Clark at vclark@vims.edu.

VIMS Celebrates Marine Science Day



Nearly 1,000 people visited Gloucester Point on Saturday, May 22nd to celebrate VIMS' second annual Marine Science Day open house, with hands-on activities, tours, lectures, and demonstrations for people of all ages.

To view a photo gallery of Marine Science Day activities, visit www.vims.edu/topstories



Photos, clockwise from upper right: Dr. Linda Schaffner explains the Chesapeake Bay food web; a young visitor shows off his recycled fish art; graduate student Todd Gedamke helps a trio of young visitors examine the stomach contents of a barndoor skate; Karinna Nunez instructs GPS treasure hunters in the Boat Basin; and graduate student Bill Metcalfe shines light on a seahorse.



VIMS Honors Castagna

VIMS named the hatchery facility at the Eastern Shore Laboratory in honor of the late Emeritus Professor Dr. Michael Castagna during a June 11th ceremony in Wachapreague. The naming coincided with a visit to the Lab by the VIMS council for their quarterly meeting.

The *Castagna Shellfish Research Hatchery* honors Castagna for his 42 years of service to VIMS. Castagna passed away on January 18th, 2004 after a long illness. He is survived by his wife Mary; his daughter Kathy Anderson; sons Michael, Robert, and John; and nine grandchildren.

Castagna began working at VIMS in 1962 when Dr. William J. Hargis hired him to direct the newly established Eastern Shore Lab (ESL).

"That was no small task," says current ESL Director Dr. Mark Luckenbach. "Mike had to begin by literally building the lab. Lacking much of a budget, he and his small staff

actually did most of the construction work themselves."

In the decades that followed, Castagna led the lab to an international reputation for its work in molluscan biology and aquaculture. He is widely credited as a founding father of hard clam aquaculture on the East Coast, an industry now valued at nearly \$100 million.

"Mike made a tremendous contribution in building and running the lab," says Luckenbach. "He unselfishly gave his time, energy, and knowledge to make this field station a valuable resource for VIMS and the College."

Since his retirement in 1992, Castagna remained active in research, outreach, and service to professional societies.

"Mike will be greatly missed by his many colleagues and friends," says Luckenbach. "We trust that bestowing his name on the hatchery will help remind us on a daily basis of his many contributions."



Dr. Mike Castagna

Volunteers Support Blue Crab Bowl

A large group of VIMS faculty, staff, and students volunteered during the 7th Annual Blue Crab Bowl at Old Dominion University on February 28.

"As always, our VIMS and ODU volunteers did a beautiful job preparing for and participating in the 2004 competition," says Marine Education Specialist Susan Haynes. "Their dedication and enthusiasm is what makes this event such a great success."

VIMS volunteers served as moderators, science judges, scorekeepers, timekeepers, and team challenge-question graders.

The Blue Crab Bowl, which is hosted by VIMS/Virginia Sea Grant and ODU's Center for Coastal Physical Oceanography, is one of 24 regional U.S. competitions that lead up to the annual National Ocean Sciences Bowl each spring.

Both the regional and national events are timed competitions for teams of high school students that involve critical thought questions and "rapid recall" responses. Questions

cover the biology, physics, geology, and chemistry of the oceans as well as marine geography, technology, history, and current events.

The winner of this year's Blue Crab Bowl was Thomas Jefferson High School for Science and Technology of Alexandria. Second place honors went to Chesapeake Bay Governor's School, Glenn's Campus, which includes several local students from Gloucester High. The first place team won a day-long research trip aboard ODU's *R/V Fay Slover* and the coach received a Virginia Sea Grant scholarship to attend the 2004 National Marine Educator's Conference. The second place team received a whale-watching trip donated by the Virginia Marine Science Museum.

Blue Crab Bowl winner Thomas Jefferson High competed in the 7th annual National Ocean Sciences Bowl, in Charleston, South Carolina in April, where they made a valiant first-round showing against the eventual champions, Mission San Jose HS (California).

Pair Contribute to *Science* Article on Ocean Fertilization

VIMS researchers Dr. James Bauer and Sasha Tozzi are co-authors of a new article concerning silica's role in the ocean's response to iron enrichment. Sprinkling iron onto the ocean surface has been touted as one way to help curb global warming, based on the idea that this iron "fertilizer" can boost the rate at which marine plants remove carbon dioxide from the atmosphere.

The multi-author article appeared in the April 16th issue of *Science*. The work was part of SOFeX (the Southern Ocean Iron Experiment), one of the largest oceanographic experiments ever mounted. This two-year collaborative effort brought 3 ships, 45 tons of equipment and supplies, and 17 leading U.S. oceanographic institutions to the waters around Antarctica. VIMS researchers Drs. Walker Smith and

Hugh Ducklow and their graduate students were also involved in the project.

Silica is a key element in iron enrichment because marine plants called diatoms use it to build their "shells." Earlier studies have shown that diatoms are the plants that grow fastest when iron is added to polar waters. When the relatively large and heavy diatoms die, they quickly carry the carbon in their tissues to the deep sea, where it may remain for thousands of years and thus play no role in global warming.

Antarctica's Southern Ocean, where the experiment took place, is the most likely site for any future large-scale iron-fertilization projects, as it is the world's largest iron-poor ocean region and outside busy shipping lanes.

The SOFeX researchers wanted to know what would happen if iron was added to the large parts of the Southern Ocean with little silica. They thought the lack of silica might favor blooms of other types of marine plants that don't need the element. Because these kinds of plants are typically smaller and lighter than diatoms, they sink more slowly when they die. This gives other marine organisms a greater opportunity to recycle the carbon in the plants' tissues back into atmospheric carbon dioxide, foiling any promise of a quick-fix to global warming.

To test their ideas, the researchers created one iron patch in a silica-poor area north of Antarctica, and a second in a silica-rich area nearer the continent. They then measured how much of the carbon from the two patches

sank to the ocean depths when the iron-fertilized plankton died or were eaten.

The results were surprising. The researchers had expected that more carbon would descend beneath the southern patch where added iron and native silica supported a dense diatom bloom. Instead, they found that carbon "export" beneath the two patches was elevated to a similar degree.

"Although the northern, silica-poor patch supported fewer diatoms, we also measured significant carbon export there," says Bauer. "Together, these results show that iron truly is one of the key limiting trace nutrients in these waters."

The study was supported by grants from the U.S. National Science Foundation and Department of Energy.

News Briefs

VIMS Bestows 2003 Awards

VIMS recognized its outstanding faculty, staff, and students during the Institute's annual awards ceremony on April 16. For a complete list of the 2003 awards and Dr. Don Wright's remarks recognizing the recipients, visit www.vims.edu/topstories

Schaffner Briefs U.S. Congress

VIMS Professor Dr. Linda Schaffner briefed congressional delegates and staffers on the importance of "essential fish habitat" during a March meeting that was co-sponsored by the Estuarine Research Federation (ERF), the American Fisheries Society (AFS), and the Ecological Society of America (ESA).

Schaffner, who serves as ERF president, discussed how ERF, ASF, and ESA can strengthen the role of science in management and policy decisions.

"The best way to understand the complex issues that affect our ability to manage essential fish habitat is to couple research and monitoring," said Schaffner during her briefing. She called for increased funding to help expand networks of ecological research sites, coastal observing systems, and research reserves. "These are critical investments for the future of fisheries and coastal systems," says Schaffner.

A number of VIMS students and alumni attended the briefing, including Bruce Vogt (Office of Navy Intelli-

gence, Surveillance & Reconnaissance) and Sea Grant fellows Jacques Oliver, Catherine Ware, and Bo Dame.

VIMS Inaugurates Grants.gov

Ms. Jane Lopez, Director of Sponsored Programs, was recognized on behalf of the Institute for being the first federal grant applicant to submit an application package using Grants.gov, a new, comprehensive Web portal that will eventually contain information about finding and applying for all federal grant programs.

Ms. Lopez received a plaque and letter of appreciation after her invited address to a gathering of Grants.gov stakeholders in Washington, DC.

One of the Bush administration's E-Government initiatives, Grants.gov provides the public with an accurate and reliable location to access information on the \$360 billion in annual grant funds available through the 26 federal grant-making agencies.

"It's very exciting that VIMS is a part of such ground-breaking change in the federal grant-application process," says VIMS Dean and Director Don Wright. "It also highlights the enterprise and initiative of our Office of Sponsored Programs staff."

Grants.gov is a collaborative effort involving the departments of Health and Human Services, Agriculture, Commerce, Defense, Education, Homeland Security, Housing and Urban Development, Justice, Labor and Transportation, and the National Science Foundation. The site was

recently named a Showcase of Excellence E-Government winner by the Federal Leadership Council.

Veloza Earns Scholarships

First-year graduate student Adriana Veloza has won scholarships from both Sigma XI and the Hispanic Scholarship Fund (HSF). Veloza will use her \$800 Sigma XI Grants-in-Aid of Research award and her \$2,500 HSF award to support her studies of how zooplankton food quality affects the growth of summer flounder. Veloza is advised by Drs. Kam Tang and Fu Lin Chu. Sigma Xi is an international research society with more than 70,000 members. The Hispanic Scholarship Fund is the nation's leading organization supporting Hispanic higher education.

VIMS Graduate Authors Seafood Cookbook

VIMS alumna Carole Baldwin (*Ph.D.* 1992) has co-authored a new cookbook designed to help professional and home chefs choose seafood that is fished or farmed in an environmentally sustainable manner.

Dr. Baldwin wrote *One Fish, Two Fish, Crawfish, Bluefish* with colleague Julie Mounts. Both are ichthyologists at the Smithsonian's National Museum of Natural History in Washington, DC.

Subtitled *The Sustainable Seafood Cookbook*, the 330-page volume gives advice on how recreational anglers, chefs, and conservationists can

promote sustainable fishery practices while fishing, shopping, or eating out.

The authors write in the introduction that "Creating this book opened our eyes to a whole new world of choices and illuminated our own habits of relying weekly on the same species."

Julia Child, Emeril Lagasse, Alice Waters, and more than 90 other well-known American chefs contributed the book's 150 finfish and shellfish recipes. *One Fish, Two Fish* is only the second cookbook ever published by the Smithsonian Institution.

The book is available through www.westmarine.com and www.boatus.com. The cost is \$35.

Graduate Student Association Awards Mini-grants

The VIMS Graduate Student Association has presented this year's mini-grant awards to Doug DeBerry, Kristin France, Andrij Horodysky, David Kerstetter, Jennifer Miselis, and Frank Parker.

The Mini-Grant program is an annual merit-based competition in which graduate students submit proposals to a panel of faculty and student reviewers at VIMS. A maximum of \$500 is awarded to each recipient, for a total of \$2,500. Funds must be used for research materials that are not ordinarily supplied by the student's department. For more details on the recipients' research, visit www.vims.edu/topstories

VIMS Launches Real-Time Data Buoy

An interdisciplinary team of VIMS researchers and technicians launched a new data buoy into the York River on April 9th. The buoy is now streaming real-time images back to the VIMS web site and sending data updates every 15 minutes.

Funds to deploy the buoy came from Congress through a one-year collaboration between VIMS and the U.S. Coast Guard. One aim of the project is to learn how to better use buoy data, along with computer models, to support search and rescue operations.

On a broader scale, VIMS researchers see the deployment as an initial step toward expanding the Chesapeake Bay Observing System (CBOS) into the lower Bay. CBOS is one part of an array of ocean observing systems springing up along the U.S. coastline. Other local and regional systems include GoMOOS in the Gulf of Maine, SEA-COOS along the Southeast Atlantic coast, TABS in the Gulf of Mexico, and SCCOOS on the West Coast.

“These regional systems are the building blocks of a larger movement to create a national and international ocean observing system,” says VIMS physical oceanographer Dr. John Brubaker, who helps lead the Coast Guard project.

A call to develop a national ocean observing system is one of the main recommendations of the U.S. Ocean Commission’s recent report (see story on p. 1).

Report Bolsters VIMS Agenda continued from page 1

“We agree with the commission that this is a reasonable investment in view of the value generated by ocean and coastal industries,” notes Wright.

The U.S. Commission on Ocean Policy released its report in late April. Issuance of a final report will follow a 90-day review by the 50 governors and other stakeholders. The President is mandated to use the final report as a guide for submitting a new national ocean policy to Congress.

Congress mandated the 16-member commission in the Oceans Act of 2000, with a charge to make recommendations for a “coordinated and comprehensive” national ocean policy. The mandate reflected widespread recognition that ocean issues have changed dramatically in the 35 years since Congress last authorized an ocean report—including the addition of

Brubaker, along with colleagues Carl Friedrichs and Don Wright, has spent the last several years working with technicians Todd Nelson and Ned Burger and graduate students Lorraine Brasseur and Art Trembanis to develop communications and data management subsystems and to implement the sensors that now adorn the 10-foot-tall, solar-powered buoy. Initial funds to purchase and outfit the buoy came from the General Assembly.

The buoy’s data sensors measure wind, air and water temperature, salinity, pH, chlorophyll levels, and dissolved oxygen. The team is currently working to add an Acoustic Doppler Current Profiler to the mix. The ADCP uses sound waves to measure the speed and direction of currents throughout the water column and also determines wave conditions at the water surface. A two-way radio connection allows VIMS researchers to control the sampling remotely.

Brubaker notes that information on currents and waves is of special interest to the Coast Guard.

“Tidal estuaries like Chesapeake Bay pose unique challenges for search and rescue operations,” says Brubaker. “If someone goes over, the Coast Guard needs to know their likely path so they can organize a search. In tidal waters the current could carry a person or disabled boat one way for a few hours, then reverse, and they need to keep track of that. They already have some tools, but they are always

37.5 million people to the nation’s coastal watershed counties.

“The recommendations in the

report were well received by the marine science community,” says Wright. “The breadth and depth of the analysis shows that the commissioners obviously did their homework.” The commission’s report is based on 15 public meetings and 17 site visits

between 2001 and 2003, combined with input from hundreds of experts.

One such expert was VIMS Associate Professor Dr. Linda Schaffner, who as President-Elect of

looking for better information on tides and currents.”

A key to providing accurate predictions of current speed and direction is to pair the buoy with a high-resolution computer model that can extrapolate from the buoy’s single-point data to a prediction of currents throughout the lower Bay.

“Integration with models is crucial,” says Brubaker. “The buoy data helps keep the model on track. With the model we have a fine grid, a mesh of points that covers the York River and Chesapeake Bay. In principle with that we can give information almost anywhere in the River and the Bay.”

VIMS modelers Drs. Jian Shen, Harry Wang, and Courtney Harris provide the modeling expertise for the Coast Guard project. They have already refined the model to predict tidal height, and are now testing and calibrating it to accurately predict currents.

The buoy’s imaging capabilities are also of great interest to the Coast Guard. The buoy features a camera that captures pictures rapidly enough to create near video-quality moving images. These are instantly available to VIMS researchers via a 2.4 gigahertz wireless connection.

“The first thing the Coast Guard asked us for was the camera images,” says Brubaker. “It just may be that during the time leading up to a boating accident our camera might capture an image of the boat passing by.”

the Estuarine Research Federation (ERF) helped draft that organization’s statement to the Commission.

Some of the actions recommended by the U.S. Commission on Ocean Policy:

- Double the nation’s investment in ocean research
- Implement the national Integrated Ocean Observing System
- Increase attention to ocean education
- Strengthen the link between coastal and watershed management
- Create measurable water-pollution reduction goals
- Reform fisheries management
- Establish an Ocean Policy Trust Fund to pay for implementing the recommendations

unify our currently fragmented approach to coastal and marine management, and to increase the availability and use of scientific knowledge in the management process.”

“Our statement agreed with the Commission’s conclusion that our marine resources are in serious trouble and that we urgently need to develop a comprehensive National Ocean Policy,” says Schaffner. “It also stressed that we need to



Solar panels power the sensors aboard VIMS’ new research buoy.

The camera can also be useful for homeland security. “The images have a value totally separate from search and rescue, just keeping track of vessel traffic in general,” says Brubaker.

Now that the Coast Guard project is nearing its end, VIMS researchers are turning their attention toward securing the funds to continue its operation. “We now have the core infrastructure for the observing system in place and we’re still learning about what the potential and possibilities are,” notes Brubaker.

To view real-time data from the VIMS buoy, visit www.vims.edu/realtime/

The ERF letter also called for a greater emphasis on linking marine management to land-use issues and stressed the value of setting achievable goals to reduce fisheries harvests and pollutant inputs.

“We also emphasized the critical need to train new scientists and encourage interactions between scientists, engineers, economists, and social scientists so that the next generation can effectively address complex issues and assist with policy development,” says Schaffner.

Congress last authorized a report on national ocean policy in the late 1960s. Since then, pressures on the ocean and coastal watershed have multiplied significantly, while the focus of marine resource management has shifted from maximizing yields to maintaining sustainability.

For more information, the full text of the 531-page report is available online at oceancommission.gov/

Hale Takes PBDE Research to the Air

Ospreys are once again harbingers of spring across Chesapeake Bay, thanks largely to regulation of DDT and other pesticides that had devastated the species' population during the mid-1900s. But the emergence of new environmental contaminants, including flame-retardant compounds known as PBDEs, is raising concern among scientists who study the birds.

VIMS Professor Dr. Rob Hale, a leading authority on the behavior of PBDEs in the environment, is collaborating with avian experts from around Chesapeake Bay to determine the exposure of osprey to these new contaminants, and to traditional pollutants such as DDT, PCBs, and mercury.

Hale's collaborators include Research Associate Reese Lukei of the Center for Conservation Biology (CCB) at William & Mary, as well as

scientists at the Patuxent Wildlife Research Center, the U.S. Fish and Wildlife Service, the University of Maryland, and the U.S. Department of Agriculture.

Results of their research appear in the latest issue of the *Archives of Environmental Contamination and Toxicology*.

Hale is also teaming with CCB and W&M undergraduate Catherine Potter to study the effects of PBDEs on peregrine falcons. Because peregrines feed on other birds of prey from their perch atop the food web, researchers suspect they may be especially likely to concentrate contaminants in their tissues (see sidebar).

Hale's role in the osprey study was to analyze PBDE levels in eggs taken from nests along the Elizabeth River, Baltimore Harbor, and the Anacostia, Patapsco, and mid-Potomac rivers.

These are some of the most highly polluted areas of Chesapeake Bay.

The researchers removed a single egg from nests in these sites and compared their contaminant levels with eggs taken from nests along tributaries thought to be largely contaminant-free (a typical osprey nest contains three eggs).

They also followed the fate of the remaining eggs until they hatched and the chicks fledged. Ospreys in all but one of the contaminated sites showed only marginal success in breeding. Nests in the Elizabeth River and the pristine sites were sufficiently productive to maintain the local population.

Analysis of eggs from the contaminated sites showed that they often contained higher concentrations of PBDEs, PCBs, and DDE (a breakdown product of DDT) than eggs from the pristine sites. There was, however, no clear statistical correlation between individual contaminant concentrations and nesting success.

"There are likely additional factors at play that preclude a simple correlation between contamination levels and nesting problems," says Hale. "There may be other contaminants that we didn't sample for, or some of our known contaminants may have already been transformed by organisms and eliminated. Habitat loss probably also plays a role."

The migratory nature of many of the osprey's fishy prey, together with the bird's extensive hunting

range, may also help explain the lack of a clear correlation.

Most troubling, notes Hale, is that PBDE concentrations appear to be increasing in the osprey population. Levels are now four times higher in the Anacostia and Potomac rivers than in pristine sites.

Previous laboratory studies by Hale and graduate student Mark La Guardia show that exposure to PBDEs can alter reproduction and nervous-system development in many organisms.

For more about Rob Hale's work on PBDEs, visit www.vims.edu/env/research/envchem.html and the Fall 2001 issue of *The Crest*.

Faculty Help Launch Scholars Program

VIMS faculty helped inaugurate the new Hall-Bonner scholarship program during a ceremony at Hampton University on April 30.

The program is designed to increase the number of under-represented minority students earning Ph.D. degrees in marine and ocean sciences. It builds on the recognized strengths in graduate-level marine education at VIMS and Old Dominion University. Faculty will mentor Hall-Bonner scholars through the normal Ph.D.

curricula at either VIMS or ODU. The students will also take additional specialized courses at Hampton University.

The Program, which provides full support for tuition and stipends, is named for leaders in establishing marine science education at Hampton University—the late professor Anita Hall and the retired dean of the school of science, Dr. Robert Bonner. It is supported by a \$1.1 million award from the National Science Foundation.



Pictured from L are Dr. Gene Burreson and his student Ms. Delonna White, Dr. Linda Schaffner and her student Ms. Treda Smith, Mr. Leonard Pace, Dr. Rom Lipcius, and Ms. Andrea Roche and her advisor Dr. Margaret Mulholland (ODU). Not pictured are Dr. Jack Musick (mentor to Mr. Pace), Dr. Mike Newman and his student Ms. Erica Holloman, and Dr. Lipcius' student Mr. Justin Falls.



A mother osprey tends her two chicks in a nest just below the Coleman Bridge.

Donna Grusha

Preliminary research by Dr. Rob Hale and W&M undergraduate Catherine Potter is helping to throw light on the potential effects of PBDEs on peregrine falcons.

An endangered species, peregrines suffered dramatic population declines at the hands of pesticides in the years following WWII. By the early 1960s all known breeding pairs east of the Mississippi had disappeared.

Restoration efforts, including significant work by the Center for Conservation Biology (CCB) at William & Mary, have helped to re-establish a peregrine population in Virginia. In 2001, CCB staff counted 16 breeding pairs of peregrines in Tidewater.

Hale and Potter are hoping that their research will help this nascent population maintain its upward but erratic course by identifying any contaminants of concern before they might begin to affect the bird's reproductive success.

Potter, who is pursuing the research for her senior thesis in Chemistry, has found that the thickness of peregrine eggs decreases with increasing PBDE concentration. Hale notes that Potter's results confirm previous work from Sweden.

"Catherine's research also shows the great opportunities for collaboration between VIMS scientists and undergraduates on the main campus," adds Hale.

For more information on CCB's peregrine restoration program, visit fswb.wm.edu/ccb/index.html

School of Marine Science Admits Class of 2004

The School of Marine Science at VIMS has completed the selection process for the incoming class of 2004, tending offers of admission to 47 of the 152 students who applied.

To date, 70 percent of those offered admission have enrolled at VIMS. "That's an impressive figure," says Dean of Graduate Studies Dr. Iris Anderson, "as we compete with all the other leading marine science graduate schools for students."

About 60% of the incoming students will work toward a master's degree, while the remaining students will seek the Ph.D. Seventy percent of the incoming students are from outside Virginia.

One striking feature of the incoming class, notes Anderson, is the relatively small percentage of interna-

tional students. Students from outside the U.S currently make up about 12 percent of VIMS' enrollment, but the incoming class comprises only 2 foreign students (6%).

Anderson attributes the decline to tougher immigration rules that require faculty to guarantee funding to foreign students for the entirety of their graduate career. "That's a difficult promise to make," says Anderson, "particularly in a time of shrinking budgets."

Another change from previous years is the high percentage of females in the incoming class. "Women make up 70% of our incoming students," says Anderson. The current student body is about equally split between males and females.

VIMS Finds Pathogen in Non-native Oysters

VIMS scientists have discovered an unexpected parasite in non-native oysters *Crassostrea ariakensis* being held in Bogue Sound, North Carolina.

The parasite appears to be an undescribed species in the genus *Bonamia*, a group of single-celled protozoans that infect oyster blood cells. Known species of *Bonamia* occur in oysters in France and New Zealand where they cause significant mortality. Although *Bonamia* is known to occur in a small population of European flat oysters introduced and established in Maine, the parasite has never been reported in the mid-Atlantic area.

Dr. Eugene Burreson announced the discovery of the parasite in December 2003 during a regional meeting at VIMS of scientists who are conducting studies on the non-native oyster. Burreson reported that 60% of the oysters in two recent samples had light infections. The parasite was first observed in routine histological sections and its identity was confirmed with DNA-based diagnostic tools.

Oysters from the same spawn held in the Chesapeake Bay do not show the infection and it has not been observed in more than 1,000 non-native oysters examined to date by VIMS from Chesapeake Bay or the coast of Virginia.

"The big mystery right now is where this parasite is coming from," said Burreson. "It seems that oysters are acquiring the parasite from something in Bogue Sound, but we have no idea what the source animal is." The parasite has never been observed in native oysters anywhere along the East Coast.

It is unclear at this point if the parasite will cause mortality in *C. ariakensis*, but other similar parasites are very pathogenic to their hosts. Studies are underway to determine mortality, source of infection, and also to determine if the parasite can survive in lower salinities typical of Chesapeake Bay.

Non-native oysters have performed well against MSX and Dermo, the diseases that have decimated Chesapeake Bay oyster populations, but this new finding is cause for concern. If the parasite causes mortality and can survive at Chesapeake Bay temperatures and salinities, it may limit usefulness of *C. ariakensis* for restoration of the oyster resource.

"This doesn't seem to be an issue of *C. ariakensis* introducing an exotic disease to the native oyster, it is an issue of a local parasite causing problems in *C. ariakensis*," said Burreson.

Explore the Bay with CBNERRVA

The Chesapeake Bay National Estuarine Research Reserve in Virginia (CBNERRVA), in partnership with York River State Park, is offering free educational boat trips in the York River and Taskinas Creek this summer. Professional field educators will lead hands-on activities highlighting the plants and animals of these waterways. Taskinas Creek is one of four CBNERR sites in Virginia.

York River Marine Biology Boat Trips

Saturday, June 19

Join this trip on a VIMS vessel to collect York River animals using crab pots, habitat cages, a plankton net, and a trawl net. Trips will run from the floating dock in Taskinas Creek. 11am – 12:30pm OR 1pm – 2:30pm.

Tour of the Reserves Canoe Trips

Wednesday, July 28

Thursday July 29

Wednesday, August 18

On these trips, participants will take a 5-hour canoe trip through Taskinas Creek and the nearby York River to explore the salt marsh and collect estuarine animals using seine nets. 9:30am – 2:30pm.



To reserve space for these programs or for more information, contact York River State Park at yorkriver@dcr.state.va.us or 757-566-3036. Space is limited. Participants must sign up in advance and fill out a health form and liability waiver. Everyone must wear sneakers or sturdy sandals that can get wet and muddy and sign in for trips 15 minutes prior to departure time. Children must be at least 50 pounds. York River State Park parking fee is \$3 per car on the weekend and \$2 per car on weekdays. Trips are weather dependent.

Study Reveals Sharp Drop in SAV

VIMS' annual analysis of submerged aquatic vegetation (SAV) in Chesapeake Bay shows a significant decline in bay grass coverage during 2003. The 30% decrease recorded by VIMS researchers offsets significant increases in bay grass acreage measured during the previous few years of drought.

Scientists at VIMS and elsewhere around the Bay attribute the decline to last summer's heavy rains and cloudy weather. Near-record river flows in 2003 washed large amounts of nutrients and sediments into the Bay, which combined with cloudy, rain-filled days to hinder the growth of the Bay's underwater grasses.

VIMS measured 64,709 acres of underwater grasses in 2003, significantly lower than the previous year's record level of 89,659 acres. The 2003 total represents just 35% of the 2010 restoration goal of 185,000 acres set by the Chesapeake Bay Program (CBP).

"Nature continually reminds us that SAV is very sensitive to water quality," says Dr. Robert Orth, who heads VIMS' annual bay grass survey.

"Acreage fluctuations over the past two years reinforce the message that SAV can rapidly rebound when conditions improve, but also decline just as rapidly when conditions worsen as they did in 2003."

"Wet and dry years have become proxies for the problems that face the Bay and what we hope the Bay can be," adds

Dr. Ken Moore, who along with Orth heads VIMS' SAV program.

The Chesapeake Bay Program uses the VIMS data to track progress toward its SAV restoration goals. VIMS researchers base their yearly report on analysis of more than 2,000 aerial photographs.

For more information on VIMS' SAV program and data, visit www.vims.edu/bio/sav



Musick Celebrates 35th Consecutive Roanoke Round-up

Dr. Jack Musick, Acuff Professor of Marine Science at VIMS, recently led 12 graduate students on his "Roanoke Round-up," an annual field trip to western Virginia to study fish evolution in Appalachian rivers and streams.

Musick has offered this trip, where he not only teaches but cooks all the meals, for 35 consecutive years.

"The Round-up is important because it allows students the opportunity to see evolution in action," says Musick. "The geology of the central Appalachians makes an ideal environment for learning how fish change and adapt for survival."

NOAA Honors VIMS Alumnus

The National Oceanic and Atmospheric Administration (NOAA) presented VIMS alum Thor Lassen (M.S. 1983) with an Environmental Hero Award on Earth Day for his outstanding efforts to promote grassroots environmental stewardship and habitat restoration in support of the NOAA Community-based Restoration Program (CRP).

Established in 1995 to commemorate the 25th anniversary of Earth Day, the Environmental Hero award is presented to individuals and organizations that volunteer their time and energy to help NOAA carry out its mission.

Lassen, who founded the grassroots conservation organization Ocean Trust in 1992, is working through Ocean Trust's partnership with the NOAA CRP to respond to a significant fisheries habitat restoration challenge at the Bahia Grande in south Texas. The project will restore tidal flow to approximately 11,000 acres of the historically productive shallow-water estuary, which was isolated from the Laguna Madre during construction of the Brownsville ship channel in the early 1930s. Bahia Grande has remained dry since that time, and the salty dust that blows out of the basin causes numerous industrial and health problems in the area.

Lassen has coordinated the restoration project with NOAA and other partners including the local commercial shrimping industry. To date, the partners have established a mangrove nursery to provide native plants for the restoration effort, and implemented educational programs to build community support for the project. Groundbreaking for construction of the channels that will restore

Streams in western Virginia flow through limestone mountains to reach major river systems throughout the middle and eastern United States. Some feed the Tennessee system west to the Mississippi, some flow to the Atlantic Ocean, and some feed into the Ohio. Fish in these rivers came from the same ancestral stock, but have evolved in isolation, resulting in new species with subtle yet distinct differences. When erosion causes the headwaters of one stream to cut through the limestone of a mountain ridge into the next valley (a process called stream piracy), the fish popula-

tions of one river system mix with those of another.

The mixing of closely related but previously isolated fish species raises the possibility of cross breeding, but the low survival rate of hybrid offspring has led to the evolution of mechanisms to facilitate mating within a species. Minnows and darters in the clear waters of Appalachian streams find mates of their own species in the same way as tropical fish and birds—by sight.

"Each spring, when it's time to mate, the males take on brilliant species-specific colors," says Musick. "So although closely related species have the same body and fin shape, individual species can be recognized by

the decoration of bright blues, reds, yellows, and oranges."

In the early years of the Round-up, Musick's group would camp in tents in collaboration with Roanoke College. Now the group stays in the University of Virginia's Mountain Lake Field Station. This venerable facility, originally built in the 1930s, now has modern kitchen facilities and electricity, allowing students to complete lab work in the evening in all types of weather.

"The rolling hills, redbuds and dogwoods in full bloom, and the gourmet meals (which only occasionally include fresh roadkill) are all just bonuses for the trip," Musick adds with a grin. "It's a very special event."

tidal flow to the Bahia Grande is scheduled for this summer.

Lassen grew up in Hampton and earned a M.S. degree from VIMS in 1983, where he studied striped bass management in Chesapeake Bay under Dr. Herb Austin and N. Bartlett Theberge, Jr. Since graduating from VIMS, Lassen has served as a Sea Grant fellow, a representative of the Atlantic States Marine Fisheries Commission, the Executive Secretary for the National Council of Fishing Vessels Safety and Insurance, and in a variety of capacities with the National Fisheries Institute, the National Fisheries Education and Research Foundation, and the East Coast Tuna Association.



Dr. Jack Musick and students collect species to study fish evolution.

WILLIAM & MARY
VIRGINIA INSTITUTE of MARINE SCIENCE

Web Update

Welcome
Research
Education
Advisory Services
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News & Media

Real-Time Buoy Data

Water and air measurements from VIMS' recently deployed data buoy are now available on the web in near real-time. VIMS researchers are using these data to improve predictions of physical and biogeochemical phenomena in lower Chesapeake Bay. Accurate and timely forecasts of Bay dynamics can help government agencies better manage natural resources, plan for extreme events, facilitate maritime operations, and advance science and education. Visit www.vims.edu/realtime/ (as well as the article on page 8).

Alumni Pages

These pages help VIMS alumni stay connected to one another and to current VIMS students and events. An on-line directory lists the name, graduation date, major advisor(s), degree, and thesis or dissertation topic for 749 alumni of the School of Marine Science. Alumni are

encouraged to visit the on-line guestbook and sign in if they have not already done so. Visit www.vims.edu/alumni/

Non-native Oyster Trials

This site provides regular updates on VIMS' effort to monitor the Virginia Seafood Council (VSC) trial of sterile *C. ariakensis* oysters. The VIMS monitoring program, which is independently funded by NOAA, is designed to ensure that the VSC test meets the highest standards of science and biosecurity. Data on the web site track the status of the oysters at each of the eight commercial grow-out sites, and also provide updates on a parallel experiment with a sterile, disease-tolerant strain of the native oyster *C. virginica*. The Virginia Marine Resources Commission approved the VSC trial in February 2003 to help further explore the economic potential of this non-native species for aquaculture in Chesapeake Bay. Visit www.vims.edu/vsc/

Calendar of Events

—June 2004—

- 5, 12, 19, 26 Summer Saturdays at VIMS
 11, 18, 25 VIMS Public Tours
 21 - July 23 Governor's School
 24 After Hours Lecture
 28 - 30 Master Oyster Gardeners/ Oyster Workshop for Teachers

—July 2004—

- 2, 9, 16, 23, 30 VIMS Public Tours
 6 SWCD "From Your Backyard to the Bay" Day Camp
 8 Guild of Natural Illustrators Tour
 12 MAST (Minorities at Sea Together) Visit
 12-14 Genetics Course for Teachers (*see pg 5 for details*)
 16 W&M Star Program
 20 HACE (Hourly and Classified Employees) Tour
 21 Tidal Wetlands Symposium
 29 After Hours Lecture (Marine Biodiversity)

—August 2004—

- 6, 13, 20, 27 VIMS Public Tours
 10 Nauticus Oceanography Camp
 23 Orientation for New Students
 25 SMS Classes Begin
 25-27 Exploring Chesapeake Bay Habitats / Middle School Students Field Course
 26 After Hours Lecture (Seahorses)

—September 2004—

- 22 VIMS Council Meeting
 22 Maury Society Dinner (tentative date)
 30 After Hours Lecture

—October 2004—

- 8 VIMS Associates Day

For more information call 804/684-7101 or 804/684-7846.

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VIMS alumni gather at the Graduate Student Association's annual Spring Party April 17 during the first annual VIMS alumni weekend. The event brought more than 30 alumni and their families to Gloucester Point for VIMS' awards ceremony, a campus tour, and a canoe trip. Photo by Mike Ryan.



A Benefit Art Show and Auction featuring the nationally acclaimed wildlife sculpture of William and David Turner brought 180 people to the VIMS campus in Gloucester Point on April 30. The event raised approximately \$20,000 for the Hargis Library Endowment. Pictured from L are W&M alumnus Alvin Anderson, Mickey Blandford, VIMS Council member Cameron Blandford, W&M alumna Carol Wright, and Ms. Betsy Anderson.

VIMS Hosts Raft-Up

Boaters from the James River to the Potomac participated in VIMS' first-ever Raft-Up Rendezvous at Fishing Bay Yacht Club in Deltaville on May 8-9. The 225 attendees were educated and entertained by research experts Stan Allen, John Graves, Jesse McNinch, and Betty Neikirk.

"These scientists and several enthusiastic graduate students did a great job of presenting information about biological sciences, fisheries, marine geology, and aquaculture," says event coordinator Mimi Beckwith.

After a day of education and a silent auction of items such as fishing trips, oyster tastings, and canoe trips, event participants stayed for a cookout

and music by Zion Wave. Many returned on Sunday morning to discuss what they had learned and make suggestions for next year's event.

"We greatly appreciate the corporate and individual donors who made the Raft-Up possible," notes Beckwith. Event sponsors were the Bank of Lancaster, Bill Hudgins Pontiac GMC, Inc., Chesapeake Yacht Sales, Peter M. Clay, John W. Dayton, Kanawha Land Company, Pirates Cove Marina, and SunTrust Bank.

"We also send special thanks to Fishing Bay Yacht Club and all of their members who provided a beautiful site and helped make the event such a success," says Beckwith.



Guests arrived at the VIMS Raft-Up by sailboat, power boat, and dinghy. During the event, participants had the opportunity to tour the new VIMS landing craft, *The Pelican*, docked on the left in the photo.