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Virginia Sea Grant is administered by the Virginia Graduate Marine Science Consortium, whose members include the College of William and Mary, Old Dominion University, University of Virginia, and Virginia Tech. Dating back to 1966, Sea Grant is a national partnership of university, government and industry focusing on marine research, education and advisory service.

Cover photo of boat courtesy AARD.ALLTUF

FROM THE EDITOR

Celebrating Past Successes, Embracing Future Opportunities

This issue of the *Bulletin* features several Virginia Sea Grant projects that we want to highlight as "jobs well done." Many of these projects represent months, if not years, of hard work and dedication from our staff and we would like to take this opportunity to celebrate their efforts and achievements.

The projects run the gamut from aquaculture to workboat racing, but one thing they have in common is that each is a successful partnership between Sea Grant staff and other persons or agencies. Such partnerships embody the tripartite mission of Sea Grant to conduct scientific *research* and provide the results to the community through *outreach* and *education*. We use the *Bulletin* as one way to get that information out to you the public, and I encourage your comments and questions on topics of interest.

We are proud of our successes, but realize we cannot merely rest upon our laurels. As an agency charged with promoting better understanding, conservation and use of America's coastal resources, Sea Grant must be a proactive leader in identifying problems; conducting research and using the collected data to develop innovative solutions. Sea Grant has a long history of finding successful solutions, being among the first agencies to promote aquaculture, new fishing technologies and methods to protect against storm damage.

We hope to continue this tradition in coming months as Virginia Sea Grant, in cooperation with other Sea Grant programs and agencies, tackles the issue of vanishing waterfront access.

Many coastal states are facing the dilemma of how to balance booming population growth with good environmental stewardship. To address these issues and foster dialogue about the topic, Virginia Sea Grant will host "Working Waterways & Waterfronts – A National Symposium on Water Access," May 9 to 11, 2007 at the Sheraton Norfolk Waterside. The conference will bring together experts in many fields to delve into issues that surround the rapid conversion of working waterfronts — marinas, boat repair yards, fish piers and charter fishing docks — to other uses such as private residential developments and non-water dependent businesses.

The symposium is open to the public and we hope that many of our readers will be able to attend. Look for more information on this topic in the months leading up to the conference.

You may also visit the conference Web site at *www.wateraccess2007.com*.

— Erin Seiling

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Workboat Racing:

A waterman does not view himself separately from his boat—each depends upon the other. Together they find marketable product, make the catch, and bring each other safely home to dock. Virginia watermen have relied on the Chesapeake Bay deadrise boat to be part of this fishing duo for over a century.

The term "deadrise" is derived from the use of "dead" to describe a precise movement or position, as in "dead ahead, 200 yards." Larry Chowning of Urbanna, an award-winning reporter and long time field editor of National Fisherman provides the following definition, "a deadrise bow is one with the straight rise of the boat's bottom from keel rabbet to the chine."

Originally open boats used "close to home," the vessels were modified — with the addition of length and a cabin — to accommodate fishing and oystering throughout the Chesapeake Bay. The forward-cabin boats are designed to maximize deck space and provide a stable working platform that can be fitted for many different types of harvesting gear. 40 to 47 feet long and weighing upwards of 28,000 pounds when empty, the boats are capable of carrying heavy loads in shallow water.

Around port, workboat captains are not only known for their talent at hauling in seafood — many have also gained notoriety for their skill at racing. Watermen, naturally independent and competitive, have a long tradition of racing one another to see who has the fastest boat. Racing is a source of pride, providing self-esteem and standing among peers.

Cheryl Teagle

Racing between individual captains generally occurs during seasonal changeovers between fisheries. The races give watermen something fun to look forward to after weeks spent hauling out, repairing and re-rigging their boats for another fishing season. Community racing events occasionally have been scheduled around holiday times, adding to the spirit of the season.

History of Racing in the Lower Bay

In the good days of oystering, workboat races were most often associated with the opening day of oyster season, usually the first week of October. Captain Joe Blanchard of the Eastern Shore recalls boats getting ready for oystering in Poquoson would race daily in

ABOVE: The Rainbow Chaser and the Lady Diane compete at Harborfest.
RIGHT: Workboat racing has a long history in the bay as evidenced by this 1930s race photo.

A Bay Tradition

Jon Lucy

Back River, with the races sometimes lasting well after the sun had set. Races to and from "oyster rocks" — areas of concentrated oysters — were common, when a hundred or more boats rafted up in Newport News' Deep Creek to oyster. Having a fast boat could literally put extra money in your pocket on the oyster grounds.

"In the James with a good load of oysters on board, boats would race to the big 'buy-boats' anchored in the lower river. Being the first to off-load your oysters saved you time," explains Blanchard. "Slower running boats had to raft up and wait hours for their turn to unload. If lucky, a fast boat could even make another trip back to the grounds, selling two loads a day to a slower boat's one." The logic was simple, "the chance to sometimes double your pay made it well worth the extra hours spent working on your engine," says Blanchard.

But workboat racing has always meant more than just monetary payoff. For many of the watermen, winning bragging rights was worth every dime spent tuning an engine. And a few legendary racers pushed the envelope even further, doing more extensive modifications in their effort to win.

Prior to one of the Bayside community races in the early 1950s, Captain Walter Burroughs had a new bottom put on his boat, *Peggy*. Times were so good, he also installed a new 671 Detriot diesel engine. Burroughs realized that the upgrades presented him with a unique opportunity to test his boat at the upcoming race.

Some say Burroughs replaced the heavy galvanized fuel tank in his boat with a lighter-weight tank from a car. Others say Burroughs did not even fill the tank, but brought a bucket of diesel fuel on board to run the engine. The vessel was hauled out on the railway in Mathews for cleaning and painting. To further keep the weight down for the race, the mast, rigging and other equipment was left off the boat. The crew added one finishing touch before launching — they coated the bottom hull with shoe polish.

On race day, once the engine was running, Burroughs lightened the boat even more by removing the batteries from the boat, sitting them on the dock and leaving them behind. For a diesel powered boat, batteries would only be required to restart the engine if it cut off,

Courtesy Larry Chowning

a risk Burroughs was willing to take. A bucket of high octane airline fuel on board was Burroughs' final secret weapon for the race.

The story goes, "during the race, one of the crew periodically soaked a rag in the higher octane fuel and squeezed it in front of the engine's breather," says Kim Granberry, current owner of the *Peggy*.

"The *Peggy* was clocked at 26 miles per hour during the race, easily winning bragging rights for the day."

Harborfest-A New Racing Tradition

In the 1970s and 1980s many coastal areas developed waterfront festivals as a method of revitalizing long-neglected waterfront areas. Norfolk built upon the opportunity provided by OpSail 1976 to initiate Harborfest, a waterfront celebration focusing primarily on tall sailing ships and maritime history. In time, the planning committee for Harborfest sought to expand beyond the focus on tall ships to feature water events associated with more current maritime activities in the Hampton Roads harbor area. To assess various options, the all-volunteer festival committee requested assistance from Virginia Sea Grant's Marine Advisory Program (MAP) to conduct a patron survey at the 1979 event. In addition to estimating attendance and revenues generated, the survey provided insight to patron's top-ranked festival activities, including events on the water focused around ships and boats. The MAP was subsequently invited to join the festival committee and help shape the future of Harborfest.

Committee leaders concluded that a workboat race would be a good addition to the fledgling festival. If successful, it would highlight maritime traditions still important in defining the unique fabric and excitement of bay waterfront communities.

Jon Lucy, the MAP representative, teamed up with Captain Lane Briggs of Rebel Marine Service to organize the first Harborfest workboat race. Corporate sponsor support from a beverage distributor provided small cash prizes for the race winners. On May 24, 1981, the first "experimental" Harborfest workboat race attracted 15 participants.

While few in number, the racing boats represented a broad mix of homeports. Hailing ports painted across the boat's wooden sterns included Tangier Island, Hayes, Maryus, Guinea and Poquoson — places not frequented by most Norfolk citizens. Hampton and Norfolk were each represented by a single boat.

The boats were organized into four race classes, two diesel and two gas. Workboat races were something most festival partons had never experienced and certainly something that had never occurred along Norfolk's metropolitan waterfront — the races were a huge draw.

Despite the inexperience of the race committee in designing the course and the races, the captains were excited, having never raced before a crowd of thousands. It also did not hurt that winners received modest cash prizes for something they enjoyed doing anyway. The captains promised to return if the race were held again the following year.

The Harborfest workboat races evolved over time, becoming bigger, better and more popular. In 1982 some of the fastest boats on the lower bay joined the event, doubling the

Jon Lucy

Many boats that participate in the workboat parade use skiks and decorations to convey a theme. The Miss Cathy has the theme, "Keep Our Waters Clean."

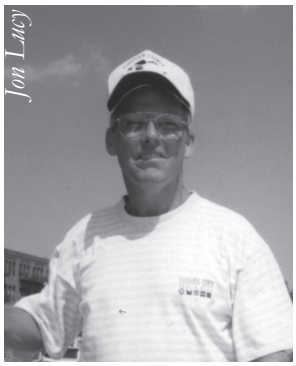
number of participants. In 1983, the number of entrants increased by half again. Also in 1983, the workboat fleet, now over 50 boats, joined Harborfest partons in celebrating the grand opening of Waterside, the new waterfront marketplace. Patterned after a similar complex in Baltimore's revitalized Inner Harbor area, Waterside's existence was largely credited to Harborfest. City leaders viewed the festival as having galvanized citizen and political support essential for the project.

The Harborfest venue expanded again in the late 1990s to include a docking competition, which highlighted different boat-handling skills than the race, and brought the action much closer to shore. The docking contest has become a favorite with the boats powering forward and then quickly reversing at almost full throttle.

The annual workboat parade, added in the late 1980s, is another crowd pleaser. The parade encouraged the captains to decorate their boats, showing the pride the captains and families have in their vessels. It was not long before ambitious captains began outfitting the captain and crew in matching outfits or presenting a message through a matching theme or skit. Captain William "Sonny" Gay, Jr., and his family on the 40-foot *Rainbow Chaser*, were the recognized ring leaders in this new festival rivalry.

Gay first raced at Harborfest in 1987. Win or lose, Gay was always a gentleman. Gay and his family boosted the spirits of those around them through their own good-nature. When Gay passed away, event organizers developed a special annual award in his memory. The Willaim R. "Sonny" Gay Sportsmanship Award honors the sporstmanship of a workboat captain chosen by his peers. The award is presented annually at the Harborfest and Poquoson Workboat Races, as Gay competed in both events.

Captain J.C. West, Jr. of Gloucester, was the first recipient of the Sonny Gay Sportsmanship Award at Harborfest. His boat, the *Carrie Leigh*, featured on the *Bulletin*'s cover, was honored on the 2006 Harborfest workboat races t-shirt as well. West not only has the longest racing record at Harborfest, he often participates in the workboat parade and helped launch the docking contest.


Jon Lacy

Capt. J.C. West, Jr. was the first recipient of the Sonny Gay Sportsmanship Award. His boat, the Carrie Leigh is featured on the cover.

West has raced at every Harborfest except one, when his wife was ill. When asked why he is such a loyal contender, West says, "coming to the first Harborfest Workboat Race, I just wanted to see what was going on. I got beaten by a Poquoson boat! Naturally I had to come back the following year to prove myself. It became a family tradition."

A Three-Race Circuit

Harborfest continued to grow in popularity, drawing more spectators and race entrants from more distant communities. Noting the number of Poquoson watermen participating in the Harborfest races, Sonny Insley who helped organize the annual Poquoson Seafood Festival, approached city officials with a proposal to add workboat races to their fall event. The first Poquoson race was held in 1990, establishing a two-city racing circuit on opposite sides of the Hampton Roads harbor.

The Poquoson Seafood Festival Workboat Races are now in their 15th year. And Insley has become a fixture at both the Harborfest and Poquoson events, announcing the races with good natured ribbing and gusto.

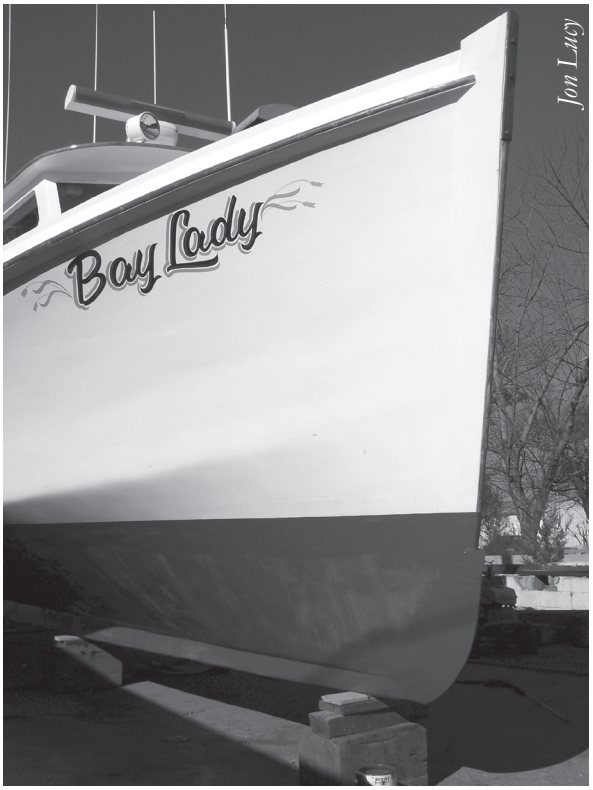
In 2000, the Watermen's Museum in Yorktown revitalized an event from earlier years celebrating the heritage of local water-

men. The festival committee requested that Insley and Lucy organize workboat races to be held during the Watermen's Heritage Celebration.

"It was essential in reviving the festival to incorporate workboat races," stresses John Hanna, President of the museum's board. "The races show people what workboats can do beyond their daily work of harvesting seafood."

The races have become a major draw for the museum and town, enhancing the arts and craft exhibits and seafood sales at the event, all of which help raise funds for the non-profit Watermen's Museum.

Virginia Sea Grant uses the festivals at Norfolk, Poquoson and Yorktown to better educate area citizens about the state's strong link to Chesapeake Bay, its water-related jobs and recreational opportunities. The message stresses the importance of bay water quality in keeping seafood species healthy. It's not lost on festival patrons, many of whom fish bay and ocean waters, that the same fish they pursue for recreation also support workboat captain's livelihoods. Both groups therefore have a common interest in protecting the bay.



The workboat racing tradition of the lower bay has developed in ways never anticipated by Virginia Sea Grant, or likely the communities where the events evolved. The races and associated workboat events attended by hundreds of watermen, their families and friends, compliment the spirit of pride at the core of the festivals. Equally important, thousands of Hampton Roads citizens and visitors support the three-race circuit. The races have also brought together a diverse mix of community and business leaders who show their pride in the bay's seafood industry by sponsoring the workboat race events.

Karen Scherberger, executive director of Norfolk's Festevents office, which now coordinates Harborfest, sums up the importance of these events, "the Chesapeake Bay workboats and watermen [in] the annual Harborfest celebration [bring] an authentic experience that cannot be duplicated or manufactured. Visitors to Harborfest are intrigued to learn about the lifestyle of the watermen, the traditions of families that have grown up on the bay, the workmanship of maintaining the boats and the gear, and the challenges to an industry that our society [largely] takes for granted."

Chesapeake Bay deadrise boats have a distinctive shape. The bow of the boat rises straight up from the keel then flattens out somewhat towards the stern. In 1988, the state legislature named the Chesapeake Bay deadrise the official boat of the Commonwealth.

Larry Chowing is the author of several books on Chesapeake watermen and workboats. *Chesapeake Bay Buyboats* and *Chesapeake Legacy, Tools and Traditions* are two titles that include references to workboat racing in the lower bay.

Why Every Marina Should Be A Clean Marina

Tom Murray and Pete Hall

Marina customers spend their free time and income on boating. They care about the rivers, bays and ocean where they recreate because water quality directly affects their recreational experience. Are the waterways swimable and fishable? Are the shellfish beds safe to harvest? Do algal blooms stick to their hulls?

Quite frankly, good water quality means good business for marina operators. Many marina operators feel that environmental protection is part of the cost of doing business in today's market. To protect water quality, and thereby their business interests, many marinas are implementing changes that promote environmental stewardship and protect aquatic resources.

It's not just about doing the right thing. Marinas benefit economically from being clean. For instance, by becoming more efficient in the use of raw materials, marinas can reduce pollution and waste and save money. Clean marinas can receive free technical assistance — such as workshops and guidebooks — that not only promote environmental responsibility, but also generate positive press for the business. Many state coastal programs award marinas with burgees to indicate their certification as a clean marina. In a way, the clean marina designation is a form of "eco-labeling," letting potential customers know that environmental quality is important to the marina and thereby attracting like-minded customers.

The National Oceanic and Atmospheric Administration (NOAA) and the Environmental Protection Agency (EPA) share the responsibility of protecting coastal waters from polluted runoff. Through the Coastal Nonpoint Pollution Control Program, these agencies are coordinating their efforts to establish management measures for all coastal states to use in controlling nonpoint source pollution. These measures are designed to prevent or reduce runoff from a variety of sources, including marinas.

To help states meet requirements of this pollution program, NOAA and EPA created the voluntary, incentive-based Clean Marina Initiative. Through the initiative, marina operators and boaters are encouraged to protect coastal water quality by using environmentally sound operating and maintenance procedures.

First, a Little Background

In 1990, the federal government, under the Coastal Zone Act Reauthorization Amendments (CZARA), required all coastal states with approved coastal management programs to develop coastal non-point pollution control programs to address non-point source pollution runoff within the coastal zone.

Non-point source (NPS) pollution is generated by agriculture, forestry, urban and suburban growth and redevelopment and marina and recreational boating activities. At marinas, unchecked storm water runoff from boatyards, drips from fuel docks, discharges from marine heads and fish waste contribute to reduced water quality.

Per the CZARA requirements, Virginia submitted a report that described the various laws, programs and regulations already in place to address NPS pollution. The EPA and NOAA reviewed the report and in 1998 released findings indicating that Virginia

needed to do more to control nonpoint sources of pollution associated with marinas and recreational boating.

Faced with the strong likelihood of imposing additional regulations on marinas, Virginia asked for and received support from NOAA and EPA to first attempt cleanup through a voluntary program. Virginia's Departments of Conservation and Recreation and Environmental Quality formed an advisory committee with public and private representatives, to establish a Marina Technical Advisory Program (MTAP) to guide development of the program. In mid-1999 the MTAP was established within the Virginia Sea Grant Marine Advisory Program at the Virginia Institute of Marine Science.

MTAP's mission is to provide advice, technical assistance and education to Virginia's marine industry. The program provided a ready source of information and a place where marina owner/operators could go to openly discuss regulatory issues or get advice on corrective action without fear of penalty.

A 14 member Virginia Marina Technical and Environmental Advisory Committee (MTEAC) was also formed to provide guidance to the MTAP staff. The advisory committee is comprised of members of the boating community, marina operators, marine conservationists and representatives from state agencies. A second committee, the Virginia Marina Industry Advisory Committee, comprised of 11 marina operators also provides guidance to MTAP staff.

The advisory commitee quickly decided to publish a guidebook to provide marina operators with a host of best management practices (BMPs) they could adopt at their facilities. The manual promotes pollution prevention and offers flexibility so that marina operators can tailor a plan suited to their needs. The idea for the Virginia Clean Marina Program came out of the guidebook.


Erin Seiling

What is a Clean Marina?

The Virginia Clean Marina (VCM) Program is a process by which marinas are recognized and rewarded for their efforts in implementing best management practices that improve and maintain water quality and aquatic resources. Clean marinas receive certification that their marina meets all legal and regulatory standards, as well as a percentage of the BMPs outlined in the guidebook.

Certification is a three step process. First, the marina owner/operator signs a pledge to meet the VCM standards within a year from signing on. Second, he or she completes a clean marina award self-evaluation checklist, provided with the guidebook, and forwards it to MTAP. Third, one or two members of the MTEAC conduct a formal site visit to the marina applying for certification and, using the checklist sent in by the marina, evaluate the business. If the marina meets all the criteria, it is recommended for VCM status.

The MTEAC votes on this recommendation and if the vote is positive, the marina is granted VCM status and receives all benefits therein. These benefits include: authorization to use the VCM logo on their letterhead and in their advertising, a burgee to fly from their property; and promotion by the VCM in publications, on the World Wide Web and at public events such as boat shows.

There is no cost or fee to participate in the VCM Program. Once achieved, clean marina

status is renewed biannually. To do so, the marina completes a clean marina award checklist, attests to its validity by signature and submits it to the advisory committee. It is reviewed by the Committee and, if all is in order, a recertification is issued for the marina.

Support for the VCM program is provided by Virginia Sea Grant's MTAP, which conducts annual reviews of clean marinas, holds workshops providing educational opportunities to marina owners, operators and staff, and provides technical assistance on an "as-needed" basis.

The VCM program gives marina owner/operators the opportunity to avoid more government regulations by voluntarily adopting and implementing BMPs and common sense approaches to improving and maintaining water quality and living resources. In site visits to marinas, most are found to already meet 90 percent of the criteria for certification — therefore becoming certified requires little additional effort for these facilities.

As of summer 2006, there are 40 certified clean marinas in Virginia. An additional 7 have pledged to become VCMs within a year.

The Benefits of Becoming a Clean Marina

As the boating public becomes more environmentally conscious, many look to patronize marinas that share their view. Aside from the environmental benefits, the implementation of BMPs leading to VCM certification means increased business and economic growth for marinas.

A survey of Virginia's certified Clean Marinas conducted by Virginia Sea Grant provides some real insight into how the industry views the benefits of becoming a clean marina.

Among the findings:

- 79 percent of clean marinas feel that VCM status has brought economic benefits to their marina by both reducing costs and increasing revenues.
  - o When asked to elaborate, 70 percent of the marinas responding felt that VCM designation had led to increased revenues (ranging from $5,000-$50,000 annually), primarily from attracting new customers.
- 43 percent felt the VCM guidebook and management practices helped reduce costs of operating;
  - o 29 percent said they had not had VCM status long enough to quantify such impacts.
- 79 percent felt that VCM status led to more "goodwill" and significantly improved relationships with regulators.

Further, the group consistently reported that "regulators are more responsive to new ways to accomplish given ends" and "they are more willing to work with us knowing that we are all working toward the same goal." VCM marinas also cited increased transient traffic, increased fuel sales and an overall "value-added" perception by the customer as important measures of economic benefits gained.

Clean marina status was likened to "star ratings" for hotels, as boaters know exactly what to expect in the way of service and amenities when visiting a certified Clean Marina. One marina concluded, "recognition for caring for the environment brings in a higher quality clientele. They tend to take better care of their boats and our property."

For more information on the Virginia Clean Marina Program, or to download the clean marina guidebook, visit www.vims.edu/adv/vamarina/index.html. *Links will also direct you to a listing of certified VCMs in the state and those that have pledged to meet standards within a year.*

A Day in the Life

By Erin Seiling ♦ Photos by Carol Hopper Brill

Science teachers from across the Commonwealth gathered at the Virginia Institute of Marine Sciences' Eastern Shore Lab in Wachapreague this summer to experience a few days in the life of a field researcher. For three days, the teachers lived by the tides — as the rise and fall of the water level dictated their work schedule. Days began early, preparing equipment and provisions for long days in the field. Nights ended late, analyzing and identifying samples in the lab and completing field reports. In between, the teachers-turned-students braved mucky marshes and buggy barrier islands to collect data and specimens.

(TOP) VIMS researcher Rochelle Seitz introduces a group of high school environmental science teachers to the marsh environment of the Eastern Shore.

(RIGHT) One afternoon was spent doing a profile of Cedar Island. The group walked across the island, measuring changes in elevation, vegetation, sediment and shell distribution.

The field activities are part of an oceanography course for middle and high school teachers taught through the Virginia Earth Science Collaborative program. The program, which held its first classes in 2005, is designed to increase the number of endorsed earth science teachers in the state and to improve students' achievement on the Earth Science Standard of Leaning (SOL) Test. To receive the earth science endorsement, teachers complete a five course series in oceanography, astronomy, meteorology, physical geology and the geology of Virginia.

"The classes are really integrated," says Gabriella Mirabilio, teacher at Strasburg High School in Shenandoah County. "You need to understand the geology to understand the oceanography and the meteorology to understand the geology and so on," she says.

Mirabilio, like many other teachers, finds it "almost necessary" to earn the earth science endorsement as school systems encourage teachers to keep pace with their own changing curriculum requirements.

Each of the five courses is composed of lectures and field work. As teachers know, hands-on activities solidify conceptual ideas discussed during lecture. So, the field experience serves a dual role in the courses.

First, it gives the teachers first-hand practice with the concepts they are teaching. And second, it gives them ideas of activities they can lead their own students in, as many of the field activities can be modified to meet the individual needs of their classroom.

Educators Vicki Clark and Carol Hopper Brill of Virginia Sea Grant have partnered with the program for the past two summers to guide four oceanography classes through Eastern Shore environs. Along the way, the teachers rediscovered the excitement of learning.

"We're learning by discovery," professor

(TOP, clockwise from left) Educator Vicki Clark explains how sea level rise affects hardwood trees. • Rachel Seitz describes the life cycle of native oysters to a group of teachers. • Teachers sample temperature, salinity, dissolved oxygen and conductivity with this meter. • A refractometer is used to determine the salinity of the water. • Several butterfly rays were caught in the sample trawl. (RIGHT) Sea pork was one of the more unusual finds of the day.

Kristen St. John of James Madison University reminded her group. Over the three days, the group discovered new environments, new skills and new equipment. Much of the high-tech research equipment is beyond what the teachers can afford on their limited school budgets. In the field, the groups compared the accuracy of a simple and inexpensive salinity meter to a top-rated field device costing several hundred dollars. The happy result was the inexpensive meter being just as accurate as the high-end model, meaning the teachers could both afford the device and rely on its results. That got the group excited about the possibility of using their new field skills at home.

Debbie Faulkner, who completed the oceanography course in 2005, says the field experience was indeed an "invaluable resource" to her in the class room last year.

"Kristen developed lesson plans that directly correlated to what we were doing in my classroom," says Faulkner. And, after testing, she kept her students interested in learning by introducing several field activities she learned in Wachapreague. And that, after all, is the idea of the program — that the teachers will return to their classes with new lessons and activities that get their students excited about earth science.

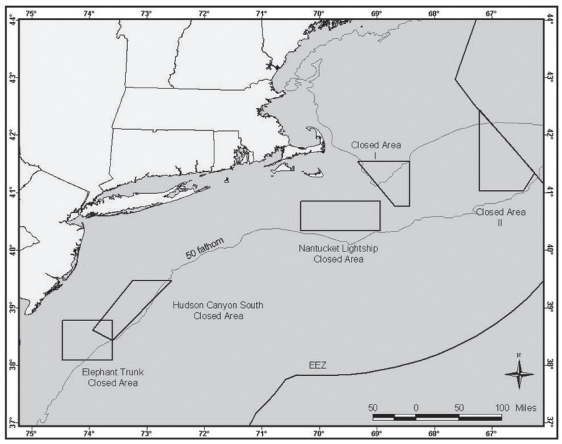
(ABOVE) Coquina clams (Donax varibilis) live in the wet sand near the surf zone. (LEFT) A seine net is used to collect small fish and crusteceans in the nearshore environment. The cool dip was a welcome break after a day spent in the field. (BELOW) At low tide, the group used shovels and hands to locate specimens that inhabit a mud flat.

The Virginia Earth Science Collaborative is a partnership of nine institutes of higher education, nonprofits and more than seventy school divisions across the Commonwealth. Virginia Sea Grant has partnered with the program since 2005. For more information, visit virginiaearthscience.info/index.htm.

Sea Scallop Surveys Show Results

The Elephant Trunk area off of Delaware Bay will reopen to the sea scallop industry in 2007. The area has been closed since 2004, to protect a strong year class of juvenile sea scallops (*Placopecten magellanicus*).

Since the closure, Virginia Sea Grant researchers, William DuPaul, Dave Rudders and graduate student Noëlle Yochum have conducted surveys monitoring the status of the resource aboard the *F/V Carolina Boy* out of Seaford, Va. The surveys, funded by NOAA Fisheries, are a cooperative effort between the researchers at the Virginia Institute of Marine Science (VIMS) and the sea scallop industry. Survey results are being used by NOAA Fisheries to develop fishing regulations for the reopening.



The Elephant Trunk closed area off of Delaware Bay is estimated to hold over 100 million pounds of scallop meats. Elephant Trunk will reopen to scallop harvesters in 2007. Other special management areas are shown on the map.

Survey Method

Sea scallops are found in waters from Virginia to Maine. NOAA Fisheries manages several sites in this region as "closed areas," which are periodically closed to protect strong year classes of juvenile scallops and reopened when the protected stock reach maturity.

Closed area management for sea scallops began almost by accident when three area on Georges Bank were closed to protect groundfish stocks. To help the severely depleted groundfish populations recover, NOAA Fisheries closed certain areas to all boats that could potentially harvest groundfish. This included sea scallop vessels, which capture groundfish as bycatch in their dredges.

Not surprisingly, areas that are good habitat for groundfish provide good habitat for other species as well, including sea scallops. NOAA Fisheries scallop surveys in Georges Bank detected an increase in sea scallop abundance and biomass as a result of the closures. This led to the hypothesis that stocks of sea scallops could be protected and "grown out" to a harvestable size by closing the area to harvest for a few years.

In 2004, Amendment 10 of the Sea Scallop Management Plan formalized the utilization of rotational closed area management. NOAA Fisheries and the New England Fishery Management Council currently manage two scallop resource areas, the Hudson Canyon closed area and the Elephant Trunk closed area, in addition to the initial three Georges Bank sites, which now periodically open for sea scallop harvest.

DuPaul and Rudders conduct surveys in closed area sites to estimate the biomass of sea scallops in the area and to examine the selectivity characteristics of the commercial scallop gear. During a survey, the vessel is outfitted with one of two dredge configurations. The first configuration is the standard

NOAA Fisheries sea scallop survey dredge, measuring eight feet wide with 2-inch rings, a 1.5-inch liner and a 3.5-inch twine top. The second configuration is the regulated commercial scallop rig that is 15 feet wide with 4-inch rings, a 10-inch twine top and no liner. The vessels sample in discreet locations within each closed site by towing the dredges at 3.8 knots for 15 minutes.

Survey samples are used primarily to estimate the biomass of adult scallops in the site. That figure, in part, helps to form the basis for the magnitude of fishing effort when the closed areas reopen. NOAA Fisheries also uses the data in decisions regarding when to reopen a closed area, and setting the total allowable catch (TAC) and days at sea (DAS) for the fishing fleet.

By comparing the catches of scallops collected by the two dredge configurations, the researchers are able to estimate the size selectivity of the commercial dredge. Due to the small ring size and mesh liner, the NOAA Fisheries gear is considered "non-selective," meaning it retains all of the scallops that enter the dredge. The commercial gear has larger openings that allow small scallops to pass through the rings. By comparing the difference in catch between the two configurations, DuPaul and Rudders are able to estimate the selectivity of the commercial gear — what size scallops commercial fishers are catching versus how many small scallops escape. This data helps NOAA Fisheries assess the stock and make projections for future abundance.

The non-selective NOAA Fisheries gear also allows the researchers to estimate the abundance of juvenile sea scallops in the area. This information provides a more complete understanding of how sea scallops respond to closed area management. Protecting a strong juvenile year class to adult size is one accomplishment, but the fishery is more sustainable if closures also augment new recruitment to the stock.

The small number of scallops harvested by researchers does not adversely impact the biomass later available to harvesters. In fact, NOAA Fisheries allocates a percentage of scallops in a closed areas for research purposes as part of their management strategy. The data gathered in surveys and other research projects benefits the industry by contributing to sound management decisions.

Scallops sampled in this research project are part of the research set aside program managed by NOAA Fisheries.

Sea Scallop Management

The sea scallop industry is managed in two sectors. The first is a "limited access" fishery for the large commercial vessels which limits the number of vessels in the fishery and the number of days the vessels may harvest scallops. These measures are meant

Researchers measure the size of sea scallops to determine the biomass of adult scallops in a closed area. The numbers are also used in estimating the size selectivity of commercial scallop dredges.

to control fishing pressure and protect the stock. The second sector is the "general category," composed of smaller boats. These vessels are limited to a catch of 400 pounds per fishing trip. No new permits are issued for the limited access fleet, although general category permits are still available. In recent years, there has been a significant increase in the number of vessels holding a general category permit.

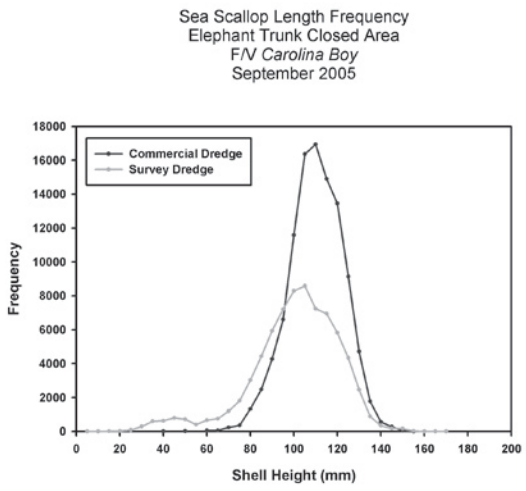
To harvest in the special management areas, scallopers trade off their DAS allocation. In the Elephant Trunk area, for example, harvesters will use 4.9 of their open area DAS for one 18,000 pound harvest trip in the closed area. This tradeoff is designed to prevent scallopers from concentrating their fishing effort in open areas which are not optimal for harvest.

From the 2005 and 2006 survey data, DuPaul and Rudders estimate that over 100 million pounds of harvestable sea scallops exist in the Elephant Trunk area.

When the Elephant Trunk area reopens in January 2007, scallop boats from all along the Atlantic coast are expected to participate. NOAA Fisheries is currently considering management strategies that will allow fishers to sustainably harvest the adult stock in the site. Accurate population estimates, including those determined by Dupaul and Rudders' surveys, are an integral part of the management equation. If not carefully regulated, intense fishing pressure could harvest sea scallops before they have reached optimum yield and damage juvenile recruitment to the stock. The stock surveys are important in setting appropriate DAS and TAC levels for the fleet that will maintain a sustainable fishery.

Scallops in Virginia

The Virginia Marine Resources Commission reports that sea scallops were worth $7.38/lb. in 2005, with landings valued just over $84 million in the Commonwealth, making it the state's most valuable fishery by far. According to NOAA Fisheries data, the sea scallop fishery landed 65 million pounds of meats with an ex-vessel value just over $321 million nationwide in 2004. These landings resulted in the sea scallop fishery being the second most lucrative fishery along the East Coast of the United States, second only



Both gear types indicate an abundance of large, harvestable sea scallops in the Elephant Trunk area.

in value to the fishery for American lobster (*Homarus americanus*).

While historically subject to inconsistent productivity cycles, the industry has benefited from recent management measures intended to bring stability and sustainability to the fishery. These measures include: limiting the number of participants, total effort (days at sea), gear and crew restrictions and most recently, through rotational area closures.

Surveys conducted by VIMS researchers indicate that closing areas for scallop growout is working well. What remains to be seen is how the harvest strategy will work. If the TAC is set too high, too many scallops will be harvested and the area will not support three years of harvest, as expected. If the levels are set too low, scallopers will not be able to harvest enough scallop meats in these sites to make the closures economically profitable to them.

"It's about finding that balance," says DuPaul.

When an area is closed, it means a harvest loss to the fishers. One has to be able to balance that initial loss out later, when the area reopens. NOAA Fisheries must also balance closed areas and open areas.

"It's not possible to close everything at once," adds Rudders, "there wouldn't be anywhere to fish."

Closed area management has been so successful that NOAA Fisheries is considering adding additional sites to the rotation. When Elephant Trunk opens in 2007, NOAA Fisheries will likely close an area just to the south, protecting a strong stock of small scallops there. NOAA Fisheries and VIMS researchers will continue to monitor scallops in closed areas, updating harvest and management regulations to meet the needs of this growing and valuable fishery.

Why Area Closures Work

Area closures take advantage of rapid growth rates in scallops. Between the ages of three and six, sea scallops experience a 100 percent increase in shell height and a 400 percent increase in meat weight. Area closures are meant to protect scallops aged two to five years, eliminating fishing pressure during a critical time of growth. Scallops reach sexual maturity at age two. Therefore, area closures also offer some protection to subsequent generations by protecting the spawning stock.

The optimal time to harvest scallops is between five and seven years of age. At this point, growth has leveled off, so additional gains in meat weight are reduced. Closed areas are opened in three year cycles, so that most scallops are harvested between the ages of five and seven years, near the optimal harvest time. Only 20 percent of the biomass is intended for harvest during the first year of re-opening; a level which is controlled by appropriate TAC and DAS allocations. The remaining 80 percent is available to contribute to the spawning stock and is available for harvest in subsequent open years.

Dave Rudders

Recirculating Aquaculture Research and Extension:

A Statewide Commitment to a Sustainable Future

Angela Correa

It's the mantra of fisheries biologists the world over, and anyone with a connection to the industry has heard it before: *demand for seafood worldwide continues to increase and this demand places increasing pressures on already-depleted fish populations*. U.S. seafood consumption currently tops 7 kg per capita and worldwide, the figure is closer to 16 kg (FAO). This pace is not sustainable, and it necessitates the development of alternative ways to bring fish and shellfish into the market. Projections trend towards a yearly per capita seafood consumption of 30 kg by the year 2020. This would require "doubling the 2000 seafood production. This could only be attained by keeping the average world aquaculture growth rate (10 percent per year during the decade 1990-2000) for 17 more years." (Source FAO, Report of the Expert Consultation on International Fish Trade, 2003.)

Virginia Sea Grant researchers and extension specialists across the state are working to meet this demand though the recirculating aquaculture industry. In the Sea Grant network, Virginia is unique in the depth and breadth of recirculating aquaculture research and extension it supports.

A Tour of the Testing Grounds

One of the largest facilities dedicated to recirculating aquaculture research, the **Virginia Tech Aquaculture Center** (VTAC) in Blacksburg supports graduate-level research on a variety of fish species, including tilapia (*Oreochromis niloticus*) and cobia (*Rachycentron canadum*). VTAC facilities can accommodate research in fresh, brackish, and marine waters under temperate, warm and tropical conditions. Current research on cobia includes determination of alternative protein and lipid sources for the fast-growing fish, as well as research on immunology and development. Another area of importance is gene expression research to determine more clearly what is happening as fish undergo morphological changes during early development and how they respond to different dietary treatments. These studies are meant to meet the applied-science objectives of the center, where many of the trials include industrial collaboration.

On the mouth of the York River, aquaculture research programs at the **Virginia Institute of Marine Science** (VIMS) are focused on rearing fish for stock enhancement and conservation. Systems utilize purified river water for spawning fish and growing out fingerlings and an adjacent facility serves as a hatchery, with systems dedicated to production of live food — algae, rotifers and artemia — for larval culture. Ongoing projects include raising cobia for stock enhancement and using small cobia as surrogates for wild fish, part of tag and release program. Tank-raised cobia have been found to quickly adapt to wild conditions and reintegrate themselves into the population. Another project involves spawning and rearing the Northern puffer fish (*Sphoeroides maculatus*), a high-value foodfish that can also be raised for the ornamental market at smaller sizes. In addition, VIMS aquaculturists

are working on the implementation phase of a multi-year project to culture spot (*Leiostomus xanthurus*) as live bait for recreational anglers. The research and evaluation phases for spot are complete and VIMS aquaculturists are working with private producers to implement spot culture at their home facilities.

Located on the Hampton waterfront, the **Virginia Seafood Agricultural Research and Extension Center** (VSAREC) specializes in larval rearing of marine species, such as summer flounder (*Paralichthys dentatus*) and cobia. VSAREC faculty members consistently achieve some of the highest survival rates documented during this very fragile portion of the life cycle. The VSAREC not only provides fish for its own ongoing aquaculture research projects, but also supplies juvenile fish to the VTAC in Blacksburg, as well as other research programs as part of the International Initiative for Sustainable and Biosecure AquaFarming program. The VSAREC hosts highly-respected residential training programs for industry hatchery managers and graduate students and conducts annual intensive marine larviculture production workshops.

Situated in Virginia's mountainous west, the **Southwest Virginia Aquaculture Research and Extension Center** offers prospective growers concrete information on the facts of life as an aquaculture farmer. The center was founded in 2001 to serve as a commercial-scale demonstration facility, fostering technology transfer and economic development in the region. Functioning as a working freshwater recirculating aquaculture venture currently raising yellow perch (*Perca flavescens*), the center reaches out to area tobacco and dairy farmers and landowners interested in finding an alternative crop to generate income on their land. The center offers hands-on learning opportunities, as well as ongoing extension support for new aquaculture businesses in the region.

The **Aquatic Medicine Laboratory at the Virginia-Maryland Regional College of Veterinary Medicine** in Blacksburg is a fully-functional fee-for-service diagnostic laboratory which provides diagnostic services to aquaculturists, home aquarists and researchers. The laboratory specializes in the detection and evaluation of diseases of marine and freshwater foodfish species. The laboratory also works to identify parameters for the evaluation of fish health, including comparative blood chemistry and immunologic profiles for healthy and ailing fish. This work serves to optimize the health of farmed fish and to minimize the negative effects of handling stress, chemical toxicity, pathogens and other potentially lethal incursions on fish raised in captivity. The laboratory also investigates the potential usefulness of new drugs for use with cultured fish, develops vaccines for disease prevention and explores the crossover potential of diseases such as mycobacteriosis, which can harm fish populations and also infect humans who come


Mike Oesterling

The recirculating aquaculture facility at VIMS is currently raising cobia.

in contact with contaminated waters.

These laboratory facilities, research programs, short courses and diagnostic centers are geared to make a difference for industry while adding to the knowledge base on animal physiology, management principles and sustainable agriculture. One of the most exciting new ways that this knowledge is being put to work is at the massive Blue Ridge Aquaculture facility in Martinsville, VA. Blue Ridge Aquaculture is the largest indoor fish farm in the world currently shipping over 38 tons of tilapia *per week* to markets along the mid-Atlantic seaboard. The newest venture at Blue Ridge Aquaculture is a project to use tilapia effluents to support shrimp aquaculture in addition to the current crop. Shrimp is the number one seafood consumed in America. Research at the shrimp culture facility will be supported by Sea Grant and USDA, with the ultimate goal of establishing the feasibility of shrimp/tilapia co-culture on a commercial scale.

Through the support of these facilities, Virginia Sea Grant researchers across the state will continue to make inroads into the science and application of recirculating aquaculture and to lead the way in disseminating this information to aquaculturists around the world. Recirculating aquaculture opens up the possibility of bringing seafood production away from the oceans and estuaries and into a controlled setting, making it possible to increase the food supply, safeguard the environment, and provide the spark for new enterprise in the Commonwealth and beyond.

Additional Recirculating Aquaculture Resources

For more than twelve years, Virginia Tech has hosted the International Conference on Recirculating Aquaculture (ICRA). This biannual conference draws industry experts and researchers from all over the world for three days of intensive discussion, scholarship, and networking. A trade show, tours and poster sessions round out the conference offerings.

"This is the primary conference for research dissemination with a great mix of academics, industry, and consulting engineers," says Steven Summerfelt, ICRA co-sponsor and aquaculture research program leader at the Freshwater Institute in Shepherdstown, WV.

The next conference is scheduled for July 19-21, 2008. Visit the Web site for more details, *www.cpe.vt.edu/aquaculture/r-aqua/*.

Emerging from ICRA's success, Virginia Sea Grant researchers and communications personnel at Virginia Tech also started the International Journal of Recirculating Aquaculture accessible online at *www.ijra.com*. This peer-reviewed journal is dedicated to the consolidation of research and applications expertise in the area of recirculation systems. The journal, in its eighth year, provides a forum for the exchange of reliable information on all aspects of recirculating aquaculture.

Web sites:

VTAC *www.fishwild.vt.edu/aquaculture_center/test_menu.htm*.
VIMS: *www.vims.edu*
VSAREC: *arecs.vaes.vt.edu/arec.cfm?webname=seafood*.
SW VA Aquaculture Research & Extension Center: *arecs.vaes.vt.edu/arec.cfm?webname=Saltville*
Aquatic Medicine Laboratory at the VA-Md Regional College of Veterinary Medicine: *www.vetmed.vt.edu/Organization/Research/Aquatic/*

News from The Point

15th Annual Chef's Seafood Symposium a Success

The 15th annual Chefs' Seafood Symposium, co-sponsored by Virginia Sea Grant and the Virginia Chefs Association, held at the VIMS campus in October presented an educational event for culinary professionals, culinary students, and seafood business representatives. The program honored the upcoming 400th anniversary of the Jamestown settlement by focusing on selected Virginia seafood species that played a role in colonial history. Scientists described restoration efforts focusing on two of these historically important species, American shad and oysters.

Chefs demonstrated recipes, including the preparation of cownose ray, a fish which earned a place in history by injuring Captain John Smith during a fishing expedition. Try your own ray fajitas by following the recipe below

Chesapeake Ray Fajitas

1 ½ lbs. Chesapeake Ray filets, skinned
(cownose ray, *Rhinoptera bonasus*)
2 Tbs. garlic, minced
2 tsp. ground cumin
2 Tbs. lemon juice
1 Tbs. lime juice
¼ C. vegetable oil, plus 2 Tbs.
1 C. sweet red pepper
1 C. onion
¼ C. julienned jalapeno or poblano pepper
1 lime, cut in wedges
1 tsp. oregano
1 Tbs. garlic minced
1 Tbs. fresh cilantro, minced
Salt and pepper

Combine 1 Tbs. garlic, cumin, lemon and lime juice and ¼ cup vegetable oil for marinade.

Slice ray fillets into strips. Season ray with salt and pepper. Cover in the marinade and let sit in refrigerator for about 1 hour.

Over medium heat, quickly sear ray strips on both sides. Ray should be medium rare; do not overcook! Remove from skillet and reserve in a warm oven.

Add additional garlic to pan and sauté for one minute. Add pepper and onions and cook until they are soft. Add wedges of lime and heat through.

Serve ray and vegetables with soft flour tortillas and condiments such as sour cream, guacamole, and salsa.

This recipe was adapted from an original recipe developed by Chef John Maxwell for the Virginia Marine Products Board (VMPB). Virginia Sea Grant MAP and VMPB are collaborating on a marketing feasibility study of the cownose ray.

New Communicator at VIMS

Erin Seiling joins the Virginia Sea Grant family as the communicator for the MAP program at VIMS. Seiling comes to Virginia Sea Grant from her former position at North Carolina Sea Grant, where she completed a one-year Science Communications Fellowship. Seiling holds a B.S. in zoology from North Carolina State University and a masters of environmental management from Duke University.

Seiling grew up in northeastern North Carolina and enjoyed spending time at the coast during her childhood. Her rural roots and love of the outdoors led her to a career in environmental work. In her free time, Seiling enjoys reading, outdoor activities and spending time with friends, family and her pets.

Blue Crab Bowl Prepares for its 10th Annual Competition

On February 24, 2007, approximately 80 high school students from across Virginia will converge on the Virginia Institute of Marine Science at Gloucester Point to compete in the 10th Annual Blue Crab Bowl. This academic quiz-bowl competition promotes ocean literacy and allows students to demonstrate their mastery of marine science topics. As the Virginia regional competition of the National Ocean Sciences Bowl (NOSB®), the Blue Crab Bowl is proud to be among the inaugural NOSB contests launched in 1997-98 by the Consortium for Oceanographic Research and Education (CORE) in recognition of the International Year of the Ocean.

Virginia Sea Grant has played a key role in the Blue Crab Bowl from its inception, providing key staffing and funding for the annual event. Marine Education Specialist Carol Hopper Brill of the VIMS Marine Advisory Program staff serves as Co-Regional Coordinator, sharing responsibilities with a colleague from co-host institution, Old Dominion University. Officials for the bowl are drawn from faculty, staff and student corps from both institutions, as well as their colleague agencies.

Teams from 16 Virginia high schools will go face-to-face, answering multiple-choice, short-answer, and long-answer analytical questions drawn from scientific and technical ocean science disciplines. The winning Blue Crab Bowl team advances to the National finals in April where they will face the top teams from 24 other regions.

Last year's winners from the Chesapeake Bay Governor's School-Warsaw Campus were coached by teacher, and VIMS fisheries alumnus, Kevin Goff. The team was honored at the national competition with the James D. Watkins Sportsmanship Award.

The Blue Crab Bowl is a great VIMS and Virginia Sea Grant tradition and its success depends on the expertise and enthusiasm of more than 60 volunteers each year. For more information about the Blue Crab Bowl – including how to participate as a volunteer – visit the Bowl's new website at *www.vims.edu/bcb*. The information-packed site contains details on Bowl competition and the all-important jobs played by volunteer officials.

Join us in inspiring the next generation of marine scientists!

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