

UNIVERSITY OF DELAWARE SEA GRANT REPORTER

Turning 25



Inside: Learn about some of the discoveries that Sea Grant scientists have made in the past 25 years.

On back: Find out where you can get information about the coast. Tell us your concerns about Delaware's seas and shores.

Volume 20, No. 1—2001 Annual Report



Dr. Carolyn Thoroughgood

Preserving Delaware's Coastal Heritage

When you look at a map of Delaware, what do you see? At the University of Delaware Sea Grant College Program, our focus is on the state's coastal resources — the ocean, bays, beaches, marshes, and marine life that make the "Diamond State" shine.

Since our program was established in 1976, our goals have been to promote the wise use, conservation, and management of Delaware's coast through three major efforts: the conduct of high-quality marine research, the education of graduate students who will become tomorrow's environmental scientists and teachers, and the transfer of useful information to the public on topics ranging from rip currents to seafood.

From the early days of human settlement, the ocean and coast have played a critical role in sustaining us, providing food, transportation, industry, and recreation. Today, Delaware's ocean beaches attract millions of visitors a year, while our bay beaches rank as one of the world's key stopovers for migrating shorebirds. The Delaware Bay is a vital shipping corridor, supporting the fourth largest port complex in the nation. It is also the world's population center for the horseshoe crab and home to over 100 species of fish.

This map points out just a few of the coastal resources we have, the benefits we derive from them, and the pressures they face from human and natural forces. I hope it will remind you of our state's rich coastal heritage and how important it is to preserve it.

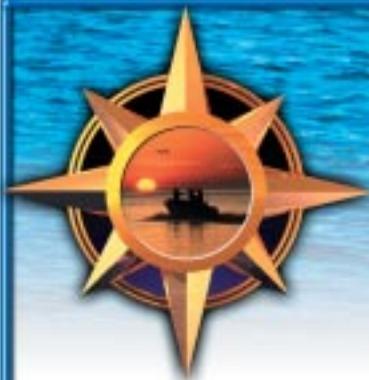
As we mark 25 years of history at the University of Delaware Sea Grant College Program, we renew our commitment to addressing coastal challenges on behalf of Delawareans and the environment we all depend on.

Carolyn A. Thoroughgood

Dr. Carolyn A. Thoroughgood
Director, UD Sea Grant College Program
Dean, UD Graduate College of Marine Studies



Sources: Delaware Dept. of Natural Resources and Environmental Control, Jack Faucett Associates, Maritime Exchange for the Delaware River and Bay, Nanticoke Watershed Alliance, National Marine Fisheries Service, Port of Wilmington, U.S. Army Corps of Engineers — Chesapeake & Delaware Canal Project Office, U.S. Census Bureau.



25 YEARS OF DISCO

Sea Grant

What is Sea Grant? Congress established the National Sea Grant College Program in 1966 to foster research and education focusing on marine resources — “a far-reaching and largely untapped asset of immense potential significance to the United States.” The name “Sea Grant” was chosen as a parallel to the “Land Grant” program, which was created in 1862 to accelerate U.S. agricultural development.

In 1968, the University of Delaware received funding for its first Sea Grant project, on the declining oyster population in the Delaware Bay. Our capabilities in marine science and outreach grew steadily. In 1976, in recognition of our academic excellence and strong statewide support, the University of Delaware was designated the ninth Sea Grant College in the United States.

Today, there are 30 Sea Grant programs, one in each coastal state. It is a unique partnership between the nation’s universities, the National Oceanic and Atmospheric Administration, and the states aimed at advancing coastal research, education, and stewardship.

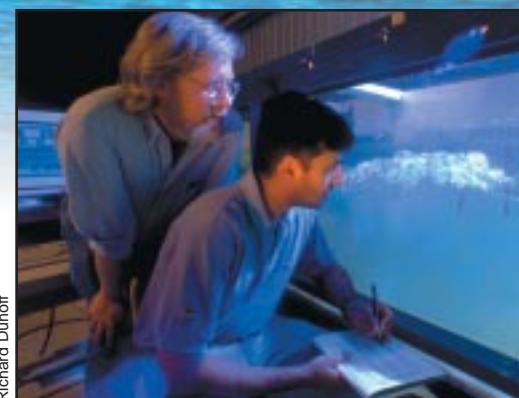
During the past 25 years, Delaware Sea Grant has conducted research in coastal engineering to marine biotechnology. We’ve trained hundreds of students and shared information with thousands of citizens via our Marine Advisory Service and Marine Communications staffs. An advisory council of leaders in state government, industry, education, and resource management plays a key role in guiding our efforts.

The following pages highlight several of our program’s past accomplishments and current efforts. To learn more, please visit our Web site at www.ocean.udel.edu. We look forward to welcoming you aboard!

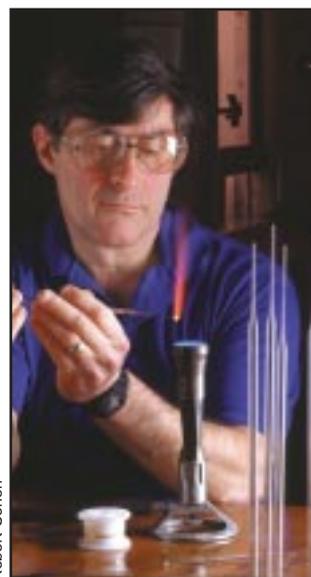
▼ **Chitin Is Excitin’!** In the 1970s and ’80s, Delaware Sea Grant scientists Paul Austin, John Castle, and Charles Albisetti discovered how to dissolve a compound called chitin (“kite’h”) found in blue crab shells — the waste left in seafood processing — and formulate it into a variety of



products. Today, chitin and its derivatives are used to make absorbable, non-allergenic sutures, wound-healing dressings for burn victims, cholesterol-reducing medications, dietary supplements, and other products.



Richard Dunoff



Robert Cohen

◀ A Cool Tool for “Hot” Research.

The gold-tipped microelectrode that George Luther (left) has invented is advancing marine research. The probe can instantaneously measure key aquatic health indicators including dissolved oxygen, hydrogen sulfide, manganese, and iron. Previous sensors could measure only one element at a time.

Last year, Luther used the sensor in Torquay Canal off Rehoboth Bay to find out why two fish kills occurred. The device also is aiding other U.S. researchers, as well as scientists in Canada, Germany, Ukraine, and other countries.

Luther recently adapted the sensor for work deep in the ocean at underwater geysers called hydrothermal vents. Coated in tough plastic and placed inside a wand attached to a submarine, the novel tool acquired the first, real-time readings of the sulfur compounds in the hot, toxic water rocketing out of the Earth’s crust. This information is helping scientists learn more about the heat-hardy worms and other creatures that live there. Some possess heat-tolerant enzymes that might be harnessed for processing food and other applications.

◀ Helping the Horseshoe Crab.

The number of horseshoe crabs that come ashore along Delaware Bay to spawn each spring has declined by more than 50% in the last decade — from over 1 million crabs to 500,000 crabs — according to an annual census that Sea Grant helps organize along Delaware and New Jersey beaches.

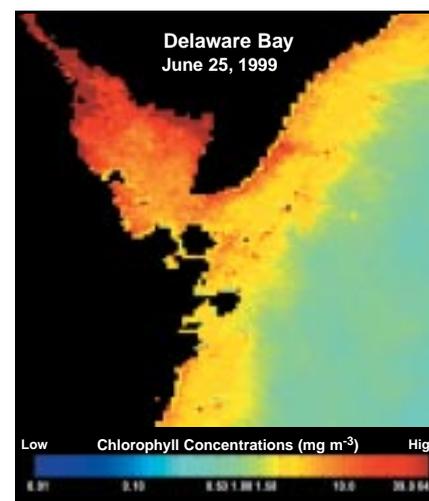
The crab’s welfare is critical to thousands of migrating shorebirds that stop by Delaware Bay each spring to feed on the crab’s protein-rich eggs before resuming their flight to the Arctic. Fish also rely on the crab’s eggs for food.

The horseshoe crab also benefits human health. Its blood, removed with no apparent harm to the crab, contains a clotting agent called *Limulus* amoebocyte lysate (LAL), which is used to test intravenous drugs, heart valves, and other prosthetics for bacteria.

The horseshoe crab also has been used for years as bait in the eel and conch fisheries. Marine biologist Nancy Targett (far left) and graduate student Kirstin Ferrari recently isolated the compound in the crab that is so irresistible to eels and conch. It is concentrated in the female’s eggs and found in smaller quantities in hemolymph, a blood component that is discarded when the crabs “donate” some of their blood to human medicine.

The scientists are working to incorporate the hemolymph’s fish-attracting properties into an inexpensive, artificial bait to relieve fishing pressure on the crab. The scientists have met with a bait manufacturer and developed several prototypes that will be tested this summer.

Robert Cohen



◀ Studying the Ocean from Space.

Orbiting above the Earth, satellites provide marine scientists with the ability to forecast phenomena ranging from El Niño to the path of an oil spill.

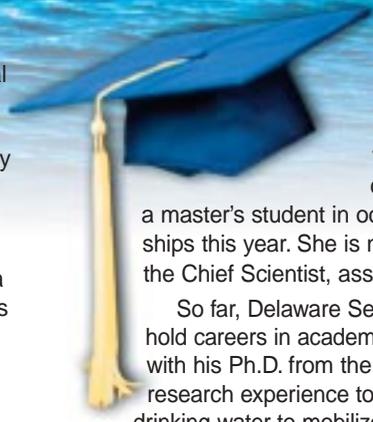
In Sea Grant research, scientists Vic Klemas and Xiao-Hai Yan have

been using satellite data to track the invasive plant *Phragmites* (right) in the state’s marshes. They also are refining techniques to detect chlorophyll (above), a key indicator of microscopic plants in bay surface waters. Algae form the base of the food chain, providing food for fish. However, when too abundant — “fertilized” by high nutrient inputs from land runoff — algae can harm the bays. As the tiny plants decompose, the water is robbed of oxygen.

In a new project, co-sponsored by the U.S. Office of Naval Research, the scientists are examining satellite images for internal waves. These waves, which occur offshore entirely underwater, can reach the height of a 30-story building. They pose danger to submarines and offshore oil rigs.

◀ **Catching a Wave.** Using a flume at the University of Delaware Center for Applied Coastal Research, engineer Jim Kirby (standing) and graduate student Arun Chawla conduct experiments to simulate high-energy waves. The researchers recently tested and refined a computer model that can estimate when hazardous conditions would be expected to occur in inlets, making them unsafe for navigation.

Their study is being integrated into Delaware Sea Grant's popular Refraction/Diffraction model, which is being used by engineers in the United States and around the world to show how waves behave near harbors, inlets, and islands. The model can be used to determine, for example, what changes in wave height might occur if a new channel were dredged near a harbor. The tool helps engineers test shore protection designs and strategies before they are implemented.



▶ **Training Tomorrow's Environmental Leaders.**

Graduate students in marine science gain valuable hands-on experience assisting their advisers with Sea Grant research. They also may compete for the National Sea Grant Program's Dean John A. Knauss Marine Policy Fellowship, which enables awardees to spend a year working in Washington, DC, to see how coastal policy is developed and implemented at the national level. Giselle Firme, a master's student in oceanography at the UD College of Marine Studies, won one of the coveted fellowships this year. She is now working in the National Oceanic and Atmospheric Administration's Office of the Chief Scientist, assisting the Science Advisory Board and the National Invasive Species Council.

So far, Delaware Sea Grant has contributed to the graduate education of over 300 students, who now hold careers in academia, resource management, government, and industry. For example, after graduating with his Ph.D. from the UD College of Marine Studies in 1985, Doug Hicks capitalized on his Sea Grant research experience to create a line of patented high-pressure pumps — Delpumps™ — that can provide drinking water to mobilized U.S. and Canadian troops, process chemicals, and perform other functions. Today, he is president of Composite High-Pressure Technologies Manufacturing, Inc., in Lewes, and department chair for engineering technologies at Delaware Technical and Community College in Georgetown.

▶ **From Salt Marsh to Farm Crop.**

Salt from years of irrigation and fertilization has snuffed out over 15% of the world's once-productive farmland. In the 1980s, Delaware Sea Grant scientists Denise Seliskar (right) and Jack Gallagher began examining tidal marsh plants, which tolerate salt water, to see if any of them could be developed into crops for salty fields.

The researchers pioneered new techniques for culturing salt-tolerant plants, which "speed up" nature, yielding many plants with different genetic characteristics. These plants are then analyzed for high seedling vigor, nutritional value, and taste. Delaware "marsh crops" — a hay, a grain, and a spinach-like vegetable — are now being tested locally as well as in China, Egypt, Israel, and Thailand.



Robert Cohen

▶ **Developing High-Tech Probes to Detect Harmful Algae.**

This is a magnified view of the toxic stage of *Pfiesteria piscicida*. The microscopic organism belongs to a small group of algae that grow rapidly, or "bloom," under certain conditions in seawater, with serious consequences. Harmful Algal Bloom (HAB) species have been linked to fish kills, human health problems, and other impacts.



Burkholder Laboratory

Marine scientists David Hutchins and Craig Cary recently created a super-sensitive molecular probe to test for the presence of *Pfiesteria* in coastal waters. With Sea Grant support, they are now developing a probe to rapidly detect another HAB species — brown tide (*Aureococcus anophagefferens*). While this microscopic plant is harmless to humans, it can hurt bays and estuaries. When it blooms at the water's surface, it forms a thick brown soup that shades out underwater life. In New York and New Jersey, brown-tide blooms have caused millions of dollars in losses to the shellfish and tourism industries.

In 1998, in research funded by Sea Grant and Delaware's Center for the Inland Bays, Hutchins discovered small numbers of brown-tide organisms in Little Assawoman Bay — the southernmost reporting to date. Once the probe is ready, the scientists will use it to determine brown tide's range along the East Coast, how nutrient inputs affect its growth, and the potential for a brown tide "bloom" in Delaware.

▶ **Getting *Phragmites* Out of the Marsh and into Wastewater Treatment.**

The U.S. Fish and Wildlife Service ranks *Phragmites australis* (common reed) the number-one invasive species in our region.

It has overtaken more than a third of Delaware's tidal marshes, crowding out plants that are better for wildlife.

In the 1980s, Delaware Sea Grant researchers Jack Gallagher and Denise Seliskar helped resource managers pinpoint the optimum time to spray *Phragmites* with herbicide. The present control method is to spray the plant in the late summer and early fall and burn the dead canes in the spring — a process that doesn't always stop the marsh invader from coming back.

Currently, with support from Sea Grant and Public Service Enterprise Group's Estuary Enhancement Program, the scientists are evaluating marsh plants found in nature, as well as plants they have cultured in the lab, to assess their ability to form a natural barrier, or "biological fence," to *Phragmites*.

The scientists also have been helping *Phragmites* turn over a new leaf and become a "sludge buster." The scientists have developed a striped variety of the plant that is not likely to escape sewage treatment facilities and become a weed. Once planted in sludge drying beds, *Phragmites*' extensive root system helps dry out and decompose treated waste, reducing sludge removal costs and landfill fees. In recent tests, *Phragmites* helped save the wastewater treatment plant in Bridgeville, Delaware, about \$2,000 per year.

▶ **Coast Day: An Ocean of Fun!**

Delaware Sea Grant hosted the first Coast Day at the University of Delaware's Lewes campus in 1977. Today, the award-winning open house, held the first Sunday in October, annually attracts over 10,000 visitors who take part in dozens of activities — from laboratory research demonstrations to ship tours, popular science lectures, a crab cake cook-off, and much more.

Visitors give Coast Day a high educational ranking. In a recent survey, 99% said they left Coast Day with a better understanding and appreciation of marine resources.



Bob Bowden



OUTREACH Sea Grant

Serving as the "honest broker" — sharing timely, trustworthy information about marine issues and phenomena — is a hallmark of Sea Grant. Our Marine Advisory Service (MAS) and Marine Communications staff deliver information through seminars, publications, *SeaTalk* radio announcements, and Web sites. Our outreach team includes specialists in the following areas. For more information, contact the MAS at (302) 645-4346 or Marine Communications at (302) 831-8083.

Marine Recreation and Tourism. Jim Falk, MAS director (at left in photo above), helps coastal residents deal with issues ranging from boating safety to *Pfiesteria*. In May, he helped organize "Livable Communities," a seminar for local officials and developers focusing on land-use planning techniques that make protecting natural resources a top priority.



Robert Cohen

Last year, his Inland Bays boater guide, packed with conservation tips, won top honors in the Governor's Tourism Awards.

Coastal Processes.

Wendy Carey teaches audiences about natural forces that impact the shore — from rip currents to hurricanes — and how to minimize risks to life and property. In March, she held a workshop on the infamous 1962 storm that devastated Delaware's coastal communities. Over 200 residents turned out to share photos and personal recollections, as well as learn storm-resistant construction techniques. Last fall, she received an award for her outreach activities from the Federal Emergency Management Agency.

Aquaculture. If you're interested in fish farming, John Ewart can help you. He operates the Delaware Aquaculture Resource Center at the Lewes campus, a one-stop shop providing reports and videos on raising fish, shellfish, and aquatic plants. His Web site — www.darc.cms.edu — provides information to several thousand visitors each year. Currently, he's working to establish a pilot-scale oyster reef in the Inland Bays with the help of local volunteers.

Seafood Technology. Doris Hicks (right) teaches seafood processors, restaurant personnel, and the public how to properly handle, store, and prepare seafood via workshops, publications, videos, and the Internet. She also writes the popular "Seafood Advisor" column, which is now available on the National Fisheries Institute's Web site — aboutseafood.com.



Robert Cohen

Marine Education. Bill Hall helps bring the ocean to Delaware classrooms. He trains dozens of teachers in marine and aquatic science each year in workshops hosted with the Delaware Department of Education. He also is an event supervisor for the National Science Olympiad, helps coordinate the Delaware Bay horseshoe crab census, and writes popular publications on dolphins to blue crabs.

Marine Resource Management. Joe Farrell organized the Inland Bays Citizens Monitoring Program in 1991. Today, the program is still going strong, with 30 volunteers collecting and analyzing bay water samples. This summer, volunteers will participate in a pilot program to monitor microscopic plants in the bays in response to growing concerns about Harmful Algal Blooms. He also

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helps conduct public meetings on coastal issues ranging from land use to watershed restoration.

Marine Transportation. Dave Chapman joined the MAS as a part-time specialist in February. He's transferring research on ship emissions and fuel-efficient technologies to the maritime industry. He's also meeting with port authorities and ship owners to explore ballast policies and other issues.

Marine Communications. Professional communicators play a critical role in marine education, translating complex research into engaging publications, radio announcements, and Web sites. The Marine Communications staff reached thousands of people last year and won 15 state, regional, and national awards for excellence. The team, led by marine outreach coordinator Tracey Bryant, includes production manager Pam Donnelly, artist David Barczak, writer Kari Gulbrandsen, and staff assistant Kim Doucette. In October, they will premiere a new Web expedition to hydrothermal vents with UD scientists — *Extreme 2001: A Deep-Sea Odyssey*.



Coming Events

Ocean Currents Lecture Series



Learn about the latest UD sea research in these free lectures, presented once a month, April through September, at 7 p.m., Hugh R. Sharp Campus, 700 Pilottown Road, Lewes. Reservations are required. Contact: (302) 645-4279.

Marine Science Tours

Free tours of the UD College of Marine Studies in Lewes are offered every Friday at 10 a.m., June through August. For ages 12 and up. Contact: (302) 645-4346.

Coast Day

Sunday, October 7, Lewes Campus
Our award-winning festival features research demonstrations, ship tours, exhibits, a crab cake cook-off, and more!
Contact: (302) 831-8083.



Extreme 2001: A Deep-Sea Odyssey

Hot smokers, weird worms, ghost-like crabs . . . follow along on our Web site as UD scientists explore hydrothermal vents in the Pacific Ocean in October! Teachers — sign up your classroom now for a special program that includes a live phone call to scientists in the submarine *Alvin*. Contact: (302) 831-8083. Or register on-line at www.ocean.udel.edu/expeditions.



Visit our world at www.ocean.udel.edu

PUBLICATIONS CATALOG ORDER FORM & SURVEY

The UD Sea Grant College Program has an ocean of information about the coast. For a free publications catalog and bookmark, clip and fill out this coupon, put it in an envelope, and mail it to University of Delaware, Marine Communications Office, Newark, DE 19716-3530.

What is your greatest concern about the marine environment? We want to know! Please fill out our survey on the Web at www.ocean.udel.edu or drop us a note here. Thanks for the input!

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