



# Coastwatch

UNC SEA GRANT ■ JANUARY 1990

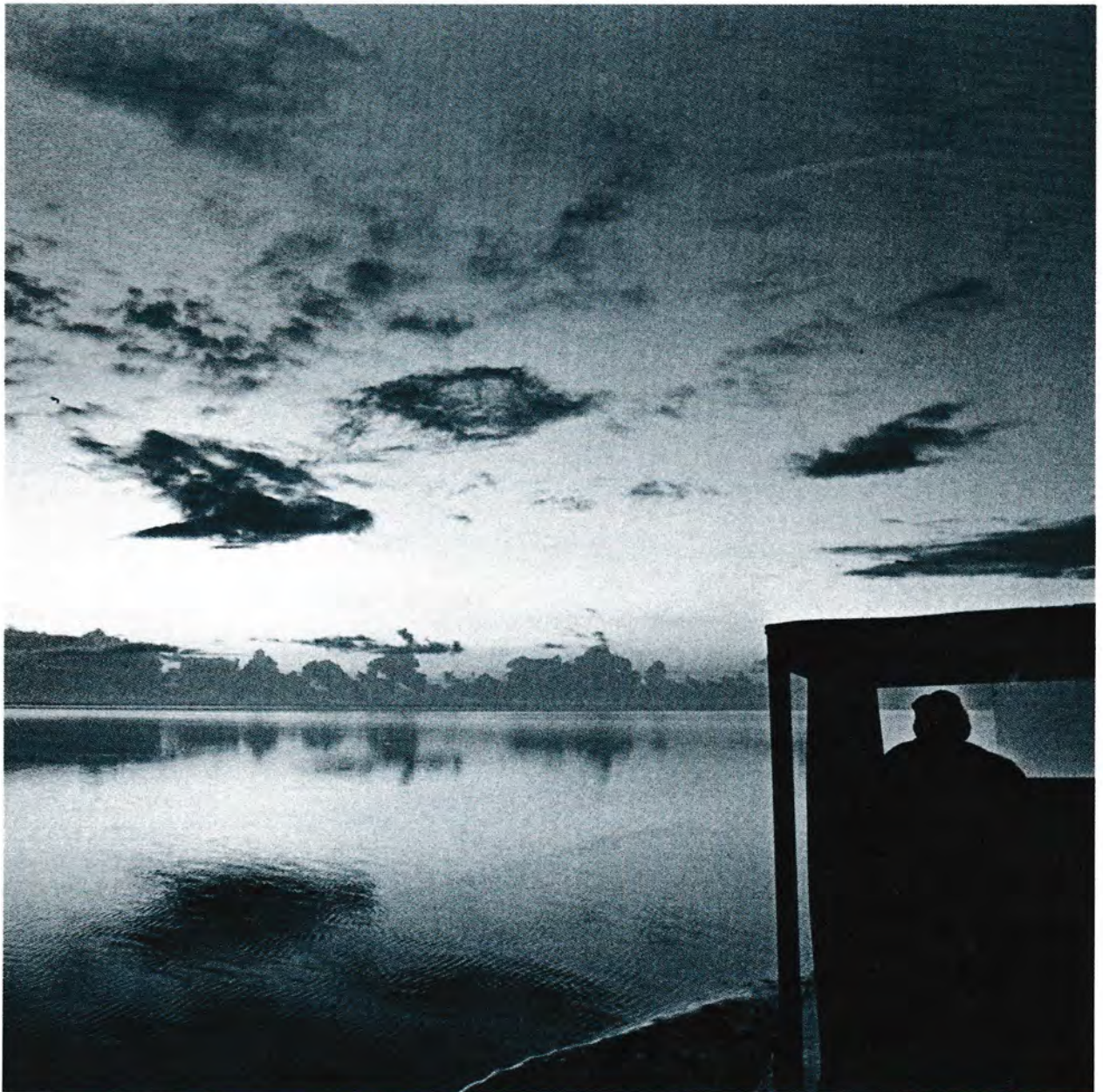


Photo by Steve Murray

**Launching Sea Grant into the 1990s**



Back in the 1960s, ecology was in. People held sit-ins, rallies and protests for the sake of clean air, pure water and wildlife protection.

But in the 1970s and 80s, the environment was almost forgotten.

Now it's a new decade. And the movement has come full circle.

At the coast, trashy beaches, rising sea level, dwindling fisheries and deteriorating water quality have revived our ecological conscience.

In the midst of renewed environmental interest, Sea Grant continues its 25-year tradition of promoting wise use and development of coastal resources.

And the work is more important than ever. Within this decade, it's predicted that 75 percent of the nation's population will live within 50 miles of the coast and Great Lakes.

Since North Carolina has 320 miles of coastline, it will experience its share of the problems. And North Carolina's Sea Grant Program will be there with some of the answers.

During the next two years, Sea Grant scientists will be solving water quality problems, developing new seafood products, discovering why fish stocks fluctuate and building aquaculture into a successful enterprise.

And in their usual manner, Sea Grant's 11 extension agents will relay the researchers' findings back to you.

In this issue, *Coastwatch* will introduce you to 18 new Sea Grant research projects.



Talk about North Carolina's estuaries these days seems always to come around to one topic: water quality.

People are concerned that the rapid development of our coastal plain is taking its toll on the quality of its waters.

Sea Grant is worried, too. That's why the program is sponsoring five new projects that delve into problems facing our estuaries.

To recreational fishermen, North Carolina's coast is a paradise. The state's temperate waters host fun-seeking fishermen year round. And no one denies the economic benefits to coastal residents.

But poor water quality in the state's estuaries may be causing a decline in the number and quality of fish landed by these die-hard anglers. And the end result may be that fewer fishermen frequent the coast.

North Carolina State University economists Kerry Smith and Raymond Palmquist will determine what recreational and economic benefits would accrue in coastal communities from improved water quality.

The results of this study could provide further impetus for coastal managers to clean up our coastal shores.

It's a fact in eastern North Carolina. If you farm sappy coastal plain soils, you have to drain and ditch them.

And where there are farms there are fertilizers. And that spells potential for a massive influx of nutrients—nitrogen and phosphorus—down the ditches and into our coastal watersheds.

Already coastal rivers are experiencing nutrient-spurred algal blooms and other water quality problems.

At least a partial answer to some of these problems may be back on the farm.

In a new Sea Grant project, NCSU scientists Wendell Gilliam, Wayne Skaggs, Robert Evans and John Parsons will examine ways to lessen the

flow of nutrients from farmland into coastal waters.

The team has developed methods already in use by farmers to control drainage and lessen nutrient input. In fact, they estimate that 150,000 acres of controlled-drainage farmland in North Carolina is reducing nitrogen outflows by 1 million pounds annually.

With their new project, the NCSU team plans to develop other land-based methods for decreasing water quality problems.

John Wells and Larry Benninger, two University of North Carolina at Chapel Hill geologists, will be digging deep for some answers to water quality problems in Pamlico Sound.

The pair plans to sift and core the sediments of the sound to learn more about the relationship between water quality and the estuary bottom.

Wells and Benninger believe sediments may play a role in storing heavy metals, pesticides and other toxic substances.

This may be particularly important in North Carolina's sounds where the barrier islands trap sediments and allow only limited movement of sediments offshore.

Don Stanley and Joseph Boyer of East Carolina University will determine how much is too much when it comes to nutrients in the water column.

Using huge tanks at the Rhode Island Marine Ecosystem Laboratory to imitate conditions found in North Carolina estuaries, the duo will quantify the relationship between nutrients and algal growth. And they will use the tanks to determine how plants and animals recycle nutrients and how nutrients cause algal blooms.

Seagrasses are the staff of life in North Carolina estuaries. They play a critical role in the coastal food chain.

But they can also be susceptible to water quality problems. Sea Grant researchers JoAnn Burkholder and Larry Crowder of NCSU will decide how excessive nutrients in estuaries affect seagrass growth.

Botanist Burkholder will assess the effects of nutrient-caused algal growth on seagrasses. She believes the algal mats may stunt seagrass growth by blocking sunlight.





Zoologist Crowder will monitor seagrass grazers (snails, fish, crabs and others) to determine whether they dine on the algae or the grass. This grazing may change how the grass responds to additional nutrients.



## Fisheries

North Carolina's commercial fishermen are baffled.

Some years they pull up nets bulging with fish. Other times, the nets come up nearly clean.

The phenomenon has fisheries managers scratching their heads and scientists searching for answers.

Researchers John Miller and Len Pietrafesa from NCSU say the fluctuations may be linked to how young fish move from the ocean into the state's estuaries.

When adult fish spawn offshore, only a small percentage of their young survive. The small fish must migrate to protective estuaries to thrive.

Miller and Pietrafesa will study the pathway young fish take to enter the inlets and will learn how the ocean currents and sound circulation combine to affect a successful migration to nursery areas critical to their survival.

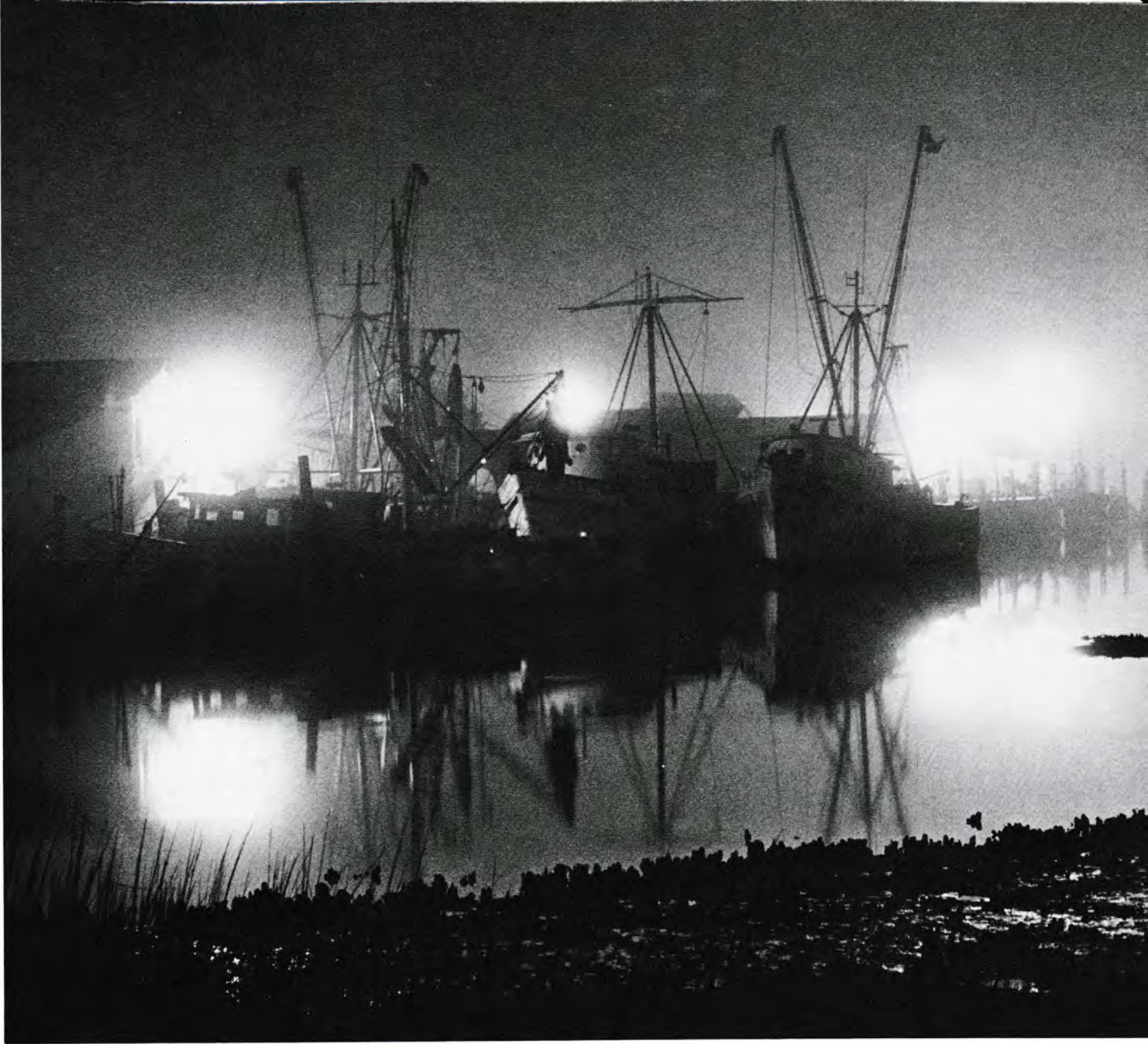
The size of larval and juvenile fish as they enter the estuaries may also affect their survival, say NCSU zoologists Jim Rice and Larry Crowder.

With computer models and field experiments, the team will determine how big young spot must be to sur-

## Portsmouth Island







vive predation and starvation before they enter the state's nursery grounds. Their findings will translate to other estuarine fish and lead to a better understanding of why fluctuations exist.

David Checkley, an NCSU oceanographer, is taking a closer look at the young fish that survive migration to find clues to the mystery.

By looking at protein layers in the ear bones of menhaden, Checkley can determine the fish's age and the water temperature at which it developed. Using satellite imagery, he can map where spawning took place.

Knowing conditions of early growth creates a better understanding of the

conditions that help the larvae survive, Checkley says. And it may explain why populations vary year-to-year.

With his research, Checkley can look at the number of eggs spawned each year and help predict how many adult menhaden will survive. And because menhaden are similar biologically to other fish that roam the oceans, his findings can be applied to species around the world.

As Checkley looks to solve some questions about young menhaden, Ed Noga of the NCSU College of Veterinary Medicine will address a problem plaguing the old of the species.

Angry, open sores have been eating away at the flesh of menhaden

and other fish in the Albemarle-Pamlico estuary. Noga diagnosed the culprit as a disease called ulcerative mycosis.

He links the cause of the disease to a bacteria found in the water. To learn more about the bacteria, Noga will develop a laboratory model of the disease. And he'll also look at how environmental changes, primarily water quality, affect its growth.

As NCSU scientists try to unravel some mysteries concerning traditional stocks, Charles Peterson of the UNC Institute of Marine Science will concentrate on a new stock—soft-shelled or steamer clams.

Seafood connoisseurs in the North-





### **Beaufort harbor**

east are hungry for the sweet-tasting soft-shelled clams. But supplies of the savory shellfish, normally harvested from more northern waters, aren't abundant enough to meet the high demand.

But the sandy bottomland of Pamlico Sound may provide the perfect place for soft-shelled clams to grow.

Peterson plans to test the potential for a soft-shell clam aquaculture industry in North Carolina. He'll look at the clam's biology, its habitat and possible predators to determine the best conditions for a successful venture.



## **Aquaculture**

The challenge of aquaculture is simple.

Americans are demanding more seafood, but the supply just doesn't meet the demand. To offset the difference, seafood processors and retailers import.

Aquaculture could be a viable way to meet demand in the United States and cut imports.

That's why people took notice when Beaufort County farmer Lee Brothers harvested his first hybrid striped bass for market.

It was the nation's first commercial harvest of pond-raised hybrid striped bass. It was also a significant step for Sea Grant researchers who have spent the past decade developing this type of aquaculture into a profitable venture.

But despite the success of Brothers' operation, the culture of hybrid striped bass is not yet an efficient enterprise, says Ron Hodson, Sea Grant's associate director. He identifies three problems in hybrid culture that Sea Grant scientists will attempt to tackle in 1990.

One problem concerns the production of broodstock. All eggs used in the Brothers operation are taken from wild fish. Hodson and NCSU zoologist Craig Sullivan are looking for ways to domesticate broodstock.

They will experiment with the use of hormones in maximizing egg production. Solving these concerns will give aquaculturists control over the life cycle of the hybrid, Hodson says.

And the NCSU duo will be investigating ways to increase survival of fingerlings in controlled environments. Decreasing the loss of fingerlings could solve another problem facing the aquaculture industry and add more fish to the final harvest.

Feed can be a costly problem for fish farmers. Because feed for hybrid striped bass is based on animal proteins (primarily fish meal), more than

50 percent of the cost of raising the hybrids can be spent on feed.

This year, Margie Gallagher of ECU will investigate less expensive ways of providing protein to hybrid striped bass in production.

At the same time, Joseph and Celia Bonaventura of the Duke University Marine Laboratory will explore ways to force-feed these fish in the larval stage.

Since these tiny fish don't feed well naturally in their early stages, the Bonaventuras will attempt to develop a process that allows the fish to absorb food molecules. This is, in effect, a force-feeding, Hodson says.

The primary focus of Sea Grant's aquaculture research will be to assure that the successes of the past are fine-tuned, making hybrid striped bass an important ingredient in America's expanding seafood market.



## **Seafood**

During the 1980s, we dared to eat what we had never eaten before—sushi, shark, squid and surimi—and all in the name of good health.

Like oat bran, seafood was a healthy "in" in the 80s.

But seafood's meteoric rise in popularity left the food industry sometimes playing catch up as they rushed to develop new products and address health and safety concerns.

Four new UNC Sea Grant projects are designed to help the food industry solve some "fishy" problems.

NCSU seafood scientists Tyre Lanier, David Green, Roy Carawan and Brian Sheldon are examining ways to refine surimi, or minced fish, processing.

Presently, 30 percent of the protein contained in the raw fish is rinsed down the drain as the fish is repeatedly washed and minced during



processing. But the NCSU seafood team would like to recover and concentrate that protein.

Such a process could reduce the amount of water used in processing. And the concentrated protein recovered from the wash water could be developed into a flavoring, used as a protein supplement for other food products or added back to the surimi to fortify its nutritional value.

In another surimi project, Lanier teams up with NCSU food scientist Don Hamann to explore the mixture of fish paste and red meat in processed products such as frankfurters, luncheon meats and sausage.

Alone, surimi possesses superior gelling and binding properties that seem to make it an excellent candidate for bologna and salami. But when fish and red meat are mixed and processed with techniques presently in use in the food industry, it lessens the surimi's gelling and binding properties.

Lanier and Hamann will try to determine what causes the change in the surimi and find a processing method that will allow the surimi to retain its ability to gel and bind.

Their research results may be valuable to food processing giants such as Oscar Meyer, General Foods and Gerber.

In a health and safety issue, Jim Oliver, a biologist at UNC-Charlotte, will study the effects of temperature on a novel, but deadly, pathogen called *Vibro vulnificus*. It is found in raw oysters, particularly those harvested from the Gulf of Mexico.

The pathogen can be fatal to people whose immune systems have been lowered by diseases such as AIDS, cancer or pneumonia. And there is special concern for pregnant women.

Oliver believes temperature may be a key factor in determining how infectious and how numerous these *Vibrio* pathogens may be in raw oysters. He's especially concerned about the temperature fluctuations oysters sometimes undergo between harvest and consumption and how these fluctuations affect the pathogen's infectious ability.



Photo by Scott Taylor

Oliver's results could provide life-saving information for doctors and health officials who have patients susceptible to the pathogen.

In another safety and health issue, ECU scientists David Griffith, Jeff Johnson and Margie Gallagher and Sea Grant Marine Advisory Service Director Jim Murray will explore how information about coastal pollution affects people's perceptions about seafood quality and safety.

While nutritionists are singing the health benefits of seafood, the media is reporting ever-increasing incidences of seafood contamination by industrial pollutants, medical wastes and biological toxins.

Consumers are confused.

In fact, North Carolina provided a prime example of that confusion during the red tide outbreak several years ago. The type of red tide present in our waters contained biological toxins

### **Seafood market in Morehead City**

that concentrated in shellfish and made them dangerous, but not fatal, to consumers. Fish, crabs and shrimp, however, were safe to eat.

Consumers frightened by what they heard and read swore off all North Carolina seafood. Seafood processors and retailers suffered, and the state had to mount an extensive media campaign to revive North Carolina's seafood industry.

If the seafood industry and state and federal officials had understood more about how the public perceived the outbreak's effect on seafood quality, they might have been able to head off the problems.

And that's exactly the kind of information this Sea Grant project will provide. The team will survey consumers to learn how they feel about coastal pollution, seafood safety and seafood inspection.



# The Back Page

"The Back Page" is an update on Sea Grant activities—on research, marine education and advisory services. It's also a good place to find out about meetings, workshops and new publications. For more information on any of the projects described, contact the Sea Grant offices in Raleigh (919/737-2454). For copies of publications, write UNC Sea Grant, Box 8605, NCSU, Raleigh, N.C. 27695-8605.



Sea Grant is helping train tomorrow's scientists today. For the first time, UNC Sea Grant is sponsoring a program to promote graduate studies in marine-related fields. This year, 13 graduate students will work hand-in-hand with Sea Grant scientists on research projects. Such a liaison has three benefits, says Sea Grant Director B.J. Copeland.

First of all, one of the most effective ways to transfer technology from the university to people who can use it is through graduate students, Copeland says.

For example, a few years ago two North Carolina State University students worked with Tyre Lanier's ground-breaking development of a seafood substitute called surimi. Now those students work in the forefront of surimi production for a major U.S. food corporation.

Also, because Sea Grant takes an interdisciplinary approach to solving coastal issues, the graduate students will be trained to take a broader look at problems and create practical solutions.

Thirdly, enabling top students to work with Sea Grant scientists supports university research.

One of the graduate students will be working with civil engineers John Fisher and Margery Overton, who have been developing a technique to predict coastal dune erosion during storms. Using computer and laboratory simulations, the graduate student will test the engineers' model with data from 1989 hurricanes Hugo and Jerry.



North Carolina's estuaries are coastal gems. Their protection is vital to shellfishermen, anglers, property owners and a myriad of coastal flora and fauna.

Managing estuaries properly is a key to their survival. A new report about the Albemarle-Pamlico estuarine system spells out the status of the nation's second largest estuary and makes recommendations for managing it.

"This report documents all we know about the Albemarle-Pamlico system," says UNC Sea Grant Director B.J. Copeland, who organized the report for the state's Albemarle-Pamlico Estuarine Study office.

Copeland says the report provides information that will lead to proper development and management of the Albemarle-Pamlico system in North Carolina.

"We called on the best experts North Carolina had to offer for this project," Copeland says.

The report is available in its technical version and in a more readable summary at the library of the state's Department of Environment, Health and Natural Resources in the Archdale Building on North Salisbury Street in Raleigh.

Copies are available in libraries at North Carolina State University, East Carolina University, the University of North Carolina at Chapel Hill, College of the Albemarle in Elizabeth City and the Duke University Marine Laboratory on Pivers Island.

The National Sea Grant College Program office in Washington, D.C., has funded the UNC Sea Grant College Program for 1990.

UNC Sea Grant Director B.J. Copeland says the \$1.19 million in federal funds and the \$650,000 in matching state funds represent the same level of funding received by UNC Sea Grant in 1989.

The new funds guarantee continuation

of the UNC Sea Grant's vital activities in coastal research, extension and education.

The National Marine Fisheries Service has produced a video that will teach recreational fishermen catch-and-release techniques.

*Pass It On* is a 28-minute video that educates fishermen about the importance of saving the catch for another day. It's part of a larger angler-ethics program in the Southeast designed to encourage anglers to practice fisheries conservation.

Sea Grant has a limited number of copies of the video. If you or your fishing club is interested in obtaining a copy, contact Jim Murray, Sea Grant's Marine Advisory Services director at 919/737-2454. Or write Murray at UNC Sea Grant, Box 8605, NCSU, Raleigh, N.C. 27695.



Want to know more about shellfish culture? The most up-to-date information on growing scallops and other shellfish will be presented during a shellfish culture

conference scheduled for February 17 at the Crystal Coast Civic Center in Morehead City.

The one-day event will be sponsored by UNC Sea Grant, the N.C. Fisheries Association, the UNC Institute of Marine Sciences and the N.C. Division of Marine Fisheries.

State Senator Marc Basnight of Manteo and a host of shellfish experts from up and down the East Coast will speak on leasing, permitting, current legislation and state-of-the-art scallop culture. Question and answer periods will follow each session.

The conference fee is \$15 for pre-registration and \$20 at the door. The fee includes lunch. For more information, contact Skip Kemp or Bob Hines at 919/247-4007.





**F**ishing for a New Catch premiered on the University of North Carolina Center for Public Television in July. Now the 30-minute documentary on underutilized

species is available for loan or purchase from the Sea Grant office.

The video was produced by Sea Grant, the National Marine Fisheries Service and North Carolina State University's Department of Agricultural Communications. It's aimed at saltwater sportfishermen in the Southeast.

NMFS estimates that recreational fishermen discard as much as 60 percent of the fish they catch because they don't consider them table fare. *Fishing for a New Catch* introduces sportsmen to some of those less-favored fish and explains how to handle and clean them.

Sea Grant Marine Advisory Service Director Jim Murray recommends the video for sportfishing clubs. It's available for loan or for sale at \$12. To reserve your copy, contact Murray at 919/737-2454.

The South Carolina Department of Parks, Recreation and tourism has pro-

duced a guide to the beaches in that state.

*South Carolina Public Beach and Coastal Access Guide* provides a comprehensive listing of public and commercial outdoor recreational areas along the coast. And it lists activities and facilities available in each coastal county.

For your copy of the 137-page book, send \$3 to: Coastal Access Coordinator, Division of Engineering and Planning, S.C. Parks, Recreation and Tourism, 1205 Pendleton St., Columbia, S.C. 29201. Make checks payable to S.C.PRT.

You'll notice a new byline flying beneath the headlines of our *Coastwatch* stories.

It's that of Calvin Edgerton. He joined the Sea Grant communications staff in December, replacing Nancy Davis. Edgerton comes to Sea Grant from *The Smithfield Herald*, where he was Feature Page editor.

Edgerton is also an excellent photographer. He recently had two photographs published in *The Big Click*, a four-color coffee-table book that captures a day's events in North Carolina.

For Sarah Friday Peters there will be no more writing about erosion rates, fishing gear and trash cleanups. After five years

with the Sea Grant communications staff, Peters is leaving to take a job with *The News and Observer*.

The Big Sweep is history but you still have a chance to own one of our first-quality all-cotton Big Sweep T-shirts.

Decorated with a catchy blue and yellow "Big Sweep '89" logo, these durable white shirts can hang in your closet for only \$3 each. That's half of their original \$6 price tag. To make it an even better deal, we'll send them postage paid.

The shirts come in small, medium, large and extra-large sizes and make great gifts. For your shirts, send check or money order to UNC Sea Grant, Box 8605, NCSU, Raleigh, N.C. 27695.

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