

# COAST WATCH

## Researchers to study new wrinkles in fabric of coast

*Understanding the coast of North Carolina would be difficult enough if things weren't in such a hurry to change. New growth, new technology, expanding fisheries, more people to accommodate—as these pressures on the coast's resources have increased, so have Sea Grant's efforts to answer the questions that keep popping up. Occasionally, the answers are available from other states or regions, places that have already faced some growing spells and puzzled through the problems. But hand-me-down answers are not always tailored to the bent of North Carolina's coastline.*

*UNC Sea Grant is funding nine new projects this year, six of which are to be conducted by researchers or research teams new to the program. In each of these projects, investigators will be studying problems expected to come into focus during the 1980s—from the displacement of people by machines in the seafood industry, to the disruption of estuarine grass bottoms by clam kicking.*

*Photo by Steve Murray*



*Tongs and strong arms, the traditional tools of clamming, are good enough to fill the buckets of Paul Huey, fishing near Harkers Island. But the old methods have begun to give way to mechanical "clam kicking."*

New to North Carolina, "clam kicking," a mechanical method of harvesting clams, is stirring up more than just estuarine and river bottoms these days. It's stirring controversy, too. Some fishermen like the new method because it requires less time to land more clams than previous hand-operated raking methods. But other fishermen, biologists and management officials are concerned that clam kicking, which involves stirring up the bottom with the engine propeller of a boat, may be damaging habitats vital to other fishes and jeopardizing future clam production.

The state Division of Marine Fisheries opened some areas to clam kicking this year, but more information is needed to determine the effects of this harvesting method. Three Sea

*Continued on next page*

Photo by Karen Jurgensen

Grant researchers, Charles Peterson and Richard Deriso of the University of North Carolina at Chapel Hill (UNC-CH), along with Peter Fricke of East Carolina University (ECU), are beginning a study of hard clams. Applying clam biology and a study of the clams' abundance, the researchers will try to determine how clam kicking affects estuarine bottoms and what effect it might have on future clam colonies. Another aspect of the study will focus on the socio-economic impact of management policies. The researchers will mark young clams, follow their life cycle, conduct clam-kicking experiments and survey clam fishermen. Their study may help officials manage this controversial harvesting method.

### Shrimping

After a poor shrimp harvest in 1978, North Carolina shrimp fishermen, processors and marketers suffered economic losses. A relief program was initiated to recoup some of the losses, but only three percent of the state's shrimpers and five percent of the dealers applied for and received loans. Why did so few seek aid? Officials are unsure of the answer because little is known about the social and cultural aspects of the shrimp fishery. That's why sociologists John Maiolo and John Bort of ECU are beginning a study of the fishery. They want to find out how traditions, kinships, experience and education affect the shrimpers' views of the fishery; how the fishing industry perceives federal and state aid programs, and how many members of the fishing industry have alternate income sources. Maiolo and Bort plan to interview fishermen, processors, marketers and fisheries experts.

### Water

Water is the lifeblood of every seafood processing plant. You can't steam crabs, fillet fish or shuck scallops without it. In North Carolina, most processors pump water from a nearby stream into the plant. In the past, the used water, including the seafood wastes, often went right back into the stream.

But that's changing. The Environmental Protection Agency now requires that the discharge water be treated. Some seafood processors complain that conventional methods of



*Growing more than cypress trees, North Carolina's fertile estuaries are the nurseries for many of the state's fish and shellfish*

treatment are complex and expensive. In response, North Carolina State University (NCSU) engineers Allen Chao and Jerry Machemehl, and poultry scientist Jason Shih, are trying to come up with a cheaper, but equally effective, method.

This year the researchers will experiment with a semi-permeable membrane which traps fats and proteins, but allows small molecules, such as those in water, to pass. The researchers believe that the water will be clean enough for reuse in the plant, thereby cutting down on water consumption and energy use. Higher operating costs of the proposed system would be further offset by the fact that the plants might be able to sell the trapped material for use in pet food or other products.

### Jobs

One of the growing pains industries commonly have is the problem of machines displacing people. Often, machines replace unskilled workers and, at the same time, create new, more specialized jobs for people who can look after the machines. The seafood industry is no exception. And, as the industry continues to grow, many see manpower problems on the horizon.

This year, Nozar Hashemzadeh and Michael Simmons, two assistant professors of economics at North Carolina A & T State University, begin a Sea Grant-funded study of the problems. In 1980, the researchers will intern with the N. C. Department of Labor to learn ways to help ease the

impact of advancing technology on people and the job market. Working with the Center for Manpower Development at A & T, Hashemzadeh and Simmons will then try to assess the industry's manpower requirements for the future.

## Bluefish

The bluefish is no stranger to coastal residents. Each year more than 100 million pounds of bluefish are caught by sport and commercial fishermen in the United States.

But, like many ocean migrating fish, the bluefish has scientists baffled. Because the bluefish is hard to track, fisheries experts are unsure about the number of species or subspecies which live along the Atlantic coast.

Some experts believe that the annual harvesting of bluefish smacks of

overfishing. But no adequate management plan for the species can be drawn up until scientists are clear about its life history and migration patterns.

This year J.B. Sullivan of the Duke University Marine Laboratory and Chuck Manooch of the National Marine Fisheries Service office in Beaufort, will cooperate on a study designed to identify bluefish breeding pools off the North Carolina coast. If their theory that there is more than one subspecies proves correct, they plan to extend the study to other areas along the Atlantic and Gulf coasts.

## Education

In Carolyn Hampton's view, North Carolina has outreached its grasp of coastal problems, and some valuable resources have been squandered. Hampton, a zoologist and ECU pro-

fessor, believes students need to learn more about the coast so that they can make good decisions later.

In 1979, with Sea Grant project-initiation funds, Hampton organized at ECU a course in marine studies for prospective educators. Sea Grant has also funded the project for 1980, teaming up with ECU's established education program to introduce marine scholarship into the studies of future leaders in education. The grant provides for three fellowships. In the program, prospective teachers take the regular education courses, but include nine hours of internship in marine education. Hampton hopes students can be placed in the state's marine resources centers, or in other facilities where they can meet coastal issues head-on. Bonnie Temple of Zebulon is the first intern in the program.

# Beach erosion severe

From Times wire and staff reports

Gale warnings continued in effect along the North Carolina coast today as a tropical storm, moving westward from the state Wednesday night and way to the northeast.

The storm caused little damage to the state although beach erosion along sections of the coast.

# Recreational vehicles squashing birds, nests

By Mark Travis  
Staff Writer

Birds, eggs, chicks and turtles are squashed to death by motorists off-the-road vehicles (ORVs) being driven on the beach at Ft. Fisher Marine Resources Center. "I see these motorists out here on the sand dunes like they were on a beach patrol. Ironically, they do not know how to run these vehicles."

have already reached their key goals and are shaping their findings into final reports. For others, this year will be the year investigators come up with some new insight into some very contemporary concerns.

Erosion is still chewing away at the state's shorelines, and coastal landowners are asking: What can be done? Several teams of Sea Grant researchers studied pieces of the problem in 1979. In 1980, they will begin to put those

# Pollution State closes acres of shellfish grounds

By Susan Reeves  
Staff Writer

State officials have closed 3,000 acres of shellfish waters in New Hanover and Brunswick Counties for an indefinite period of time because of pollution.

pieces together and reach some conclusions.

Researchers Ernie Seneca and Steve Broome, both of NCSU, have concluded that marsh grasses, if adequately fertilized, can stabilize eroding shorelines along the state's sounds. At some of the test sites, marsh grasses

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As the headlines grew bolder and the controversies more heated during the 1970s, coastal communities and regulatory agencies became more acutely aware of the need for solid information. Picking what seemed to be some of the most significant issues, Sea Grant funded research that has already led to a rethinking of regulations covering problems as diverse as wastewater disposal, off-road driving and coastal construction.

Twenty-one Sea Grant research projects are being continued this year. In some of these, researchers

planted in stands not only slowed erosion, but actually regained lost ground. But plantings don't always work. In some "high-energy" areas, where waves are especially frequent or intense, the grasses never get a foothold. In 1980, Seneca and Broome will continue to watch their test plantings and will try to pin down the relationship between wave energy and the growth of grasses.

Understanding shoreline erosion, and many other coastal processes, is largely a matter of understanding the movement of water. Sea Grant researchers Ernie Knowles, Bob Weisberg, Len Pietrafesa and Jerry Janowitz, all of NCSU, are using sophisticated meters and wave-monitoring gear to measure and record waves and water circulation in North Carolina sounds.

In 1979, the researchers collected enough data to conclude that their methods are accurate. In 1980, they will formulate ways to predict how water, under the influence of weather, circulates in the sounds, carrying its load of salt, sediment, nutrients and contaminants.

One of the studies will generate an atlas of the state's sounds, showing areas susceptible to flooding, and mapping zones in which marsh-grass plantings might help control erosion.

Knowles and Weisberg are also rigging equipment for the ocean, trying to determine what effect the Gulf Stream has on the state's wave climate. In the

past, standard wave-prediction formulas were applied to problems like erosion, pollution and marine construction. But these models didn't adequately take into account the Gulf Stream, which Knowles and Weisberg suspect may weaken or otherwise alter wave energy off North Carolina. The new data will be useful to communities trying to solve coastal problems and will help them develop more effective plans for the management of their resources.

## Currents

As Knowles and Weisberg are studying the ocean's surface, Tom Curtin and Yates Sorrell are looking under the waves to find out what's happening with underwater currents. Curtin and Sorrell, both of NCSU, have built and lab-tested an electro-magnetic sensor that they believe will help them measure and record movements of sea water near the shore. The researchers expect to launch a working model near Duck this winter. If it survives rough seas, they will float three or four in the water and begin collecting data this spring or summer. The researchers believe the data will help scientists and engineers track pollution, understand the mixing of nutrients in the currents, and design better marine structures.

## ORVs

For those who use off-road vehicles

to follow the fish, or just to let off steam, North Carolina's coastal terrain has been almost irresistible. But as the traffic multiplies, so does public concern: from opponents, who feel ORVs are defacing the landscape, and from supporters, who resent having their driving restricted.

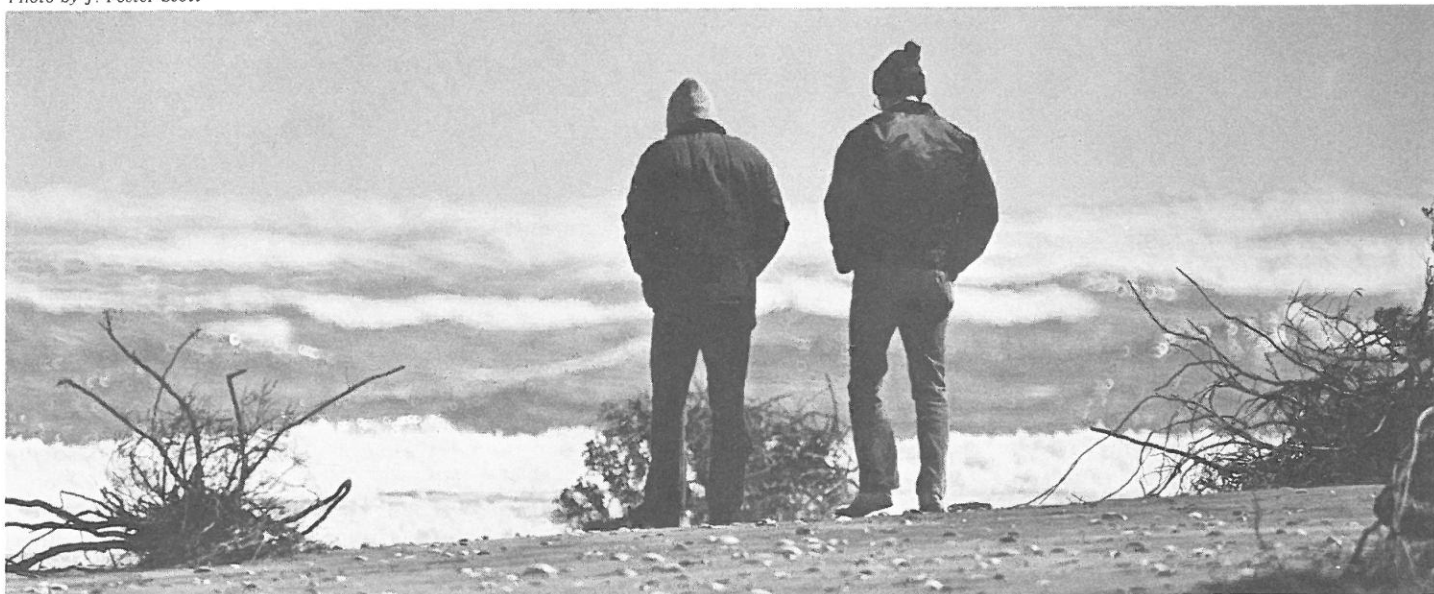
As the debate roars on, Sea Grant's Paul Hosier, of the University of North Carolina at Wilmington, has been carefully studying the beaches for hard evidence to show exactly what effect ORVs have on the coast.

Hosier has found that ORV traffic can indeed strip vegetation from dunes, marshes and grasslands. Just a few passes from a vehicle can kill grasses that need years to recover. And, as ground is bared and compacted, damage continues to underground stems and roots. All this can spell erosion.

In 1980, Hosier will continue to measure the impact of ORVs at test sites in Nags Head and at two national seashores, Cape Hatteras and Cape Lookout. He will also try to identify ways drivers and communities might keep ORV damage to a minimum.

Off-road driving is not the only sort of recreation booming in North Carolina. Sport and tournament fishing attract thousands to the state's coast each year. But little is known about the recreational fishermen and their sport: Where are they from? How much do they spend on a fishing trip? What do they do with their catches?

Photo by J. Foster Scott



Visitors pick their way through debris on a beach near Oregon Inlet, where, in 1979, heavy winter seas eroded shorelines, stranding uprooted vegetation

Where do they like to fish?

East Carolina University sociologist Peter Fricke has surveyed fishermen to find answers to these and other questions. Fricke completed his surveys in 1979, and expects to analyze the responses this year. The results, he believes, will help communities plan for the yearly stampede of recreational fishermen.

## Pollution

As commercial and private development have continued to increase along the North Carolina coast, so has the problem of wastewater pollution in estuarine and near-shore waters. Shellfish such as oysters and clams are retaining bacteria and disease-causing enteric viruses from these contaminated waters. Twenty percent of the state's shellfish harvesting grounds have already been closed due to contamination.

Sea Grant researcher Mark Sobsey of UNC at Chapel Hill again will be studying contaminated shellfish. Last year Sobsey examined the rates at which the shellfish cleansed themselves of bacteria and viruses at varying temperatures. This year in a new project, Sobsey wants to find out in which body tissues and organs the contaminants settle, exactly how the shellfish purge themselves, and what causes the cleansing rate to vary with temperature. His studies will aid state shellfish sanitation officials in establishing standards for shellfish relay systems and in determining more reliable ways to evaluate shellfish quality.

## Alternatives

To get to the heart of the contamination problem, wastewater pollution, Bobby Carlile of NCSU is continuing his work with alternative wastewater disposal systems for North Carolina. More than 200 of the alternative systems already designed by Carlile have been installed in 12 of the 20 coastal counties. Some counties are now using these systems exclusively to allow some development to continue. This year Carlile plans to continue his work on the alternative systems, but his main emphasis will be modifying conventional septic tank systems so that they can be adapted to the loose sandy soil and high water tables of the coastal plain.

# Aquaculture May Flourish

*This is the second of two columns dealing with new developments in aquaculture.*

Though the word aquaculture is still new to most science has been around for a long time. As far as century B.C., Chinese philosopher Fan-li was ? carp in man-made ponds — not so very different done on parts of Lake Norman and in small country today.

Aquaculture development depends economy. In countries where land is so scant, it can quickly become important. North Carolina Sea Grant College, aquaculture industry and vital protein producer much of the more exotic seafood

# New Package Could Boost Fish Industry

RALEIGH — All that's separating North Carolina's fishing industry from a new multimillion dollar market may be a thin piece of plastic, according to a North Carolina State University researcher. Dr. Tyre C. Lanier, an NCSU food scientist, sees packaging sently under way at

In the past, when the state's seafood industry set about dividing the fishes, the "trash fish" quite often outweighed the keepers.

Every year, for instance, thousands of pounds of edible, but relatively unpopular, croaker, spot and mullet bring low prices at North Carolina's docks.

So for the past two years, NCSU food scientists Don Hamann, Tyre Lanier and Frank Thomas have been experimenting with new ways to use the minced meat from these fish. They want to determine the binding property of the fish. Binding ability affects the texture of any final product and is an important consideration for commercial companies.

As a by-product of their work, the researchers have come up with several products, including smoked salad bits, smoked sausages, luncheon meats and a shrimp-croaker product.

During 1980, the researchers will concentrate on work with surimi—washed, minced fish. Surimi is used extensively in Japan as a base for fish products. The researchers hope they can create similar products which would appeal to the American appetite. Their ultimate aim is to stimulate the development of a seafood industry in the South based on minced fish and surimi.

In a related research project begun in 1979, Lanier and Thomas are exploring other ways of boosting the seafood industry. They have found that many inland markets are closed to seafood distributors because most North Carolina processors package only fresh iced fish, which can't be shipped far or stored long.

Lanier and Thomas think that freezing fish is one solution to the problem. This year they will continue market-testing a variety of wrapping and packaging techniques to see which are the most appealing to North Carolina consumers.

## Aquaculture

As early as the Fifth Century B.C., the Chinese were experimenting with aquaculture.

In the United States, aquaculture is still an infant industry, producing mainly specialty foods. One specialty food, for which there is a big demand in the Orient and Europe, is the eel. Since 1975 UNC Sea Grant has funded research on methods of culturing the American eel.

Early last year the eel farm moved to expanded facilities on the shores of the Pamlico River near Aurora. During 1980, the researchers, headed by Sea Grant associate director Bill Rickards, will continue to offer advice and information to other eel culture operations.

Next door to the eel farm, two NCSU fisheries biologists are working on another type of aquaculture project. Using tanks and grow-out ponds similar to those at the eel farm, Howard Kerby and Mel Huish are experimenting with raising hybrids from striped bass X white bass and striped bass X white perch.

The researchers are interested in the hybrids as food fish. In the wild, striped bass populations are waning, and scientists have been unable to raise this delectable fish under culture

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conditions. Kerby and Huish believe that the more vigorous hybrids will thrive in aquaculture. And, they report, the hybrids are just as good to eat as the popular striped bass.

### Better tests

*Vibrio parahaemolyticus* is the big name for one little bacterium that has microbiologists baffled. Through Sea Grant studies begun in 1978, NCSU food scientists Bibekananda Ray and Marvin Speck found that vibrio is the most prevalent bacterium in North Carolina seafoods. The researchers are skeptical about the accuracy of standard tests which show that most of the *Vibrio parahaemolyticus* are non-pathogenic. This year Ray will head a new project designed to formulate a simple, sensitive test which will distinguish between the two strains.

### Management

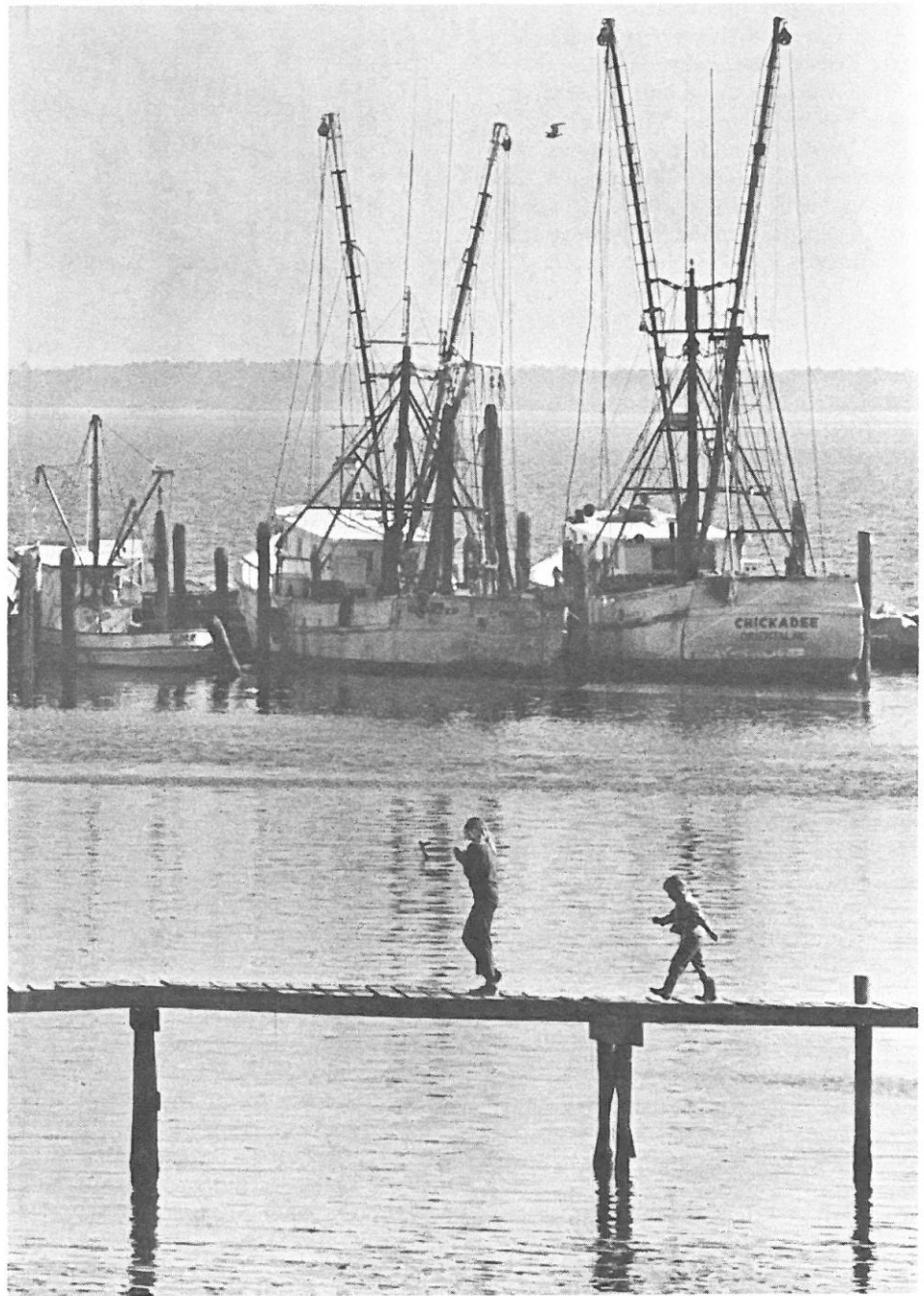
Last year's shrimp harvest of 2.7 to 2.8 million pounds was a "fair" catch after the worst harvest on record in 1978, 1.8 million pounds. But the 1979 harvest was nothing like the catches of years past, which were often 4 million to 5 million pounds.

Officials are hoping that better management policies can put the shrimp fishery back on an even keel. Researcher George Fishman of UNC-CH is developing a numerical model that will help management agencies predict the economic and biological effects of differing shrimp management policies on shrimp and other fishes. The model will be based on the biology and behavior of shrimp as well as the geographic, social and economic aspects of the North Carolina fishery.

### Spot, croaker

Another researcher, John Miller of NCSU, is also working toward better fishery management policies. Miller is studying juvenile spot and croaker in their estuary nurseries to see which seasonal, environmental and biological factors most affect their abundance. So far, Miller has found that both spot and croaker rely largely on zooplankton for food. Besides a common diet, croaker and spot also seem to share habitats. But Miller wants to know what biological or environmental

Photo by Steve Murray



*Marching as if to a fisherman's tune, two children cross a weathered footbridge at Oriental*

factors separate them and what causes their abundance to vary. By discovering these differences, officials will know how nursery management policies might affect spot and croaker and other species as well.

While researchers are grappling with some of the long-range concerns of the state's fishing industry, fishermen are struggling to adapt to shortages, new gear, rising fuel costs and increased competition.

To help them keep up, Sea Grant,

working with Jim McGee of the Division of Continuing Education at ECU, is conducting courses designed specifically for fishermen. Wayne Wescott, who is coordinating the courses, has asked fishermen what they need to know, and, in response to their ideas, has conducted classes in everything from boat maintenance to financing.

Plans for 1980 include classes in electronics, safety in cold water, and survival equipment.

# 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 and workshops, and new publications. For more information on any of the projects described, contact the Sea Grant office in Raleigh (919/737-2454).



To many inland city-dwellers, oysters are just things that come ready-to-eat in a carton. Coastal folks know differently. Lundie Mauldin, Sea Grant's marine education specialist, believes it's time people took some notice of the valuable oyster, which has been beleaguered of late by overfishing and pollution.

During a program called "The World of the Oyster," held Jan. 22 at the North Carolina State Museum of Natural History in Raleigh, Mauldin showed a crowd how to crack open both the shells and the secrets of the delectable shellfish. The group discussed the oyster's life history, its economic importance, its physiology and its place in coastal ecology.

Mauldin told the group that the oyster begins its life swimming, but that soon its steadily enlarging shell weights the oyster and sinks it to the bottom. If the oyster finds something solid there, it latches on and sets up housekeeping. But if it falls on sand or silt, it dies.

Mauldin also explained that an oyster can change from male to female during the course of its life. And, because oysters feed indiscriminately on plankton and other suspended matter they filter from the water, scientists can find in the oysters' bodies evidence of any pollution in their habitats.

But when the classwork was over, the group got down to what Mauldin calls "the meat of the matter": a steaming bowl of oyster stew.



If you spend any time on the water this winter, the Coast Guard has a message for you: cold water is a killer. No matter how well you swim, you'll lose body heat at an alarming rate in water less than 70°F. This heat loss, called hypothermia, can lead to death. Off the coast of North Carolina, water temperatures average less than 70°F more than half the year.

Fortunately, there are some things you can do to improve your chances for survival if you end up in cold water. The Coast Guard is conducting a series of workshops designed to teach cold water survival techniques. The workshops are aimed at boaters, commercial fishermen, waterfowl hunters, sport fishermen, emergency service personnel and others who spend time on the water.

Saturday, February 16, the Coast Guard will conduct a workshop in Manteo. Co-sponsored by UNC Sea Grant, the workshop will be held from 9 a.m. until 4 p.m. at the Old Nags Head Cove Recreation Center. Members of the Coast Guard Boating Safety Team will demonstrate the use of cold water survival suits, heat conserving postures and personal flotation devices.

The workshop is open to the public free of charge, but advance registration is required. Call the N.C. Marine Resources Center on Roanoke Island, (919) 473-3937.



The weather. Often, a fisherman's livelihood, not to mention his safety, depends on knowing exactly what the elements are up to. But many fishermen complain that the weather reports they get are designed for the public, and are too general for the fisherman's needs. Many would like regular, up-to-date data on weather systems at sea, the location of warm and cold currents,

sea-surface temperatures and more. With better information, fishermen believe they could avoid foul weather and find the best fishing spots.

This year, Sea Grant is funding a study of the fishing industry's need for weather information. Jerry M. Davis, as associate professor of climatology at North Carolina State University, will ask fishermen what their needs are, study the sources of information available, and formulate ways to put the two in closer contact.

Davis believes that fishermen could benefit from a custom service like the "Green Thumb" weather program on which farmers rely.



*Cold Water Drowning: A New Lease on Life* presents medical findings indicating that drowning victims may be saved in spite of long submergence, particularly if the water is cold. The illustrated brochure also describes resuscitation techniques. Published by the Michigan Sea Grant Program and the U.S. Coast Guard, the brochure is available free from UNC Sea Grant.

*Rip Currents*, an 11" X 28½" color poster, explains what causes the dangerous currents, how to spot them, and what to do if you get caught in one. For a free copy of the poster, write UNC Sea Grant.

*Sea Grant Publications*, an illustrated brochure, provides a brief description of all the general-interest publications offered by the UNC Sea Grant program from 1972 to October, 1979. The brochure also includes an order form that can be used for requesting the listed publications. For a copy of this brochure or any publication listed in the Back Page this month, write UNC Sea Grant, P.O. Box 5001, Raleigh, N.C. 27650.

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**North Carolina Marine Education Manuals** are designed to help middle grade educators increase the coastal awareness of their students. The

manuals were designed by public school teachers and university professors for classroom use. They provide experiments, facts about the North Carolina coast, and references for further information.

**UNC-SG-78-14-A Unit One, Coastal Geology** describes the origin, dynamics and structure of the state's barrier islands and estuaries.

**UNC-SG-78-14-B Unit Two, Seawater** explains tides, waves and seawater chemistry.

**UNC-SG-78-14-C Unit Three, Coastal Ecology** describes marine habitats, adaptations sea creatures make to their environment, and a food chain.

**UNC-SG-78-14-D Appendices** provides information for constructing a marine aquarium, resources for films and magazines and a field trip guide to coastal North Carolina.

**UNC-SG-78-14-E Unit Four, Coastal Beginnings** explains the early cultures of North Carolina from the pre-colonial Indians to the first coastal communities.

North Carolina educators may receive a single copy of each manual free of charge. Prices for out-of-state requests range from \$1 to \$2 per unit.

Lundie Mauldin is available to introduce these manuals and the subject of marine education at teacher workshops on a county-wide basis.



If you own a marina on the Pamlico River, you may have more in common with the guy who owns a marina at Wrightsville Beach than you think. What's more,

you may be able to share ideas for improving your businesses.

That's the kind of thinking that recently motivated a group of coastal marina operators to form the North Carolina Marina Association. The marina operators have been working with Sea Grant's recreational specialist, Leon Abbas, who is familiar with similar trade associations in other states.

The fledgling organization will get its official christening at a conference for marina operators scheduled for February 28 and 29 at the McKimmon Center on the North Carolina State University campus in Raleigh.

For more information on the conference, contact Leon Abbas at the Sea Grant headquarters in Raleigh, (919) 737-2454.

## I want Coastwatch

*Coastwatch* is a free newsletter. If you'd like to be added to the mailing list, fill out this form and send it to Sea Grant, Box 5001, Raleigh, N.C. 27650.

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