UNIVERSITY OF NORTH CAROLINA
SEA GRANT COLLEGE
NEWSLETTER

January, 1979

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Sea Grant '79

Come summertime, the populations of three major North Carolina beach resort areas increase a whopping 142 percent. Increases such as these along our shores bring dollars into the local economy—travelers spent an estimated $168 million in the coastal counties in 1977. But those travelers also bring problems. The very beaches, sounds and marshes that attract them must be protected from the effects of increased development, such as sewage overloads.

Though the quantity of fish being caught in North Carolina waters has increased in recent years—in 1977, seafoods brought $28.4 million at the dock—so have food needs. In the United States, the need for more food taxes stocks of popular fish while less well-known species are not sought out. On top of that, fish are affected by man-induced changes in the environment.

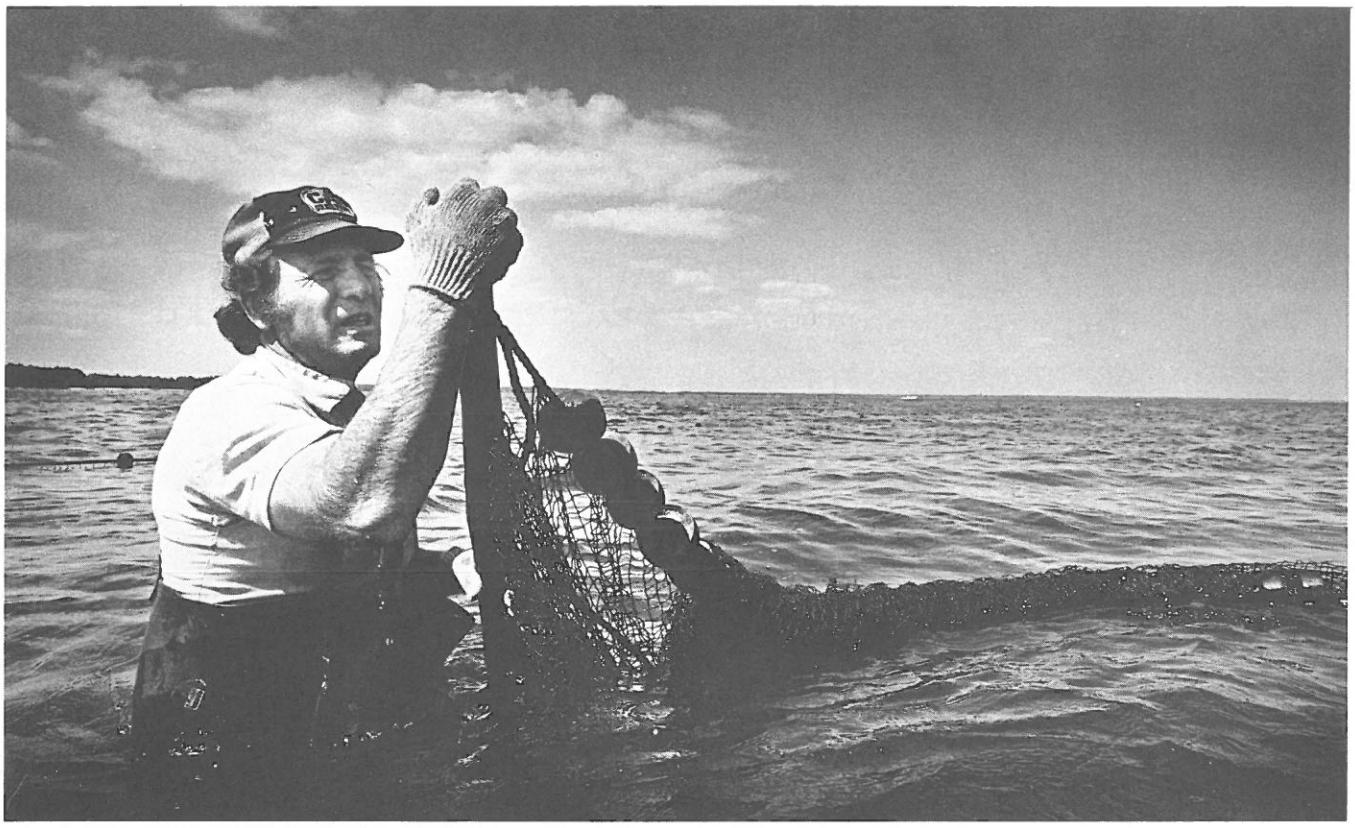
North Carolina's coast has much to offer and the demands on it are many. But its use must be tempered with an understanding of the fragile environment. To assist in the wise development of coastal resources, the University of North Carolina Sea Grant College Program this year is supporting 20 coastal research projects, four marine education programs, and 13 advisory agents and specialists.

Researchers this year are investigating the possibilities for new seafood products, improved sewage disposal, seafood safety and packaging, fish management, the impact of off-road vehicles on sand dunes, coastal storm hazard areas and much, much more.

Advisory personnel are working with the charter boat industry, recreational and commercial fishermen, seafood processors and coastal landowners.

A $1.4 million grant from federal and state government supports the program. Researchers are located at the University of North Carolina at Wilmington (UNC-W), East Carolina University (ECU) in Greenville, North Carolina State University (NCSU) in Raleigh and the University of North Carolina at Chapel Hill (UNC-CH). Advisory agents are located in the state's three coastal Marine Resources Centers, in Morehead City and in Raleigh.

What follows is a brief description of our program for 1979. For more information, contact the individuals named or the Sea Grant office in Raleigh (see Sea Hunt?, page 8).



Food from the sea

North Carolina's seafood industry has come a long way in recent years. In 1977 it was a $161 million business. But, as any fisherman can tell you, there's still room for improvement. Six Sea Grant-supported food from the sea projects are lending a hand this year.

Right now new markets hold the promise of expansion for the industry. Recent studies show that consumers in inland areas would buy large quantities of fresh and frozen seafoods if they could get consistently good products. But because seafoods are highly perishable, transportation over long distances has been a problem. This year food scientists Tyre Lanier, Frank Thomas and economist Ed Leonard of NCSU are working on methods to determine the quality of fish and predict its shelf life. They will then develop packaging designed to protect the fish during shipment, prolong shelf life, and improve attractiveness to the consumer.

About 15 million pounds of croaker were caught off North Carolina in 1977. Though croaker is an excellent source of protein, most of the catch was ground into pet food and fertilizer. Food scientists Don Hamann, Frank Thomas and Tyre Lanier of NCSU think the protein could be put to better use. For the past two years, they've been working on products that are appealing to the consumer. So far they have developed a luncheon loaf, a wiener product, fish jerky, spreads and dips. This year they are trying to identify and eliminate the handling and processing practices that lead to poor texture of croaker meat.

Before any of the new products can be commercially produced and marketed, there's one important question that must be answered: how long can the fresh or frozen products be stored safely? Hamann and his associates would prefer to produce products without using artificial preservatives. In that case, shelf life depends largely upon the types of bacteria present and how fast they reproduce. This year NCSU food scientists Marvin Speck and Bibek Ray will be doing bacteriological studies on the new products.

Speck and Ray also have received funding for another project which could have important repercussions in the seafood industry. They are trying to develop a test to differentiate between pathogenic and non-pathogenic bacteria in seafoods. There's evidence that the standard tests being used to determine the safety of shellfish aren't entirely reliable. The scientists are looking at two types of bacteria which have been known to cause outbreaks of food poisoning: *Vibrio parahaemolyticus* and *Vibrio cholera.*

Aquaculture is one way of making better use of the ocean's resources. For the past five years Sea Grant has funded an experimental eel farm near New Bern. Researchers have raised American eels which are acceptable to connoisseurs in Japan, where the eel is considered a delicacy. This year the operation is moving to bigger and better facilities at ECU's Coastal Resources Center near Aurora. Sea Grant's associate

director Bill Rickards and technicians John Foster and Jack McCauley are continuing experiments with nutrition and pond production dynamics. The farm is a demonstration project and is open to the public. For an appointment or more information, call 737-2454 in Raleigh.

NCSU fisheries biologists Howard Kerby and Mel Huish plan to run another type of aquaculture experiment at Aurora this year. They will crossbreed striped bass with white bass and white perch. It's a known fact that certain hybrids can improve fish stocks, but so far no one has experimented on a large scale with these particular hybrids. If successful, their work could be the beginning of a new type of commercial aquaculture.

Sometimes tradition is a casualty in the march of progress. Harker's Island, for instance, is one of North Carolina's oldest traditional fishing and boat building communities. But increased tourism in recent years has begun to radically affect this little island. Anthropologist Marcus Hepburn has been living on the island for the past year, studying the social organization, labor attitudes and general way of life of the islanders. Anthropologists Jim Sabella and Richard Dixon and political scientist Roger Lowery of UNC-W hope that a better understanding of this community will help open channels of communication between the islanders and the management agencies which affect them.

Coastal studies

North Carolina's coast is a changing, dynamic place. While the dunes, beaches and sounds have the look of permanence, they are always changing. Sand grains shift and accumulate in one place one year and in another the next. Inlets open, close, or simply wander. The constant battering of winds and waves shapes the coast. Sea level is rising and in some areas land is subsiding. The mainland gradually is being gobbled up while the barrier islands move westward.

In the midst of all that impermanence, man has pitched his tent and imposed his boundaries. Homes and businesses continue to spread across the coast. Tourists flock in. Fishermen continue to ply the waters. The demands on the coast are many. While man and science can't tame nature, there are ways to live in greater harmony with the dynamic coastal environment. To help learn how, Sea Grant is funding five research projects in coastal studies this year.

Vegetation plays a crucial role in stabilizing the coast. Where grasses grow, sand is trapped and accumulates. This year, Sea Grant-supported researchers are taking a look at two areas where the grasses are important.

In recent years, NCSU botanists have established that marsh grasses can in some cases be used to slow and even reverse estuarine shoreline erosion. This year Ernie Seneca, Steve Broome and oceanographer Ernie Knowles are continuing their efforts to determine just where and under what conditions the grasses can take hold and work. The information will be provided to homeowners, county agents and Sea Grant advisory agents.

Just as the marsh grasses play a crucial role in estuarine stabilization, other grasses protect beach sand dunes. Where those grasses are destroyed, dunes—and nearby development— are more susceptible to the destructive forces of nature. In preliminary studies last year, biologists at UNC-W learned that steady traffic from off-road vehicles (ORVs) on the dunes depletes grass supplies. Paul Hosier and Tom Eaton found that in one study area the ORVs kept the sand so churned up that only half as many grass species were present. They also found that the grassy area behind dunes usually was destroyed.

This year Hosier and Eaton are continuing their studies of ORV impacts on the beach-dune environment. In addition to the grasses, they are studying beach profile changes, overwash, sand transport and intertidal organisms. The information will be provided to federal, state and local officials charged with management of the more than 300 miles of beach in North Carolina.

Grasses of course provide little protection from the severe storms which strike our coast. For example a

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Off-road vehicles leave their mark

100-year storm, such as Hurricane Hazel, has the capacity to flood coastal North Carolina up to an elevation of about 11 feet, according to coastal engineer Jerry Machemehl of NCSU. Machemehl is continuing work this year to map the coastal areas susceptible to flooding and wind damage from storms of varying intensities. In addition, Machemehl will spell out safe construction features for the coastal area. This information, along with maps delineating the hazard areas, will be published for the public this year.

Currents and waves affect everything from erosion to offshore dumping of sewage. In recent years researchers have concentrated on the currents and waves well off North Carolina's shore. There is, however, much to be learned about the nearshore area of the ocean. Two groups of researchers are beginning work this year to better define and predict what's happening with waves and currents in the nearshore ocean—from the surf up to 20 kilometers offshore.

At NCSU oceanographers Ernie Knowles and Bob Weisberg are analyzing data on waves to predict nearshore ocean conditions in response to such factors as storms. That information should be of use to fishermen as well as coastal engineers.

But in order to assess the mass movements of water in the nearshore area, new instruments must be developed. Oceanographer Tom Curtin and engineer Yates Sorrell of NCSU this year are attempting to develop an inexpensive device to measure more accurately nearshore currents. Experiments will be carried out off Nags Head to test the instrumentation. Once the devices are developed, it will be possible to calculate the transport and mixing of any pollutant discharged into or entering a region. The device will be useful to communities considering ocean outfall of treated sewage.

Carolina Beach a month after Hurricane Hazel

Estuarine studies

Estuaries, by definition, are mixing zones, where ocean water meets fresh water. But they also are among the most biologically productive areas on the coast. They provide nursery grounds for countless species of fish and shellfish, sinks for runoff from the mainland and buffers against the torrents of coastal storms. In North Carolina there are more than two million acres of estuarine water, making the state's coast one of the most unique in the nation.

Unfortunately like many important natural systems, estuaries also are very vulnerable to the effects of pollution. Last year nearly a fourth of the state's shellfishing waters were closed due to pollution, much of it a result of man's activities. Translated into dollars and cents, such closures can mean tremendous economic loss.

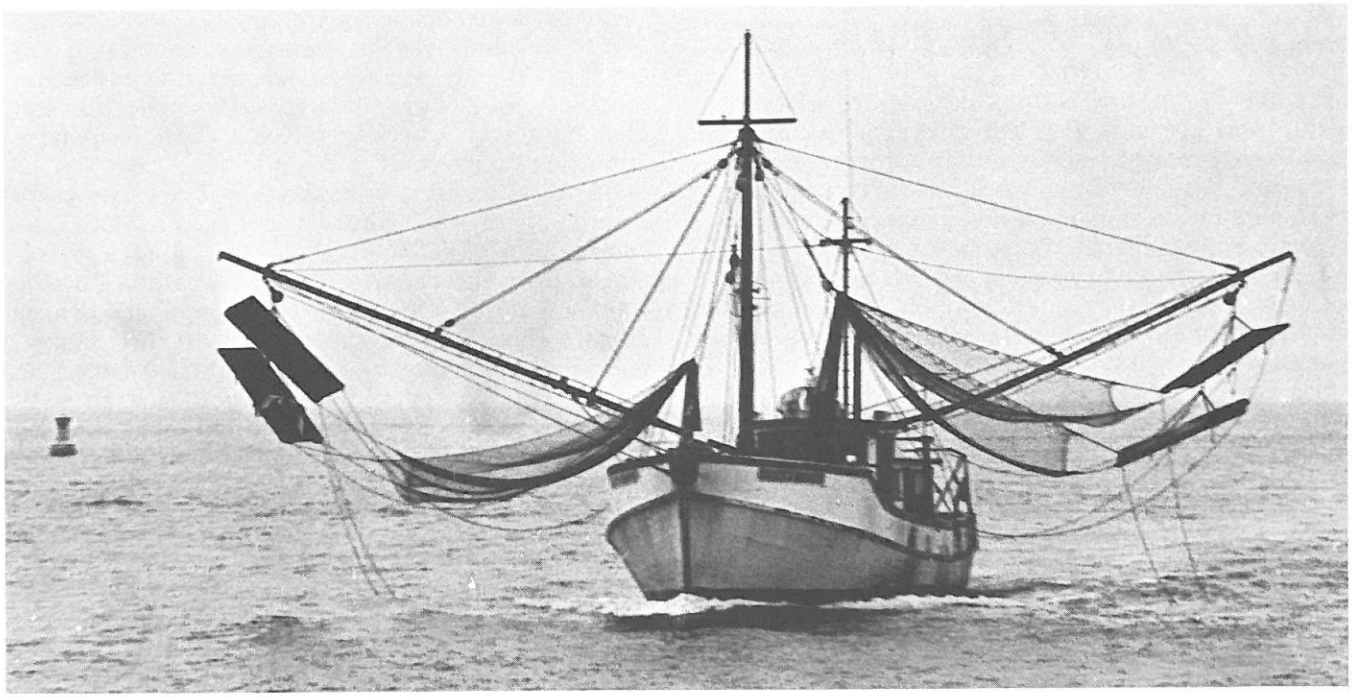
This year Sea Grant is funding eight research projects dealing with the state's estuarine resources. Taken together, these projects will help provide a clearer understanding of the estuarine environment and how it can be protected from unwise use.

Results of a Sea Grant study started several years ago by soil scientist Bobby Carlile of NCSU are already helping. Two alternative septic waste disposal systems designed by Carlile have made safe development possible in coastal areas such as Hyde County where nearly 90 percent of the soils are unsuitable for conventional septic systems. This year Carlile is continuing his work with the new systems. He's looking at ways to rejuvenate failing conventional systems and plans to devise a formula for predicting how well different soil types can handle disposal loads.

The effects of pollution aren't limited to water quality. Pollution affects the quality and safety of shellfish as well. In earlier studies microbiologist Mark Sobsey of UNC-CH found that bacterial standards used in testing shellfish quality weren't adequate for detecting viral contamination. Now he wants to find out what sort of relationship exists between sewage contamination and virus levels in shellfish and surrounding waters and sediments. Ultimately that information may make it possible for health authorities to establish shellfish standards based on enteric virus levels. Sobsey also will be testing methods for removing viruses and bacteria in shellfish taken from polluted waters by transferring or "relaying" them to clean waters.

Like Sobsey, microbiologists, Barney Kane and Donald Jeffreys of ECU have found that bacterial standards are not always the best measure of shellfish quality. In the case of the brackish water Rangia clam, they found that the clam has a naturally high level of harmless bacteria. In the past the high bacterial content has kept the clam from being marketed.

Now the researchers think the clam is safe enough to market from a bacteriological standpoint but they worry about problems with taste. Though harmless, the bacteria in the clam give it a "musty" flavor.



Shrimp boats bring in the state's most valuable seafood crop

Kane and Jeffreys are hoping to find ways to reduce the bacterial content of the Rangia and improve its taste, shelf life and overall marketability.

Scientists already know that estuaries are important as nursery grounds. It's there that many larval and juvenile forms of fish grow and develop into adults before returning to the sea. But how do seasonal and environmental variations affect the role of the estuary as a nursery? Biologist John Miller of NCSU hopes to begin answering at least part of that question. This year Miller is looking at the seasonal abundance of croaker, spot and related fish in the Pamlico River estuary and how their distribution relates to such environmental factors as depth and vegetation.

In some cases weather can be the critical factor in fish survival. Last year a deadly combination of a cold winter and wet spring nearly decimated North Carolina's shrimp fishery. Total catches were down by nearly two-thirds from previous years.

Despite the disastrous season, shrimp continues to be the state's most valuable seafood crop. And as the stakes get higher, so do the fishing pressures. But deciding how to manage this valuable resource isn't easy. For example, premature opening of the fishing seasons can spell disaster. Biostatistician George Fishman of UNC-CH believes that it is possible to predict both the biologic and economic effects of various shrimp management policies. Fishman is developing a prediction model that will help resource agencies in North Carolina and elsewhere make better management decisions. The model will take into account the biology and behavior of shrimp as well as the geographic, social and economic character of the North Carolina fishery.

There are 23 species of colonial waterbirds that nest in North Carolina. For most people these birds are simply fun to watch and photograph. But for biologists they have a very special meaning. Their population reflects the overall health of the environment because they frequently are at the top of food chains. For several years Jim Parnell of UNC-W and Bob Soots of Campbell College have been studying North Carolina's waterbirds.

They've found that under the proper conditions, man-made dredge spoil islands can provide ideal nesting habitat for birds. And as more and more natural areas are destroyed, these man-made sites become more important. This year Parnell and Soots are evaluating various techniques for creating and improving nesting habitat. Eventually they hope to develop a model for the management of colonial waterbirds in North Carolina estuaries.

Pamlico Sound is virtually synonymous with North Carolina's estuaries. But despite it's importance, relatively little is known about the sound, its circulation patterns or its responses to atmospheric conditions. This year oceanographers Bob Weisberg, Len Pietrafesa and Jerry Janowitz of NCSU are continuing physical studies of Pamlico Sound started last year. Information collected in their study will be used for predicting storm surge, flooding and erosion patterns along the sound as well as the movement of sediments and contaminants.

Recreational fishing is one of the most popular pastimes along North Carolina's coast. Ironically little is known about the fishery, who is involved in it, how it affects local economies or even its impact on commercially important fish species. This year sociologist Peter Fricke of ECU is examining some of these questions. Through a series of surveys and interviews he hopes to find out such things as the social characteristics of the recreational fisherman and how much money is spent on an average fishing trip. What he finds out will be valuable to coastal resource management agencies.

Advisory services

It's the job of Sea Grant's network of advisory agents and specialists to see that the results of research are made available to those who need them the most. Whether there's a landowner struggling with shoreline erosion or a seafood processor plagued by sanitation problems, it's up to the advisory agent to field the questions and come up with the answers.

Of course answers don't always exist. Then it's also up to the agent to suggest areas where more research is needed.

Sea Grant advisory agents and specialists work in marine fisheries, recreation, seafood processing, coastal engineering and marine education. Some agents are located at the North Carolina Marine Resources Centers on Roanoke Island, Bogue Banks and Fort Fisher. Others are at the NCSU Seafood Lab in Morehead City, the Sea Grant eel farm near Aurora, and on the NCSU campus in the Sea Grant office.

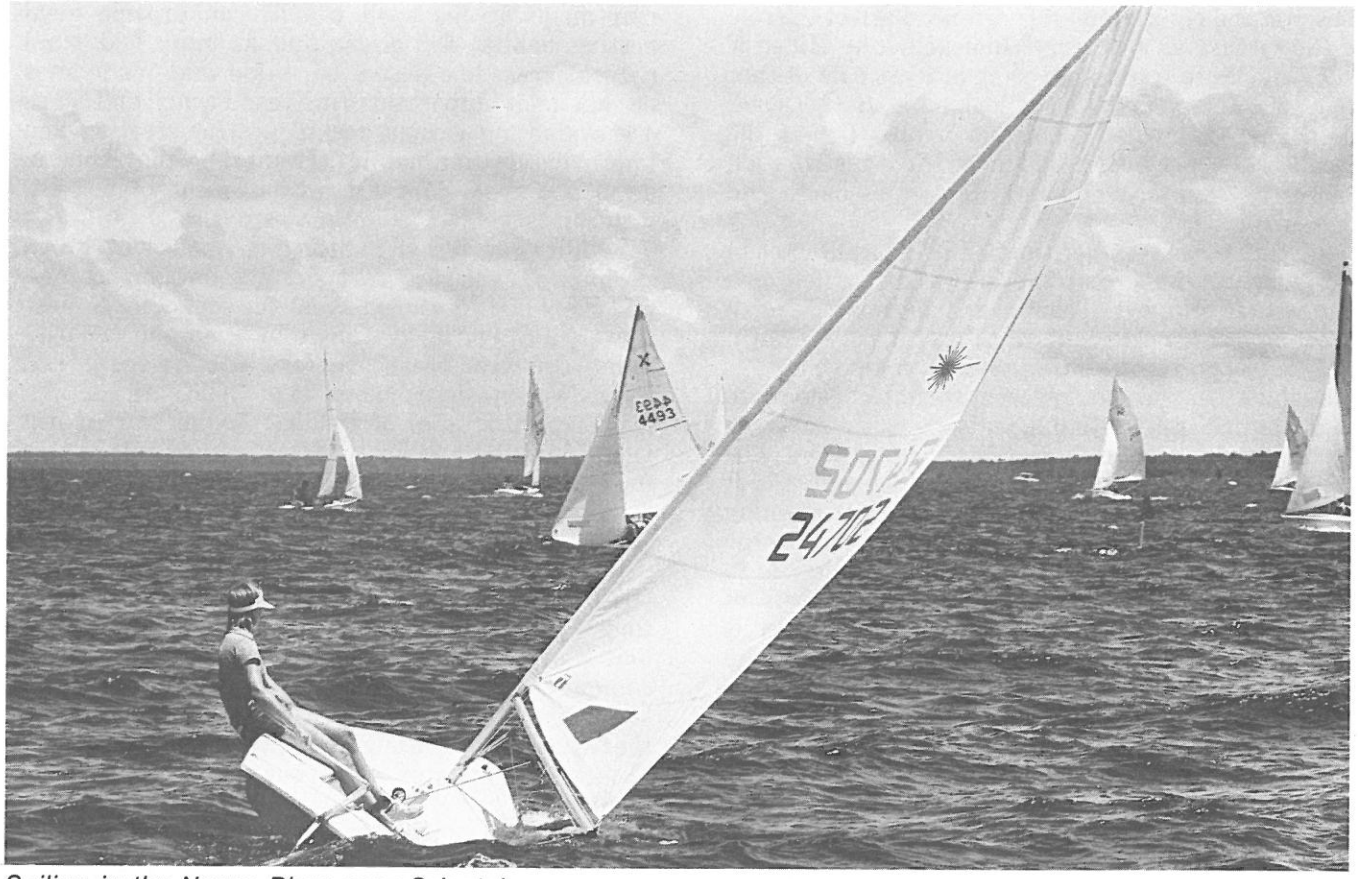
For more information on the activities of Sea Grant's advisory services, contact the individuals listed below.

Though 20 of the state's 100 counties front the ocean or sounds and thousands of North Carolinians flock to the beaches, little emphasis has been placed on marine education until recently. In response to growing interest across the state, specialist **Lundie Mauldin** (NCSU, 737-2454) is now working with public school teachers, the University system and the North Carolina Marine Resources Centers to encourage the development of marine education statewide. One of her projects is the publication and distribution of a series of North Carolina marine education manuals.

All too often nature's whims take coastal property owners by surprise. Erosion lops off chunks of estuarine backyards, bulkheads crumble, beach houses suffer from the ravages of harsh weather. To give folks a hand, coastal engineering specialist **Spencer Rogers** (N.C. Marine Resources Center/Ft. Fisher, 458-5780) is working with individual homeowners on coastal construction and erosion problems. In addition, this year he is working with the Coastal Resources Commission on rules and regulations governing coastal construction.

A growing part of the North Carolina coastal economy is tied up in one way or another with recreation—from boating to surfing, fishing and hang gliding. Often both the recreation businesses and the sportsmen could use some help. That's where economist and recreation specialist **Leon Abbas** (NCSU, 737-2454) comes in. This year Abbas plans a series of workshops for marina operators and charter boat owners. He'll also work closely with the sports fishing bait industry. And, moving inland, he'll sponsor a series of lectures on coastal recreation in populous sections of the state.

Four agents are located at the N.C. Marine Resources Centers. Though they have areas of



Sailing in the Neuse River near Oriental

specialization, they're all there to serve the coastal public in whatever way they can. **Dennis Regan** (N.C. Marine Resources Center/Roanoke Island, 473-3937) is located in one of the recreation hot-spots of the state. His specialities are marina operations, charter boats and tourism. In 1979 he plans to present a series of programs on recreational safety and coastal ecology. Regan also is continuing work with Dare County residents to establish an Outer Banks bike trail.

Hughes Tillett (N.C. Marine Resources Center/Roanoke Island 473-3937) is an old timer with Sea Grant. A native of Wanchese and a former commercial fisherman, he's a well known source of reliable information on fishing off the Outer Banks. This year Tillett is continuing to introduce local fishermen to new hydraulic and electric gear for small boats. And he'll work with folks interested in starting clam and oyster culture operations in all sections of the coast.

Skipper Crow (Marine Resources Center/Bogue Banks, 726-0125) is involved in the problems that concern fishermen too. But he also has a special interest in seeing that North Carolina seafood reaches new markets as far inland as the Midwest. This year he's continuing work started last year on the feasibility of marketing North Carolina skates and rays in Europe.

While he too works with commercial fishermen, **Jim Bahen** (N.C. Marine Resources Center/Ft. Fisher, 458-5498) also spends a good deal of time with sports fishermen. This year he plans bait rigging workshops and a film series on blue water fishing. For more commercial interests, Bahen is holding LORAN-C workshops, continuing work on gear development, such as new nets, and he's also experimenting with clam and oyster aquaculture.

From hosting workshops on fish preservation and developing new products to redesigning processing plants to improve energy conservation and lower production costs, the Seafood Lab is an important source of information on just about anything that involves seafood. This year the staff at the lab will be working more extensively with smoked fish and preparing a handbook on marine contaminants in seafood. The staff includes: **Dave Hill, Joyce Taylor, Sam Thomas** (NCSU Seafood Lab, Morehead City, 726-7341) and **Frank Thomas** (NCSU Food Science Department, 737-2956).

Education

Part of the job of making better use of coastal resources involves people and helping them to understand the marine environment. In the last few years, Sea Grant's education program has grown by leaps and bounds. This year, four major education projects are being supported in addition to a full-time marine education specialist (see Advisory services, previous page).

At NCSU, an option in marine education is being added to the graduate program in the Department of Mathematics and Science Education to meet the growing need for specialists in the field. Graduates of the program will be qualified to teach in community

colleges and technical institutes, serve as educational consultants or supervisors and/or demonstration teachers in elementary and secondary schools. The curriculum is being developed by science educators Norm Anderson and Ron Simpson.

Law students at UNC-CH are continuing this year to research legal problems concerning state and national needs in the management of ocean and coastal resources. The research began in conjunction with a Sea Grant-sponsored course, Ocean and Coastal Law, which now has been incorporated in the law school's curriculum. This year students are examining the state's permit letting program under the Coastal Area Management Act, federal/state consistency determinations in the coastal area of North Carolina, and legal constraints in aquaculture development. The students are supervised by UNC-CH law professor Tom Schoenbaum.

This year for the first time, Sea Grant is offering fellowships to both graduate and undergraduate students. Three graduate students will be supported in the University's marine science doctoral program. And five minority undergraduates will be given internships at campuses offering marine sciences. The program is administered through the Sea Grant office at NCSU. For details, call 737-2454.

Finally, a continuing education program for fishermen will provide on-the-spot training at technical schools, community colleges and the North Carolina Marine Resources Centers. Courses will be offered in business affairs, power systems, nets, marine electronics, navigation and marine refrigeration. Jim McGee of ECU's Division of Continuing Education is getting the program underway this year.

Sea Hunt?
See What?
Sea Grant?

In coastal and Great Lakes states Sea Grant folks are working for the wise use and protection of coastal and marine resources. Information on coastal questions and developments is shared in a nationwide network of 27 programs.

Sea Grant was created by Congress in 1966 along the lines of the tried and true land grant college concept. Federal funding is administered through the Department of Commerce, and, in North Carolina, funds are matched with money from the state Department of Administration through its Office of Marine Affairs. Funding is granted on an annual basis following proposal submission and review.

In North Carolina, Sea Grant got started in 1970. What began as a modest attempt at research has matured into a broad program of coastal research, advisory services and educational programs.

The North Carolina Sea Grant office is on the NCSU campus. The staff includes program director, B. J. Copeland, associate director Bill Rickards, secretaries Frances Holland, Lynda Blair and Elaine Murray. Down the hall, the three folks who bring you this newsletter and other publications hang out. They are Karen Jurgensen, Mary Day Mordecai and Jinny Worthington.

For more information on Sea Grant in North Carolina, write us at Box 5001, Raleigh, 27650. Or, if you like, stop by our office at 105 1911 Building on the NCSU campus. Our telephone number is (919) 737-2454.

Gimme...

The Newsletter

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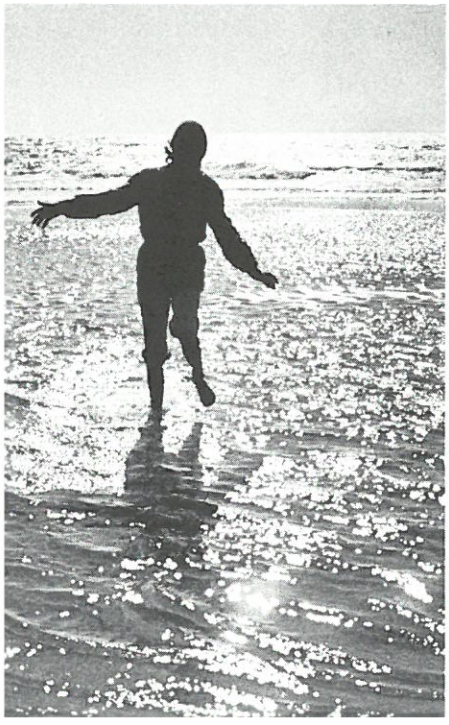

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