UNC Sea Grant

September, 1984

COASTWATCH

Photo by Joel Arrington

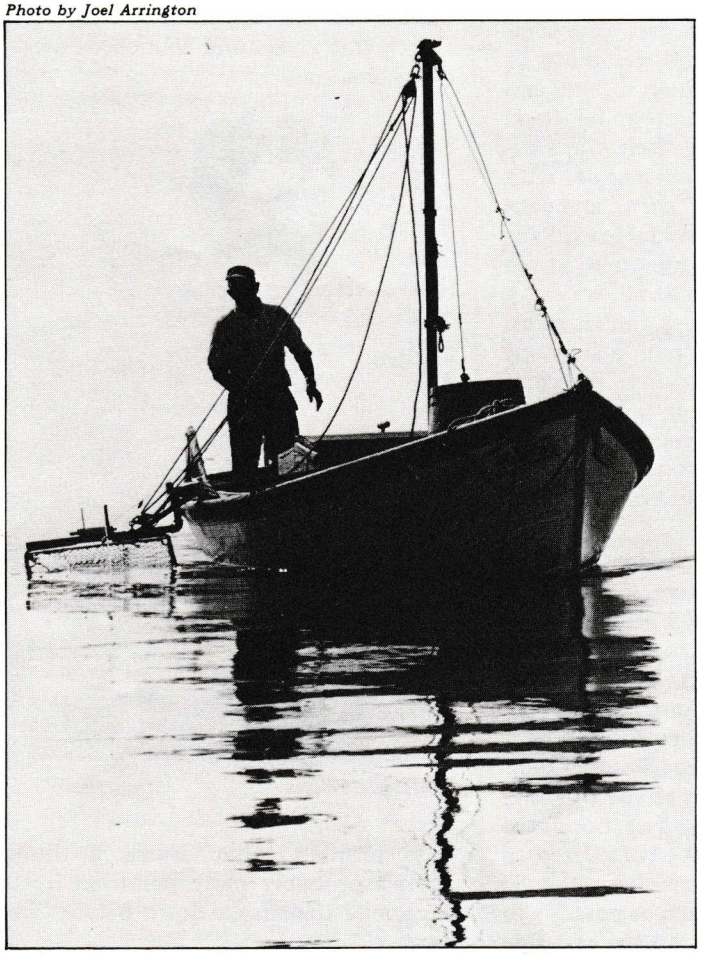

Photo from NCSU Agricultural Communications

Fishermen say runoff from farm fields may be affecting their catches

Water: a question of use

Like his father and grandfather before him, Dell Meekins fishes the waters of Pamlico Sound near Engelhard. He catches mostly croaker, but these days he doesn't always reach the dock with a full hold.

"Every year, there are less and less fish and smaller and smaller fish," says Meekins, a member of the Governor's Coastal Water Management Task Force. "Three or four years ago, we were catching as many large croaker as medium and small. But this year, I haven't even seen what I'd classify as a large croaker." (Meekins classifies a 3-pound croaker as large.)

To make matters worse, the smaller croaker bring a lower price in the market. Meekins says, "One time I had to quit working because they were so small."

Meekins isn't a biologist. But he knows that croaker and other commercially important species are dependent on the estuaries—estuaries he says are declining in quality. He thinks one of the culprits may be freshwater

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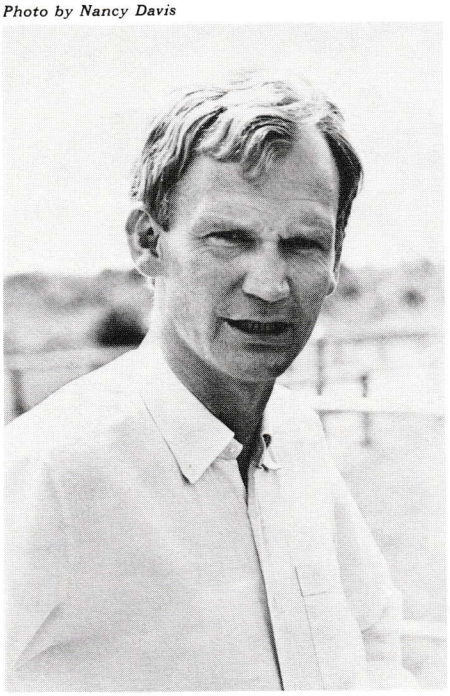
drainage from nearby farm fields. But he adds that it's not the only culprit.

Meekins scoffs at a view that portrays him and his fellow fishermen at odds with the farmers. Both realize there is a problem, he says. But he adds that it's going to take time and research before the finger, or fingers, of blame can be pointed.

"The fisheries are declining and we're passing the buck onto somebody else. Agriculture is part of it, but not all of it," says Meekins.

Meekins attributes some of his empty hauls to increased fishing pressure. "Twenty years ago we had 55-foot boats in Pamlico Sound. Now,

Photo by Nancy Davis



Uli Bennewitz

that's a small trawler. We're capable of catching so much more these days. We can't put all the blame on the farmers."

Add to that an increase in the number of fishermen, both recreational and commercial, says Meekins. While the statewide catches may be up, the catch must be divided among more fishermen.

Stumpy Point fisherman Fran Altman agrees with Meekins. "There are so many more boats and more people fishing now. The slice of the pie has just gotten smaller," says Altman, also a member of the Governor's Coastal Water Management Task Force.

While Altman says land drainage is probably not the only cause for his smaller catches, he does think it's a contributing factor. "It has to be affecting our fishing, but it's certainly not the only villain."

Meekins says he'd like to see stricter controls and regulations placed on the fishing industry and more research to see if the theory of freshwater drainage is founded. He thinks that the drainage affects the estuary during the crucial spring months when juvenile fish and shellfish arrive after spawning offshore.

Farmers are concerned about the drainage problem, too. But their livelihoods depend on their ability to control the water. Without ditches and canals, a heavy rainfall would flood their fields, destroying their crops.

Uli Bennewitz manages Lux Farms—9,000 acres of corn, soybeans and forest near Engelhard. He explains the dilemma: "In theory, we're at sea level. If it doesn't rain at all, we don't have to pump. But every time it rains, we have to pump. We're in a constant juggling situation, trying to compromise with the water table. In the summer, we try to raise the water table. In the winter and spring, we pump more to lower the water table."

Bennewitz is also manager of Mattamuskeet Drainage Association. The six-member, 40,000-acre drainage district is composed of six pumping stations. Three drain into the Intracoastal Waterway, one into a barge canal and two into the environmentally-sensitive Pamlico Sound. Bennewitz says 80 percent of the runoff is funneled into the Intracoastal Waterway, which is not considered to be environmentally sensitive.

"We're doing as much as possible to minimize the pumping on the east side (near Pamlico Sound)," says Bennewitz. "We have double the pump hours on the west side as on the east side."

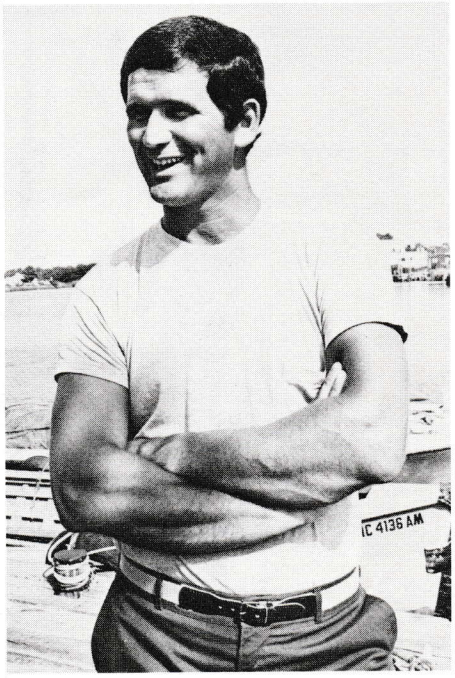
Bennewitz looks at both sides of the drainage issue. He says there's no evidence that farm drainage is affecting the production of the estuaries. But he adds that there's no evidence that it's not affecting it either.

Until scientists find some answers, Bennewitz has some ideas he thinks may help. He'd like to pump some of the excess water into agriculturally non-usable land, dike it and create a lake. Then, when the hot summer months bring on a drought, he could recycle the water by irrigating his crops with it. Bennewitz says he'll have to convince the U.S. Army Corps of Engineers to go along with his plan before he can implement it.

UNC Sea Grant Director B.J. Copeland says the estuaries are affected by a variety of factors. "The estuaries are located at the end of rivers and whatever goes on upstream in the Piedmont affects them," says Copeland.

Belhaven farmer Marion Dilday takes a tougher approach. "All the water from Raleigh finds its way into the creeks, rivers and sounds. It's not only farmland that drains. I think there's probably more pollution from up above than from down below," he says.

Photo by Nancy Davis



Dell Meekins

But for Dell Meekins and Fran Altman, empty nets mean lean years. They hope researchers will find some answers—and soon. But even answers won't cure the ills plaguing the fisheries, says Meekins. "It took years for this to happen and it's going to take a lot of years to cure it."

—Nancy Davis

Fishing for answers

Where land and sea meet

In eastern Hyde County, some of the state's most productive land lies adjacent to some of its most productive coastal water. But the distinction between the two is vague; much of the land is barely above sea level.

Farmers have found that these drained wetlands yield bountiful crops—if they can control the water. Ditches drain the fields, and canals carry the runoff to creeks that empty their waters into Pamlico and Albemarle sounds.

Experts tell us more than 2 million acres in coastal North Carolina are being drained. And the water from those fields ultimately reaches the estuaries that serve as nursery grounds for over 90 percent of the state's commercially important fish and shellfish.

Scientists, resource managers and fishermen are worried that the freshwater influx may be affecting the makeup of the estuaries and in turn affecting fisheries production.

In 1981, the Governor's Coastal Water Management Task Force was formed to make recommendations for improved water management. Recently, the N.C. General Assembly acted on those recommendations, appropriating money for a study to measure the impact of land drainage on estuaries. Researchers will use Broad Creek in Hyde County as a demonstration site.

UNC Sea Grant Director B.J. Copeland, coordinator of the project, says the goal is to demonstrate the relationship between an estuarine nursery and water management.

Sea Grant researchers John Miller, Margery Overton and John Fisher will participate in the project. In an earlier Sea Grant project, Miller studied the effects of salinity changes on juvenile fish and shellfish, using Rose Bay as his laboratory. A heavy rainstorm meant a drop in the bay's salinity. Then, he waited for Mother Nature to perform experiments for him. When she did, he analyzed the effects.

But Miller says the Broad Creek site offers researchers a chance to do more than just study the effects of a heavy rainstorm on estuarine organisms. They'll be able to "create" their own rainstorms.

The flow of runoff into Broad Creek is controlled by a pumping station on the 5th Avenue Canal. (The canals are so numerous that they've been given the names of avenues and streets.) With the help of landowners, researchers will manipulate the amount of water entering the nearby estuary. Scientists will use one branch of the creek as a control while they perform experiments on the other branch.

"This project presents an opportunity to get answers much more efficiently," says Miller. "We'll be able to discharge significant amounts of fresh water into an estuarine area. And hopefully we'll be able to see the impact on the biology of systems and how fast they recover."

Miller has some theories about what he may find at the Broad Creek site. In his research on Rose Bay, he found that up to a certain point, a salinity reduction did not produce much change. But further decreases in the salinity resulted in what Miller refers to as "thresholds."

At the first threshold, the estuary undergoes a temporary change in the distribution of fish and shellfish. At the second threshold, the change may be great enough to force baby fish into areas of higher salinity where they would be vulnerable to predation.

At the third threshold, the fish population could experience permanent reduction, says Miller. The change in salinity might be great enough to cause the death of the fish's food supply or of the fish themselves.

Miller will be testing the waters of Broad Creek to find out if his theories hold true. He says his strategy will be to determine what those thresholds are. He may begin by reducing the salinity by 50 percent in one day. Or, perhaps he will reduce the salinity by

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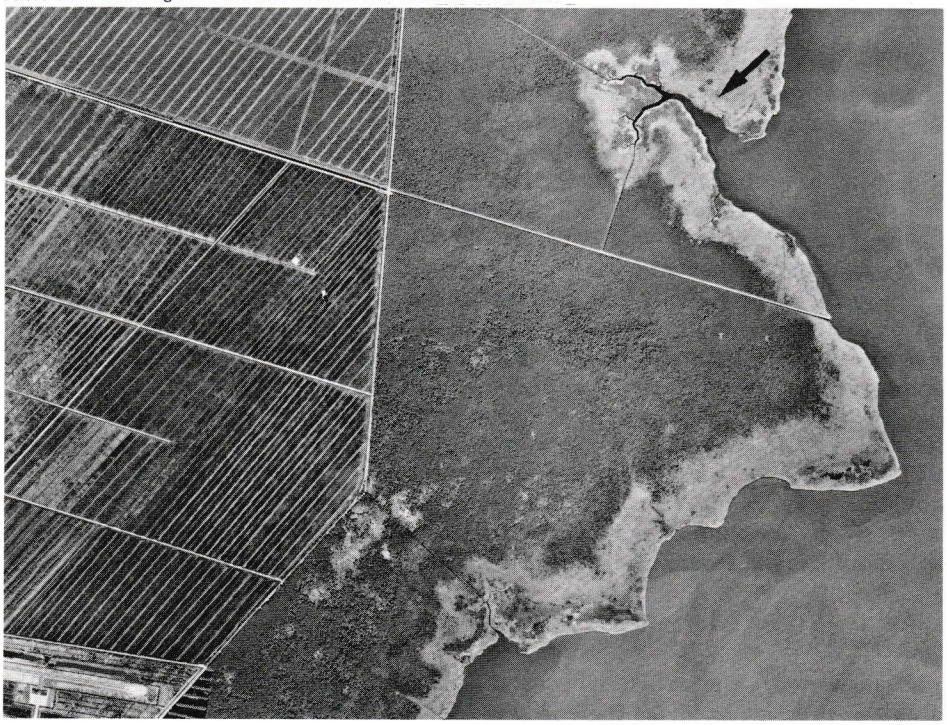
Photo from USDA Agricultural Stabilization and Conservation Service



Fields, ditches and canals near Broad Creek (see arrow)

25 percent for two days. Then he'll measure the response of the fish and shellfish.

He'll also study how long it takes the system to return to its original state. It may be that some species can handle the fluctuating salinities better than others.

Sea Grant researchers Overton and Fisher will attack the freshwater drainage problem from an engineering angle. They'll measure how much water flows into the creek and record depth, temperature and salinity data. In a second phase of their project, they'll develop a mathematical computer model to simulate the flow of fresh water into the estuary.

Also participating in the three-year project are the N.C. Division of Soil and Water Conservation, the N.C. Division of Environmental Management, and the N.C. Division of Marine Fisheries.

Sea Grant estuarine research will complement the state-supported Broad Creek project. Researchers will probe the relationships between predator and prey in the estuary. They'll examine the food sources for the commercially important spot and croaker. Wayne Skaggs and Wendell Gilliam will develop a model to predict the effect of different drainage methods on the flow of water from the fields. In his Sea Grant-supported project, Miller will investigate the recruitment of juveniles to their nursery areas and the resulting variation in juvenile abundance and production.

—Nancy Davis

Photo by Nancy Davis

5th Avenue Canal carries water from ditches to the sound

Clean water on tap for N.C.

A lone boater putters across the Chowan River at dusk, heading for the dock. With the sun and trees behind him, everything appears postcard-perfect. But a closer look tells us something is muddling the picture—and the water.

Pollutants, sediments and toxics flow into the Chowan and other North Carolina waterways every day. And the situation may be getting worse with increased construction and industrial development.

Yet many state officials and citizens believe something can be done to clean up our water. Several water projects have already been initiated, and the N.C. General Assembly recently appropriated nearly $7 million for the Clean Water Budget of the N.C. Department of Natural Resources and Community Development.

This legislation, which has been on tap for two years, provides funding for research and assistance programs across North Carolina. A synopsis of the projects follows, with emphasis on those relating to the coast.

Coastal Water Management Program

It's no secret to the individual coastal fisherman that the catches just aren't as big as they used to be. No one is sure what the cause is, but some speculate it may be a result of freshwater drainage into the brackish estuaries.

To find some answers, the legislature appropriated funds for research at Broad Creek in Hyde County. Three state government agencies, in cooperation with Sea Grant researchers, will study the effects of land drainage into the estuaries.

Anne Taylor, NRCD's deputy assistant secretary for natural resources, sees this project as one in which the state, farmers and fishermen can all work together.

"The result of the Broad Creek demonstration project should be the guidelines under which farming and forest operations along the coast are managed in harmony with the fishing industry," she says. "The significance of those funds to do that research project should have long-term ramifications."

Money also was appropriated to the Division of Soil and Water Conservation for a wetlands identification and mapping project in the Albemarle and Pamlico sounds area.

Nutrient Sensitive Watershed Project

A little greenery growing in our rivers and streams is all right, but not if it becomes harmful. Bacteria and vegetation sprout when nutrients like phosphate and nitrogen seep

into the water from industries, farms, city streets, forestland and even the air.

Three bodies of water, the Chowan River and Jordan and Falls lakes, are especially susceptible to this type of growth and are legally designated as "nutrient sensitive." Already, the Chowan River and lower Neuse River contain nuisance blue-green algal blooms that were facilitated by these nutrients. UNC Sea Grant researcher Hans Paerl has found that these blooms may be altering the food chain.

With such problems evident, the legislature earmarked approximately $3 million to the study of these watersheds, or drainage areas. Two-thirds of the money will go to NRCD's Division of Soil and Water Conservation to provide cost-sharing programs to farmers in 15 surrounding counties, says Buddy Atkins, chief of the division's Agricultural Non-Point Source Section.

Under these programs, farmers receive state funds for implementing "Best Management Practices" to reduce the flow of animal wastes, fertilizers, pesticides and other pollutants into the waterways. BMPs include such techniques as waste management systems, conservation tillage, terracing, planting grass waterways, strip-cropping and crop rotation.

The BMP program, scheduled to begin in September, will be administered by the local Soil and Water Conservation districts. Similar federal cost-sharing programs are currently offered and can be used in conjunction with the new state program, Atkins says.

Farmers aren't the only ones who will be using BMPs. Loggers will be also. Cutting down trees, making roads and clearing land should be regulated because each contributes to erosion on the coast and inland, says H.J. "Boe" Green, director of the Division of Forest Resources.

"Soil sediment is considered to be the greatest water pollutant we have," Green says. "Depending on the amount of sedimentation, it causes the water to be unfit to use. . . It carries nutrients into the water and contributes to algal problems," and is harmful to fish when it settles in the reservoirs. We already see these problems in the Chowan and Neuse rivers, he says.

A large portion of the funds will be used to minimize erosion. Loggers will be asked to make proper stream crossings and road layouts, to seed roads with grasses quickly after logging, and to plow only surface soils. Other monies will go toward seed, fertilizer and labor for revegetating cleared land.

To help identify highly erodible lands around the Falls-Jordan area, some state government computer whizzes have developed a map that won't be found in any gas station. The Land Resources Information Service, under NRCD's Division of Land Resources, mapped the Falls Lake area and received funds to compile a similar one for the Jordan watershed.

The maps show a variety of information that can be color-coded and presented in overlays, says Karen Siderelis,

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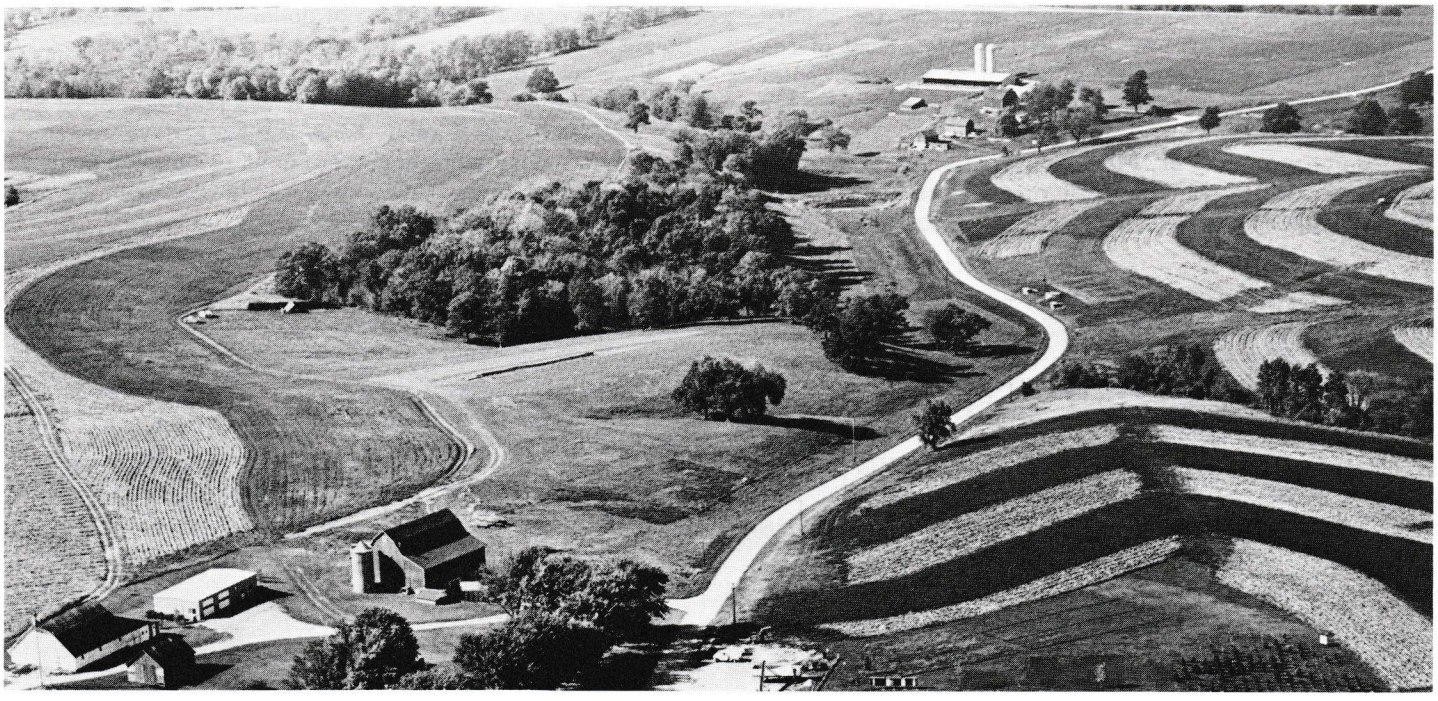
Photo by Herman Lankford

Use of forestry BMPs will cut down on erosion

Photo from NCSU Agricultural Communications



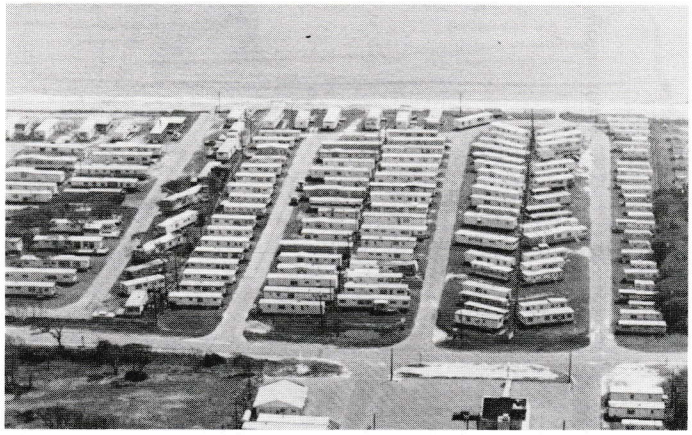
Strip-cropping and grass waterways are effective deterrents to land drainage

director of the service. Each shows base-map data such as roads, streams, urban areas and counties, plus other data on erosion rates, drainage and conservation areas, land use and soil depths.

Matching these factors helps pinpoint areas likely to erode, says Bill Holman, a lobbyist for the Conservation Council of North Carolina. Mapping is important not only to scientists and farmers, but also the policymaker judging which areas need attention, and to developers considering sites for construction.

And right now, "There's so much construction in this area it just overwhelms you," says Steve Conrad, director of the Division of Land Resources. Part of his job is to see that builders use an approved erosion control plan when constructing. But since this was made a law in 1973, some builders have complied and some haven't, says Conrad. For this reason, $158,000 were budgeted for the division to improve monitoring of construction sites in the three watershed areas.

Photo by Jim Page



Budget calls for improved planning of development

Monitoring of a different kind will be taking place in the Chowan, Jordan and Falls. The Clean Water Budget included about $350,000 for the study of the water quality standards of each, says W. Lee Fleming Jr., chief of the Water Quality Section of the Division of Environmental Management. Researchers will sample and analyze nutrients taken from these areas.

A major concern of Fleming's is the regulation of phosphates. He says if the legislature had passed the controversial phosphate ban, the problem would have been reduced by 25 percent.

But the municipal discharges of phosphate are just part of the problem. "We still need to know how many nutrients are going into the rivers and who's contributing what. You want to be fair in asking different groups to decrease nutrients," says Holman. And to do this, "more information is needed to make better decisions."

Statewide Toxics Program

In some of North Carolina's waterways, toxics are streaming in from a variety of sources. Researchers aren't sure, however, what these toxics are or where they are originating.

To answer a few of these questions, appropriations will aid Fleming and his staff in setting up extensive screening procedures to test discharges and their toxicity on fish and other organisms in the water. In addition, a mobile lab is taken to different waterways twice a month to test waters all over North Carolina.

Pollution Prevention Pays Program

In 1983, 7.3 billion pounds of hazardous wastes were generated in North Carolina. The culprits include everyone from chemical companies to homeowners.

To help prevent our state from becoming a large wasteland, the state initiated the PPP program, patterned after one used by the 3M Corporation. According to the program's director, Roger Schecter, it is "a way of looking at or reducing pollution and/or toxics before they become a problem."

Schecter and his staff, in conjunction with other state agencies, work on an individual basis with each client to determine what types of pollutants the companies discharge and to suggest ways to reduce, prevent, recycle or eliminate those materials before they reach the air or water.

And it's paying off, says Schecter. Companies such as Burlington Industries, Burroughs Wellcome and Duke Power have saved thousands of dollars by finding more efficient methods of disposing of or recycling wastes.

While elements of the Clean Water Budget are not specific to the coast, the benefits it will reap cannot be underestimated, says Taylor. With the waterways upstream and the coast downstream, there have to be some positive effects. But, she says, this budget is only the beginning step to cleaning up our state's waters.

—Sarah Friday

More troubled waters

Researchers know that problems exist in the waters near the coast. And the answers to those problems are often as muddy as the waters themselves. There's a new project in the making, though, that may be able to clean up them both.

In the past few years, there have been several state, federal and local studies focusing on the Pamlico and Albemarle sounds and the waters surrounding them. As a result, the scientists who looked at subjects like fishing resources, drainage and peat mining have identified some of the most common and pronounced problems.

Now, the N.C. Department of Natural Resources and Community Development is organizing a comprehensive program to find some solutions. Spurred by the action of N.C. Congressman Walter Jones, through his Merchant Marine and Fisheries Committee, to designate Albemarle Sound as an "estuary of concern," the program will be carried out by NRCD, UNC Sea Grant and other governmental agencies. Jim Smith, coordinator of the Coastal Energy Impact Program, says a few of the projects will include studying the changing land uses, substances coming from the rivers and vegetation of the sounds.

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, NCSU, Box 8605, Raleigh, N.C. 27695-8605.

If it's a marlin you want to catch, there's no better place to fish than the Gulf Stream. But first you must find this meandering corridor of warm water that cuts along the East Coast. The Gulf Stream can shift position, alternately snaking and straightening as it flows northward. Often eddies of warm water break off the main body of the stream.

Commercial and recreational fishermen seek out the Gulf Stream and its eddies because of the warm-water fish that travel its path. Marlin, tuna, wahoo, dolphin, swordfish and shark are prevalent.

Jim Bahen, the Sea Grant marine advisory agent at Ft. Fisher, wants to help fishermen locate the elusive Gulf Stream before they leave the docks. Bahen has worked with the National Environmental Satellite Service in Miami to develop a chart that plots the Gulf Stream's path on a longitude-latitude grid from Jacksonville, Florida to Norfolk, Virginia. The chart also provides the width of the Gulf Stream, the average speed of its axis in knots, its average temperature in Celsius, and the distance from its western wall to landmarks such as Frying Pan Tower. Bahen will receive the chart three times a week via a telecopier at his office. He says the charts can save fishermen time and fuel.

If you'd like to know more about Bahen's Gulf Stream Information Service, write him at the Marine Resources Center/Ft. Fisher, General Delivery, Kure Beach, N.C. 28449. Or call 919/458-5498.

From Calabash to Currituck, the UNC Sea Grant Marine Advisory Service has news for you—the commercial fisherman, the angler, the aquaculturist, the seafood dealer, the property owner. Marine advisory agents Jim Bahen in Wilmington, Bob Hines in Atlantic Beach, Wayne Wescott in Manteo and Randy Rouse in Aurora have joined with specialist Rich Novak to bring the public an informal monthly newsletter about the latest in commercial and recreational fishing gear, fisheries regulations, fishing tournaments, aquaculture, marketing news, publications and more.

The team is calling its newsletter *The Marine Advisory News*, and it's free for the asking. The team newsletter takes the place of separate newsletters, such as *Light Line*, published by individual agents. To receive a copy, write *The Marine Advisory News*, Box 8605, North Carolina State University, Raleigh, N.C. 27695-8605.

What yields more crabs in a single catch than eight to 10 crab pots? The answer: a peeler pound. Randy Rouse, the marine advisory agent at the Aquaculture Research Center in Aurora, is experimenting with a peeler pound to catch hard crabs and peelers. So far, the results have been good. In one night he caught 50 legal-size crabs, 15 peelers, three flounders and four large eels.

Used frequently in Virginia, peeler pounds are set in shallow water and extend from the shore to a trap at the end. The peeler pounds have three main parts—the lead, the heart and the trap. Leads are usually constructed of crab pot wire strung along the bottom, but some are made from net webbing. Hearts are generally constructed with wire and may or may not have tops and bottoms. The heart herds the crabs to the trap, which is also constructed of wire and attached to framing made of treated wood or iron.

Rouse learned that peeler pounds need to be set in protected areas where winds and waves can't destroy them. And he's had some problems with grass fouling the lead.

If you're interested in learning more about peeler pounds, write Rouse at the Aquaculture Research Center, Rt. 2, Box 305, Aurora, N.C. 27806 or call 919/322-4054. Rouse suggests that fishermen talk with an N.C. Division of Marine Fisheries enforcement officer about regulations before setting up a peeler pound.

The western Pamlico River isn't a place for females—female blue crabs that is. Researchers have estimated that female blue crabs make up only about nine percent of the total blue crab catch in the area. And this makes for problems when it comes to harvesting peelers. Other crabbers along the coast catch female peeler crabs (mature females ready to shed and mate) by baiting their pots with male crabs called "jimmies." But in western Pamlico River, the low percentage of female crabs makes this method unprofitable.

Using UNC Sea Grant mini-grant funds, two scientists, Graham Davis and Steve Harlan of East Carolina University, will study alternative methods for havesting peelers. They plan to add synthetic grass to peeler pots to create a refuge for the soon-to-shed crabs. Studies have shown that peelers seek out grass beds as a haven

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of protection when they shed. These grass pots may be a way to entice the mainly male crab population into the pot, and the pot will allow for easy harvest by the fishermen.

Coastwatch will report what the scientists find out in a later issue.

If you've ever seen a stranded dolphin or whale on the beach and weren't sure what to do, you may want a copy of a new UNC Sea Grant Blueprint, *Beached Marine Mammals*. It describes steps on handling marine mammals and gives local and regional telephone numbers to call for help.

For a free copy of this Blueprint, write UNC Sea Grant. Ask for publication number UNC-SG-BP-84-2.

If sport fishing is your game, then UNC Sea Grant has two fishing charts that could help you locate prime "fishing holes" before you leave the docks. The first chart shows fishing locations near Masonboro Inlet on one side, and the locations off Beaufort Inlet on the other. The second chart covers the waters around Roanoke Island and those off Oregon Inlet.

Both charts include loran headings and are designed as a navigational aid. They are place mat size and waterproof. For your copy, send $1 for each chart to UNC Sea Grant. Be sure to specify which chart you're ordering.

Jim Murray, director of UNC Sea Grant's Marine Advisory Service, and Jeff Johnson, an anthropologist at East Carolina University, have received a second year's grant from the National Marine Fisheries Service to develop a program that will increase the demand for underutilized fish among recreational fishermen in the Southeast.

"We will be building on the marketing research that was done in year one," Murray says. "We'll be choosing 10 to 12 species of fish to target for a major educational campaign, fishing tournaments, posters, brochures, radio spots and television programs."

Murray and Johnson will be working closely with Sea Grant's Southeast Marine Advisory Service to develop programs and disseminate information.

Walter Clark has been named to fill a newly created position as UNC Sea Grant's coastal law specialist. Clark, formerly the chief of Implementation and Enforcement at the N.C. Office of Coastal Management, had just completed a temporary one-year appointment with UNC Sea Grant.

Clark holds a law degree from Wake Forest University and a master's degree in regional planning from the University of North Carolina at Chapel Hill.

If you would like to contact Clark, write him at UNC Sea Grant, Box 8605, North Carolina State University, Raleigh, N.C. 27695-8605 or call 919/737-2454.

UNC Sea Grant Director B.J. Copeland was selected as chairman-elect of the Council of Sea Grant Directors during a July meeting in Minneapolis. He will become chairman in 1985. The Council of Sea Grant Directors works with the Office of Sea Grant to establish national policies for the National Sea Grant Program, develop program directions for the Office of Sea Grant, and unify the 29 state Sea Grant programs into a national program.

Coastwatch is published monthly except July and December by the University of North Carolina Sea Grant College Program, 105 1911 Building, Box 8605, North Carolina State University, Raleigh, NC 27695-8605. Vol. 11, No. 8, September, 1984. Dr. B.J. Copeland, director. Kathy Hart, editor. Nancy Davis and Sarah Friday, staff writers. Second-class postage paid at Raleigh, NC 27611.

COASTWATCH

105 1911 Building
Box 8605
North Carolina State University
Raleigh, NC 27695-8605

Second-class postage paid
at Raleigh, NC 27611
(ISSN 0161-8369)