UNC Sea Grant

February 1988

COASTWATCH

Photo by Scott Taylor

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The toxic tide put clammers like these out of business

Photo by Scott Taylor

By Kathy Hart

Invasion of the Red Tide

October 31, 1987, was D-Day in coastal North Carolina.

Patches of yellow-green organisms invaded the waters of North Carolina's coast.

Scientists at the state's three marine laboratories scurried to sample and magnify the organisms under their microscopes. They quickly identified the intruding organisms as "red tide."

Red tide in North Carolina?

This isn't Florida, Texas or Long Island Sound where red tide is common. Besides, there was nothing red about the yellowish slicks that clouded the waters.

But the prognosis proved right. The tiny organisms were a subtropical species of a red tide dinoflagellate called **Ptychodiscus brevis.**

More simply, they are single-celled plants. But they have a few animal characteristics such as the tiny hair-like flagella that permit them to swim.

Despite their name, all red tide dinoflagellates are not red. This particular tide was yellow-green, although some patches were brick red.

And it left beachcombers coughing, fish suffocating and shellfishermen out of work.

What could be in organisms 20 microns (a micron is one thousandth of a millimeter) big that could do such damage?

Neurotoxins. This dinoflagellate contained neurotoxins that affected the nervous systems of other creatures, including man.

Other types of red tide possess paralytic and diarrheic toxins that cause paralysis and diarrhea, respectively. Some red tides carry no toxins at all.

Along the surf, crashing waves crushed the red tide organisms and sent their toxins airborne. That's what caused surf and boat fishermen to cough and feel dizzy and nauseous.

The toxins can paralyze the gills of fish, making it impossible for them to pass water over their gills. They soon suffocate.

But the toxins do not taint their flesh. It is safe to eat fish, crabs and shrimp taken from North Carolina's red tide waters.

Oysters, clams and scallops are a different matter.

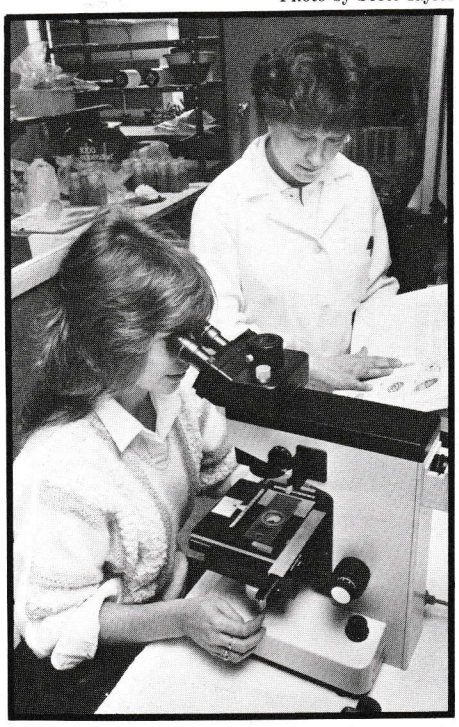
These shellfish, which filter their food from the surrounding habitat, concentrate the toxins in their digestive systems. And since oysters and clams are eaten whole, they are dangerous to consume even if cooked.

If tainted shellfish are accidentally eaten, this type of red tide will not cause death, says Dan Kamykowski, a red tide expert at North Carolina State University. But Kamykowski says that red tides found along the Canadian and Central American coasts can be deadly.

Photo by Jefferson T. Turner

Red tide dinoflagellate, a single-celled organism

Photo by Scott Taylor



Pat Tester, right, helps identify red tide organism

Photo by Scott Taylor

Crashing waves released toxins in the air that sent beachcombers back into their cottages

To eliminate any threat to the public's health, the N.C. Division of Shellfish Sanitation recommended that the N.C. Division of Marine Fisheries ban the harvest of shellfish along a 200-mile stretch of the Tar Heel coast until counts of the organisms dropped.

Pat Tester, a biologist at the National Marine Fisheries Service in Beaufort, says counts of the organisms ran as high as 20 million per liter. Immediate offshore areas and inlets—Beaufort, Bogue, Bear and New River—had the most organisms.

Counts must drop below 5,000 cells per liter before state officials will consider reopening waters. After the counts drop, officials must wait a few weeks to reopen waters so that shellfish can purge themselves of the toxin.

In mid-December, seven miles of water were reopened between Avon and Brooks Point.

But Tester says counts in the Beaufort area were still high in December—100,000 organisms per liter. By the first of January, counts had dropped below 50,000 organisms per liter in most areas, and scientists hoped the new year's surge of cold weather would end the tide's visit.

Scientists are baffled by the red tide's long stay. Sea Grant researcher Hans Paerl says warm waters, sunny days and light onshore winds have caused the tide to linger.

And those conditions may have contributed to the tide's initial onslaught. But there are differing opinions among scientists about just why the Tar Heel coast was invaded.

Tester believes the tide hitched a ride on the northbound Gulf Stream. She points to red tide breakout in Naples, Fla., on Aug. 24.

"We believe that the Gulf Stream was 'seeded' with the red tide organisms then," she says.

Forty-eight days later the tide was encroaching on North Carolina's coastline. Tester says that the travel time between Naples and North Carolina in the Gulf Stream would be 40 to 60 days.

Both Tester and Paerl also point to the unique configuration of the Gulf Stream prior to the red tide's appearance. Satellite infrared photographs revealed that an eddy of the warm-water current veered directly into Cape Lookout.

The close proximity of the Gulf Stream plus a gentle onshore wind may have pushed the red tide ashore, scientists say.

And the winds also may have caused localized upwellings of natural ocean nutrients that feed the red tide organisms, Paerl says.

Paerl does not believe that this red tide outbreak was linked to pollution. But Kamykowski says other outbreaks of different red tide organisms may be connected to pollution problems.

Paerl says the red tide not only hitched a ride. It brought a friend—a marine blue-green algae also typically found in subtropical waters.

In fact, Paerl says the slicks of nontoxic blue-green algae were often mistaken for red tide. And its appearance supports the theory that the red tide was an "imported" organism.

But Kamykowski says there are at least two other reasons why the red tide may have occurred.

The organisms could have already been present in offshore sediments in a seedlike cyst form. The cysts were possibly planted during a previous red tide that either no one noticed or no one identified, he says.

The wind, wave and weather conditions this fall may have simply jolted the cysts into growth.

Or it is possible, Kamykowski says, that the species is a "natural part of our marine community"—one that has gone undetected.

But whatever the cause, the main questions on the minds of shellfishermen and beachcombers are how long will the tide stay and will it come back?

Scientists simply don't know the answers. Kamykowski says that very little is known about the life history of this organism.

But state officials are hoping that a new study will find some answers. The Albemarle-Pamlico Estuarine Study Technical Committee approved a $25,000 federal-state grant to study whether the tide is likely to return.

The study will determine whether the dinoflagellate is forming cysts that are likely to survive through the winter. If the cysts survive, they could threaten the state's waters again next year.

But shellfishermen hope that's not the case. They've had enough of the tide called red.

By Sarah Friday

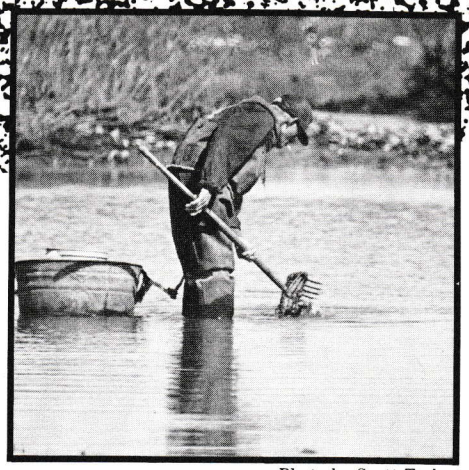


Photo by Scott Taylor

Down and Out in Coastal North Carolina

Twenty-seven dollars a day isn't much, but oysterman Phillip Dixon of Mill Creek figures he's lucky to make that much.

He knows fishermen who haven't seen work in weeks.

Red tide took their jobs.

Now Dixon must drive 60 miles to put in his 17½-foot workboat. Then it takes another hour and a half on the water to reach the oyster beds.

Some days his harvest is good—as much as seven bushels. Others, it is hardly worth the drive to the dock.

Riding out the ebbs and flows of the red tide has been rough for 9,000 of the state's shellfishermen.

The slick muck of algae that spread across the waters of Carteret, Onslow, Pender and New Hanover counties during fall and early winter stymied the oyster, scallop, finfish and clam fisheries.

The toxic tide led to a ban on shellfish harvesting in the 200-mile stretch from Avon to Long Beach. And it scared the public from eating favored fish.

The N.C. Division of Emergency Management gauges red tide cost the state more than $4 million in regard to commercial fishing.

It quelled the recreational fishing industry, too. In the four-county area, pier owners lost from $4,000 to $12,000 per week. Bait and tackle shops showed declines of $500 to $3,000 per week. And charter boat services, $14,000 per week.

The timing of red tide couldn't have been worse.

The 1987 brown and pink shrimp seasons left most commercial fishermen empty-handed. The poor fishing led many to put their hopes in the winter shellfish harvests.

And things looked good.

Prices were up for North Carolina oysters, clams and scallops because harvests in Maryland and Virginia were small.

"We were looking forward to a big season this year," Dixon says. "We had the biggest setting (crop) of oysters in eight years."

Before the tide, oystermen were pulling 10 to 12 bushels out of the water a day. Now that's been cut in half.

The scallop harvest looked good, too. "There were scallops like you'd never seen," Dixon says.

But red tide hurt that fishery, too. More than 50 percent of this year's bay scallops died, says Sea Grant researcher Charles Peterson, a shellfish expert. And many of the juvenile scallops—next year's harvest—died also.

Most commercial fishermen count on shellfish for an extra $2,000 to $3,000 before Christmas, says fisherman Mark Hooper of Smyrna.

This December, it wasn't there.

On top of that, some fishermen risk losing houses and boats because of missed mortgage payments. Phones have been cut off, meals skipped and furnaces left cold.

"There's people down here that's real hurt," says Pinky Lewis, a fisherman for more than 40 years from Beaufort. "Every day that it goes on, they're that much closer to going out."

Red tide hit the small operations, the individual fishermen, the hardest. If they couldn't fish, they tried to find construction work or other kinds of jobs. Or they worked on their boats and hoped things would get better.

But for some, fishing is all they know. So they went out of their way to find open waters with untainted shellfish. Or they switched to another fishery.

By mid-November, clammers around Beaufort started sink netting, gill netting and crabbing. Oystermen and clammers farther south began gill netting for spot, speckled trout and puppy drum.

Other fishermen geared up for offshore runs for tuna and king mackerel.

Before long, everybody was fishing for the same thing in the same place, says Bob Austin, a full-time fisherman from Williston. "You go set two to three nets in the morning and when you get back there's a 100 on top of you. There's so many of us at it, it crowds the market," he says.

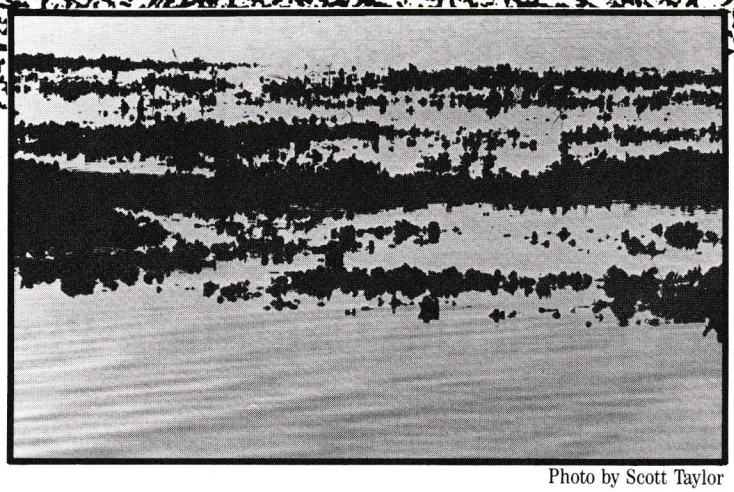


Photo by Scott Taylor

Last year, sights of fishermen raking oysters were common; this year they were nonexistent

Contaminated oyster beds were left untouched, only to paint a pretty picture

The saturation plus less demand for finfish forced prices down, Austin says. Where he once got 50 cents a pound for croaker, now he gets 22 cents.

Commercial fishermen in Florida, Connecticut and Texas faced a similar scene last year.

In Calhoun County, Texas, more than 2,500 shellfishermen lost $100,000 a day during a red tide outbreak. It washed over the bays in September 1986 and kept the oyster season closed until November, says Joe Surovik, a marine agent with the Texas Agricultural Extension Service.

Researchers found the toxin residual in oysters, so the state closed the 1987 season, too.

The outbreak not only hurt commercial fishermen, it affected tourism and ruined the county's recreational fishing industry, Surovik says.

Relief came slowly, mostly from state and local organizations willing to fry a fish, flip a bingo chip or hand out food donations.

Getting help for North Carolina's fishermen and seafood businesses took time, too.

In November, the federal Small Business Administration denied a plea for low-interest loans on grounds that red tide did not classify as a natural disaster. Congress rescinded red tide as such a disaster by an act in 1981.

But North Carolina's congressional delegation was not daunted. In late December they passed a bill declaring the red tide infestation a disaster in North Carolina, making the loans available after all.

Back home, the state allowed commercial shellfishermen to relay oysters and clams from polluted areas to cleaner waters for $1 a bushel. Fishermen could harvest and replant up to 500 bushels per week.

Money for house or boat payments was also made available through the state's Community Service Block Grant program.

And the deadline to purchase 1988 commercial fishing licenses was moved from February 1 to March 31.

Fund raising took a different turn in Raleigh where a contingent of Florida fishermen and seafood dealers held a fish fry December 19 to benefit their northern neighbors. With the help of the N.C. Fisheries Association, they cooked 5,000 pounds of grouper, mullet and black drum fillets and reeled in $10,000 for the state's needy fishermen.

In the coastal counties, employers or employees who pay unemployment insurance can file for aid. But most fishermen do not qualify.

Social services can help with food stamps and utilities.

Although counts of participants are up, especially in Carteret County where one third of the state's commercial fishermen work, most families have not applied.

"You're dealing with some very proud people, some very independent people," says Dennis Moffett of the N.C. Division of Emergency Management. Asking for help isn't part of their nature.

Photo by Scott Taylor

Signs closing waters to shellfishing were posted along 200 miles of the Tar Heel coast

That's why Neal Lewis and friends decided to provide some aid.

Lewis, executive director of the Carteret County Chamber of Commerce, helped organize an effort to distribute Thanksgiving turkeys. The success of "Love Tide" spurred the community to plan more events for Christmas and the rough months to come.

No matter how tough it gets, most of North Carolina's fishermen try to stay on the water, says Clinton Willis, a Smyrna fisherman and president of the Carteret County Waterman's Association.

They help each other. They fish regardless of the money.

For one thing, Willis says, four generations of Willises have fished before him.

Plus, "It's just like the circus," he says. "You go there and it's hard to get the sawdust out of your nose." With fishing, "I can't get the salt out of my blood."

By Nancy Davis

Banned shellfish scared consumers away from otherwise safe seafood

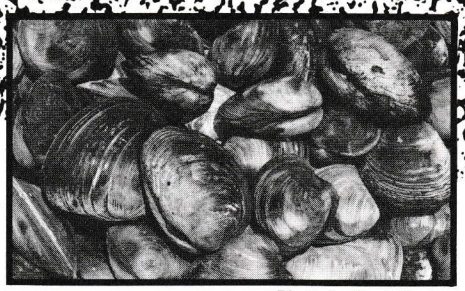


Photo by Scott Taylor

Seafood Lovers Avoid the Captain's Platter

Uncle Henry's Oyster Roast has seen some bad seasons . . . but none as bad as this one.

When the toxic red tide swept into North Carolina and closed 200 miles of the state's coastal waters, it nearly wiped out the Wilmington restaurant's business.

November and December are peak months for oysters, the restaurant's specialty. Usually at that time of year, Uncle Henry's does about $1,700 worth of business each week.

But this year, red tide got the best of that business.

In early December, the restaurant was taking in less than $100 a week.

Henry Kirkum, the third generation of his family to operate Uncle Henry's, says, "People just quit eating everything. They just don't even come in."

Red tide dealt a blow to North Carolina's seafood industry. But consumer fear struck a knock-out punch that left some owners of small seafood restaurants and markets struggling to get back on their feet.

Shellfish—oysters, clams and scallops—in affected areas were banned. But finfish, shrimp and crabs were safe to eat.

Even so, consumers were wary. And many swore off seafood altogether.

The result: the red tide took a larger toll on the seafood industry than it had to.

Seafood experts say the toxic algae affects only shellfish. Although the red tide may kill some finfish, fish are safe to eat. The algae doesn't concentrate in the flesh of a fish. Instead, it kills the fish by paralyzing its gills or by reducing oxygen levels in the water.

But seafood consumers didn't trust what they were hearing. And even pictures of Gov. James Martin sampling North Carolina seafood did little to change folks' minds.

The effects of the red tide rippled through coastal North Carolina like the Domino effect. First fishermen, then seafood dealers, and eventually, restaurant and hotel owners suffered.

A report released by the N.C. Division of Marine Fisheries estimated that more than 600 coastal businesses were losing millions of dollars because of the red tide. About 9,000 commercial fishermen were affected.

It couldn't have happened at a worse time. Fishermen count on the shellfish for Christmas money. And seafood dealers usually see business pick up during the holiday season.

"From the individual clammer whose livelihood is at bay, it's trickled down to people who truck the clams to people who serve the clams in restaurants," says Doug Brady, owner of Meridian Seafood, a wholesale and retail seafood business in Morehead City.

Brady estimates his business dropped by 80 percent because he couldn't convince his customers that seafood was safe.

"I've had people come in here who have lived on the coast all their life and say, 'I want some fish. Can you get me some from out-of-state?'" Brady says.

During the holidays, traditionally a popular season for seafood, Wilmington seafood dealer John Peterson usually sells about 60 gallons of shucked oysters.

This season, he sold 20 gallons.

The oysters came from Virginia, several hundred miles from the North Carolina waters affected by red tide. But folks were afraid the oysters had come from contaminated waters.

At the Bridge Tender Restaurant in Wilmington, manager Bob West took an educational approach to the problem. He trained his wait staff to answer customers' questions about red tide.

West also made sure his staff knew where the restaurant's seafood came from.

Fortunately for West, the restaurant's bill of fare included more than seafood. He noticed a sharp rise in orders for prime rib and steak.

Many coastal businesses have accepted this season as a loss. But seafood retailers and restaurateurs are optimistic. They think that once the red tide has diminished, folks will start buying their product again.

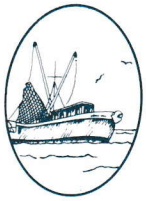
But if the red tide returns, as some scientists believe it will, the seafood industry wants to be prepared.

For dealers in the southern part of the state, that means banding together to form the Cape Fear Seafood Dealers' Association.

Peterson, president of the newly-formed association, says the group will be ready next time red tide hits. They'll mount a public relations campaign to be sure folks know that some seafoods are safe.

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.



In the September *Coastwatch*, we told you about Sea Grant agent Jim Bahen's efforts to work with a netmaker to develop an inexpensive turtle excluder device or TED. Come May 1, federal regulations will require shrimp trawlers 25 feet in length or longer to use TEDs in offshore waters in North Carolina. The devices are designed to exclude endangered sea turtles from nets.

So far, the National Marine Fisheries Service has certified five types of excluder devices. The structures vary from aluminum boxes to deflector grids to web screens. The web screens are called "soft" TEDs.

Bahen's new TED is of the soft variety. Nicknamed the "Parrish" TED after inventor Steve Parrish of Supply, this excluder device awaits final approval by NMFS.

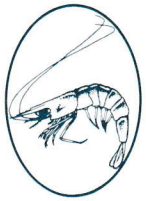
In October, it passed field tests. The Parrish TED barred all sea turtles from the shrimp net's tailbag.

The Parrish TED, made of 8-inch webbing, deflects turtles downward through a 40-inch hole in the bottom of the net. The opening is held rigid by a rectanglar bar and closed with an elastic chord.

But pressure from a large object such as a turtle will cause the opening to gap and allow the turtle to escape.

The Parrish TED is sewn into the net between the main body and the tailbag. Bahen says it is easy to install and costs $80 to $100.

For further information about the Parrish TED, call Bahen at 919/458-5498.



The N.C. Division of Marine Fisheries has $73,200 that it plans to use to help North Carolina fishermen buy TEDs. Details of the DMF's TED Purchase Program will be presented in a series of six public meetings held along the North Carolina coast the last week of February. The meetings will be cosponsored by Sea Grant.

At the meetings, Sea Grant agent Jim Bahen will present information about and show models of the different kinds of TEDs, provide hand-outs and summarize their performances. A DMF representative will outline the purchase project — how to apply and receive money for buying a certified TED.

The meeting schedule is as follows: Monday, Feb. 22, 7-8:30 p.m., Brunswick County Agricultural Extension office, Bolivia; Tuesday, Feb. 23, 8:30-10 a.m., New Hanover County Agricultural Extension office, Wilmington; Wednesday, Feb. 24, 7-8:30 p.m., Sneads Ferry Volunteer Fire Department, Sneads Ferry; Thursday, Feb. 25, 7-8:30 p.m., N.C. Division of Marine Fisheries, Morehead City; Friday, Feb. 26, 7-8:30 p.m., Pamlico County Agricultural Extension office, Bayboro; Saturday, Feb. 27, 9:30-11 a.m., Hyde County Agricultural Extension office, Swan Quarter.

The money will be available to fishermen in early March. It comes from the N.C. Department of Commerce's Energy Division. It was distributed to the state by the federal government for use in energy efficiency projects. The money had been collected from oil companies that were penalized for overcharging consumers in the 1970s.

TEDs increase energy efficiency by reducing the drag on nets created by turtles and other bycatch.

For more information about the meetings, contact Bahen at 919/458-5498.

The N.C. Commercial Fishing Show is making waves as one of the biggest boat and gear shows in the Southeast. The seventh annual show promises to be no exception.

March 11 to 13, boat dealers and marine manufacturers will display their lines at the Crystal Coast Civic Center in Morehead City. Representatives will show the latest in fishing boats, nets, motors, traps, pots, engines and accessory gear.

And seminars will be offered on commercial fishing topics.

The show is cosponsored by UNC Sea Grant and the Carteret County Waterman's Association. Merchants interested in participating should call Sea Grant agent Bob Hines at 919/247-4007.

The winter months may be too cold for sunbathing at the beach, but they're just right for planting. If you're a coastal property owner, this is the time to protect your investment with beachgrasses, shrubs and ground cover.

And Sea Grant has several guides that can help you.

Seacoast Plants of the Carolinas for Conservation and Beautification is a general guide on the use of plants for landscaping and stabilizing coastal soils. It contains illustrated descriptions of over 100 plants that are native to the North Carolina coast. Ask for UNC-SG-73-06. The cost is $4.50.

Building and Stabilizing Coastal Dunes with Vegetation provides instructions on transplanting, fertilizing and maintaining dune grasses with detailed information on species. Ask for UNC-SG-82-05. The cost is $1.50.

Planting Marsh Grasses for Erosion Control provides a guide to transplanting, fertilizing and maintaining marsh grasses for estuarine erosion control. Ask for UNC-SG-81-09. The cost is $1.50.

Remember, coastal property is dynamic. A few dollars for these books and the plants recommended will be worth it if it helps keep those sandy soils from sifting away.

Continued on next page

When Sea Grant agent Wayne Wescott visits his clientele, it's usually fishermen in Hatteras, Colington, Edenton or Engelhard. But in late January, Wescott made a visit that was out of this country.

He traveled to Turkey to provide advice for developing a soft crab shedding industry on the shores of the Mediterranean Sea. The Turks harvest a species of crab that is similar but slightly smaller than our blue crab.

But the Turks know nothing about shedding their crabs into soft-shell delicacies. That's why Wescott, a nationally renown shedding expert, was asked to make a visit.

The trip was paid for by a multinational corporation, Destek International. The company plans to develop the soft crab as an alternate food source for the people of Turkey.

Sea Grant Marine Advisory Service Director Jim Murray is conducting an assessment of artificial reef programs in the Mid-Atlantic and Southeast.

In the study funded by the N.C. Division of Marine Fisheries, Murray will interview fisheries managers from New Jersey to Texas to find out how each state conducts its program.

When the study is complete, DMF will use the information to formulate a plan for North Carolina's artificial reef program.

UNC Sea Grant has received its funding for 1988. The program was allotted $1,184,000 — the same amount it has received for the past two years.

You've got L.L. Bean and Spiegel at your fingertips. And now, you can add the Sea Grant catalog to your magazine rack.

It's chocked full of publications that provide advice on everything from shrimping to landscaping. There's something for the tourist, the fisherman, the boater, the conservation-minded and more. Many of the publications are pictured, and there's a form for convenient ordering.

Don't miss out on a single bit of Sea Grant information.

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Ask for UNC-SG-88-03.

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