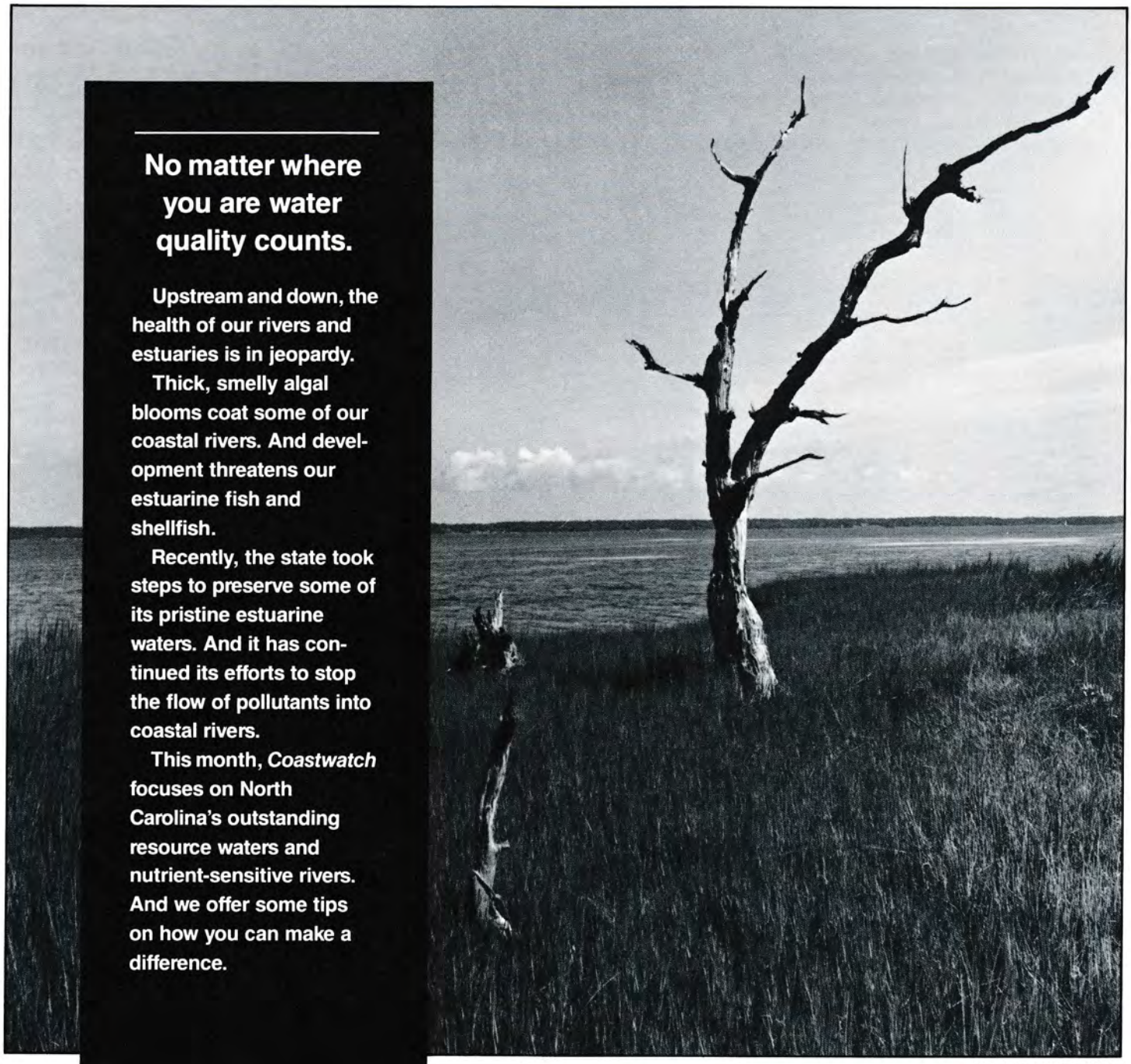
Coastwatch

UNC SEA GRANT ▪ NOVEMBER/DECEMBER 1989



No matter where you are water quality counts.

Upstream and down, the health of our rivers and estuaries is in jeopardy.

Thick, smelly algal blooms coat some of our coastal rivers. And development threatens our estuarine fish and shellfish.

Recently, the state took steps to preserve some of its pristine estuarine waters. And it has continued its efforts to stop the flow of pollutants into coastal rivers.

This month, *Coastwatch* focuses on North Carolina's outstanding resource waters and nutrient-sensitive rivers. And we offer some tips on how you can make a difference.

Photo by Jim Strickland

Pristine and Protected

By Sarah Friday Peters

The best just got better in North Carolina.

On Sept. 14, the N.C. Environmental Management Commission designated almost 200,000 acres of coastal rivers and lakes as "outstanding resource waters."

Now seven water bodies from the Alligator River to Masonboro Sound carry extra protections against degradation.

Photo by Scott Taylor

Like a principal honoring her best students with scholarships, the state chose its most pristine coastal waters and placed more stringent water quality standards on them.

From the public to the U.S. Congress, the move has garnered praise as an aggressive program to protect coastal resources.

But some scientists and environmental groups say it's not enough.

North Carolina's coast boasts approximately 2,044,374 acres of saltwater estuaries and sounds. Of that, 181,000 acres, or about 9 percent, were nominated as ORWs. Carteret County's Core Sound and the Alligator River in the Albemarle region make up 85 percent of that.

Fisherman Murray Bridges works Alligator River, its surrounding sound and the ocean for a living.

In the winter, he catches perch and flounder in the river's black waters. Other times, he pulls in mullet, croaker, gray trout, catfish, whitefish and blue crabs.

So far, Bridges hasn't seen too much pollution in the area but he isn't a scientist, he says.

Still, scientists agree with Bridges.

The Alligator River is surrounded by forests and farmland. No known sources of pollution seep into it. The water is dark, organically rich and has a low pH.

Fisheries resources thrive. Vegetation such as widgeon grass and wild celery covers the lower third of the riverbed. Black bear, red fox and even alligators roam its borders.

Like every water body in North Carolina, the Alligator River is classified by how it's used. Each classification also specifies the maximum amount of pollutants the water can handle before there's damage, says Derb Carter, an attorney with the Southern Environmental Law Center.

At the coast, SA waters, for example, protect shellfishing and demand the toughest water quality standards. SB waters, designated for recreation and fisheries, accept some sewage, bacteria and other pollutants. SC waters are safe for fishing and swimming but have a higher risk of pollution than SB waters.

The federal Clean Water Act in 1972 recommended states take a step beyond such measures and protect unspoiled rivers, lakes and sounds.

By 1986, North Carolina began its ORW program inland in places such as the South Toe River in Yancey County and the Cataloochee River in Haywood County.

The push for coastal ORWs began a year later with a petition to the EMC, a 17-member environmental commission that adopts regulations for controlling pollution.

Industry waste, failing septic tanks, construction, mining, and stormwater runoff from development, farms and forestry foul some coastal waters.

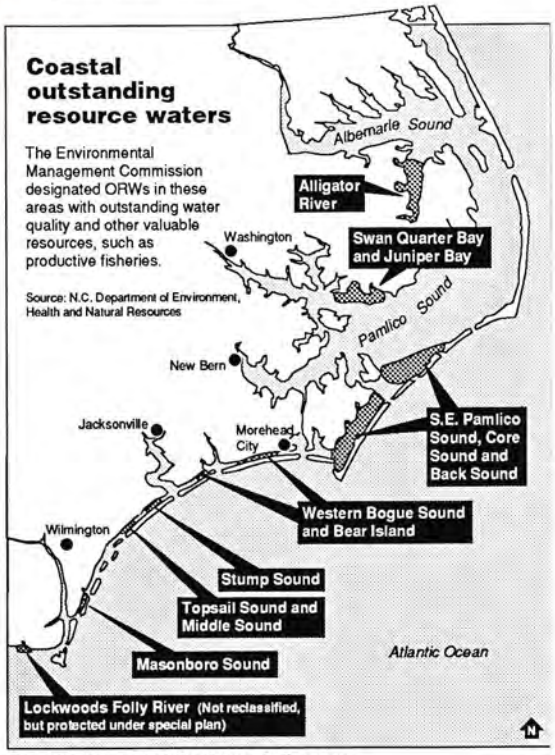
But to qualify as an ORW, each site must show no known sources of pollution and carry a water quality rating of excellent.

In addition, it must have resources or uses that make it unique such as recreational use, outstanding fishing habitat or special ecological significance.

To find such waters, state and federal agencies tested coastal water chemistry and fecal coliform levels, and reviewed fish and shellfish resource data, seagrass bed information, land-use plans and permit actions.

By Sept. 1988, they had culled the best.

Eight ORWs were nominated and ac-



Graphic courtesy of The News & Observer

Photo by Jim Strickland

cepted for public hearing and further study by the EMC.

From north to south, the sites included Alligator River; Swan Quarter Bay and Juniper Bay; southeastern Pamlico Sound, Core Sound and Back Sound; western Bogue Sound and Bear Island; Stump Sound; Topsail Sound and Middle Sound; Maşonboro Island; and Lockwoods Folly River.

From the beginning, public support favored coastal ORWs, says Charles Peterson, a member of the EMC and a Sea Grant scientist. Calls, letters and comments represented a growing public awareness of what's happening at the coast and the desire to save it, he adds.

In December, Gov. James G. Martin and his administration recommended ORW approval for the sites. The governor's backing "greased the skids," as one EMC member put it.

Even so, environmentalists were worried that the tide would turn.

Three EMC decision-makers held strong ties to development. And nine of the voting members were sworn in Sept. 14, the day the vote was taken.

There was some disagreement and discussion, Peterson says, but when the votes came in, none were even close.

All but one site was approved. Lockwoods Folly, one of the state's prime shellfishing grounds, had been closed because of pollution. EMC recommended a plan to clean up the waters. And they designated the Tar-Pamlico River as "nutrient-sensitive waters." (See story, next page.)

The EMC clearly saw threats to coastal waters with the rate and type of development occurring, Derb Carter says. By protecting existing water quality and refusing to tolerate degradation, "they acted in the best interest of all the citizens of the state who use and are interested in these waters," he adds. "They did the right thing."

The new ORW classifications protect critical areas such as shellfish beds, grass beds and nursery areas for young fish.

"Each water body has its own specific standards," Carter adds. "Each is different according to what resource you're trying to protect."

Basically the standards cover sewage disposal, density of development, new marinas, dredging and channels.

The biggest change is an expanded area where construction and sewage disposal permits will be required, Carter says.

Until now, specially designated waters have been protected by regulating development and discharges within a zone 75 feet back from the water.

For ORWs, the zone was expanded to 575 feet. And only low-density development is permitted within the zone. Twenty-five percent of an area can be built up.

No doubt those who watch the coast are pleased. In fact, the U.S. Congress is looking at using North Carolina's ORW classifications as a model for the rest of the country.

But some say it's just a start.

For one, the state's ORW plan may not provide the long-term protection that's needed, says Doug Rader, senior scientist with the N.C. Environmental Defense Fund.

Rader and other environmentalists say that while the new management plans differ with each ORW site, they are not specific enough in some areas.

For example, standards in shellfishing grounds such as Bogue and Stump sounds are not stringent enough to fully protect the resource, Peterson says.

And in regard to coastal development around ORWs, 25 percent density may be too much, says Todd Miller, executive director of the N.C. Coastal Federation.

The Federation recommended levels of 12 to 15 percent development to the EMC. Pine Knoll Shores, developed at 17 percent, is already experiencing water quality problems from stormwater runoff in its canals.

Others agree that the decision-makers need to expand the range of protection of coastal waters.

The new ORW plan focused on the most threatened waters along the southern coast. Identify and protect ORWs from Cape Lookout north now, Miller suggests.

Address the whole watershed and protect wetlands too, he says. What happens upstream affects the water downstream.

"North Carolina has a lot of waters in pretty good shape," Rader says. "With ORWs, we're trying to keep them that way," he adds. "We're the stewards."

Photo by John R. Rottet

Prescription for the Pamlico

By Kathy Hart

The Tar-Pamlico is a river in trouble.

Fewer and fewer schools of spot and croaker fill fishermen's nets.

Slicks of dead fish and algal blooms occasionally foul the waters.

And ugly sores afflict crabs and fish with sickening frequency.

Etles Henries Jr. put it like this at a public hearing in June: "I think maybe people would understand a little better if they could ride down and see fish swimming around with holes in them, crabs eat up, just general terrible bad water—water bad enough that you don't want to get in it."

"The river is yelling and screaming for help," says Doug Rader, a senior scientist with the N.C. Environmental Defense Fund. "There is nothing else the river can do."

Like other rivers nationwide and in coastal North Carolina, the Tar-Pamlico is showing the symptoms of human abuse.

The ailment is a condition called eutrophication, a scientific term that means the river has too many nutrients, namely nitrogen and phosphorus.

What causes the ailment? You and me.

It's the output from our waste treatment plants and industries; the runoff from our farms, forests, backyards and city streets; and the acid-laden rain from the sky.

As a result of this ailment, the N.C. Environmental Management Commission recently classified the Tar-Pamlico "nutrient-sensitive" from the headwaters of the Tar River to a line in the Pamlico River connecting Roos Point and Persimmon Tree Point.

The Tar-Pamlico joins the Chowan, Neuse and upper Cape Fear rivers in sharing this nutrient-sensitive designation. Like the Tar-Pamlico, these rivers are rich in nutrients and plagued by algal blooms.

By designating a river nutrient-sensitive, the EMC places restrictions on nutrient input.

Now, nutrients are flowing into the Tar-Pamlico like water from a faucet. Scientists at the N.C. Division of Environmental Management calculate phosphorus levels at Tarboro average 0.15 milligrams per liter; nitrogen levels, 0.85 milligrams per liter.

These figures compare similarly to the Chowan River in the late 1970s and early 1980s when thick, malodorous blue-green algal blooms were as much a part of the Albemarle summer as watermelon and mosquitoes. Then, phosphorus levels in the Chowan measured 0.12 milligrams per liter; nitrogen, 0.96 milligrams per liter.

A 1988 study indicates that most of the nitrogen in the Tar-Pamlico comes from indirect sources management officials call nonpoint sources. These include 30 percent from farm runoff, 21 percent from forest runoff and 19 from acid rain. Another 15 percent of the total nitrogen comes from the pipes of waste treatment plants that discharge into the river.

In contrast, phosphorus flows mainly from point sources. About 50 percent comes directly from the pipes of Texasgulf Inc. in Aurora and 14 percent from waste treatment plants. Another 12 percent washes off farmland.

Two recent events will change phosphorus inputs. A phosphate detergent ban, enacted in 1987, has already reduced phosphorus by 8 percent. And a new discharge permit issued to Texasgulf Inc. will reduce the phosphate company's input by 90 percent by July 1, 1992. Then Texasgulf's overall phosphorus contribution to the Tar-Pamlico will drop from 50 percent to 9 percent.

An abundance of nutrients can trigger a chain of events that begins with an increase in the growth of single-celled organisms, such as algae and dinoflagellates, and culminates in low dissolved oxygen levels and fish kills.

It works like this.

Nitrogen and phosphorus spur nuisance algae and dinoflagellates to grow and multiply. In some rivers, such as the Neuse and Chowan, blue-green algae form "surface scum so thick you can almost walk on it," says Hans Paerl, a Sea Grant scientist who has studied algal blooms.

In other incidences, the algae and dinoflagellates spread densely through the first foot or two of surface water. There, they photosynthesize, adding lots of oxygen to surface waters.

But the algae block the penetration of sunlight and slow photosynthesis by plants deeper in the water column. If these plants can't photosynthesize, they don't produce oxygen. The water can become anoxic, or oxygenless.

That's when you find fish floating belly up.

But there are other causes for anoxia.

Photo by Kathy Hart

Photo by Steve Murray

Sea Grant researcher Don Stanley says decomposition of dying algae and dinoflagellates along the river bottom can rob waters of needed oxygen.

Couple the decomposition with no turbulence from wind and wave action to mix oxygen-rich surface waters with oxygen-poor bottom waters and waters can again become anoxic, Stanley says.

But oxygen depletion isn't the only problem. Nuisance algae and dinoflagellates aren't considered "tasty" by some fish and shellfish. This taste discrepancy can alter the food chain, leaving waters inhabited by less desirable bottom fish. And the algae and dinoflagellates can release toxins that can kill fish and shellfish.

And those are just the problems caused by algal blooms. An abundance of nutrients and poor water quality have also been connected to fish and shellfish diseases.

Sea Grant scientist Ed Noga has determined that ulcerative mycosis, a fish disease that infects menhaden and other fish, is directly linked to the stresses caused in the fish by poor water quality and nutrients.

Since nutrients are clearly the "germs" causing the Tar-Pamlico's ailment, the EMC placed restrictions on their input. Phosphorus inputs into the basin are to be decreased 64 percent. Most of the decrease will come when Texasgulf Inc. lowers its input in 1992. Meanwhile, the EMC required that nitrogen inputs drop by 10 percent.

The DEM will work with industries and waste treatment plants through discharge permits to decrease nutrient output from these sources. And farmers will be encouraged through the N.C. Agricultural Cost Share Program to implement Best Management Practices in their barnyards and fields. The BMPs include contour plowing, terraces, crop rotation, grassed waterways and animal waste management.

Although the nutrient-sensitive designation is a step in the right direction for the Tar-Pamlico, Rader feels the restrictions were not tough enough.

"The state is waiting for results from the Albemarle-Pamlico Estuarine Study to implement tougher restrictions," Rader says. "But I'm not sure the river can wait for science. Virginia officials are planning to reduce nitrogen and phosphorus levels in the Chesapeake by 40 percent using seat-of-the-pants science. That's the kind of thing I believe we need to do on the Pamlico."

And Rader is concerned about nitrogen input from acid rain. "EPA (Environmental Protection Agency) estimates that by 2030, emission of nitrogen (from combustion engines in cars and trucks) into the air will go up 60 percent in the Southeast," he says. "If so, that will be a big change, and the state needs to address that."

As "doctors" to the ailing rivers, scientists such as Paerl, Stanley and Noga are beginning to diagnose the symptoms and offer resource managers some remedies. And they're broadening their examinations to include the estuarine systems downstream.

All of North Carolina's nutrient-sensitive rivers empty into vital, productive estuaries that serve as nurseries to 90 percent of the state's commercially important species of fish and shellfish. And in that flow of water teems plenty of nutrients that are just beginning to cause estuarine maladies.

Paerl says he is seeing more salt-tolerant algal blooms in estuaries. And the input of nitrogen from acid rain may have an even greater impact in estuaries and nearshore waters than it does in our rivers, he says.

But the prognosis is not all bad.

"With good science and proper management, the nutrient problem can be reversed," Paerl says. "But we have to start now. The environment can't absorb any more than we're putting in it presently."

Photo by Allen Weiss

Good, Clean Advice

By Sarah Friday Peters

Take a quick tour through your home and yard.

Pass by the driveway and walkways; walk through your grass and by your plants.

Inside, check out your kitchen and your bathrooms. Even look in the laundry room.

What you see could spell trouble for North Carolina's coastal waters.

Fertilizers, leaking toilets, runoff from driveways, leftover paint and motor oil are just a few of the culprits.

Every time we wash our hands, clean our dishes or water our lawns, we add to the load of wastes and heavy sediments flowing to the coast.

Federal, state and local laws protect the waters and their uses. But with a few helpful hints, you can do your part to conserve and preserve this vital coastal resource.

Around Your Yard

Loose soil and poor drainage can facilitate erosion, flooding and runoff. To reduce surface runoff:

- Plant ground cover, shrubs and trees to promote infiltration.
- Landscape with plants appropriate to your soil. Don't select plants that need lots of watering.
- Divert rain from paved surfaces onto grass to permit gradual absorption.
- Encourage your community to minimize the use of asphalt.

Lawn and Garden

About 20 million acres of lawn exist in the United States. If healthy, a lawn can help prevent erosion and act as a filter for rainwater. If fertilizers or pesticides are used recklessly, lawns and gardens can be a source of pollution.

For a healthy lawn:

- Plant the right type of grass for your location.
- Don't overwater your lawn.
- Use the right fertilizer for your soil at the right time. Do not apply it on windy days or just before it rains.

Inside Your Home

Many of the products we use at home pose no threat to the environment when they're properly disposed of and treated. But some of the most common products such as floor wax and furniture polish are toxic to people and the environment.

Take care to:

- Read labels. Know what chemicals are potentially hazardous. A few are lye, phenols and petroleum distillates.
- Use alternative, less harmful products whenever possible. For example, lemon oil mixed with linseed oil makes a good furniture polish.
- Recycle motor oil and antifreeze.
- Never put the most toxic household products into sewer or septic systems. Take leftovers to a landfill or your town's hazardous waste collection site.
- Make sure your community has effective sewage treatment.

Water Conservation

Most of us use about 100 gallons of water a day, when we need only four. Conserving water helps at the coast, but it can also mean lower sewer, energy and water bills. To save water:

- Check your water meter while no water is being used. If the dial moves, you have a leak. Fix any that you find.
- Turn off your water and water heater when you go on a trip.
- Run dishwashers and washing machines only with a full load.
- Don't keep the water running when you wash dishes in the sink, brush your teeth or shave.
- Install a water conservation shower head.
- Take short showers instead of a bath.
- Wash your car and water your lawn only when necessary.

These tips are taken from *Sound Advice*, a guidebook published by the N.C. Coastal Federation and WRAL-TV. For a copy, send $3 to the N.C. Coastal Federation, 3223-4 Highway 58, Swansboro, N.C. 28584.

Photo by Rex Gary Schmidt

The Back Page

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

In the rubble left by Hurricane Hugo are some valuable lessons about coastal construction, says Sea Grant coastal engineer Spencer Rogers. He surveyed the damage along the South Carolina coast after the Sept. 21 hurricane.

"There were no surprises," Rogers says. "The buildings that fell were poorly suited for the conditions that occurred."

The homes and businesses that collapsed were built on concrete slabs or pilings that extended only a few feet into the sandy soil, Rogers says. During the hurricane, the waves and storm surge washed the sand from around the shallow foundations and caused the buildings to fall.

Other buildings sustained heavy wind damage because they did not use straps to connect floors, walls and ceilings.

"You have to tie a building together from the peak of the roof to the bottom of the foundation with good, solid connections to resist the winds," Rogers says.

"In areas subject to erosion and flooding, you have to elevate the building above the water because everything the waves hit they usually destroy."

Rogers says total building destruction was the exception rather than the rule on the Sandlapper coastline.

"Many buildings are beat up and bruised," he says. "But most are repairable and reusable."

How would North Carolina have fared if Hugo had whirled ashore along our coastline?

Much better, Rogers says.

The N.C. Building Code requires pilings in erosion-prone areas to extend 16 feet below the soil surface. And hurricane clips are a must.

"Any area hit by a storm of that magnitude would be beat up, and some buildings would totally collapse," he says. "Our standards and quality are by no means perfect, but the damage would have been a lot less in North Carolina."

Cracking into shellfish aquaculture can be a tough task. But fishermen and entrepreneurs can break into the business by coming to a one-day conference Feb. 17 at the Duke University Marine Laboratory on Pivers Island.

The morning session of the third annual Shellfish Culture Conference will address North Carolina's permitting and leasing programs. State agency representatives will be on hand to talk about the system, its history and how to apply for a permit or lease. A N.C. aquaculturist will follow to lead discussion on the pros and cons of the system.

In the afternoon, East Coast experts will give up-to-date technical advice on successful scallop culture.

The workshop is co-sponsored by state fisheries organizations and agencies. For more information, call Sea Grant agent Bob Hines at 919/247-4007.

Neither rain nor sleet can stop the U.S. Postal Service. And even a hurricane couldn't stop volunteers for The Big Sweep '89. Hurricane Hugo blew his mighty forces across the Carolinas Sept. 23, delaying North Carolina's cleanup one week.

But on Sept. 30, more than 3,645 people came to the coast, inland parks and rivers for the state's first waterway cleanup.

They covered Duck, Emerald Isle, Wrightsville Beach, the Tar River, Lake Jordan, Lake Lure and 49 locations in between. And they picked up enough trash to fill approximately 5,252 bags.

Out of 25 states holding cleanups this year, North Carolina ranked fourth in the number of volunteers and amount of trash collected. Puerto Rico, the Virgin Islands, Canada and Mexico also held beach cleanups.

UNC Sea Grant is compiling the number of items collected during The Big Sweep, and final tallies will be reported soon. A few of the more unusual items volunteers found included lawn chairs, car headlights, coconuts, a toilet seat and a computer chip.

And some of this year's booty had a foreign look. Folks found a bottle of German detergent, hair mousse from Colombia, hair spray from the Soviet Union and a jar of salmon eggs from Siberia.

Keep an eye on *Coastwatch* for the final results and information on The Big Sweep '90, set for Sept. 22.

For every pound of shrimp North Carolina fishermen catch, another four to 13 pounds of finfish may be swimming in their nets. For shrimpers, the extra bulk doesn't pay off. And sportsfishermen are worried the bycatch reduces stocks.

The problem has already become an issue in Florida where shrimpers have been banned from fishing in parts of Tampa Bay.

But fisheries experts in North Carolina hope to squelch the smoke before it becomes a fire.

That's why Sea Grant has initiated a project to find a new type of gear that can reduce shrimpers' bycatch.

With a new grant from the Southeast Regional Office of the National Marine Fisheries Service, two Sea Grant advisers, a netmaker and a scientist hope to help devise the perfect Finfish Separator Device for Tar Heel waters.

Experimental FSDs come in several different shapes and sizes now, but most are funnel-shaped with large-mesh net at the top. As the net is pulled, the shrimp whisk through the funnel as fish escape through the top.

This winter, Jim Murray and Jim Bahen of Sea Grant, netmaker Steve Parrish, and

Continued on next page

an advisory committee will identify 20 "highliners," or opinion leaders, in the fisheries.

With three drawings in hand, they'll ask the highliners which net would work best and how it could be improved.

After modifications are made, the team plans to test its FSD in a flume tank and then out on the water.

Roger Rulifson, a zoologist at East Carolina University, will video the field tests to find out how the fish react to the new nets. Then changes can be made based on their reactions.

"We do not see this as a panacea, but a start," Murray says. "We're trying to do some work—involve fishermen's ideas—before there's a crisis."

The Albemarle-Pamlico Estuarine Study is seeking proposals for its fourth funding period. The study gives grants for research and public involvement projects that will lead to an effective conservation management plan for the Albemarle-Pamlico region.

APES proposals can be submitted from Nov. 22 to Jan 12. Late proposals will not be considered.

For more information, write Robert E. Holman, DEHNR/Albemarle-Pamlico Estuarine Study, P.O. Box 27687, Raleigh, N.C. 27611.

If visions of Christmas are dancing in your head, why not give your friends and family the gift of better health.

No-Salt Seafood, written by Sea Grant seafood education specialist Joyce Taylor, offers seafood recipes that contain no added salt—only what occurs naturally in the food or in small quantities in the ingredients.

The American Heart Association recommends that everyone restrict salt consumption, especially those with high blood pressure. Salt may not cause high blood pressure, but it can make the condition worse.

To help everyone lessen their dependency on the salt shaker, Taylor and a group of food and nutrition leaders from Carteret County eliminated table salt from more than 40 seafood recipes. In its place, she substituted herbs, spices, citrus juices and table wines.

For a copy of *No-Salt Seafood,* write UNC Sea Grant. Ask for publication UNC-SG-89-07. The cost is $3.50.

After seven years of writing about science, seafood and fishermen, Nancy Davis left the *Coastwatch* staff in October to take a job with the University of North Carolina at Chapel Hill.

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

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