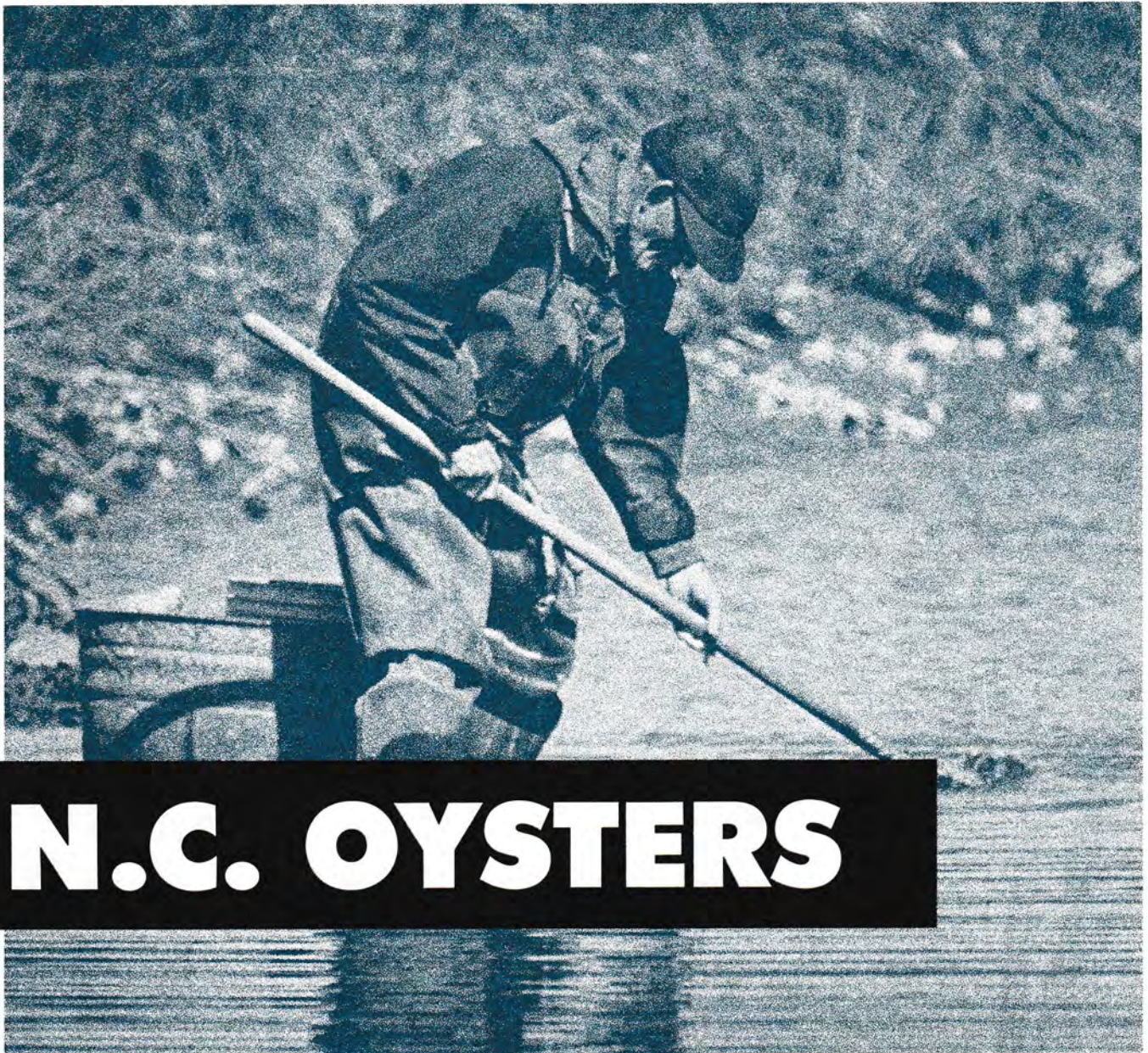
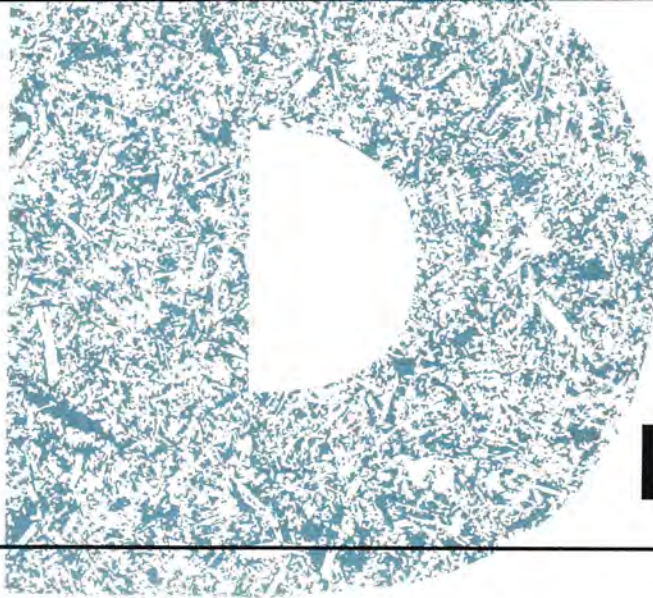


COAST WATCH



N.C. OYSTERS



ISEASE

Everything pointed toward a record harvest of oysters.

A year ago, the red tide had closed down most of the state's shellfish beds, leaving the oyster crop largely untouched. Fishermen reasoned that it would mean a bumper crop awaited their tongs this year.

But by early summer, well before the season opened, their hopes were dashed.

In the Newport River, clammers started noticing "boxes" in nearby oyster beds. The oysters were still hinged shut as though they were alive, but there was nothing inside.

And in Lockwood Folly River and Virginia Creek in Topsail Sound, the story was the same.

The oysters were dead.

Once plentiful beds were full of empty shells. Every now and then, a twist of the oyster knife revealed an animal inside. But more often than not, the mollusk was wasting away.

By November, the N.C. Division of Marine Fisheries confirmed the fishermen's worst fears.

The parasites that had decimated the once prolific oyster beds of the Chesapeake Bay had spread into Tar Heel waters.

Dermo and MSX, parasites that kill oysters, are leaving slim pickings for the state's oystermen.

Dermo and MSX had shown up here.

Both are single-celled parasites, invisible to the human eye. They thrive in warm, salty waters typical of tidal creeks and sounds during drought conditions. The organisms attack oysters, eventually killing them.

DMF officials stress neither organism is harmful to humans, so shellfish beds will not be closed.

Of the two parasites, Dermo is the most prevalent here. In samples from the Newport River, 40 percent of the oysters contained Dermo. Lockwood Folly and Virginia Creek samples showed that nearly 85 percent of the oysters were affected with Dermo. The parasite has also been identified

in Jones Bay in Pamlico County.

MSX has been identified in the Newport River, Wysocking Bay in Hyde County and the Crab Slough area near Oregon Inlet.

Until recently, it seemed North Carolina would escape the problems that have plagued our Northern neighbors since the 1950s.

So, when Maryland Sea Grant agent Don Webster heard Dermo and MSX had been identified here, he had four quick words. "Oh, God help you," he said.

Oysters once dominated the seafood industry there. At one time, as many as 3,000 oystermen plied the waters of the Chesapeake Bay. Now fewer than 500 fishermen harvest the bivalves.



Photo by Scott Taylor

By Nancy Davis

STRIKES OYSTER CROP.

And Maryland, a state that once was the biggest supplier of oysters on the East Coast and claimed harvests of as much as 2.5 million bushels of oysters a year, now records about half a million bushels a year, Webster says.

In North Carolina, about 50 percent of the state's oyster crop is dead, estimates Mike Marshall, chief of DMF's Fisheries Development Section.

He attributes most of the oyster mortalities to Dermo.

Under normal circumstances, as much as 5 to 10 percent of the oysters die each year, Marshall says.

Last year, even though most of the shellfish beds were closed to red tide just a few weeks after opening, the state recorded one of its best harvests of oysters. Fishermen gathered 225,000 bushels of the bivalves at a value of \$2.9 million, Marshall says.

Then, Marshall estimates an oysterman on the Newport River could bring in 15 to 18 bushels of oysters a day. This year, that same oysterman would be lucky to find three to five bushels, he says.

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Newport River oystermen say as much as 90 percent of their oysters are dead.

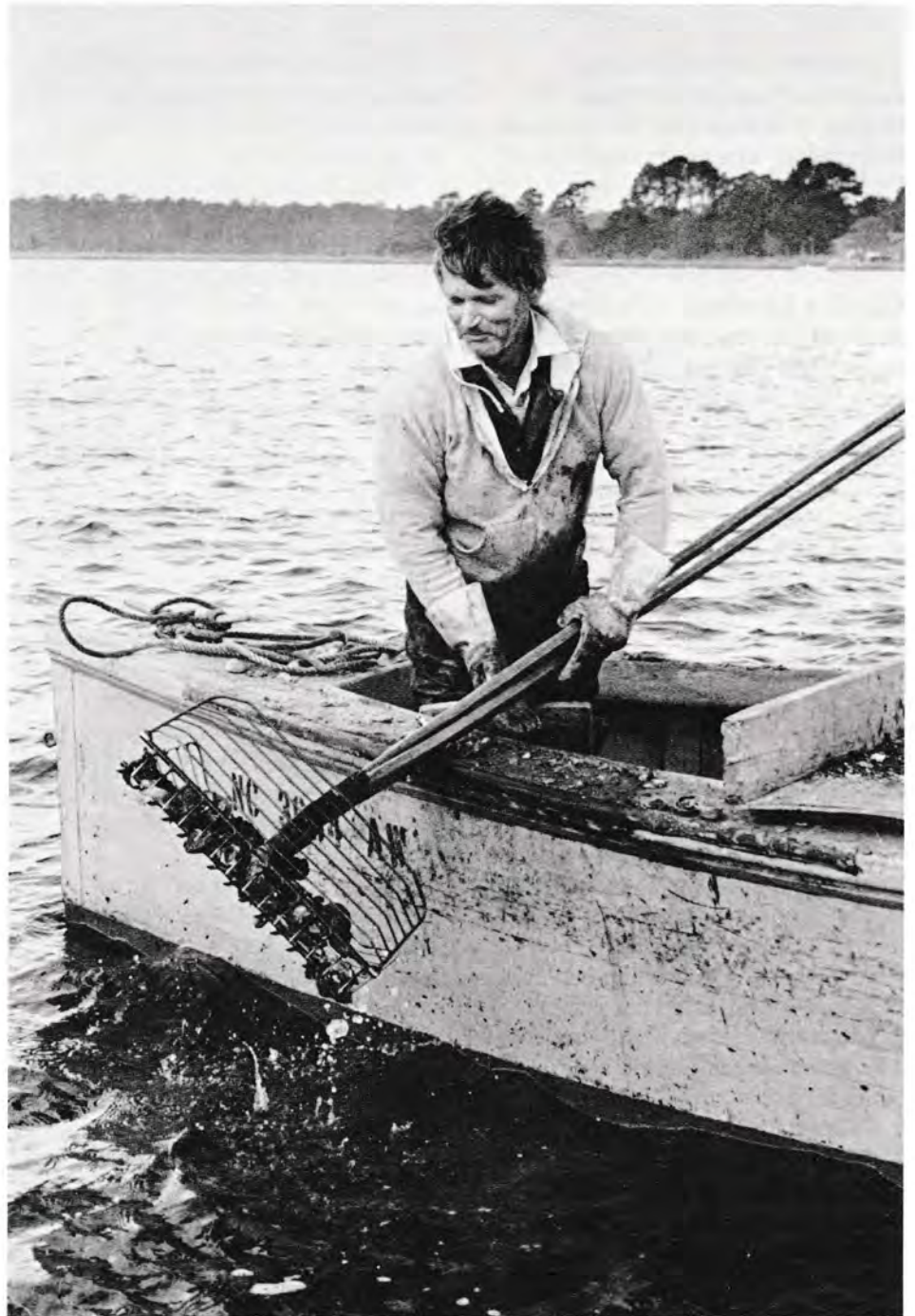


Photo by Nancy Davis



Dermo and MSX attack the oyster, leaving only the shell.

Oysterman Raymond Graham agrees. Last year he harvested 25 bushels of oysters from the Newport River before 10 a.m. on opening day for the harvest. This year, it took him five hours to come up with four bushels.

Newport River oystermen say the mortality figures for their area are much higher than the estimated state figure of 50 percent. They believe more than 90 percent of the oyster crop there is dead.

As proof, on a recent December morning, Mill Creek fisherman David Oglesby pulled up a tongful of oyster shells from public bottom in the Newport River. Only two oysters were alive; the rest were empty shells.

Marshall says this may not be the first time Dermo has struck oyster beds in the Newport River. He believes the state has had outbreaks of Dermo before, but it simply wasn't identified. In 1981, for example, large numbers of oysters in the river died. Then, the mortalities were attributed to environmental conditions.

And interestingly enough, Marshall says, those environmental conditions were the same conditions under which Dermo is thriving now. The hotter and saltier the water, the better for Dermo and MSX.

"Those situations would be tough on an oyster anyway," Marshall says. "The stress of that, coupled with the parasitic protozoan in the system, causes a lot of mortality."

In the Chesapeake Bay where Dermo and MSX have ravaged oyster beds, scientists agree that Dermo is more of a problem.

When it rains and salinities drop below 10 parts of salt per thousand parts of water, MSX is quickly eliminated, says Eugene Bureson, a biologist at the College of William and Mary's Virginia Institute of Marine Science.

"But Dermo doesn't get eliminated or killed," he says. "It just sits there and redevelops when salinities go back up."

"Dermo is much more of a long-term problem than MSX," Bureson says.

Scientists aren't sure how Dermo and MSX got into North Carolina waters. Some believe the parasites have always been present, just waiting for the right conditions.

Dermo has killed oysters in Atlantic and Gulf of Mexico waters. MSX has been recorded from Maine to Florida.

And although the two parasites cause similar results—death of oysters—they are very different organisms, Bureson says.

Dermo is a slow killer, Bureson says. Usually an oyster has to be infected with Dermo for a year to 18 months before mortalities begin to occur.

The mollusks probably ingest Dermo as they are filtering water for food. Eventually, the parasite spreads throughout the oyster's system, overwhelming it until it finally wastes away.

Bureson believes that since shellfish beds were closed last year because of red tide, the denser populations may have contributed to the spread of Dermo this year.

MSX deals a swifter blow to oysters, killing in five to six months.

But so far, facts about how MSX enters the oysters have eluded scientists.

MSX, or multinucleate sphere x for unknown, was first spotted in Delaware Bay in 1957. Because researchers couldn't identify it, they named it for its spherical shape and numerous nuclei.

Now, 30 years later, scientists are still baffled. They haven't been able to culture the parasite in a laboratory, and they still aren't sure how it attacks oysters.

Some scientists believe other marine animals may carry MSX and transfer it to oysters. But they haven't been able to identify the carriers.

At Rutgers University Shellfish Research Laboratory, researchers are breeding oysters that show some resistance to MSX, says biologist Susan Ford. The oysters are produced by selectively breeding survivors of MSX infections.

These oysters may offer some hope to fishermen with private leases.

But until researchers find more clues and answers about how to control Dermo and MSX, they say the only thing to do is hope for wetter weather.

By Sarah Friday Peters

GIVING OYSTERS A CLEAN BILL OF HEALTH.

When oysterman David Oglesby's grandfather plucked an oyster from Mill Creek, he never thought twice about disease. Bushel after bushel of plump, juicy shellfish looked fine to him and tasted even better to his customers.

The senior Oglesby wasn't alone. Before the 1920s, hardly anyone worried about oysters and disease. The savory shellfish slipped by regulations just as easily as they slid down diner's throats.

Epidemics of typhoid fever in New York, Chicago and Washington soon changed that.

The cause. . .sewage-polluted oysters.

The cure. . .national standards for testing shellfish waters and authority to close polluted ones.

By 1925, North Carolina had its own Shellfish Sanitation Program to oversee Mill Creek and other state oyster grounds.

But 64 years later, scientists still want the poop on shellfish and sewage.

Increased development and populations nationwide put pressures on shellfish growing areas. Now researchers must look for better ways

to test polluted waters and improve purification methods.

Human and animal wastes are almost solely responsible for shellfish contamination, says Mark Sobsey, a Sea Grant researcher and a biologist at the University of North Carolina at Chapel Hill.

Bacteria and viruses flow into shellfish waters from seepage or sep-

tic tank overflow, sewage, discharges from industry, agricultural runoff or marinas with heavy boat traffic, he adds.

Oysters pick up harmful wastes as they feed on suspended particles in the water. Contaminants don't affect them. They don't even make the oysters look or taste different.

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Biologist Mark Sobsey.

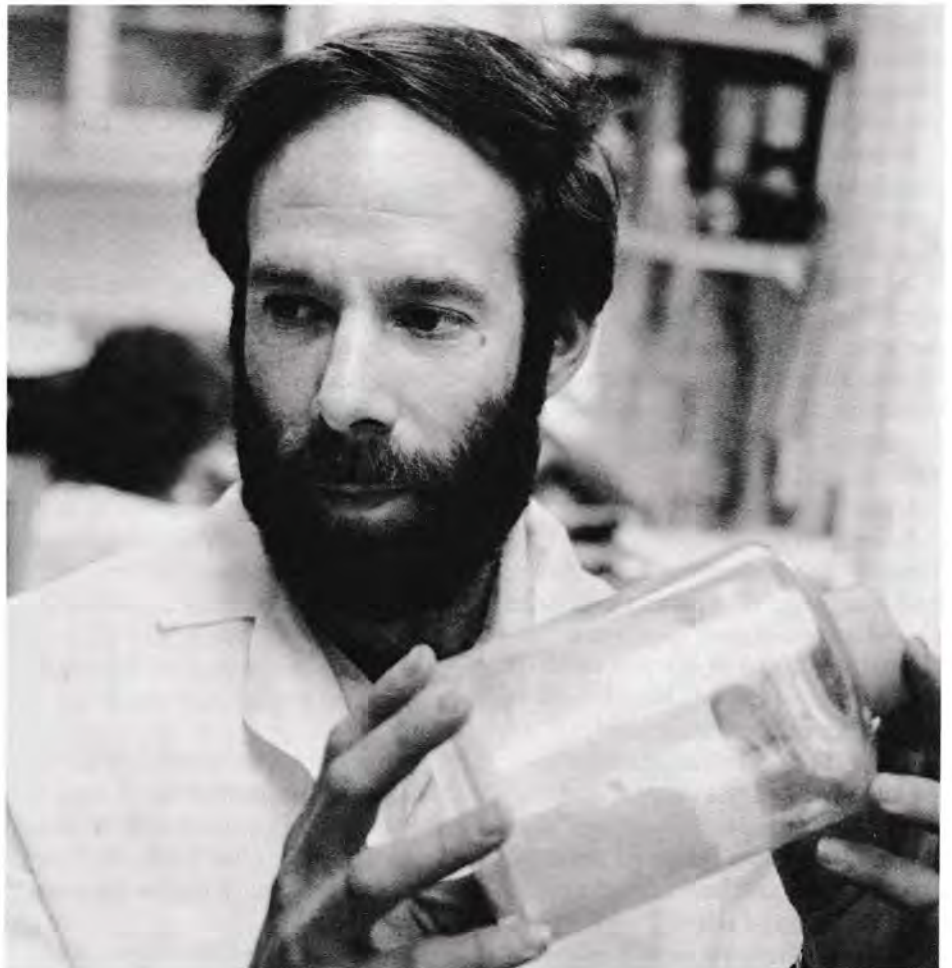


Photo by Neil Caudle

He has less bottomland to fish than his grandfather did, but oysterman David Oglesby is still on the water.

But if someone eats a tainted oyster that's raw or partially cooked, he may get sick.

Typhoid fever is rare these days, but other symptoms can occur.

If you've ever eaten an oyster that's sent you running to the bathroom, you know.

Nausea, vomiting and diarrhea can strike within hours of eating contaminated shellfish. Or in a few cases, stomach or intestinal illnesses can occur.

Bob Benton, head of the state's Shellfish Sanitation Program, says he gets reports of about four or five cases a year. Most of the outbreaks can be traced to oysters taken from illegally fished waters or from imports.

To guard against bootleg operations, the Division of Marine Fisheries polices North Carolina's shellfish areas. The state follows U.S. Public Health Service and Federal Drug Administration standards to provide additional protection.

Benton and his crew routinely check waters and shellfish meats, inspect wastewater treatment plants and certify and inspect processors.

As for the past 64 years, the agents' main job is to check the water for harmful bacteria from fecal wastes. Waters close to oystermen when test totals show more than 14 organisms per 100 milliliters of water.

Oglesby can verify that.

Resting in his skiff on a cold December morning, the fisherman points up river to an area that's been closed for more than four years.

That was some of his private shellfish beds they closed. Now he fishes mostly on public bottomland.

The FDA and Public Health Service established the current standards in the 1970s, Sobsey says. The original measures set up in the 1920s were 70 fecal coliform bacteria per 100 milliliters of water.

"These standards have been useful



in protecting the public from typical bacterial diseases such as typhoid fever," Sobsey says.

But in the 1950s, scientists discovered that oysters and other bivalves could also pick up human viruses such as hepatitis. The viruses, as well as diarrhea and stomach diseases, could be transmitted to people.

Since then, there has been a lot of research trying to find out if the current standards for testing can also detect viruses, Sobsey says.

So far the answer is "no."

"We need to look for a better indicator of shellfish viruses," Sobsey says. "We still don't have convenient ways to detect all viruses."

With his research, the Sea Grant scientist hopes to find a new testing standard acceptable by the FDA.

Keeping bad oysters off the market is one way to stop diseases from spreading.

Nature provides another way.

Remarkably, oysters can purge themselves of contaminants if placed in clean water. Over time, the clean water flushes out harmful bacteria and viruses.

North Carolina fishermen some-

times transfer polluted oysters to clean estuarine waters, under supervision, then harvest the shellfish when the cleaning process is done.

Federal law requires relayed oysters to stay in clean water at least two weeks. But Sobsey found that it may take longer to rid oysters of viruses. In his tests, it took one month to purify relayed oysters of all bacteria and viruses.

Commercial cleaning, or depuration, shows similar results.

Sobsey's lab tests simulating depuration revealed most viruses moved out rapidly. But one virus—Hepatitis A—persisted. Now he recommends commercial depuration periods also be extended.

In spite of his job, Sobsey still eats raw oysters.

The chances of infection are extremely rare, he says. And, he points out, all bacteria and viruses can be transmitted by other routes besides shellfish. Swimming in contaminated water, eating foods prepared by someone without proper hygiene, and mixing sick children in day-care centers can produce the same results.

By Sarah Friday Peters

WORKING ON THE WATER.

The boat motor hums in a quiet monotone as oysterman Raymond Graham skims across Newport River in his handcrafted skiff.

The water ripples as he makes his way to a familiar oyster bed about a half-mile from his fishing shack on the shore.

It was a trip the Mill Creek fisherman had made almost every day of his life. The water is in his blood, you could say.

Five generations of Grahams have worked the Newport River waters. The first dollar Raymond ever made came from culling oysters for 5 cents a bushel.

At 58, Graham still makes his dollars from shellfish—fishing and distributing oysters and clams all over the country.

He is one of more than 8,000 commercial shellfishermen in North Carolina, and one of the reasons oysters end up on our plates.

This December day, Graham is dressed in a blue flannel shirt, jeans, black rubber boots and a navy blue baseball cap depicting a boat and bearing the words "Becky L. Smith." A chaw of tobacco rests in his cheek.

His hands and his eyes show oystering is hard work. To an outsider, it's both science and art.

Like farmers, oystermen work hand-in-hand with an unpredictable Mother Nature. It takes skill and luck to turn a profit.

In North Carolina, oystermen pick, tong or dredge for "coons" and "rocks." They call smaller oysters coons because the shell is shaped like a raccoon footprint. "Rocks" are bigger and thicker. Both can be found along the coast in bays, rivers, inlets and sounds.

"You take an oyster," says old-time oysterman David Oglesby of Mill Creek. "He doesn't want a real salt water or a real fresh water. He wants a brackish water."

Oysters survive best in water with low to moderate salinity. They spawn during warm weather, sending millions of larvae floating through the water. The young oysters, or spat, cement themselves permanently to one place to grow. Oyster shells work best for a setting, Graham says, but

other shells, tires and cans work just as well.

If larvae land on mud or shifting sand, they quickly die, says David Taylor, central district manager for the Division of Marine Fisheries. For this reason, the state plants shells to aid natural oyster production.

Weather, fungi, sponges, barnacles and disease impede setting, too, Taylor says. Usually a low percentage of young oysters make it to the marketable size of 3 inches.

It takes about 18 months to two years to get a 3-inch oyster out of the Newport River, Graham says. Oysters grow fastest in the winter.

The traditional, and legal, harvesting season runs from Oct. 15 to April 1 for shellfishermen working public bottomland. Those with privately leased bottomland can fish year-round.

Graham has about 61 acres of

Continued on next page.

A Newport River oysterman pulls in the oysters while his wife culls them.



Photo by Nancy Davis

Shellfisherman Raymond Graham.

leased land on the bottom of Newport River. Once a year, he pays \$5 to the state for each acre. Some of the leases came from his grandfather. Others he got from friends.

Riding along in his 18-foot skiff, Graham points out his plots. Each one is marked with corner stakes and signs with his name and lease number. Some 40,000 similar plots exist in North Carolina.

Out in Newport River, oystermen pick and tong for their spoils. Dredging, or harvesting with mechanical rakes from boats, isn't legal there.

"We've always caught them by hand," Graham says. "It's the only reason this river's survived. . . . We've always had clams and oysters."

To pick oysters, fishermen wait until low tide then wade on shoreline or sandbar-type shellfish beds. With a bucket and a pair of gloves, they pick out oysters to take back.

Around Mill Creek, though, most people tong, Graham says.

The boat slows as Graham reaches his destination in the middle of the river. Nine other fishermen, some with a partner or two, are already at work.

Graham grabs his hand-made tongs. He works the six-foot shafts in his hands like a giant pair of scissors and rakes the basket across the river floor.

In a minute or two, he pulls a basket full of oyster shells from the icy water and throws the live ones on a large culling board stretched across his boat.

A woman in a nearby boat sits by her culling board as her husband draws the oysters from the water. With a flat iron bar, she knocks pieces of shell from dead oysters off the good oysters.

Restaurants and oyster bars require oysters to be clean and single for serving on the half shell.

Cleaned oysters go in a bucket. Discarded shells fall back in the



water as substrate for future oyster crops.

"If you throw them away with dead shells on them, you wouldn't be able to work," says the woman.

In minutes, Graham putters to another spot near an exposed rock covered with shells.

David Oglesby has been working the section since about 7 a.m. It's nearing noon now, and he has almost two bushels of oysters.

"That's about right for this time of year," he says.

Business could be better. But like Graham, the 70-some-year-old Oglesby fishes most every day.

He likes being on his own, making a living from the water.

Besides, he says, "This is what I've done all my life."

As the water shimmers and the wind breezes by on the ride back to shore, anyone could see why.

Oyster Culture Workshop.

Year-round markets for oysters have placed the savory shellfish in high demand. To meet that demand, and to aid in producing a surer crop, some fishermen cultivate their own oysters on leased bottomland.

North Carolina fishermen can learn more about oyster culture at an all-day conference at Duke Marine Lab on Feb. 25 from 8:30 a.m. to 6 p.m. Noted speakers from across the East Coast will give fishermen state-of-the-art findings and information to get them started.

The conference will cover

hatchery and nursery techniques, stock selection and grow-out, diseases, predators, water quality, and financial and legal considerations for oyster culture.

Sponsors for the workshop include Sea Grant, the N.C. Division of Marine Fisheries, the N.C. Fisheries Association, the UNC Institute of Marine Sciences and Duke Marine Lab.

For more information, write Bob Hines at Sea Grant, P.O. Box 896, N.C. Aquarium/Pine Knoll Shores, Atlantic Beach, N.C. 28512. Or call him at 919/247-4007.



By Nancy Davis

HUCKING AN OLD IMAGE.

Oysters are coming out of their shells.

No longer must they hide behind the misconceptions that have plagued them for years.

And for consumers, the news is good.

Used to be, the tasty bivalves were off-limits for folks on low-cholesterol diets.

But new research shows that oysters aren't the harmful foods they were once thought to be.

Joyce Taylor, Sea Grant's seafood education specialist, says that the old estimates of cholesterol in the shellfish were based on analyses that detected non-cholesterol components as well as cholesterol.

Recent findings show that mollusks, including oysters, are actually low in cholesterol. And they're even lower in cholesterol than some other seafoods.

A 3½-ounce serving of oysters contains about 45 to 55 milligrams of cholesterol, Taylor says. The amount of cholesterol in oysters may vary, depending on season, reproductive cycles and what the oysters are eating.

But be sure your cooking method doesn't elevate the amount of cholesterol in the dish, Taylor says. If you fry oysters in saturated oils, you're turning a healthy food into one you should avoid.

Taylor recommends cooking in unsaturated oils.

Or better yet, try roasting or steaming oysters in the shell. If you're

using shucked oysters, bake or broil them or include them in a casserole.

Oysters are available in several forms. They are often sold live in the shell by the dozen or by the bushel. In grocery stores, you'll often find oysters shucked in half-pint, pint or gallon containers.

Oysters in the shell should be alive, Taylor says. The shells should be tightly closed or should close tightly when tapped.

Shucked oysters should be plump with a natural, creamy color and clear or slightly opalescent liquid. They should not contain more than 10 percent liquid, and should have a mild odor.

Taylor recommends you buy at least six oysters in the shell per person and one-sixth of a pint of shucked oysters per person.

If you harvest oysters for yourself, be sure you take them from open public waters, says Bob Benton, head of the state's Shellfish Sanitation Program.

If you buy live oysters from a dealer, be sure the bag or container is properly tagged, Benton says. The tag should contain the area and date of harvest as well as the dealer's name and certification number.

Shucked oysters should also contain the dealer's certification number and an expiration date on the container. Don't buy oysters with an expired date, Benton says.

And some folks prefer to shuck their own oysters, Taylor says. And for those people, Taylor has some ad-

vice. Be sure you're equipped with a good, sturdy knife and a pair of protective gloves.

And then choose from one of these methods.

1. With your knife, chip off the thin lip of the oyster until there is a small opening. Insert your knife and cut the muscles from the top and bottom shells. Then scoop the oyster free from the shell, and it's ready to serve on the half-shell or to use in other dishes.

2. Another method for shucking oysters is to work the knife into the front of the oyster opposite the hinge. Then go in deep and cut the muscles, twisting the knife and popping the oyster shell open.

3. Finally, you can insert your knife at the hinge and twist to pop the oyster open. Then insert the knife at the front and cut the muscle loose.

If you want more information on buying and handling fresh North Carolina seafood, write Sea Grant. The following brochures are available: *Hooked on Fresh Fish and Shellfish* (UNC-SG-85-08); *Bringing the Catch Home* (UNC-SG-86-26); *Dressing Finfish* (UNC-SG-86-10); *Flaking Fish* (UNC-SG-87-05); *Cracking into Crustaceans* (UNC-SG-88-01); and *Breaking into Bivalves* (UNC-SG-88-02). Each brochure is 50 cents.

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.



North Carolina's seafood processing industry stepped into the future in December when a plant in Plymouth, N.C., unveiled a state-of-the-art freezing facility.

The plant will serve as a model for the state's other seafood processors.

The demonstration project is part of an effort to improve in-state processing of seafood, says Sea Grant seafood extension specialist David Green.

Carolina's Pride Seafood and Liquid Air Corporation, an international company with its U.S. headquarters in California, worked with Green to develop the pilot facility.

At a ribbon-cutting ceremony to dedicate the facility, Gov. James G. Martin presented Sea Grant with a certificate of appreciation for its involvement in the project.

The seafood company will use cryogenics, a technology by which foods can be individually quick frozen at extremely low temperatures within minutes. The process has been used with other foods, but it's only recently been applied to seafoods.

The Plymouth demonstration facility is the first of its kind in the state's seafood industry.

Green says the project also will explore new packaging and marketing techniques for the frozen products.

The Plymouth facility is the showcase for a larger effort to improve the state's seafood processing industry.

Green says that ultimately the project will result in more seafood products being processed in North Carolina. And

that will mean increased revenues for the state as well as new job opportunities.

"We want to present a quality image for seafood processing in North Carolina," Green says. "And the seafood industry is looking at improving its quality by upgrading its facilities and using new technology to be more competitive on a national and international basis."

UNC Sea Grant is soliciting proposals for the 1990-1991 funding period. If you're a researcher and would like to submit a proposal, call the Sea Grant office in Raleigh or consult the "Call for Proposals" memorandum available at the research office of your university.

All proposals must be submitted by April 14.



Sea Grant's Marine Advisory Service has formed an advisory board. The board is made up of 13 members with backgrounds and interests in everything from commercial and recreational fishing to local government and coastal regulations.

The board will help the Advisory Service remain responsive to its constituency.

The Advisory Service is Sea Grant's outreach or extension program. Its agents conduct educational and applied research programs in fisheries, seafood technology, aquaculture, recreation and tourism, marine education, coastal engineering, business development and coastal law.

The advisory board will recommend programs that will help the Advisory Service continually refine its priorities and develop new programs.

Members of the board and their backgrounds include: Bo Nowell, recreational fishing; David Owens, coastal management; Joseph Phillips, extension administration; Jerry Schill, commercial fishing; Clark Calloway, seafood processing; and Lockwood Phillips, news media.

Also on the board are: Webb Fuller and Tony Caudle, local government; Melvin Daniels Jr., banking; Carson Davis, recreation; Wende Allen, education; Steve Parrish, commercial fishing business; and William Raney, coastal law.



Recycling saves money, energy and natural resources. But for the most part, Americans don't take the time or make the effort to recycle their bottles, cans and

newspapers.

Consider these facts supplied by the Environmental Defense Fund:

Americans throw away enough glass bottles and jars to fill New York's World Trade Center every two weeks. We throw away enough aluminum to rebuild our commercial airfleet every three months. And we use 2.5 million plastic bottles every hour, only a small percentage of which are now recycled.

In a brochure, *If You're Not Recycling, You're Throwing It All Away*, the EDF explains how recycling can save us money and how you can get started.

If you'd like a copy of the brochure, write the N.C. EDF, 128 E. Hargett St., Raleigh, N.C. 27601.

When manufacturers began touting the benefits of artificial seaweed to reduce beach erosion, Sea Grant coastal engineer Spencer Rogers was curious.

The idea was that the long strips of fiber acted as underwater sand fences that built sandbars.

But Rogers reviewed artificial seaweed research and monitored a test site containing the seaweed. And he found that the seaweed was not a viable solution for controlling beach erosion.

As a result, several North Carolina coastal municipalities saved thousands of dollars when they opted not to buy the seaweed.

In *Artificial Seaweed for Shoreline Erosion Control?*, Rogers examines this alternative. He addresses the develop-

ment, experiments, problems and improvements of artificial seaweed in the past 25 years.

For your copy, write Sea Grant. Ask for UNC-SG-WP-86-4. The cost is \$1.

When 99.9 percent of the bloater fish larvae died in Lake Michigan, most fisheries biologists studied the reasons why. But two North Carolina Sea Grant researchers and a scientist from the University of Wisconsin decided to take a different approach. They examined the .1 percent of larvae that lived to find clues to their survival.

For their research, zoologists James Rice and Larry Crowder of North Carolina State University, and Mark Holeý of Wisconsin, received an award from the American Fisheries Society at the annual meeting Sept. 14 in Toronto. Plaques were given for publishing the "most significant paper" in the 1987 volume of the *Transactions of the American Fisheries Society*.

The team studied growth rings in the inner ear of this commercially important fish and found that the fish's size or growth rate influenced survival. They also identified a direct correlation between bloater populations and its main predator, the alewife.

"The concept they're working on is at the forefront of science," says UNC Sea Grant Director B.J. Copeland. Understanding the relationship between size and survival is crucial to fisheries management, he adds. Rice and Crowder have transferred their findings to a companion Sea Grant study in North Carolina using spot and flounder.



Coast to coast, recreational fishermen spend millions of dollars every year on saltwater fishing tournaments. And these tournaments are no longer small contests among friends. They have grown into large money-making businesses, with the same headaches of publicity, money management and legal decisions as any other commercial venture.

But for every tournament that succeeds, another falls by the wayside. Now, there's a book that explains the complicated process of organizing a tournament and gives tips for making them more successful.

Tackling Tournaments, published by

Texas A&M Sea Grant College Program, provides an outline for organizing, financing, publicizing, managing and evaluating a saltwater fishing tournament. The guidebook provides helpful hints to directors who are old hands at staging tournaments, as well as to those who are just getting their feet wet.

UNC Sea Grant Marine Advisory Director Jim Murray and agent Jim Bahen provided a chapter on organizing tournaments for underutilized species.

For a copy of *Tackling Tournaments*, write Marine Information Service, Texas A&M University, College Station, TX 77843-4115. Ask for publication number TAMU-SG-88-603. The cost is \$15.



Sashimi isn't just for the Japanese. These thin slices of raw finfish are popular in the United States now, too. Sashimi is commonly served molded over rice and called sushi.

But even though it's increasing in popularity, some folks are concerned about the possible presence of parasites in the raw fish.

Doris Hicks, Delaware seafood technologist, reports that these live worms can only be transferred to people who eat raw or insufficiently cooked fish. And even then, the parasites are usually digested with no ill effects.

Hicks adds that fewer than 30 cases of illnesses resulting from the presence of parasites in sushi or sashimi were reported in the United States in 1986. And most of those cases were reported on the West Coast where more fish are infected with parasites.

Adequate freezing or cooking will eliminate possible infection from parasites, Hicks says. But in a home freezer, it can take up to five days to kill all the parasites, especially in large fish. The fish is also safe when it's been cooked and it has reached an internal temperature of 145 F for five minutes.

If you do eat raw seafood, Hicks recommends that you hold the fillet in front of a light so that any parasites can be seen and removed. The parasite is usually a tightly coiled, clear worm imbedded in the flesh. Simply cut off the affected portion.

For more information on parasites, write: Delaware Sea Grant College Program, University of Delaware, 263 E. Main St., Newark, Del. 19716. Ask for a two-page flyer, "Eating Raw Finfish: What Are the Risks, the Benefits?" Single copies are free.

Sea Grant Marine Advisory Service Director Jim Murray has received a grant from the National Marine Fisheries Service to survey artificial reef users.

Continued on next page

Coastwatch is a free newsletter. If you'd like to be added to the mailing list, fill out this form and send it to Sea Grant, Box 8605, NCSU, Raleigh, N.C. 27695-8605.

Name _____

Address _____

City/State/Zip Code _____

To help us specialize our services, please answer these questions.

I am in the following line of work:

- | | |
|---|--|
| <input type="checkbox"/> Boatbuilding/repair | <input type="checkbox"/> Marina operator |
| <input type="checkbox"/> City/County government | <input type="checkbox"/> Marine recreation |
| <input type="checkbox"/> Commercial fishing | <input type="checkbox"/> Mass media |
| <input type="checkbox"/> Educator | <input type="checkbox"/> Seafood processing/marketing |
| <input type="checkbox"/> Farming | <input type="checkbox"/> State government |
| <input type="checkbox"/> Homemaker | <input type="checkbox"/> University professor/researcher |
| <input type="checkbox"/> Lawyer | <input type="checkbox"/> Other _____ |

Coastal property owner: yes no Boat owner yes no

\$_____ contribution to defray printing costs for *Coastwatch*

Conflicts are rising over reef use and construction as more and more people are competing for a limited resource.

Murray will survey environmentalists, commercial fishermen, sport fishermen and divers in three Southeastern states to get their input on how they'd like to see artificial reef programs developed and managed.

Then he'll turn his results over to reef managers.

Offshore anglers are always looking for a spot that will guarantee them a catch of snapper, grouper or king mackerel.

Often recreational fishermen drop their hooks above the wrecks and ar-

tificial reefs where fish congregate. But these spots can be as crowded with anglers as a shopping mall on the day of a sale.

Why not try fishing the natural reefs offshore.

Sea Grant scientists have plotted the locations of these reefs in Onslow Bay—the area between Cape Fear and Cape Lookout—on a large, four-color map called the Hardbottoms Distribution Map. Hardbottom is a geologic term for reef.

The map charts low, medium and high-relief reefs. These irregular bottom areas support the small plants and animals that attract gamefish such as snapper, grouper, mackerel and sea bass.

For a copy of the Hardbottoms map,

write Sea Grant. Ask for UNC-SG-86-25. The cost is \$5.

The map includes a Loran grid and underwater depictions of the reef areas.

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