

# COAST WATCH

Photo by Steven Wilson



## Fresh vs. frozen

Frozen seafood is better. At least, it will be someday.

Please don't give us up for bonkers, just yet. And no fair boasting about that bluefish you

*Continued on next page*



Photo by Neil Caudle



Boxes of fresh-frozen seafood line a blast freezer

pulled out of the surf this morning, just in time for breakfast. Nothing will ever taste better than that.

We're talking averages here. Unless you live right on the coast, the average "fresh" seafood you buy may be six days old. Two weeks out of the water is not so unusual.

Today's commercial blast freezers, on the other hand, can stop the freshness clock at about two days, if that's how long it takes the fish to reach the freezer.

We'll admit, frozen fish may have deserved its unsavory reputation in years past. Not anymore. Science has found a way to drop the temperature without dropping the flavor. Still skeptical? Read on. This month's *Coastwatch* looks at what happens when you freeze a fish—the right way.

## Eight days in the life of a seafood

Consider the flounder fillet on your grocer's meat counter. Perhaps it landed whole and alive on the deck of a trawler somewhere off North Carolina. Had it been possible for you to clean and cook the fish that moment, you'd have tasted flounder at its peak: firm, fresh and delicious.

But shortly after it reaches the boat, the flounder and most of the rest of the catch are shoveled below decks and iced for safe-keeping. The clock is already taking its toll on the flounder's flavor.

After another night or two of fishing, the crew heads home.

Elapsed time: two days.

At the fish house, things happen fast. The flounder are unloaded, sorted, cut, boxed, iced and loaded onto trucks—all in a matter of hours. From the packer, the trucks often travel to wholesale distributors, where the flounder might spend another night or two before it is packed off to grocers and restaurants across the Piedmont and Coastal Plain. Often, these shipments reach the grocery stores on Tuesday nights. The meats manager unpacks the boxes, and trays and wraps the flounder for sale the next day.

Elapsed time: five days.

Wednesday and Thursday, sales are good, but Friday is the big day for seafood. And Friday evening might have found you at the meat counter,

picking up a package of "fresh" flounder.

Elapsed time: eight days.

This is only a hypothetical case. There are other routes the fish can take to your market, and sometimes the elapsed time is a day or two less. Occasionally, it is even longer—sometimes two weeks or more.

His studies, using panels of tasters, market studies and lab tests, have shown that most seafoods, properly frozen and prepared, are at least as good to eat as fresh products.

"There's maybe a slight difference in the appearance of frozen seafoods, but when they're cooked there's no difference at all," Lanier says. "In fact,

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*"Most panels cannot distinguish between a fresh fish and one that has been frozen over a year."*

—Tyre Lanier

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Handled correctly, many week-old fish are still very good. But much beyond that one-week interval, quality drops quickly. The fish teems with activity. Bacteria convert nutrients into smelly new compounds. Unsaturated fats and oils become rancid. Enzymes break down muscle proteins and reduce the texture to mush. Eventually, time will make the meat inedible.

Can the clock be stopped? Almost. But ironically, the very means for preserving seafood's quality is the method many of us equate with inferior seafood: freezing.

Tyre Lanier, of the food science department at North Carolina State University, has for five years been conducting Sea Grant research into the packaging and preserving of seafoods.

most panels cannot distinguish between a fresh fish and one that has been frozen over a year."

But Lanier says that such quality depends on fast-freezing the product in a good package, at temperatures below -10° F. A home freezer won't do the same job.

"If you freeze seafood, all you do is crystalize the water," Lanier says. "If you fast-freeze it, the water crystals are very small, and they do the least damage to the product. The faster you freeze it and the colder you hold it, the less damage."

Uneven cooling due to the cycling of some freezers can build larger crystals and reduce the quality of frozen meats, Lanier adds.

Lanier says that some seafood species keep longer than others. Low-



fat fish such as croaker, trout and flounder can taste fresh after more than a year of frozen storage. But with fatty species, including bluefish, mullet and mackerel, rancidity is a problem after two or three months. Some fish common off northern states, notably cod, hake and haddock, freeze poorly because enzymes toughen the meat. But for the most part, North Carolina's common species—shellfish included—could be frozen with excellent results, Lanier says.

The technology is tested and ready for quick-freezing seafoods. Modern blast freezers, and equipment using carbon dioxide and nitrogen gases, can bring fish down to  $-20^{\circ}\text{F}$  or even  $-30^{\circ}\text{F}$  in hours or minutes. Fleets from Europe and Japan fish around the world, processing and quick-freezing seafoods aboard their ships. Fish handled this way are frozen near their peak, just hours out of the water.

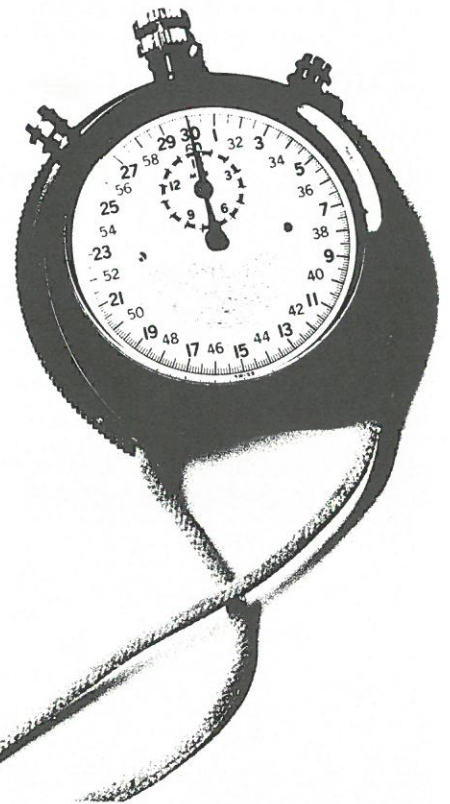
Lanier says that when Germany first tried marketing fresh-frozen products from their factory ships, many consumers thought the fish

tasted "too fresh," and wouldn't buy them. This bias didn't last long. (North Carolina's one experiment with on-board processing and quick-freezing has been a Wanchese boat designed specifically for squid. The enterprise has been unable to find a market for its product.)

But even without these expensive on-board freezers, the freshness clock could be stopped at three or four days, if fish were frozen dockside. Much of Lanier's Sea Grant work has been directed at solving the technical problems such a practice might pose. Studies by assistants on the project found that fish gutted before cold storage kept better than fish left whole. Another study set some objective guidelines for measuring quality in fresh and frozen seafoods.

Much of the research has been concentrated on the seafood package itself. "A good freezing job involves not only rapid freezing but also wrapping in some sort of a package that provides a good barrier to oxygen and moisture

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*Photo by J. Foster Scott*



*Fish landed on this bottom-fishing trawler may take up to 14 days to reach the dinner table*





*Tyre Lanier explains proper freezing techniques for seafood*

migration," Lanier says.

Moisture leaving the food causes freezer burn. Oxidation of the fat can follow, leaving the fish with a dry, chalky taste and an "off" flavor.

Lanier says the traditional frozen-food cartons have their faults, and have perhaps contributed to the consumer's low opinion of frozen seafood.

"The waxed cardboard box can be a good oxygen barrier, but because it's not skin-tight to the products, moisture can migrate out of the food, unless there's another package inside," Lanier says. "Any time you see frost accumulation in one of these boxes, you know you've had some freezer burn."

Lanier's tests have shown that frozen seafood is best protected when it is vacuum-packaged in a tight-fitting, plastic film. But such packages are expensive. And, in North Carolina, where much of the seafood is still sold wrapped in yesterday's sports pages, not every seafood handler has either the means or the know-how to modernize.

Lanier says it will take education, and a few good success stories, to con-

vince the industry to try quick-freezing fresh seafoods. It will also take some convincing to dispel the public's attitude that all frozen fish is inferior.

"That attitude is based on bad experiences in the past, when most seafood was frozen because it was getting old," Lanier says. He adds that no matter how well you freeze and

they need to promote fish, that they need to offer fish in as much variety and quality as they do red meat and chicken," Lanier says. "This has not been done in the past."

Hank Walker, frozen-foods buyer and merchandizer for the Charlotte-based Harris-Teeter chain, says his company's 71 stores have for the last

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***—Tyre Lanier***

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package a fish, it won't come out of the package fresh unless it went in that way.

Many grocery stores have little experience with seafoods, Lanier says, and are reluctant to carry anything more than a few cuts of unfrozen flounder or trout, and a few boxes of shrimp and breaded seafoods.

"The big problem is in convincing the supermarket retail chains that

year reported declines in sales of processed, frozen seafoods. Most of these products are battered or breaded outside North Carolina.

"I see the market going more into inexpensive, minced-type products," Walker says, "simply because people who would buy your high-ticket items are leaning toward the local fresh items, which are becoming more available to them. Walker says that his



company was impressed with the un-breaded, fresh-frozen seafoods offered by a Charleston, S. C. firm (see story on page 8).

Charlie Watson, who buys local seafoods for Harris-Teeter, says he's handled mostly flounder and black bass this spring. The fish come into stores on Tuesday nights, and are sold through Saturday. He knows of nobody from North Carolina offering quick-frozen fish.

"We would consider buying frozen fish," he says. "In our stores, frozen sells as well as fresh. The decision would be based on whether the price and quality were right, and whether we could count on the fish being available."

Watson says a good line of frozen seafoods would help his stores keep fish in the inventory year-round.

"Fresh supplies are hard to come by," he says, "especially in the summer. Frozen seafoods would be easier to count on."

Hank Walker says the stigma attached to frozen seafoods is outdated. He says that many seafood handlers freeze fish, then let it thaw to sell as "fresh."

"The majority of shrimp is frozen in five-pound blocks," Walker says. "And there's a good bit of so-called fresh product that has been frozen at one time. You're foolish if you believe all this fresh seafood has never been frozen."

Walker says Harris-Teeter won't sell thawed seafood as fresh.



G.J. Coles and Coy labels used in NCSU marketing study

ready to consider radiation pasteurization again," Tyre Lanier says. "With it, we could extend the shelf life of seafoods probably twenty or thirty days. But if you had to use the word 'radiation' on that package, it would probably kill the whole concept."

So Lanier and others believe modern freezing may yet prove the best way to reach more people with better seafood. The trick is to somehow make a frozen fish just as appealing on the meat counter as, say, a pork chop or ribeye—a difficult job if that flounder fillet is frozen stiff.

"People generally prefer to buy meat products unfrozen," Lanier says. "One reason is that they can judge the quality of unfrozen products better."

As part of his Sea Grant research, Lanier and his associate, Reino

two stores near Raleigh and Chapel Hill. The test lasted five weeks, and new fish were stocked each week.

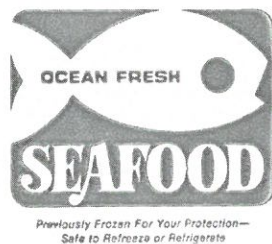
The results were surprising: Overall, the previously frozen fish sold as well as or better than fresh fillets. In fact, previously frozen flounder outsold fresh flounder by about 50 percent, although fresh trout did outsell thawed trout by 25 percent.

The results seem to indicate that the public may not be as reluctant to buy previously frozen seafoods as some dealers and processors have imagined. Lanier says the success of an Australian firm, G. J. Coles and Coy, has shown that the freeze/thaw method can be very popular with consumers, even in a country of beef-eaters. Coles' sales were around \$12 million last year.

Lanier says that while the freeze/thaw method can provide an appealing product, there are some limitations. A thawing fish can lose moisture and spoil the looks of a package—repackaging might be necessary in some cases. And, after they are defrosted, fish have a slightly shorter shelf life than their fresh counterparts. It would be easier, Lanier says, to simply leave the fish frozen.

"As a technologist, I don't really recommend freezing fish and then thawing it before you sell it," Lanier says. "But as a realist, that's the best way to handle fish and sell the most." How can the seafood buyer tell a good frozen product? Lanier advises consumers to choose fish in a good, airtight package. And, he says, choose a brand name you can trust.

—Neil Caudle



Labels used in NCSU chilled-fish marketing study

But if freezing turns buyers off, other ways of preserving food fare no better. Chemical preservatives are unpopular with consumers these days, and radiation techniques—if they're approved—would likely meet resistance as well.

"After twenty years of research, the Food and Drug Administration is

Korhonen, conducted a market study of the public's reaction to "previously frozen" seafoods—fish quick-frozen but defrosted before they were set out for sale. The team packaged similar cuts of trout and flounder and labeled them as to whether they were "previously frozen" or "strictly fresh." Fillets were offered at \$2.99 a pound in



# Fisheries hamstrung By 'fresh' market

Fresh-frozen seafood may someday offer inland consumers good seafood more consistently. It may also help relieve some of the commercial fishing industry's toughest problems.

Gluts, scarcities and market fluctuations have long plagued the industry, especially here in North Carolina, where most of the seafoods are sold whole and unprocessed.

Sam Thomas, a Sea Grant seafood specialist at the NCSU Seafood Laboratory in Morehead City, says that, for now, seafood prices in the state are governed by the fresh market. Because unfrozen seafood is so difficult to handle, store and transport, distribution is very limited. Often, grocers will save space for only the most familiar species. To get assured supplies at the right times, dealers pay top prices. But when a glut comes, perfectly good fish are sometimes dumped overboard for want of a buyer. Other times, scarcities among the popular species leave fishermen with nothing to fish for.

"If you're a fisherman, you may come to the dock one day and get fifty cents a pound for trout," Thomas says. "The next day, you may get twenty. If we had a good market for frozen seafood, the processor could look at a more stable price at his end, and from that, he could probably offer a more stable price to a fisherman."

Thomas spends much of his time advising seafood processors on how to modernize their plants and improve efficiency and sanitation. He and the Sea Grant marine advisory agents he works with see many very edible species of fish going begging, while fishermen struggle to stay afloat.

They say a good market for fresh-frozen seafoods might enable the industry to put more variety into the grocer's meat case.

But Thomas admits the industry has a lot of work to do first. There are few modern commercial freezers in the state, and channels for marketing frozen seafoods don't exist here yet.

"For the most part, we could offer a better seafood shipment frozen than we can fresh," Thomas says. "It's just going to take a lot of effort to get people to change their way of doing things."

## Racing to beat the clock

*Time is fresh seafood's enemy, from the minute the catch is made. At the fish house (below), seafood is quickly weighed and packed in ice. Many fish arrive whole at markets, where they're often sold wrapped in newspapers (right).*

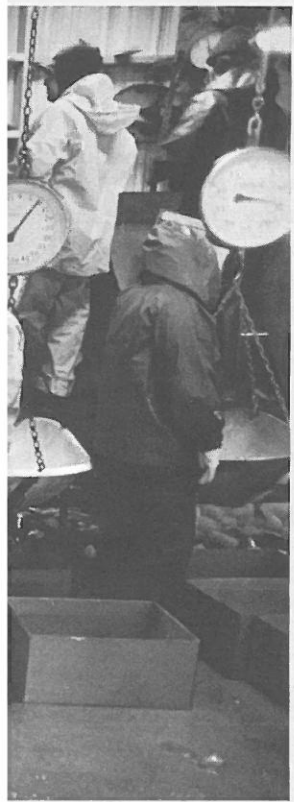
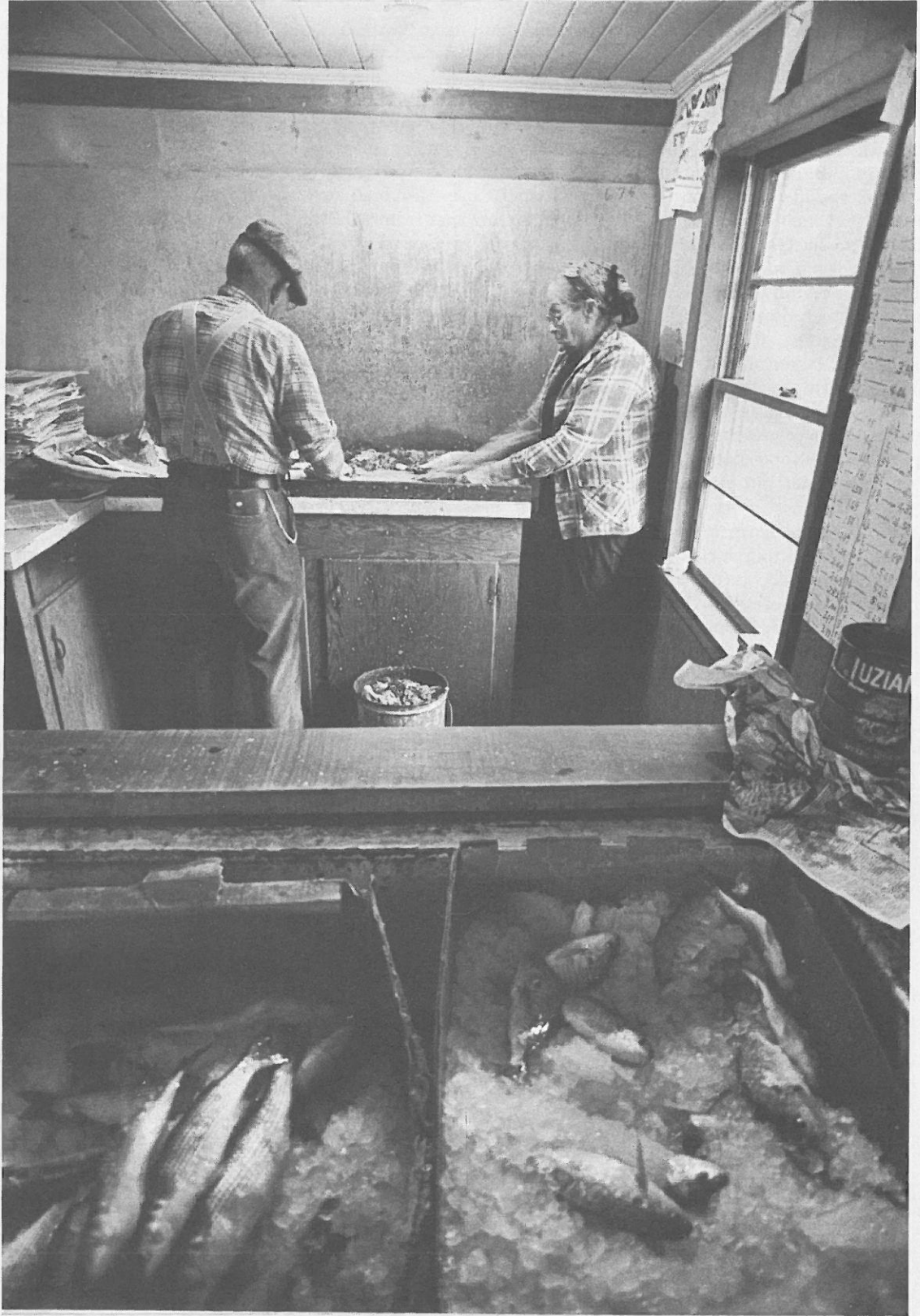
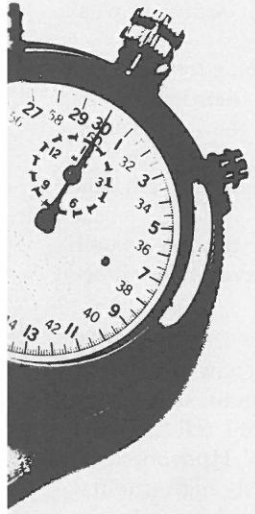
Photo by Gene Furr



Design by Neil Caudle



Photo by Steve Murray



# Some fresh ideas for frozen seafood

At least two seafood processors, one in North Carolina and the other in South Carolina, are trying to change the public's attitude about frozen seafood.

Jim Hudson, owner of Cap'n Jim's Seafood in Zebulon, is struggling to sell grocers on the idea of freeze-and-thaw seafood, and he's using a new tray design to do so. Gary Swift, president of Port City Processing Company, Inc., in Charleston, S.C., is using slick marketing techniques and a special vacuum package to get his frozen seafood into supermarket frozen-food counters. Both men believe that good freezing and packaging techniques, fresh fish and a marketing strategy will help frozen seafood become a larger part of the American diet.

In a processing plant more than 100 miles from the fishing docks, Jim Hudson has developed a tray pack that allows him to freeze and thaw fish in the same package. Hudson has been working on his idea for almost five years and expects to spend \$2 million to get his freeze-and-thaw seafood into the grocery stores.

Under Hudson's method, fresh fish,

no more than two days old, Hudson says, are trucked to the Zebulon plant. The fish are then filleted or dressed, individually quick-frozen and glazed to prevent rancidity and freezer burn. They are packaged in one-pound portions in Hudson's thick, padded trays, which are designed to absorb the moisture lost from the fish as it thaws, keeping it looking dry. The fish are stored in vacuum-packaged master boxes at -10° F until they are sold.

Once sold, usually to supermarket chains, the fish are shipped to the chain's distribution center where they are thawed under 33° to 34° F refrigeration. But Hudson would prefer that the fish go to the stores before it is thawed. "If the supermarket meat managers would thaw the fish properly," Hudson says, "Then they could assure themselves of no spoilage."

Hudson's fish remain in refrigerated meat counters three-and-one-half days before meat managers are instructed to pull them. "If frozen fish are handled well, my freeze-and-thaw fish can taste just as good as fresh seafood," he says. "But the key is to start with a fresh product. Frozen seafood has gotten a

bad name because many processors were freezing the fish they couldn't sell fresh as a last resort to keep from losing money. Freezing doesn't make the fish good again. It's no wonder the public thought frozen seafood was bad."

When thawed, Hudson's freeze-and-thaw fish looks almost identical to its fresh counterpart. But the label reads "Safe to refreeze and refrigerate," a sign to the consumer that the fish has been frozen.

Hudson claims other processors sell thawed seafood but never label it as such.

"I sometimes sell my frozen fish to other wholesalers who thaw it and sell it as fresh to the same chain stores who won't buy my fish when I tell them up front that it is frozen," Hudson says.

If offered a consistently high-quality product, the public would learn to accept freeze-and-thaw seafood and like it, Hudson says. But his problem may be getting chain-store fish buyers to stock his product. Hudson believes a good education and marketing program may solve that problem. He has already hired a marketing research company to find out how consumers prefer their fish (whole or filleted), and when fish sell best.

Despite marketing research and the time and money spent on developing his freeze-and-thaw processing methods, Hudson is struggling to keep his processing plant open. "Right now I'm hanging on by my toenails," he says. "I may spend my last penny getting this thing going."

"Doing business in the 80s" is the theme Gary Swift uses to run Port City Processing Company in Charleston, S.C. Swift believes most seafood processors are behind the times in technology and marketing techniques. "Most of the processors aren't willing to spend the time and money needed to do anything new," he says. "They are conservative by nature and as long as they're making a little profit they're content. But because of that they're still doing business the way it was done in the nineteen-thirties."

Swift is using new technology to get his frozen fish into supermarkets. Working with seafood specialists at Cornell University in New York, Swift developed a film he uses to vacuum-pack his frozen fish. Swift sells the fish

Photo by Neil Caudle



Hudson's specially designed tray packs



Photo by Steven Wilson

he processes frozen, in one-pound packages for consumers to thaw at home or transfer to their freezers for storage. The special fish film, made of a combination of nylon, polyester and syrlene, extends the shelf life of his frozen product and eliminates dehydration.

Swift spent two-and-a-half years developing his vacuum-packing techniques and now he's putting them to use. Swift markets a line of gourmet frozen seafoods under the name Tropical Seas. The line includes scallops and swordfish, at about \$3.99 to \$7.99 a pound. A lower-priced line offers such products as black bass and red snapper. The Kroger supermarket chain in New York City is buying Swift's seafood. He processes 10,000 pounds of fish a day in his Charleston plant, he says.

Swift says he has learned good marketing can go a long way toward getting his frozen seafood from the frozen-food counter into the shopper's grocery cart. He's hired a Madison Avenue firm to tell him who's buying fish, how to target those consumers and how to persuade them to buy his fish.

Swift says that of every dollar spent on food in the U.S., 83 cents are spent in chain stores. People are eating in restaurants less often and preparing more of their food at home, he says. With that in mind, Swift chose to knock on the doors of supermarket chain-store buyers to sell his product rather than restaurants or independent grocery stores.

Through the marketing research, Swift has learned that people who buy fish tend to be more health-conscious in selecting their food. He has aimed his advertising slogan—"Fish—Put Your Diet in the 80s"—at that group.

Besides knowing his market, Swift is using some slick advertising techniques to get the public to try his frozen fish. In marketing his frozen golden tilefish, Swift alludes to French cuisine. In one of his ads, a picture shows an elegant place-setting and a plate of tilefish covered in a creamy sauce. Below the picture are the words: "The French call it elegant fish."

"To change people's opinion you can use two methods, sanctions or rewards," Swift says. "In this case we used sanctions by alluding to the authority of French cooking."

—Kathy Hart



Swift sells his vacuum-packed frozen fish in boxes like these

## Freezing seafood in your home

Blast freezers and carbon dioxide tunnels aren't standard equipment in American homes. So the home freezer may be called on to freeze those 15 pounds of flounder you brought home from your last fishing trip. The key to good home-frozen fish, like the key to good commercially frozen fish, is to start with a fresh fish, one that has been properly handled from the minute it was taken off the line.

Joyce Taylor, a marine advisory agent at UNC Sea Grant's NCSU Seafood Laboratory in Morehead City, says fish you want to freeze should be coated with a glaze to guard against freezer burn and oxidation. Freezer burn changes the texture of the fish, and oxidation, the interaction of oxygen with fish fats, can cause bad odors and flavors.

To prepare the glaze:

—Measure  $\frac{1}{4}$  cup of lemon juice into a pint container. Fill the rest of the container with water.

—Dissolve one packet of unflavored gelatin in  $\frac{1}{2}$  cup of the lemon juice-water mixture.

—Heat the remaining liquid to boiling.

—Stir the dissolved gelatin mixture into the boiling liquid.

—Cool the mixture to room temperature.

Dip the fish into the glaze and drain it for several seconds. (The glaze will be enough for about a dozen medium-size fillets.)

Wrap the fish in a saran-type wrap, label and date the package and place it in the coldest part of your freezer. Taylor suggests freezing seafood in small portions so it will freeze faster with less deterioration.

Lean fish such as flounder, snapper and trout can be safely stored in the freezer three to six months. Fatty fish such as bluefish, mackerel and mullet should not be stored for more than three months.

Taylor says shrimp are best frozen in their shells in strong plastic bags. Scallops should be shucked and frozen in air-tight containers. Clams and oysters are best frozen in their shells, which makes for easy shucking and no loss of juices; but they can be shucked and frozen in air-tight containers too. Taylor warns against freezing crab meat already picked from the shell, because it loses its texture and flavor. She suggests freezing the core of the body and the pincers after the crab is cooked, then picking out the meat when it thaws.

When thawing frozen fish or shellfish, Taylor says, never leave it at room temperature. Seafood is best thawed by placing it under cold running water for 15 to 20 minutes.

For more information about freezing fish at home, write for UNC Sea Grant publications, *Don't Waste that Fish* (UNC-SG-75-23) and *Bringing the Catch Home* (UNC-SG-78-05).



# 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).*



Reporters, students and hurricane experts gathered May 10 and 11 in Raleigh for a two-day program, "Hurricane Preparedness: A Community and Family Responsibility." The program, organized by John Sanders, Sea Grant's coastal weather awareness specialist, included a workshop for the media. It drew representatives from television stations, radio stations and newspapers from North Carolina and Virginia. Another training workshop was designed to strengthen the working relationship of government agencies responsible for emergency response. County commissioners, public safety officers, emergency management coordinators, building inspectors, city councilmen and other key government officials attended. Workshop participants saw a film on Hurricane Hazel, and heard lectures by several experts, including Neil Frank, director of the National Hurricane Center.

During the program, students from the Science Club of Pamlico Junior High School got some practice in hurricane evacuation. At the American Red Cross headquarters, they set up an emergency shelter, complete with survival boxes and hurricane-safety checklists. The students even spent the night in the shelter—with Sanders and their teachers—to simulate "braving the storm."

What do you do if a hurricane warning is given for your area? Are you prepared to evacuate? Do you

know how to safeguard your house and property during evacuation? For answers to these questions and many more, plan to visit the three N.C. Marine Resources Centers for Hurricane Awareness Week, the first week of August.

The week-long program will feature films, exhibits and lectures on hurricane preparedness and storm-resistant construction. There will even be folk stories for children. Each of the centers will also have a news media workshop on emergency management and hurricane preparedness. John Sanders, Sea Grant's coastal weather awareness specialist, will visit each of the centers during the week, to participate in several programs and lectures.

For more information on the program and on other activities at the centers this summer, write: N.C. Marine Resources Center/Roanoke Island, P.O. Box 967, Airport Road, Manteo, N.C. 27945; N.C. Marine Resources Center/Bogue Banks, Atlantic Beach, N.C. 28512; N.C. Marine Resources Center/Fort Fisher, Kure Beach, N.C. 28449.



Crabs steer clear of a crud-clogged crab pot. And cleaning marine growth from pots is a chore no crabber looks forward to. A new anti-fouling paint, however, may work where other products have failed.

Bob Hines, a Sea Grant marine advisory agent at Bogue Banks, will test the anti-fouling paint this summer in a Sea Grant mini-grant project. Hines plans to set out 40 crab pots, comparing the fouling rates of treated and untreated vinyl-coated and galvanized pots. Catch records will also be kept, to see which pots attract the most crabs.

Hines says a Maryland Sea Grant study indicated that the anti-fouling paint significantly reduced fouling and extended crab pot life. The fouling rate of the painted pot was 83 percent less

than the vinyl-coated pots, which most crabbers in North Carolina use. Catch figures also indicated that the pots treated with the anti-fouling paint, which has tributyl tin oxide as an active ingredient, caught more crabs. Hines wants to see if he can get the same results in North Carolina.

Part of the mini-grant project will include demonstrations of the new product. Chester Cooper, a Columbia crab pot manufacturer who is using the paint, will talk to the crabbers about the paint and will treat some of the pots brought to the meetings. The demonstrations will be held in Pamlico and Carteret counties at the end of June. For more information, contact Bob Hines or Larry Giardina at the N. C. Marine Resources Center at Bogue Banks. Their number is (919) 726-0125.



After serving for one year as president-elect of the Sea Grant Association, UNC Sea Grant Director B. J. Copeland will assume the association's presidency during Sea Grant Week in Washington, D.C., July 19-22. Copeland succeeds Feenan Jennings, director of Texas A&M Sea Grant. The Sea Grant Association unites the numerous state Sea Grant programs along with others to create a strong national voice on issues involving marine problems.

Faculty members from six North Carolina universities have asked for a total of \$4.2 million to conduct Sea Grant research during 1983 and 1984.

Forty-four proposals, submitted in May, now face reviews at four levels. Proposals deemed worthy by reviewers will be included in UNC Sea Grant's funding proposal to the Office of Sea Grant in Washington, D. C.

Dirk Frankenberg, director of the Marine Science Program at the University of North Carolina at Chapel Hill, has been named coordinator of UNC Sea Grant's coastal studies sec-



tion. He replaces Jay Langfelder, who is on leave from North Carolina State University, to serve as assistant secretary of the N. C. Department of Natural Resources and Community Development.



If you're heading to the beach, take along UNC Sea Grant's "How to" series. *How to Hang a Gill Net*, written by Jim Bahen and Mary Day Mordecai, tells how you can make a gill net, saving about half the cost of one ready-made.

*How to use Eels as Bait*, written by Leon Abbas and Mary Day Mordecai, explains how to rig eels for boat and pier fishing, bottom fishing, trolling and freshwater fishing. It also describes how to transport and care for bait eels.

*How to Build a Crab Pot*, written by Kathy Hart, provides a step-by-step description of putting together a crab pot. The booklet also explains the regulations governing the use of crab pots for recreational fishing.

For copies of these publications, write UNC Sea Grant, P. O. Box 5001, Raleigh, N.C. 27650-5001. All the booklets are free.



UNC Sea Grant researcher Mark Sobsey and his graduate students at the University of North Carolina at Chapel Hill are continuing to unfold the mysteries of contaminated shellfish.

Under Sobsey's direction, Anne Meinhold has taken a close look at the elimination of poliovirus in contaminated oysters. She found that at lower water temperatures—between 43°F and 63°F—poliovirus is eliminated primarily through waste elimination and pseudo-feces. Pseudo-feces are particles the oyster draws in, but rejects as unsuitable to eat. As the thermometer rises, poliovirus, which is susceptible to higher temperatures, is made inactive by heat.

Meinhold says that at the lower temperatures the poliovirus is eliminated slowly by the oysters, while at the higher temperatures the elimination is much faster.

While Sobsey and his students may have learned a little more about poliovirus, there are many other viruses that can contaminate shellfish. Sobsey says that next his laboratory will study the elimination of bovine rotavirus, which causes gastroenteritis.



*Design and Installation of Low Pressure Pipe Waste Treatment*, written by Craig Cogger, Bobby L. Carlile, Dennis Osborne and Ed Holland, is a manual designed for use by sanitarians, contractors, architects and engineers. The low pressure pipe system (LPP) is a modified septic system, created for use in soils not suitable for on-site sewage disposal by conventional septic systems. It was developed in a Sea Grant research project led by Carlile.

The manual specifies the procedures and materials to be used for the successful siting, design, installation and maintenance of residential LPP systems.

For a copy of the manual, write UNC Sea Grant. Ask for publication UNC-SG-82-03. The cost is \$2.50.

Note: The Southeastern On-Site Wastewater Treatment Conference, originally scheduled for April, has been rescheduled for Sept. 28-30 at North Carolina State University's McKimmon Center in Raleigh. For more information, write Dennis Osborne, NCSU Department of Soil Science, Box 5907, Raleigh, N.C. 27650.



Project CAPE (Coastal Awareness in Public Education), a marine education project of the Dare County Schools, has two new publications available for educators to purchase. *Navigation* introduces fifth- and sixth-grade students to the world of celestial navigation, to the everyday lives of sixteenth-century sailors, and to modern navigational equipment. *Wanchese Harbor—Community Development* is designed for junior high social studies and science students. The unit uses a seafood industrial park as an example of community planning and introduces students to the business of commercial

*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 5001, Raleigh, N.C. 27650.

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



fishing. For more information about the units, write Project CAPE, Dare County School Board, P. O. Box 640, Manteo, N.C. 27954.

Rodney T. Gross, an arts and technology major at Elizabeth City State University, has received a \$1000 stipend from UNC Sea Grant to work as an intern at the Marine Resources Center in Manteo. Gross will build exhibits and sharpen his photography skills as he learns more about the marine environment. The internship is part of a Sea Grant program designed to recognize and assist talented students at predominantly black institutions.



A little bit of sun can be healthful, but too much may be dangerous. Jim Patterson, a University of North Carolina dermatologist, says the sun can cause

serious skin damage, the worst of which is skin cancer.

Prime candidates for skin damage and skin cancer are people who spend long hours in the sun with little or no protection. Fishermen fit this description, and they may even be getting a triple dose of trouble because of the reflective quality of the water and the fair skin common among the fishing families in this state.

The threat of skin damage and skin cancer can be reduced, however, with protective clothing, sunscreen and less exposure to the sun. To find out more about protecting yourself from the

damaging rays, write for Sea Grant's free Blueprint, "Skin Cancer and Fishermen." To receive a copy, write Sea Grant, Box 5001, Raleigh, N.C. 27650-5001. Ask for publication number UNC-SG-BP-81-6.

Another Sea Grant blueprint, *The \$10 Holding Tank*, is aimed at small-boat owners. The U.S. Coast Guard now requires boats operating within three miles of shore to be equipped with sanitizing gear or onboard holding tanks. Both are expensive items for recreational boaters. But Spencer Rogers, Sea Grant's coastal engineering specialist and a sailboat owner himself, has come up with a low-cost alternative.

*The \$10 Holding Tank* describes the materials needed and gives instructions for assembling the portable onboard holding tank. The holding tank, which can be attached to an existing head, is light enough to be carried home and emptied at the end of the day. For a free copy of this Blueprint, request number UNC-SG-BP-80-1.



Ever see a blue crab take it off? Hundreds of crabs are going to be shedding their old shells this summer in a new outdoor exhibit at the

Marine Resources Center on Roanoke Island.

Hughes Tillett, a Sea Grant marine advisory services agent, and Rhett White, director of the center, used a Sea Grant mini-grant this year to construct the exhibit. Two large shedding

trays, filled with water pumped in from the sound, have been set up for the crabs. Displays nearby explain the shedding process.

The exhibit will not only give the public a chance to watch crabs during their natural molting cycle, but it will also serve as a model for new commercial crab-shedding operations. Their product? The prized and delectable soft-shell crab.

A series of video tape programs about business management for commercial fishermen is available at the Sea Grant Marine Advisory Services office at the N.C. Marine Resources Center at Bogue Banks. The tapes feature Fred Smith, a marine economist at Oregon State University. The topics are: Profit: What is it? (30 minutes); Decisions (32 minutes); Risk in decision-making (19 minutes); Financial analysis (32 minutes) and Record-keeping (26 minutes).

Individuals or groups wishing to view the tapes can do so by calling 726-0125.

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