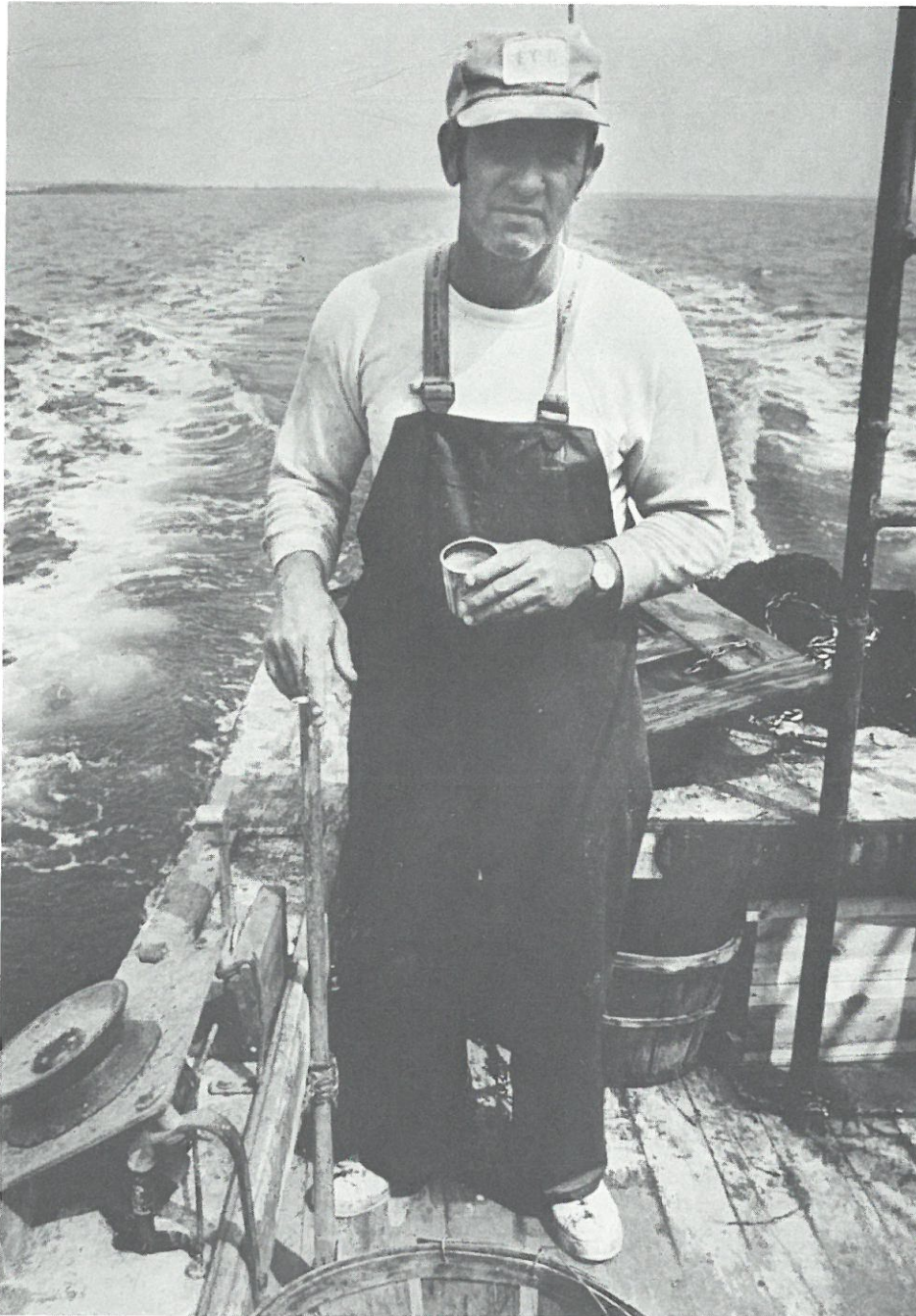


COAST WATCH



Bridges steers his boat toward a prime crabbing spot

Pots, peelers And blue crabs

The water still reflects the light from the nearly full moon as Murray Bridges, a crabber, starts the motor of his 25-foot boat about 4:30 a.m. The boat putters quietly out of its dock and down the creek by his Collington home, heading to the Roanoke Sound for the first haul of the day.

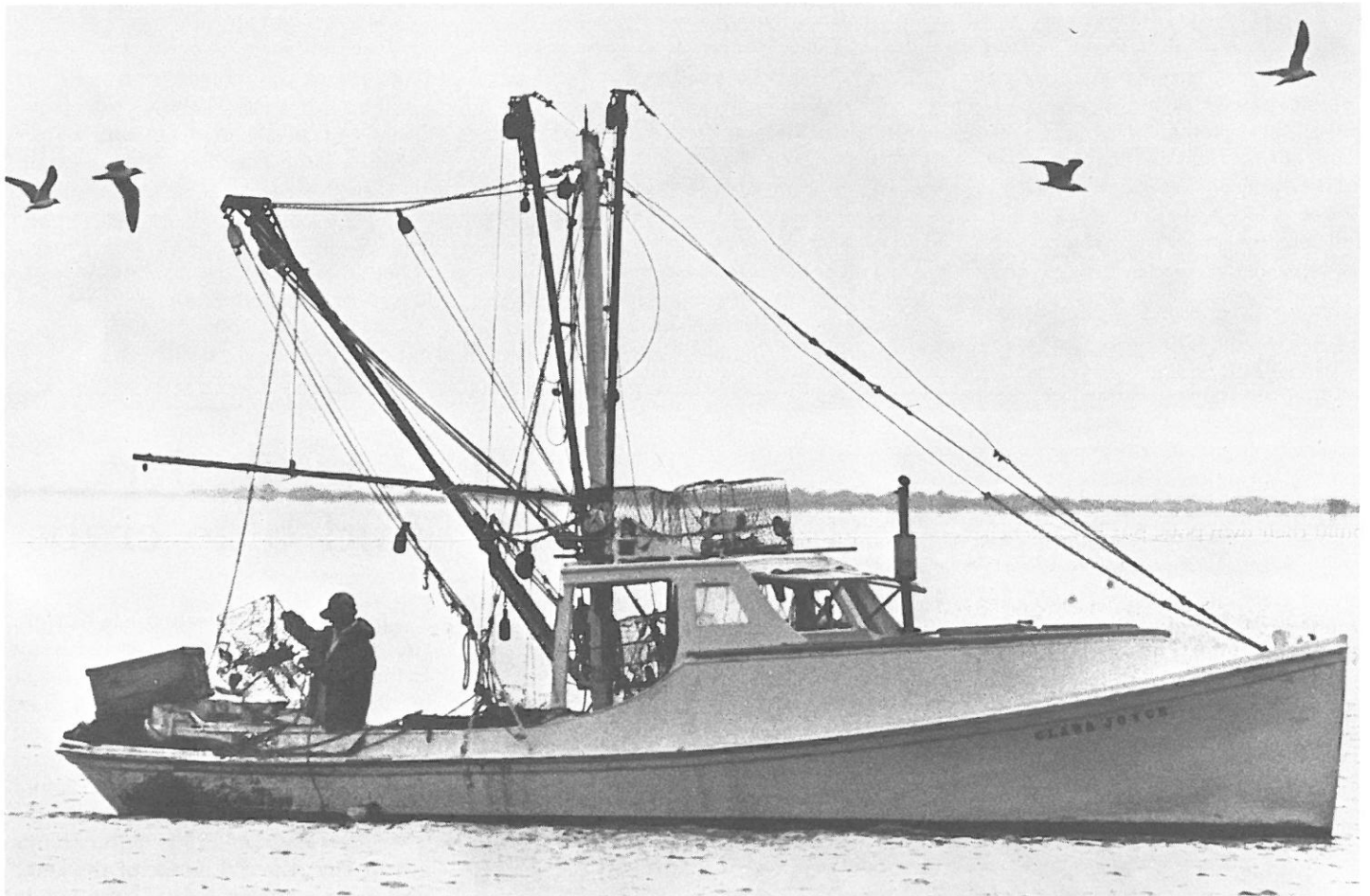
Bridges explains in his Outer Banks accent that the old adage of the early bird catching the worm is born out in fishing. "I don't know why, but early in the morning before dawn and at night about dusk are the best times of the day for fishing and crabbing," he says. "You can't lie in bed all day if you want to catch fish and make money. That's what I have to keep telling my boys."

Bridges has been crabbing the Roanoke Sound for the past eight years. He mixes his crabbing with a little shrimping in the summer and gill netting in the early winter. But mostly he crabs for hard crabs and "peelers" (crabs about to shed their shells). He crabs with wire-mesh pots or by dragging the sound bottom with a net, as he's doing this hot July morning.

Bridges lets the boat idle as he tosses the net and doors into the water. Next, he gears the boat into a slow, forward crawl, pulls out his thermos for a cup of coffee, and settles back for some talk about crabbing.

Bridges admits that he didn't know much about crabbing when he began. He had spent his earlier years in the Merchant Marines. But when he re-

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A crabber checks his crab pots near Harkers Island

turned to his native Outer Banks he decided to take up crabbing. "If you like what you're doing, then you're going to want to learn more about it," Bridges says. "That's the way it was with me. I learned some by doing myself and the rest I've learned by talking with others."

For instance, Bridges knows that crabs are often concentrated along the sides of depressions or narrow craters in the sound bottom. "I figure the crabs like the sloughs 'cause the water is cooler there," he says. "And they settle along the sides 'cause the current runs too strong through the valley of the slough."

To make this "learned" knowledge pay off, Bridges has bought a depth recorder for his boat. With the recorder he can search out these depressions. "The depth recorder is an expensive piece of equipment that most crabbers don't have," Bridges says. "But for me it has paid off in better catches. I ain't like a lot of crabbers who think their way is the only way. I'm willing to try something new. I'm not set in my ways yet."

Bridges was one of the first crabbers in the area to try a hydraulic pot puller, which pulls the wire pots laden with crabs from the water. He rolls up his sleeve to show the veins that stand out along his lower arm. "See these?" he says. "They came from pulling up a couple hundred pots a day. My arms would just ache at night. Now I just feed the pot rope into the puller and it does the work for me."

Bridges says crabbing in the Roanoke is as good this year as ever. "It's not unusual to get 30 or 40 crabs in a single pot on a good day," he says. "The most I've ever caught in one pot was a hundred. But, there's a lot more people fishing crabs this year and that means more of us are dividing up the catch."

He boastfully claims that North Carolina blue crabs are as plentiful and large as Chesapeake Bay blue crabs, which often have been proclaimed the biggest and the best found anywhere. "Virginia hasn't got anything we don't have here in North Carolina," he says. "Our crabs are just as good, but Virginia does do a better job of looking

after their crabs. They have all kinds of research going on at VIMS (the Virginia Institute of Marine Sciences) and the state limits the number of small crabs a fisherman can keep. By only allowing a very small percentage of a catch to be less than five inches wide, then naturally their crabs are going to look bigger and better to seafood dealers than ours." (North Carolina allows up to 10 percent of a crabber's catch to be less than five inches wide.)

"I think we need some tougher laws down here to make our crabs more competitive on northern markets," he says. "Now a lot of crabbers aren't going to agree with me about this 'cause they sell straight to picking houses and they get paid by the pound. So, all that matters to them is how much they catch, not what size they are. But crabbers in Virginia and Maryland grade their crabs out and sell the big number-one jimmies (male crabs about six inches wide) for more than the rest of the catch. They have to do a little more work, but it pays off."

Bridges certainly isn't afraid of work. He puts in 14 hours a day most

days and often gets up during the night to check his peelers. "Crabbers certainly don't keep banker's hours," he says with a chuckle. Bridges usually makes three hauls with the net before noon. After lunch he must get his crabs to the dealer. He usually spends the rest of the day working with his peelers and making necessary repairs to his boats or nets.

About the end of November, Bridges stops crabbing and turns to gill netting until January when it becomes too cold for man or fish on the water. During the next two months, he makes major repairs to his boat and prepares for the coming spring by building around 700 new crab pots. Many crabbers don't build their own pots, but Bridges believes in doing almost anything he can himself.

The pots are two-foot cubes made from 1½-inch wire mesh. The inside of the pot is divided by an inverted-V

partition. In the lower chamber of the pot, Bridges places four funnels by which the crabs gain entry. In the center of the lower compartment is the bait well that he baits with dead fish to attract the scavenging blue crab. The upper compartment of the trap is called the parlor. After swimming into the lower section of the pot to nibble on the bait, the crab, looking for a quick escape, rises upward through the holes in the parlor floor. Once inside the parlor, the crab is destined for the crab picking house.

As the conversation has progressed, so has the sun, and it's time to pull in the net to see what's been caught. After some heaving from Bridges and few squeaky turns of the wench, the first haul is dumped into a tray for sorting. There are crabs of all sizes, nine or ten handfuls of large brown shrimp and a few small fish.

Bridges pulls a thick rubber glove on-

to his right hand and begins picking out the crabs. The number-one jimmies are placed in one basket, while the smaller jimmies, she-crabs (immature female crabs) and sooks (mature female crabs) are placed in another basket. In a third pail go the peelers and in a fourth go the shrimp. The sorting takes about 15 minutes. When it's over, Bridges tosses overboard all the small crabs and fish. The laughing gulls, hovering close by, swallow this feast in seconds.

Other crabbers were plying the sound waters this morning. And, not long after we made our first haul, they began chattering back and forth about their catches. It seems no one was doing particularly well today. As the day got hotter and the catches smaller, Bridges was ready to call it quits. He had other work he could be doing if the sound wasn't going to relinquish anymore of its bounty today.

Blue crabs—beautiful swimmers and good eating

Stalked eyes, four pairs of segmented legs, one set of menacing, jagged claws and a hard, exterior frame that widens into lateral spikes combine to make one of the most succulent creatures on the East Coast—the Atlantic blue crab. Called *callinectes* (Greek, beautiful swimmer) *sapidus* (Latin, savory), the blue crab makes its home from Nova Scotia to Mexico.

Though some consider the crab an ugly creature, its meat ranks alongside shrimp and lobster as the best in seafood. But those who think the crab ugly have probably never seen a basket of crabs just taken from the water. Their white bellies sharply contrast their olive-green dorsal shells. Mature males wave arms of rich azure blue and females snap claws that are a bright red-orange. Hence, *callinectes* may not be as inappropriate a name as it might first seem.

Beside their uncanny beauty, crabs also display some interesting habits. One of those is shedding. In order to grow a crab must shed its hard shell, which does not expand. From the time it first hatches until it reaches full maturity, a crab may shed 25 to 27 times.

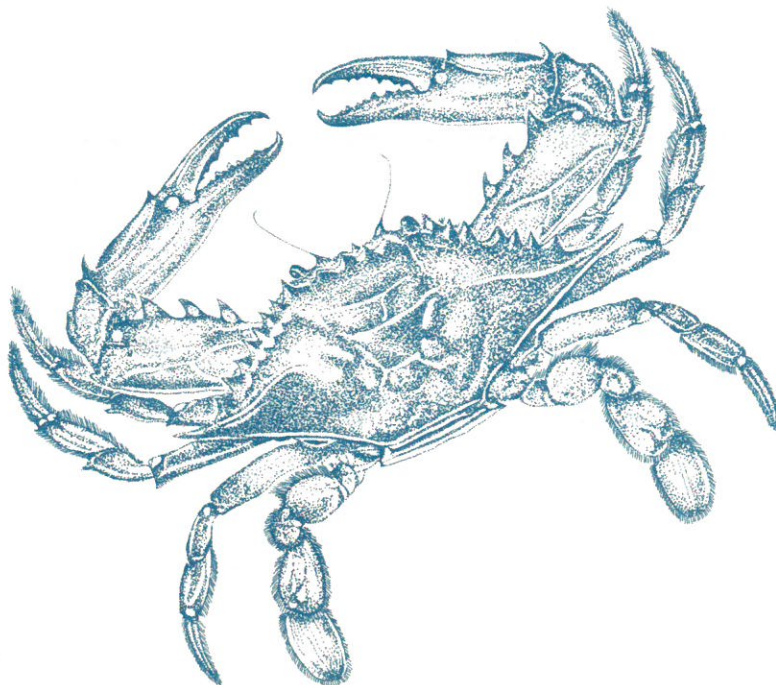
Crabs signal their impending change with a variety of signs that crabbers

have described in colorful terms like "busters," "peelers," "red-sign" crabs and "white-rims." And, it takes a sharp eye and years of experience to detect the subtle signs of a crab's impending moult.

Illustration by John Kirtz

The first stage is the white-rim crab. If you look closely at the last leg or swimming fin of the crab, a thin white line can be seen along its inner border.

Continued on next page



The blue crab

This means the crab will shed in about two weeks.

Gradually this white line will turn pink and then red. A red-sign peeler is only two days from shedding.

A crab is "rank" just before its shell cracks and it's a "buster" once the soft crab begins backing out of its old shell. A crab may grow as much as two inches after it sheds. The crab appears almost lifeless after it moults because of the tremendous energy it takes for the crab to withdraw from the old shell. When in its soft shell stage, the crab is most vulnerable to predators. After six or seven hours, the shell

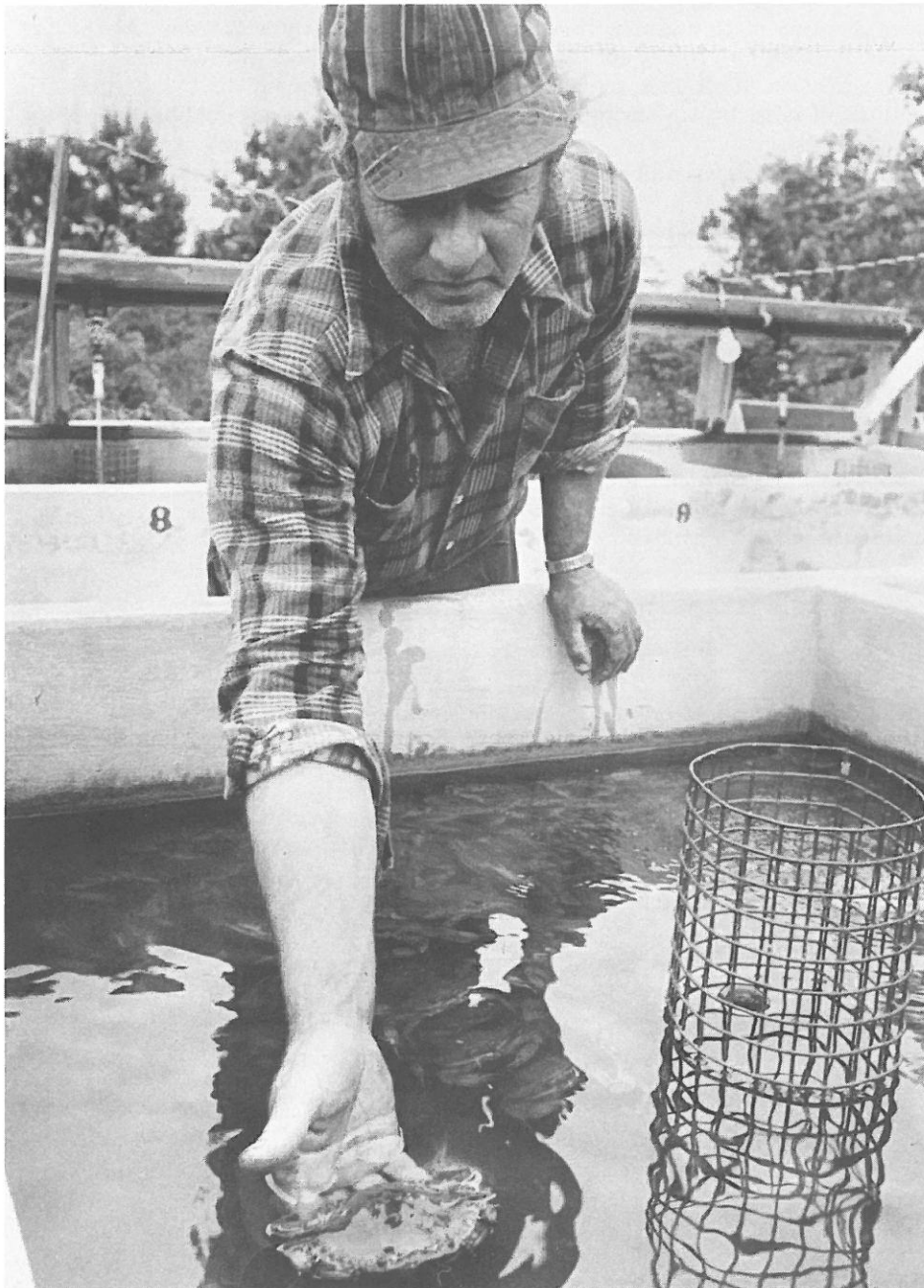
begins to harden to the consistency of paper. Hence, the name papershell crab. After two days, a crab again has a hard shell.

Another interesting aspect of shedding is mating. A female crab can only mate during her last moult, when she reaches maturity. An immature female crab or she-crab has a V-shaped apron, while a sexually mature female crab or "sook" has a semi-circular apron. But it is only during the change from the V-shaped apron to the semi-circle apron that the female can mate.

During an elaborate courtship, the male and female wave their arms and

legs to catch each other's attention. Finally, the female backs herself beneath the male. He grabs her with his walking legs and cradles her beneath him until she is ready to moult. Crabbers call these mating crabs "doubblers" or "buck and rider." The male may carry the female for two to three days and travel long distances before the moulting occurs. When the female is ready to shed, the male makes a protective cage around her with his body. Once the female has shed and the mating has occurred, the male again will cradle the female until her shell is hard.

Photo by Neil Caudle



Bridges holds up a "rank" peeler from his shedding tray

Shedding crabs- A 24-hour job

Murray Bridges may enjoy crabbing, but his real love when it comes to crabs are his peelers. Row after row of concrete trays stand outside his Collington home for shedding out peeler crabs.

Bridges began a small peeler operation several years ago when crabbers were just beginning to shed crabs in trays over land. Chesapeake Bay crabbers have been shedding crabs for years in wooden trays, called "floats," which they staked in the water. The crabbers would have to paddle their skiffs alongside the trays to remove the soft crabs. But scientists learned that crabs would shed just as well in trays or tanks on land if they had a constant supply of water from a nearby creek or estuary. And that's just the kind of operation Bridges has set up.

The prime peeler month is May. About the first of the month, Bridges begins jimmy potting. He baits his traps with several large jimmy crabs in the parlor section of pots. The jimmies attract the she-crabs that did not make their final mating moult the previous year.

"The jimmies can attract 20 to 30 rank female peelers in a single pot," Bridges says. "You know how they say women always chase men during leap year. Well, every spring we have a leap year with crabs. Those females go right to the males," he says with a chuckle.

But jimmy potting only lasts until about mid-June. After that, for a reason unknown, jimmy potting no longer attracts female peelers.

Not only is May a good month for female peelers, it is an excellent month for peelers in general. Like almost every other creature of nature in the spring, the crab casts off the old of winter and takes on the new of spring. And all of this shedding makes a jackpot for peeler crabbers who get prices like \$8 to \$10 a dozen.

But, Bridges is not getting rich. A peeler operation requires a major investment in money and time if it is going to pay off for the crabber.

For instance, this year Bridges added 30 or so new concrete trays to expand his peeler operation. He built about 700 pots, which cost \$6 to \$8 each. He must consider rising prices for operating his boats. And there are countless other costs for everything from the wenches on his boat to the huge freezer he uses to store his crabs before shipping.

"So far this year I haven't come even on my investment," Bridges says with a sigh. "People think you're making a lot of money when you tell them how many you shipped and the price you're getting for soft crabs. But what they forget is the money it takes to make that shipping possible."

But money isn't the only expenditure it takes to make a peeler operation successful. It takes time—24 hours of it. The trays must be checked every four or five hours religiously for newly shed crabs and dead crabs.

Bridges says he lets a crab "firm up" for about an hour after it has shed before he removes it from the water for packing. But he can't let the crab firm to the papershell stage, which can begin as early as six or seven hours after shedding.

If a crab reaches the papershell stage then it is worthless to the crabber and is usually discarded. But Bridges is trying to work up a market for the papershell. Stripped of its thin shell and legs, the papershell can be fried in a light batter and eaten just like the soft shell crab.

Sea Grant advisory agent Hughes Tillet of Manteo and seafood specialist Sam Thomas of the NCSU Seafood Laboratory in Morehead City have been helping Bridges develop a market for the papershell by asking restaurant owners and seafood dealers to give the papershell a try.

Bridges thinks it is the papershell's name that turns people away from trying the crab. "I think if you could get

'em on the market under a different name, then you could sell 'em like hot-cakes," he says.

Bridges sells his soft shell crabs to seafood dealers in the north where he can get top-of-the-line prices. "Last year I was asking 25 cents more than most Chesapeake Bay crabbers and they were still meeting my price because they told me mine were the best-looking soft shells on the market," he boasts.

Bridges says he would eventually like to do nothing but shed crabs. "I would like to buy the peelers off the crabbers in the area, shed 'em out, then sell 'em up north," he says. "I figured it out and we'd both be better off that way. A lot of crabbers wouldn't waste their time and money trying to shed their crabs if they had a shedding house to take their peelers to. That's the way they do it in Maryland and Virginia."

Processing a valuable product

With freshly steamed crabs piled high before her and a dozen plastic containers to the side, Lue Lewis is all business as she rhythmically cracks and extracts the sweet meat found in blue crab claws. A veteran crab picker of 18 years, Lewis works for the Luther Lewis and Son Seafood in Davis, one of the 30 commercial crab processing plants in North Carolina.

The crab meat industry is big business in this state. According to Sam D. Thomas of the North Carolina State University Seafood Laboratory in Morehead City, a record 26 million pounds of live blue crabs were landed in North Carolina last year. A \$16 million industry, commercial crabbing owes most of its wide distribution and increasing demand to the 30 processors and picking plants. Here, local and plant crabbers sell their catch, grading out the number ones (big jimmies or male crabs) for the basket market and the number twos (generally male crabs under six inches) and number threes (sooks or female crabs) for picking. The spring basket market in North Carolina begins around mid-June when the Chesapeake crab supply is low and the Baltimore steamed-crab restaurant demand is high.

To prepare the other blue crabs for picking, baskets holding several hundred pounds of the crustaceans are steam-cooked in large retorts. Thomas says that a small operation, employing about 10 pickers, can pick approximately 4,000 to 5,000 pounds of crabs a day. An average 10 to 15 percent return will yield 400 to 500 pounds of the delicious meat.

Demonstrating a high degree of manual dexterity at full production, pickers' flying hands and nimble

fingers blur as they extract meat for which they get about 80 cents per pound. The crab meat is divided into three basic categories: prime lump or backfin, which is only about two percent of the live weight; special or flaked meat; and the claw which yields cocktail claws and claw meat. When picked and packed by weight, crab meat is marketed as fresh-cooked meat, pasteurized meat, fresh or frozen patties and canned cooked meat or soups.

The majority of the pickers in North Carolina's processing plants are women, older women. Lue Lewis and Mary Willis, another 18-year veteran picker, enjoy the routine work, additional income and family-type atmosphere, but admit there's little future in it for young people. The often long days, which can be dull and frustrating, make this type of work unappealing to many except as a temporary job. Sam Thomas predicts labor will continue to become more undependable as the older women retire, leaving vacant chairs at the picking table.

Mechanization is being tested in North Carolina with more than one processor expressing an interest beyond mere curiosity. This past April, the Seafood Lab gave a demonstration on mechanical crab picking equipment, inviting all state processors. Over 75 percent, the best response ever, attended and asked questions. One processor in the state is using mechanical equipment this year, yet he still retains a regular picking crew to get the claw and lump meat his machine is incapable of extracting.

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Machines, many processors and pickers alike argue, don't yield the better "bone-free" meat demanded by restaurants and consumers, and picked by experienced hands. Many claim that the machines have a long way to go, producing meat now that "looks like it chewed it all up and spit it out for bad." However, most processors are aware their businesses' futures will soon rely upon the dependable and time-efficient labor source found in the new machines being perfected through modern technology.

Sanitation, another problem in the business, can also be checked better through some mechanization. Unsanitary pickers, flies in the picking room and improperly cleaned tables are the prime sources for a high bacterial count in crab meat. Spoilage, poor handling and equipment breakdown can contaminate this very valuable and expensive product and cause a plant to be shut down.

When a person's health is at stake, federal and state regulations come in to ensure good sanitation and a good product. Shellfish Sanitation, under the State Department of Human Resources, is the controlling agency responsible for issuing plant permits. The United States Food and Drug Administration also makes periodic inspections of each processing plant, from the loading docks where the crabs are landed to the final packaged product under refrigeration. Samples are taken and sent back to labs for bacterial count checks. And it takes an efficient and spotless business to pass the strict regulations enforced by the state and federal government.

Waste disposal is the biggest problem the processor faces daily. The majority of the processors in North Carolina haul their waste to landfills or farmlands where it can be tilled under daily. James Paul Lewis, owner of the Lewis plant in Davis, uses his waste as prime fertilizer on his farm. A few local hog farmers take the nutritional solid crab waste to supplement their feed. But these methods aren't solutions for all processors nor for all of the waste that can be generated on a good day. Some waste does end up being dumped in creeks, left uncovered at landfills, or deposited by the picking plant.

Crab reduction equipment is the best means of waste disposal, according to Thomas, but not economically feasible for the small

plant operator. Crab reduction involves dehydrating the crab meat waste and grinding it to make such products as chicken feed. There are several commercial reduction plants and a common dryer in Pamlico County available for a fee, but most processors either don't want to haul large amounts of waste or aren't even near the dryers. Thomas warns that as demand for crabs increase, so will the waste, becoming more of a problem in the next couple of years.

However, despite some irregular moments with crabbers, owners and

pickers to meet seasonal and inconsistent demands from consumers, the crab business is a very healthy, growing business. Frozen-food concerns now use over 45 percent of all of the blue crabs landed in the United States, making this delicious product even more available and widely distributed. With an increased emphasis placed on healthy foods and gourmet cooking, crabs and all other forms of seafood have been in great demand. And, when the chance to get the fresh, sweet meat of North Carolina's blue crabs comes to most people, very few turn it down.

Photo by Cassie Griffin



Veteran Mary Willis extracts the backfin meat of a blue crab

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 office in Raleigh (919/737-2454).



Rip currents along the Outer Banks killed five people in August. Rescuers battled the heavy surf to save many others. The deadly currents were blamed on a combination of things: several days of northeast winds, which mounded nearshore waters especially high; a full moon, which further raised the tide, and Hurricane Charlie, making waves from off the coast of Virginia.

The pull was intense, but not unusual. Rip currents are common in North Carolina. They can form when water, shoved against the shoreline under pressure, breaks through a sand bar and rushes to sea at a rate of several feet per second. Rip currents can also form when longshore currents moving in opposite directions meet, often in a bay, or when a longshore current is diverted by a jetty or some other structure.

How can you avoid them? Watch the signs: especially green or murky water, a gap in advancing breakers where the current pushes seaward, or a floating object that moves steadily seaward.

If you're caught in a current, don't panic. Don't try to swim against the flow. Instead, swim diagonally toward shore until you break the current. If you can't break it, float calmly out with the current until it dissipates, usually just beyond the breaker zone.

For more about rip currents, write for Sea Grant's free poster, "Rip Currents." The address is UNC Sea Grant, P.O. Box 5001, Raleigh, N.C. 27650.



When it comes to seafood, North Carolina and Japan have a lot to talk about. That's why Frank Thomas, project director of seafood science and technology for UNC Sea Grant's marine advisory services, is studying Japanese.

Thomas, along with 18 other North Carolina State University faculty members, have been invited to spend the fall semester of 1981 in Japan. The trip is part of a university program established to link North Carolina and Japan more closely in a range of fields, from food science to textiles management.

Thomas will share with the Japanese the latest in American seafood technology, and will in exchange, bring home Japanese innovations. He will visit fishing vessels, processing plants and laboratories. He will also bring home a deeper understanding of Japanese culture—an understanding that he believes will help professionals develop new markets for North Carolina seafood and keep information flowing between the two peoples.

For Thomas, the trip will tie in nicely with a liaison he established with Japan in 1968. Through that effort, North Carolina and Japan have already traded ideas and technology related to minced fish, seafood processing techniques and market development for underused species of fish.



It read like a movie script. Loudspeakers blasted warnings to swimmers to stay out of the surf as schools of sharks roamed the waters close to the North Carolina shoreline. But the situation was real and danger was present.

The North Carolina Division of Marine Fisheries called the shark alert, the first one ever, August 9, after Dr. Frank Schwartz of the University of North Carolina Institute of Marine Sciences reported finding an unusual

number of sharks near the shore. Schwartz said the high temperatures in July and August had driven up water temperatures and driven away the shark's normal food supply. The search for food coupled with an onshore current brought the sharks toward shore.

Carteret County officials banned swimmers from the water August 9 and 10 along 26 miles of coastline from Atlantic Beach to Emerald Isle. The county became the center of state and national attention as reporters called county officials and fisheries experts to get the scoop on the patrolling sharks.

No one was attacked along Carteret beaches, but a 10-year-old Greensboro girl was bitten in the leg while wading in the surf at Ocean Isle Beach in Brunswick County. There have been only two other victims of confirmed shark attacks in North Carolina. Connell Purvis, director of the Division of Marine Fisheries, told reporters that the attack was an isolated incident and unrelated to the sharks sighted near Carteret County.

The alert was lifted August 10 as the sharks moved back out to sea.



No longer will it be just fishes, sea mammals and trawlers plying the watery depths of the mid-Atlantic continental shelf. Scientists will be too. The National Oceanic and Atmospheric Administration (NOAA) has awarded funds for an underwater research, training and education program, the Southeastern Consortium for Undersea Research Efforts (SECURE). It will serve Virginia, North Carolina, South Carolina, Georgia and Florida. The Southeastern Undersea Research Facility (SURF) will be on the campus of UNC-Wilmington.

According to Harold Dubach, SURF's administrative officer, SURF is gearing up for operations by out-

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fitting an 80-foot converted trawler, the *Seahawk*, with a decompression chamber and other diving equipment. "We're putting together an experienced diving crew and we've already received about 30 proposals for research," Dubach said. Proposals for underwater research are unlimited, he said, and include questions about marine medicine, underwater archaeology, fish populations, ocean pollution and underwater geology.

During Phase I of the SURF program, plans are for divers to study and conduct experiments at depths of 90 feet in a wet diving bell. Later in Phase II, researchers will be able to descend to depths of 200 feet in a dry or closed diving bell. Eventually, plans are to develop a mobile underwater habitat.

SECURE is the fourth undersea project to be funded by NOAA. Others are located in Hawaii, California and the Virgin Islands.



Homegrown tomatoes and cucumbers certainly are a delicious reward from your backyard garden, but what about largemouth bass? That's right, largemouth bass, and it's just one of the species suitable for water gardening, says John Foster.

Foster works with water gardening, or aquaculture, at the North Carolina State University (NCSU) Eel Culture Project in Aurora. Home aquaculture as a hobby, he says, is one of the cheapest and most efficient methods of producing meat. And, North Carolina has an abundant groundwater supply and excellent climate.

For the interested gardener, there are several methods of cultivation: in ponds, creeks or rivers; in an indoor greenhouse, or in a basement tank. Pond aquaculture generally requires an area drainable by gravity (no pumps), three to five feet deep. It should not flood, and it should have an efficient soil lining to hold water. A small garden pool or cages set in flowing water are other alternatives for outdoor aquaculture.

Indoor aquaculture involves more control over the environment, Foster says, and "absolutely requires recirculation or filtering of the water." Tanks can be constructed of concrete blocks, waterproofed and sealed, or swimming pools with plastic linings are acceptable. A combination greenhouse-aquaculture system provides benefits to both plant and fish cultivation, often stabilizing the environment's temperature and eliminating the need for a heater. Even edible plants, such as watercress, can be grown in the tank's ecosystem.

For warm water systems, the following species are recommended: catfish, bullheads, crayfish, prawns, largemouth bass, eels, tilapia, bluegills and Chinese carp. Cold water species require more oxygen in the water and a much greater flow, but rainbow trout, yellow perch and coho salmon are suitable for this type of cultivation.

For the beginning aquaculturist, it is important, Foster says, to be familiar with the lifestyle and needs of the species stocked, in addition to the maintenance and most efficient use of the aquaculture system. For more information, contact John Foster at the NCSU Eel Culture Project, Route 2, Box 305, Aurora, N.C., 27806, or telephone 919/322-4054.

Coastwatch is published monthly except July and December by the University of North Carolina Sea Grant College Program, 105 1911 Building, North Carolina State University, Raleigh, NC 27650. Vol. 7, No. 8, September, 1980. Dr. B.J. Copeland; director. Written and edited by Neil Caudle, Kathy Hart, and Cassie Griffin. Second-class postage paid at Raleigh, NC 27611.

COASTWATCH

105 1911 Building
North Carolina State University
Raleigh, NC 27650

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

