

COASTWATCH

Photo by Neil Caudle



Sailboats at a marina near Minnesott Beach

A door for folks afloat

A place to tie your boat and step out. A repair shop, gas station, warehouse, boat dealer, laundry, restaurant, lounge, tackle shop and social club. A place to gather and shoot the breeze; a place to catch the next breeze out.

The definition of marina is as new as the word, but saying what marinas are is much harder than saying what they do: they link people to the water.

"Marinas are the doorways to the waterborne public," says Leon Abbas, Sea Grant's marine recreation specialist. Abbas has spent years studying and promoting the economic health of the marina industry in North Carolina, an industry he says is critical to the state's coastal economy.

The industry is young, Abbas says, but growing: There are about 150 marinas operating along the coast, representing a value in excess of \$60 million. They range from small, family-owned businesses with a few slips to luxurious operations complete

with condominiums, yachts and club houses. They cater to fishermen on the sounds, blue-water sportsmen, and yachtsmen passing through. They can store about 10,000 boats.

And, demand for the services marinas offer is very high. Inlanders tired of burning fuel to haul their boats between the coast and home want coastal storage for their boats. More of us have leisure time for boating.

But all's not well with marinas. Most of them are built on shorelines bathed by tides, where marine life is most sensitive to disruption.

There is evidence that the dredging around marinas can threaten fish. There are shellfish waters closed to fishing because of contamination from marinas. There are public waters practically closed to public navigation because they are clogged with marina docks and mooring posts. And, to deal with problems like these, there are newly proposed regulations that have some marina owners upset.

This month, Coastwatch takes a look at the state's marina industry and the issues surrounding it.

New rules wouldn't sink marinas, state says

What both sides want is a peace treaty, not a war. But sizing up the issues, a cynic might predict the worst.

On one hand are the marina operators, by most accounts some of the hardiest and most independent men and women doing business in North Carolina. One of them said: "Regulations are like poison darts; the more they let fly, the more likely you'll get stuck."

On the other hand is the Office of Coastal Management, the regulators. They have the responsibility of protecting the coastal environment for the common good, and they intend to regulate how marinas affect that environment.

In fact, there has already been one skirmish, over a new set of standards proposed by Coastal Management at a meeting of the Coastal Resources Commission in July. Marina operators present at the meeting took issue with the proposals and accused Coastal Management of trying to regulate marinas out of business.

"We were taken aback," says Preston Pate, director of field services in Coastal Management's Morehead City office. "They said we hadn't made an effort to get their opinions, and we felt we had." Pate says that on

June 26 he sent out 140 copies of a letter to members of the marina industry. The letter included copies of the proposed standards and asked for comments before the July meeting.

"I got one written comment and one phone call," Pate says. He says the lack of response led him to believe that most of the operators were reasonably satisfied with the proposals.

But marina operators point out that the letter came during their busy season, when all but the most pressing mail stacks up on desks, unopened. After hearing the marina operators' complaints in the July meeting, the commission moved to postpone approving the standards until later this year, after marina operators had had more time to respond. The proposals were to have been discussed at the October meeting of the commission. If approved, they will be aired in public hearings and could be adopted as early as December.

Gene Floyd, a Wrightsville Beach marina owner and president of the N. C. Marina Association, says several of the standards, as written, could have the effect of stunting new growth among North Carolina marinas. Floyd cites one standard that would prevent marinas from being situated within

500 yards of shellfish beds. "You can find a clam just about anywhere," Floyd says. "And you could use that rule to stop just about any marina."

Floyd and others also feel that the new standards will further complicate the process by which new marinas are granted construction and operating permits—a process they say is already too time-consuming.

"It takes everything from six months to a year to get anything done," Floyd says. "We don't think we need all this regulation. For example, we're concerned about water quality, because we live with it every day. A lot of operators are voluntarily putting in grease traps, and we're coming up with our own ideas about pumpout stations."

Preston Pate says the proposed standards were never intended to discourage new marinas.

"I don't think what we're doing is going to have that effect," he says, "and it's not an attempt to change the operations of any existing marinas. Our coastal program recognizes marina development as an integral part of the coastal communities. But we have seen some development that does not exhibit the wise use of the resources we have."

Photos by Neil Caudle



Dry-stack marinas like this one near Atlantic beach store many boats efficiently. But at any saltwater marina, maintenance is a problem. Damaged pilings like the one at right, from a marina near Morehead City, must be replaced before the structure becomes unsafe.



Pate says the proposed standards speak to the three key issues concerning coastal marinas:

—Dredging, which is necessary in most marinas to keep channels open, increases turbidity and can put some fish at risk. "One of the big problems is locating marinas in shallow, tidewater creeks that offer protection from storms, but also carry the necessity to dredge for maintenance and expansion," Pate says. "Traditionally, these small tidal creeks are some of the most productive areas, and dredging changes the character of the nursery areas significantly."

—The construction of marina docks and slips in public waters is another serious issue. Pate notes that many marinas freely use publicly owned waters for building sites; he lists several cases in which marina operations actually block waterways to other traffic. Coastal Management has asked the N.C. Department of Administration to decide how the state should regard such construction in public waters, and has suggested the state employ a leasing program. But the Department of Administration has not acted on the recommendation. Pate says that an obstruction of public waterways could be challenged in court, unless some sort of formal leasing program is begun. In lieu of such a program, he says, "we have the responsibility of holding these public areas in trust for the use of all the public."

—Waste disposal and water quality around marinas are also stubborn problems in North Carolina, as they are in other coastal states. Because they are a gathering place for people, even well-managed marinas produce some contaminants, if from no other sources than the rainwater runoff from parking lots and rooftops.

Coastal Management's reluctance to endorse publicly owned, open-water sites on sounds and creeks leaves the office with standards that tend to favor shoreline basins partly surrounded by high ground.

Spencer Rogers, Sea Grant's coastal engineering specialist, has responded to Coastal Management's proposed standards, and has expressed reservations about endorsing basins over open-water sites for marinas.

Rogers points out that research into the question of how much marinas contaminate nearby waters is still incon-

clusive, but there is some evidence that open-water sites create fewer pollution problems than mostly enclosed basins. A study funded by Virginia Sea Grant at the Virginia Institute of Marine Science found that water samples taken near a marina showed no significantly higher bacteria counts than samples taken farther away. Other studies have shown very high coliform bacteria counts in more nearly enclosed marina basins, where water circulation is not as good.

"It seems as if local hydrography has more to do with water quality than being near a marina does," Rogers says. He points out that basins tend to concentrate contaminants, not only from marinas, but from other sources such as septic tanks and industry.

"In order to minimize the ecological impacts, what you would do is to design the marina for a maximum of wind or tidal flushing and a minimum of dredging," Rogers says, "and that would mean an open-water site. But that encroaches on the rights of others trying to use the water, by obstructing public-trust waters. So that leaves you with the question of what serves the public interest best—having marinas on the open-water sites, or preventing them there?"

Gene Floyd's answer to that ques-

tion reflects the marina operators' view: "We feel like we're a necessary industry for people who want to use the waters," he says. "We provide a service. Without us, the public would have a hard time getting access to the water at all."

Coastal Management had already dropped, before the July meeting, one of its most controversial marina standards. The standard required marinas to provide pumpout stations for removing wastes stored aboard boats.

"It was a tremendous enforcement problem," Pate says of the requirement. "It only applied to new marinas, and we found that, where the pumpouts were put in, there was very little use of them. Some were never used at all."

Pate says that the pumpout requirement was meant as a companion to the U.S. Coast Guard's new regulation forbidding boats to discharge untreated waste through their hulls into nearshore waters. In order to comply with that regulation, most boaters would have had to outfit their craft with expensive treatment systems or somewhat less expensive onboard holding tanks. Since the tanks have to be emptied, Coastal Management felt marinas should be required to provide

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Industry finding voice, clout

Just two years old and 30 members strong, the North Carolina Marina Association is like a growing adolescent, testing its new muscles and finding its voice. But the association's president, Gene Floyd, insists the group was not formed "to fight city hall."

"We don't want to build a barrier between us and the agencies we deal with," Floyd says. "We give credit to Leon Abbas (Sea Grant's marine recreation specialist) for helping us see the need for working with these agencies, not against them."

The association made Abbas an honorary member for his role in helping the group get the information it needed to organize itself and find its identity. Abbas says the marina association is teaching the industry that it can communicate and solve

some of its problems, collectively. Before the association, Abbas said, "there was a feeling of isolation, since they are geographically isolated."

Floyd says the association is tackling some routine business matters, such as how to secure group insurance rates, but has also found that its voice can publicly represent the interests of the industry. When, during the Carter administration, a ban on weekend boating was proposed as one of the standby measures states might employ during an energy crisis, the association's members spoke against the plan during a public hearing in Raleigh. They were heard, and North Carolina's energy office dropped the ban from its list of options.

"What they've found is that they are not alone," Abbas says. "They can find more solutions through cooperation than they can individually."

pumpouts, a measure designed to help ensure that tanks' contents were disposed of properly. But as Pate points out, so few boaters have complied with the Coast Guard's rule that the pumpout stations often go unused.

"We didn't want to get into the position of closing somebody's marina down because he didn't have a pumpout station, since they weren't being used anyway," Pate says.

Instead of the pumpout rule, Coastal Management is proposing a standard that would require marinas to display, on a sign, the location of the nearest pumpout station.

(Spencer Rogers has also been working on the waste-disposal problems of boats and marinas. His design for a low-cost holding tank for boats is aimed at helping boaters comply with Coast Guard regulations. The tank is portable, and can be emptied into most

any sewerage system. For details about Rogers' design, write for Sea Grant's free Blueprint, *The \$10 Holding Tank*, and ask for publication number UNC-SG-BP-80-1. Rogers is also designing a portable, hand-operated pumpout unit that could be rolled along the dock and cost less than a pumpout station.)

But despite the rough sledding during the July Coastal Resources Commission meeting, both Pate and the marina operators seem to believe the two sides can reach agreement.

"The main concern we have," Floyd says, "is for us to be able to work together, so that we can help in the regulation of our marinas."

And Pate adds that the proposed standards are not hard-and-fast rules. Most are written to express preferred conditions, not absolute criteria. They are also written to give coastal com-

munities a framework for their own marina policies.

"One thing we're trying to encourage is communities taking a closer look at marina development," Pate says. "If a marina is proposed, and it is compatible with a community's land-use plan, then that provides some justification for marina development there."

Susan Schmidt, a research scientist with Coastal Management, has conducted much of the study necessary for preparing the new standards, and she thinks her agency actually supports marina growth in the state. "Marinas are needed," she says. "They do a service, they provide access to the water. As a matter of fact, we give preference to marinas over other businesses that could just as well be built somewhere other than on the shoreline."

—Neil Caudle

Photo by Neil Caudle



Keith Wolfenbarger on his pile driver

Three marinas, Minus one

For those who love boats, the job might seem made to order: days spent among sails and outboards, chatting with fishermen. But there's more going on at a marina than atmosphere, and perhaps the closest parallel to the job is farming: long days, risks, and bone-tiring labor.

Here are the stories of three North Carolina marinas: a new one catering to sailboats and surviving its growing pains, another for the motorboaters, thriving in a busy beach town, and a third that never made it off the drawing board.

Keith Wolfenbarger rocks back on the lever. With a deafening clang, his pile driver hammers a new piling into the harbor. It's not the sort of gear you see doctors using every day; but this doctor is weaning himself away from medicine. He's building a marina.

"We're having fun, doing this on our own," Wolfenbarger says, "although I'd have to say it's not very profitable, yet. But we have filled up our marina, and we're building on."

For now, the story of Keith and Judy Wolfenbarger's marina near Minnesott Beach seems destined for a

happy ending: permits are in hand, new boat slips are rented and full, and word is getting out about the place. But in the early going, there were several chapters of adversity.

Elaborate tie-ups with construction crews kept work stalled until the Wolfenbargers decided to finish building the place themselves, they say. There was also a disagreement with a country club that wanted to put a pier into the channel serving the marina. The question was resolved, Keith says, when he offered the club a boat ramp in place of the pier. And, getting the permits they needed took twice as long as they had expected.

"We really did have constant interference the first six months here," Judy recalls. Their problems getting permits were not insurmountable, though, partly because their site was well-suited to the marina. The basin was surrounded by high ground, there was good access to the Neuse River, and some of the necessary dredging had already been done by previous owners. They say that most of the regulations they faced made sense to them. They cite the required pumpout station as an example.

"I don't see that a pumpout is that much of a problem," Keith says. "If this marina had two hundred boats in it, each one dumping, you'd be sitting in a cesspool. We make 'em pump. But they don't seem to mind; after all, their kids swim here."

Like other sailboat marinas, the Wolfenbarger's trade is built on the rental of slips, wet-storage spaces where boats are moored. The average rental fee for a slip is about \$50 a month. But most sailing families spend much more at the marina in boat maintenance, for goods in the ship's store, and for use of the laundromat and pumpout station.

"You can do a little mental calculation with those figures, multiplying them by the two hundred boats we'll eventually have here, and come up with some impressive numbers," Keith says. "But you plow most of that right back into the business. You have to."

"After all those years playing supermom back in Kansas, this is quite a change," Judy says. "We love it, but you give up some things. The pile driver and the truck were my Christmas presents last year."

Their marina is built, but Jerry and Kathy Macon's workdays still outlast the sun. Like the Wolfenbargers, and many other North Carolina marina operators, theirs is a family business.

"I get dirty and she does the paperwork," Jerry says.

The Macons are the operators and part-owners of a large dry-stack marina at Atlantic Beach. The marina caters to power-boat enthusiasts and fishermen, and its storage building holds 136 boats in racks. An \$80,000 lift truck shuttles boats between storage and the water. Rates for storage run from about \$500 to \$700 a year, depending on the size of the boat.

Their racks have been full for four years, and the Macons say demand for boat storage is so great that "for every customer we have at least one waiting." But he adds that storage fees alone would not pay the bills. Fuel sales, merchandise sales, a used-boat brokerage and repairs help make the business profitable.

"Repair work means the difference between going a shade in the red and going into the black," Macon says. "If you don't do service work, you'd have a hard time making it. The whole business falters when you have a boat not running, because you're not selling gas or supplies, and the customer is not satisfied."

The repair work was something Jerry already knew something about when, in 1976, he and Kathy left their jobs in Raleigh for the chance at a life near the water.

"I came down here because I wanted to be around boats and the water,"

Photo by Neil Caudle



Jerry and Kathy Macon

Jerry says. "Now I never have the time to get out in a boat the way I used to. But I still enjoy the business."

Their business is in good shape, but as Jerry says, "you never have it knocked." Supplies of repair parts dry up and leave him with angry customers. Costs are rising at a dizzying rate. And, being near salt water doubles the maintenance around the business.

Despite their success, the Macons hesitate to offer much hope to anyone planning to build a marina, even though they say there's enough demand to support many more such businesses in North Carolina. "The market just won't bear the cost of a new facility," he says. "The interest rates are too high now, and the cost of waterfront property is astronomical."

The Macons are members of the North Carolina Marina Association, and they say the group will help improve the image of marinas in the state. "A lot of people, when they think of marinas, they think of an old railway for hauling out boats. They think of old paint cans and piles of engine parts lying around. But this is a different kind of business. It's a good use of land because in less than three acres we're giving a hundred and seventy families access to the water."

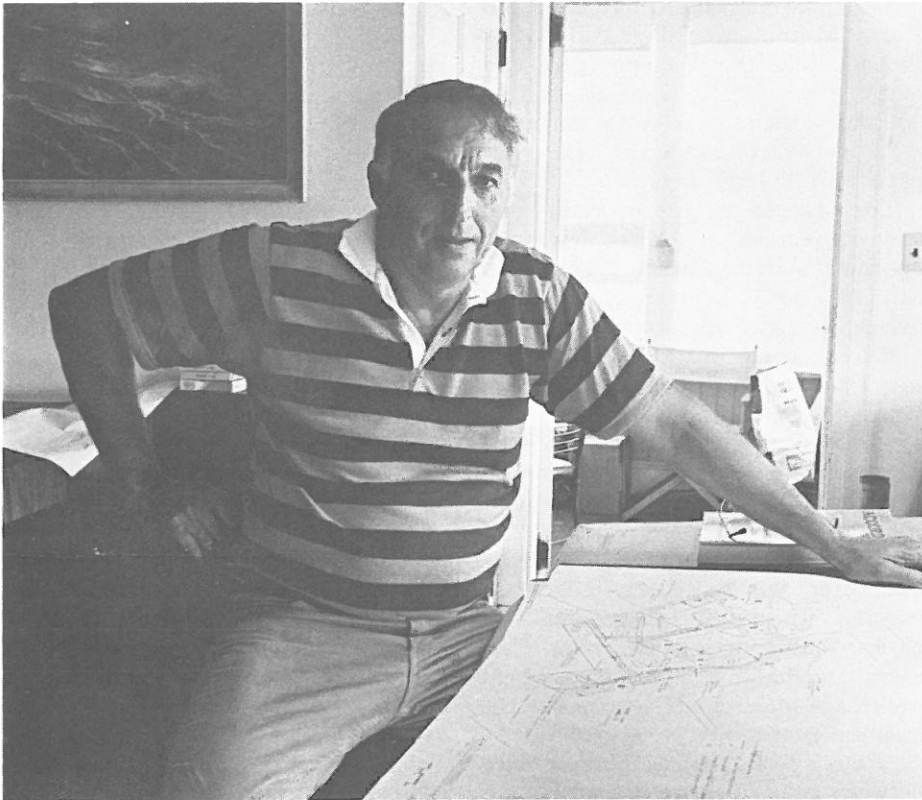
Neil Barnaby has given up trying to build his marina. Barnaby arrived on Cedar Island in 1978 with his savings, his family and a notion. He wanted to create, on the water, a small village suited to fishermen.

He planned to build some multi-family housing, heated mostly by the sun, clustered around docks and a marina for the community's boats—a mixture of pleasure craft and commercial fishing vessels. He says he wanted the housing to be priced within reach of the islanders. By his account, the community liked the idea, and he says local and state officials encouraged him.

Barnaby bought 33 acres, including a house and a saltwater basin known as Great Pond. The pond, he was told, had only recently been opened to Bogue Sound by a channel dredged by previous owners. Local fishing boats had been using the pond for a harbor, tying up at makeshift docks.

Barnaby says he planned to improve water circulation in the pond, which

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Neil Barnaby with beleaguered blueprints

has been less than pristine, and build better docks. He says he promised local fishermen places at the docks for nominal fees. The fishermen could have one side of the basin, he reasoned, and the pleasure craft the other. An engineer by training, he drafted his first set of plans himself.

That was three years and more than \$150,000 ago. Today, Barnaby has little more than he began with, except blueprints and some small ball point pens imprinted with the name Mariners Village.

"We came to a crashing halt last October," Barnaby says. "This has been a nightmare. I have spent my retirement money, and I've been frustrated in more ways than I can count."

The story he recounts reads like a badly written Russian novel—a tortured plot and too many characters. As staff would come and go in various agencies, he says, new personnel would confront him with new requirements. After two years of drawing plans, meeting with officials and paying consultants, survey teams and architects, Barnaby hit a wall. The Office of Coastal Management told him it could not approve his permit, he says, until the N. C. Department of Justice confirmed his title to the basin. Justice

decided the pond had, in the past, been navigable, and had been under tidal waters. Justice said the pond was therefore in public trust.

Barnaby says he hired a survey team whose work, he says, concluded the pond should be his. Armed with petitions signed by local residents and old photographs that he says showed the pond had not been tidal, Barnaby took his case to the state. The Attorney General's office stood firm.

With his money running out and no solution in sight, Barnaby scrapped his marina project and decided to build something more profitable: condominiums. He turned the project over to a landscape architecture firm in Raleigh.

Charles Jones, a field consultant with Coastal Management's office in Morehead City, did much of the field work on Barnaby's project. "I don't think Mr. Barnaby is a good example of how the process works," Jones says. "There were so many problems, so many complications with his site. In the beginning, I think the first people he met with made some suggestions to him, primarily dealing with water quality. I think he construed their suggestions to mean that everybody was approving his project."

Jones says that even if Barnaby's ownership of the pond had not come into question, there were other problems facing the project. "He wanted to fill in some areas to create a beach, and that amounts to open-water disposal," Jones says. "And, there's a shellfish lease directly in front of his property."

Jones says that much of the delay in the project was due to frequent revisions in Barnaby's plans as new consultants took on the projects.

"With something as complex as this, there are no hard-and-fast guidelines," Jones says. "It's very site-specific, and any change in the plans changes the complexion of the project."

John Parker, Coastal Management's permit coordinator, says the Barnaby project was delayed some because the plans Barnaby supplied were poorly copied. He says the plans took the same route other such projects do: ten state offices had two weeks each, plus possible extensions, to review and comment on the plans. (Those offices are: Coastal Management, Property, Archives and History, Community Assistance, Land Quality, Health Services, Transportation, Environmental Management, Wildlife Resources and Water Resources. A similar number of federal agencies comment to the U.S. Army Corps of Engineers.) Parker says Barnaby's marina plans ran into trouble because several of the offices had reservations about the project, including Environmental Management, which did not like the looks of the sewage-disposal plans.

"If it's a controversial project, it takes longer," Parker says. "Most marina projects can be approved or denied in about sixty-five days."

For Neil Barnaby, it took three years, and that, he says, is his gripe. "If, three years ago, somebody had told me all the steps I had to take, all I would have to go through, I would have never tried this at all. I would have never spent all that money," he says.

Anyone thinking of buying coastal property or building a marina can call on one of Coastal Management's field consultants, who will make a site visit and point out potential problems, free of charge. Todd Llewellyn, the agency's information officer, says his office is preparing a publication outlining the steps in the permitting process.

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).



Whoever thought research is only done in laboratories hasn't seen UNC Sea Grant researcher Charles Peterson on his hands and knees in the Bogue Sound marsh, sifting the sands for hard clams. Peterson, a researcher at the Institute of Marine Sciences in Morehead City, is looking at the management of the hard clam fishery in this state with special emphasis on the effects of various harvesting methods.

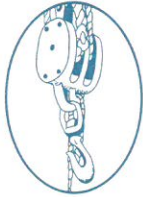
Each clam that Peterson turned up in his Bogue Sound search was dotted with paint and returned to one of 30 one-meter plots. Half of the plots were covered in Cuban shoal grass while others were stripped of their grass and the clams left in bare, sandy bottoms. The test? To see how sea grass cover affected predation of hard clams by whelks (often mistakenly called conchs).

Peterson gave the experiment six months. Meanwhile he did some detective work in the laboratory. He fed clams to whelks so he would be able to determine what kind of evidence the predatory whelk left behind.

After determining the clues of whelk predation, Peterson went back to sound to sift the sands. He found that hard clams, who had the cover of sea grass, fared well. But many of those hard clams left in bare, sandy bottoms were eaten. During the six-month experiment conducted during cold weather, 32 percent of the hard clams left on the sandy bottom were eaten by whelks. Peterson repeated the experi-

ment during four warm months, finding 70 percent of the hard clams in sandy areas preyed upon by whelks. Peterson says the higher summer mortality resulted from increased whelk activity, an increase characteristic of most marine creatures during warmer months.

What does all this mean? Grass beds denuded by raking and clam kicking can not only deprive young fishes of needed habitat, but it also sets up hard clams as a more likely target for predation by whelks.



Fishermen, marina operators, seafood dealers and others have a new source of information. Two Sea Grant marine advisory agents, Bob Hines and Larry Giardina, have published the first issue of a newsletter designed for people who use the state's marine resources. The newsletter, which will be published monthly, will offer news about research, advances in gear and methods, regulations, and programs and events of interest. To receive this free newsletter, contact the UNC Sea Grant Marine Advisory Services, P. O. Box 896, Atlantic Beach, N. C. 28512, or call (919) 726-0125.



Available: prime laboratory space in three desirable coastal locations. Utilities and some furniture and equipment included. Access to boats, darkrooms and holding tanks. Rent: based on tenant's ability to pay.

To scientists accustomed to overcrowded campus labs, an announcement like the one above might seem too good to be true. This one, however, is for real. According to Doug Young of the N. C. Office of Marine Affairs, there are four labs available in each of the three N. C. Marine Resources Centers (at Ft. Fisher, Bogue Banks and Roanoke Island). Young says the labs

are offered to qualified investigators conducting studies pertinent to problems associated with coastal and marine resources. The offer is not limited to North Carolina investigators.

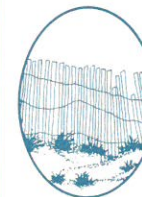
Three projects are currently underway in the centers. One of them, Project CAPE, a program directed by Carolyn Hampton of East Carolina University (ECU), is using space at the Roanoke Island center to develop teaching materials in marine education for Dare County public schools.

Qualified researchers interested in space at the centers should inquire to J. C. Jones, director, N. C. Office of Marine Affairs, 116 W. Jones Street, Raleigh, N. C. 27611.



To give some inland extension home economics agents a taste of the sea, UNC Sea Grant and the N.C. Agricultural Extension Service sponsored three days of in-service training in October at the NCSU Seafood Laboratory at Morehead City. Sea Grant staff at the lab, Frank Thomas, Joyce Taylor, and Sam Thomas, along with extension personnel, told the agents about how nutritious and economical seafood can be, and gave them tips on how to preserve and prepare it. Then, for some hands-on experience, the extension agents learned how to fillet fish, steam crabs, and pry open oysters.

Armed with their new seafood knowledge, the extension agents returned to their inland counties prepared to spread the word about seafood.



Problem: how to design a tent for camping on the beach. Requirements: must be economical, light weight, durable and weather-tight. The occasion was an October field trip for 19 students in

Continued on next page

Lundie Mauldin's course, "Oceans," at NCSU. The group traveled to Cape Lookout National Seashore with Mauldin, Sea Grant's marine education specialist, and Stan Riggs, a geologist from East Carolina University. They were there to study island ecology, shoreline processes and the predicament of the Cape Lookout lighthouse, which has been threatened by erosion.

"We also wanted them to see what it's like to rough it on an island beach," Mauldin says.

Teams of students were left on their own to design tents using only sheets of plastic and walking sticks. That night, the creations got a stiff test: a driving rain came, and the wind blew at 25 knots. All five tents held firm, though, and the students stayed dry. Many conventional tents, Mauldin says, would have failed. She says the students succeeded because their tents' low, sloping profiles deflected wind, and because the tents were well-anchored by piled sand.

"Their shelters reflected the students' ability to work with the wind forces and the lack of a stable base," Mauldin says. "They had to be observant, and they were."



Erosion is a serious threat to waterfront property along the estuarine shoreline. Some effective methods of erosion control, such as the use of bulkheads and groins, can be expensive to construct

and maintain. But, in some areas, property owners can use an inexpensive, natural buffer against erosion: transplanted marsh grasses.

Sea Grant's new publication, *Planting Marsh Grasses for Erosion Control*, provides guidelines for the property owner interested in this natural erosion-control method. Types of grasses are discussed along with choosing suitable sites, transplanting, fertilizing and maintaining a fringe of marsh grasses. Information on growing grasses from seed in a greenhouse is also included. All of the information in this booklet has been tested by the authors, S.W. Broome and W.W. Woodhouse, Jr. of the Department of Soil Science, and E.D. Seneca of the Department of Botany at North Carolina State University. The three recently completed a Sea Grant project that produced much of the information in the booklet.

For a copy of this free publication, write Sea Grant, Box 5001, Raleigh, N.C. 27650-5001, and ask for UNC-SG-81-09.



Fishermen and many other seafarers can no longer receive free health care from the U. S. Public Health Service. As of Sept. 30, patients who once qualified because they operated or helped operate vessels registered by the U. S. Coast Guard will have to find medical attention on their own.

The Omnibus Budget Reconciliation

Act of 1981, approved in August, ended the entitlement and provided for the closure or conversion of all Public Health Service hospitals and clinics.

The Public Health Service hospital in Norfolk, Va., which has admitted thousands of seafarers each year, is now closed. Retirees of the uniformed services, and dependents of active and retired members of those services, will be given general care only as outpatients in what is now called the Lafayette River Branch Clinic.

Estimation of Surface Gravity Waves from Subsurface Pressure Records for Estuarine Basins, by C. Ernest Knowles of the NCSU Department of Marine, Earth and Atmospheric Sciences, is the latest in a series of Sea Grant working papers.

To receive a copy of this working paper, send 75 cents to UNC Sea Grant. Ask for publication number UNC-SG-WP-81-6.

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