

COASTWATCH

Adapted from map by Minerals Management Service

Oil and gas

They may be hidden off the coast of North Carolina. Oil companies say that the odds of finding them at all are slim. Even so, those companies are gambling hundreds of millions of dollars on leases. Their geologists sniff oil in the form of an ancient reef, buried over a hundred million years ago. The federal government is selling chances at this reef to the highest bidders. And map-makers have drawn an unruly stretch of open ocean into a checkerboard of leasing tracts—a checkerboard upon which the oil companies and the government have already begun to play. Test drilling may begin as early as this year, on some tracts.

Are there risks? Industry representatives assure coastal residents that oil and gas won't disrupt their lives or mar their beaches. But state officials are taking a hard look at some leasing tracts nearest the shore—where the drilling might be a little too close for comfort.

This month, in the first of a two-part series, Coastwatch looks at oil and gas exploration off North Carolina—who's involved, what's at stake, and what it is about our Outer Continental Shelf that's attracted all the attention.

In the next issue, Coastwatch will examine the risks of oil spills, and what's being done to offset them. We'll also take a look at how the costs and benefits of offshore oil and gas production might stack up for North Carolina.



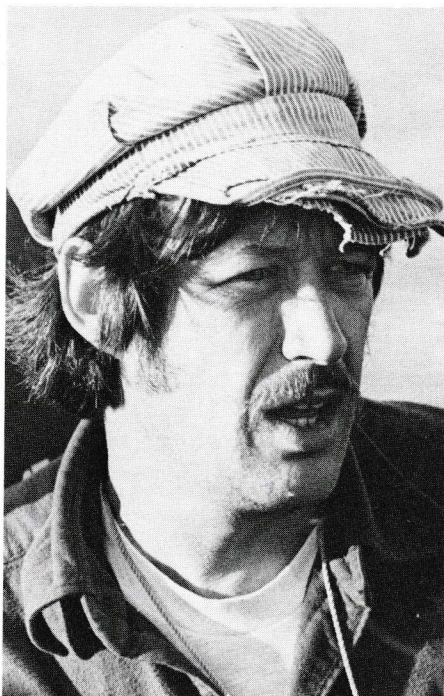
Three-mile-square tracts for oil leasing: some are too near to suit state

Companies gambling there's oil in buried reef

Massive steel rigs loom like vultures over the Texas landscape, Alaska's Prudhoe Bay and California's Santa Barbara coastline drawing up long sips of black crude to quench a nation's powerful thirst for petroleum—oil that is, black gold, Texas tea. Most of America runs on oil and its byproducts. Over one-third of that oil is produced by foreign nations, many of which are politically unstable. And dwindling reserves of domestic oil and gas are sending companies in search of new frontiers for exploration. North Carolina's outer continental shelf holds the promise of being a new frontier.

Angela Waldorf, associate director of the North Carolina Petroleum Council, says the chances for finding commercial quantities of oil and gas are about one out of 50 in a wildcat area such as North Carolina's outer continental shelf, where no test wells have been drilled. Several of the nation's leading oil companies feel the odds are good enough, though, and they are plunking down millions for leases on the nine-square-mile tracts, and may spend millions more for exploration. Chevron USA Inc., the U.S. Subsidiary of Standard Oil of California, is the first in line to drill. Chevron bought in on 12 tracts during Lease

Photo by Simon Griffiths



Stan Riggs

Sale 56 held in August 1981. And R.L. (Bob) Woodard, Chevron's division exploration manager for the northern division, says the company hopes to begin drilling in 1983 on a tract off the northern North Carolina coast.

Secretary of Interior James Watt wants to hasten the exploration and development of oil and gas reserves along the nation's outer continental shelf. He has sped up the leasing process and has sometimes sold leases at bargain-basement prices (that's in oil company scale-of-economy where a few hundred thousand dollars for a lease is cheap) to lure oil companies to the shelf, where it is estimated that 25 to 33 percent of the undiscovered reserves of oil and gas in the U.S. are waiting.

The bait luring oil companies like Chevron, Atlantic Richfield and Gulf to North Carolina's outer continental shelf is about 190 million years old. It's an elongated basin off the North and South Carolina coasts that geologists call the Carolina Trough. But it's not the trough itself that has the oil companies bidding millions of dollars for leases. Stan Riggs, an East Carolina University geologist and UNC Sea Grant researcher, says it's the features within the trough, a Jurassic reef and salt domes or diapirs.

Riggs says four ingredients are needed to produce oil or gas. The first and main ingredient is organic material—dead plants and organisms. Then the organics must be transformed or cooked into oils and gases by the right temperatures and pressures. The wrong combination of temperature and pressure could mean coal instead of oil. Once formed, the oils and gases need to be able to migrate through porous sediments to reservoirs or holding rocks where they are trapped and held.

Geologists believe the trough, created during the rifting and stretching that occurred as Africa and North America split during the Triassic period, may have made a suitable caldron for oil and gas. Approximately 39,000 feet of sediments have accumulated in the trough, leading geologists to believe adequate pressures were present for the cooking. The mounting sediments may have also been heavy enough and permeable

Photo courtesy of American Petroleum Institute



Drilling in Alaska's Prudhoe Bay

enough to squeeze the oil and gas from the trough into nearby storage structures such as the Jurassic reef.

Old coral reefs are particularly good sites for oil and gas exploration. When alive the reefs were prime collection points for large amounts of organic matter. And as they died and sank under the weight of accumulating sediments, the reefs made excellent storage bins. Their grainy makeup creates plenty of pores for the oil and gas to collect in, says Riggs.

But the reef must be sealed if the hydrocarbons are to remain trapped. The Jurassic reef off North Carolina is capped with fine-grain limestone capable of sealing in oil and gas.

Other geologic structures of interest along the shelf are 21 salt domes or diapirs found seaward of the Jurassic reef. Salt domes in the Gulf of Mexico have yielded large quantities of oil. The salt domes, like the reefs, are collection and storage areas. But Waldorf says oil company interest, for now at least, is in the reef and not the domes.

Geologists such as Riggs and Barry Drucker, a staff geologist with the U.S. Department of Interior's Minerals Management Service, believe the reef offers the best possibility for oil exploration along the East Coast. But no

one expects another Prudhoe Bay off the North Carolina coast. The draft Environmental Impact Statement issued for Lease Sale 78 estimates (based on U.S. Geological Survey information) that if the area leased is hydrocarbon productive, a mean total of 228 million barrels of oil and 860 billion cubic feet of natural gas may be discovered. In 1980, Americans used over 15 million barrels of oil a day—more than a fourth of the worldwide production of 60 million barrels a day.

But Waldorf is hesitant to put much stock in estimated production rates. "We won't know what's out there until we drill," she says. But she points out oil companies are willing to put out millions of dollars to buy leases (as a

consortium Mobil, Amerada Hess and Marathon Oil paid over \$103 million for a single tract) to find out. And she estimates to explore a lease will cost another \$25 million per exploratory well.

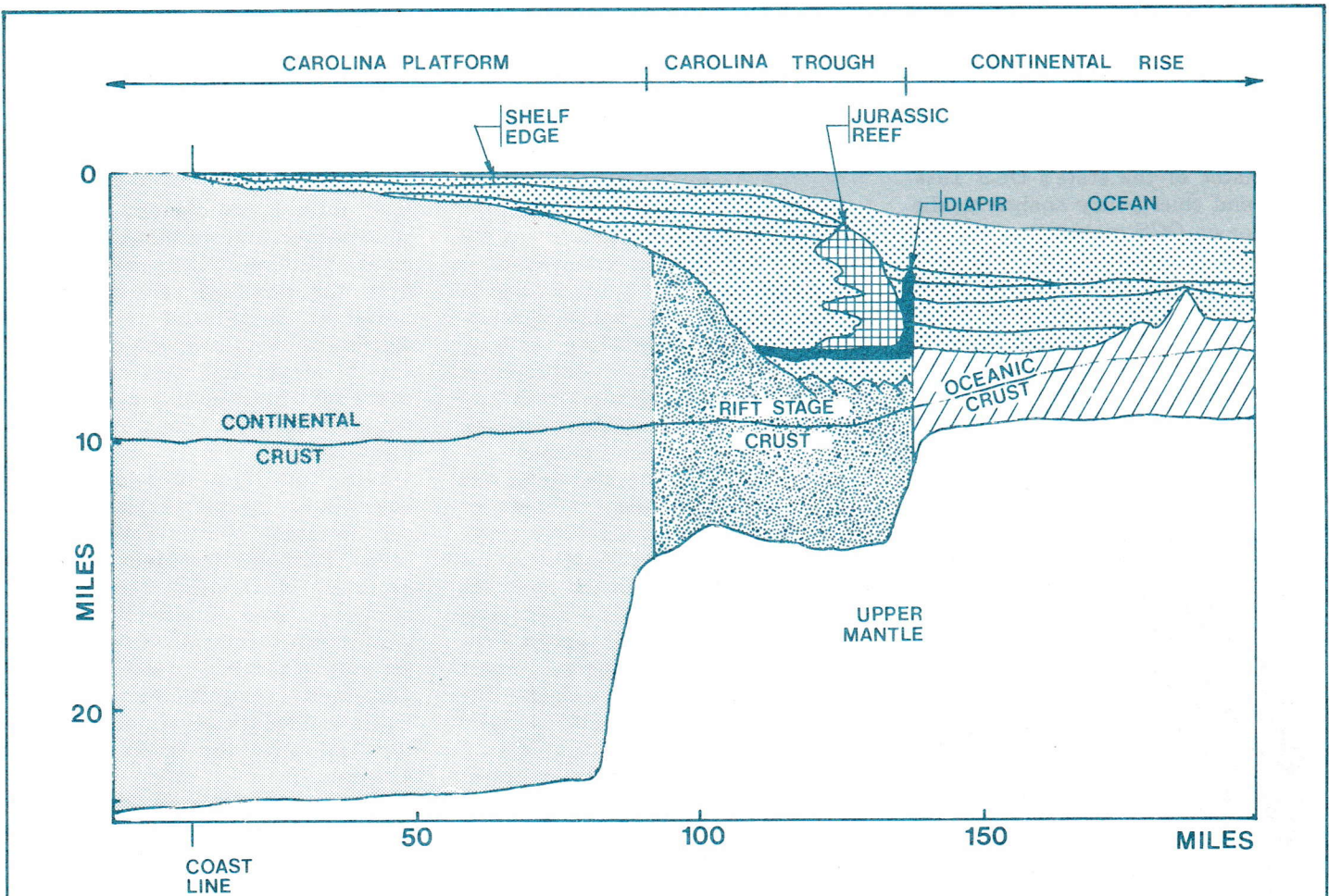
But even if oil and gas are discovered it would be another 10 years before actual production would begin, Waldorf predicts. And she stresses that substantial quantities of oil and gas would have to be found to justify the high cost of production—\$160 million to build a platform and \$1 million a mile to build a pipeline to transport the hydrocarbons landward.

And the possibility remains that nothing will be found. Six wells drilled in the Georgia Embayment turned up

dry. But sediment layers there were shallow. Waldorf says even if the first Chevron well is dry, the geologic information gleaned from the attempt could direct future drillings to more profitable areas.

Right now geologists and oil companies are depending on seismic studies to direct their exploration. Drucker and Riggs say there is a greater likelihood of turning up gas than oil. Riggs says gas is more easily produced in nature and more gas has been discovered in East Coast basins than oil. But Woodard disagrees. "We feel that this will be a good opportunity to find significant quantities of oil," he says.

—Kathy Hart



A cross section

Within the Carolina Trough, the Jurassic reef and diapirs (salt domes) seem most likely to hold oil. The trough formed as Africa and America split apart during the Triassic period. Deposits of sediment mounted on the rift stage crust, eventually burying the coral reef. (Adapted from map by Minerals Management Service)

Offshore oil wells: how close is too close?

In North Carolina, visions of oil tycoons wheeling and dealing to the clang of drilling rigs are just that. Visions.

So far the people with the most to say about oil have been the ones in government. For North Carolina, the focus has been on Gov. Jim Hunt and his Outer Continental Shelf (OCS) Task Force.

On the national level, Secretary of the Interior James Watt wants to speed up offshore oil development and to lessen the country's dependence on foreign oil—at the expense of the environment, say some of his critics.

Contrary to popular belief, Gov. Hunt is not opposed to offshore oil development. "The governor has always been supportive of efforts to develop new sources of oil and gas and to lessen the country's dependence on foreign sources," says Eric Vernon, coordinator of the state's OCS Task Force and chief policy analyst to the governor on OCS matters.

The United States imports 33 percent of its petroleum needs from foreign countries, many of them politically unstable, says Angela Waldorf, Associate Director for the N.C. Petroleum Council, a trade association for the industry. Proponents of offshore development point to the Arab oil embargo of late 1973 and

1974 and the 1978-1979 Iranian revolution to demonstrate the vulnerability of the nation to interruptions in the flow of imported oil.

Everyone agrees that the domestic production of oil needs to be increased. So, where's the controversy?

While the state has jurisdiction over the water, bottom lands and natural resources extending three miles offshore, the federal government controls the area seaward from three to 200 miles.

Still, what goes on in those waters could affect the state, its resources, its economy and its people—the things Gov. Hunt has pledged to protect.

Even with all the advice, much of what the task force bases its recommendations on is supposition. What if.

In the case of the first lease sale off North Carolina, the group reviewed the proposal and realized that six tracts lay between 12 and 16 miles east of Cape Lookout. What if a major oil spill occurred on one of those tracts?

That was a question that had already been addressed. In an environmental impact statement, the Department of Interior estimated that a major spill from the tracts near Cape Lookout had a 25 percent chance of reaching the beaches.

Thus began a chain of reactions. The

"The governor has always been supportive of efforts to develop new sources of oil and gas . . ." —Eric Vernon

Under the 1978 OCS Lands Act, the governor of an affected state has the authority to make recommendations to the Secretary of the Interior and to review planning and policy development at various steps along the way. Another safeguard, the Coastal Zone Management Act, requires that any federal activity be consistent with the affected state's laws and policies.

When Gov. Hunt decided to file suit against the Department of Interior over six environmentally risky tracts offered in Lease Sale 56, it wasn't a decision he reached on his own. Instead, he had the help of a task force, funded by the federal government through the Coastal Energy Impact Program and designed to look after the interests of North Carolina in outer continental shelf matters.

The 14-member group has representatives from Natural Resources and Community Development, the Department of Administration, Department of Cultural Resources, Department of Transportation, Department of Commerce and local government.

If the task force doesn't have the know-how to deal with a problem or question, they know whom to ask. They've built up a network of experts on OCS matters including researchers from the state's universities as well as from federal agencies such as the Minerals Management Service.

task force recommended that the governor recommend that the Department of Interior delete the six tracts from the proposed sale. When the Secretary of Interior rejected the state's request, it was the task force's turn to act again. They recommended that Gov. Hunt sue to prevent the offering of those six tracts. And he did just that.

Lease Sale 78, to be held this summer, will be the first to take place under Secretary Watt's new five-year plan. Former President Carter's Secretary of Interior, Cecil Andrus, identified areas of interest from the government's point of view and from the view of the private sector. Evaluations and geological studies of the tracts enabled the government to identify and offer the tracts of higher interest.

Now, under Secretary Watt's five-year plan, a much larger acreage is offered. There is little analysis prior to the sale. The Department of Interior identifies a broad area of interest and lets the industry select the tracts of most interest.

"I don't think there's any doubt about the changes to accelerate the process to offer as much acreage as possible and to get the government out of the business of identifying the interesting tracts," says Vernon. "The Department of Interior has taken a



Eric Vernon

very aggressive position on offering public lands for mineral extractions in general and this applies to the outer continental shelf."

Vernon cites reports that estimate 50 percent of the undiscovered petroleum resources of the United States are under the outer continental shelf. Yet only nine or 10 percent of the country's domestic oil comes from the outer continental shelf.

The five-year plan has gotten mixed reviews. Industries like it because they have more flexibility to decide on which tracts to bid. The Department of the Interior likes it because there are no lease evaluations prior to the sale. Secretary Watt says such evaluations are an inefficient use of resources because the department may be evaluating tracts that never get bids.

Opponents argue that the Department of the Interior is rushing into things, that they don't know about or care about the possible impacts to the environment.

Finally, the increase in the size of the offering makes it harder for state agencies to evaluate the potential problems of the offerings. For North Carolina, its offshore areas have been divided into the Mid-Atlantic and South Atlantic regions. This means that the task force's work could be doubled since they have to consider each lease sale separately.

Although the task force and the governor decided not to challenge Watt's five-year plan, Hunt did write a letter to Watt, encouraging him to abide by the federal-state partnership concept set by the OCS Lands Act and to listen to what the states have to say.

As for the citizens of North Carolina, Vernon has tried to assess sentiment on offshore oil in public hearings and meetings at the coast. "I think most of the people support the offshore program. I think they're very concerned that the outer continental shelf oil and gas industry be integrated into the current economic base—fishing and tourism.

"I don't think they want an industry that will come in there and upset the way they earn their living, but I think they understand the problem of developing a new source of energy and I think they support it so long as it does not threaten their quality of life or their economic base," says Vernon.

—Nancy Davis

Carolina crude—the story so far

In June 1859, Edwin Drake used a wooden rig and a steam-operated drill to bore 70 feet into the Pennsylvania crust. In two months, Drake's well was producing 10 to 35 barrels of oil a day.

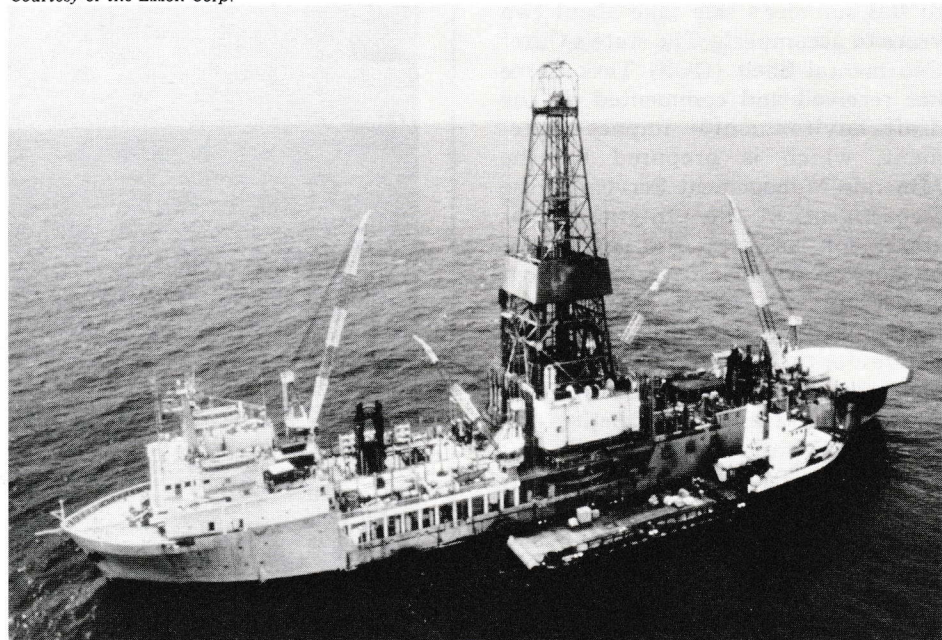
Prospecting for oil off the coast of North Carolina is a longer tale—one that has been unfolding for about four years now. And still, oil companies have yet to drill the first exploratory well into the sediment of the state's outer continental shelf.

During those four years, the companies have been going through the motions—seismic surveys, exploratory plans, lease sales, permits to drill. On the government side are environmental impact statements, public hearings, task forces and a plethora of government agencies, each with its own concern in offshore oil development.

It takes only six months for the average exploratory well to be drilled, but it could take as long as two years from the time a company buys a lease to the time drilling begins. And that's only to find out what's down there. It's a wait-and-see game, say oil company spokesmen.

For North Carolina, the game began in 1979 when the federal government included tracts off the state's coast for auction to oil companies in August 1981. While most of the tracts for Lease Sale 56 were in a block about 100

Courtesy of the Exxon Corp.



Ships are used for test-drilling over deep-water sites

miles off the coast between Cape Lookout and Wilmington, several tracts were off the northeastern coast of the state. Six tracts lay between 12 and 16 miles east of Cape Lookout.

In a 1980 environmental impact statement, the U.S. Bureau of Land Management estimated that a major spill, 1,000 barrels of oil or more, from the tracts near Cape Lookout would have a 25 percent chance of reaching the beaches.

Those odds seemed too high to Gov. Hunt who recommended to the Department of the Interior that the 54-square-mile area be deleted from the sale.

Although Secretary of Interior James Watt has the discretion to delete any tract from the proposed sale, he rejected North Carolina's request to remove the six tracts. Gov. Hunt responded by filing suit to stop the sale of oil-drilling rights in the six tracts.

Watt agreed to a compromise. If there were no bids on the tracts, North Carolina would drop the suit. If there were bids, the state reserved the right to go to court for an injunction to halt the drilling.

By the time the sale rolled around in August 1981, the oil companies weren't willing to involve themselves in any disputes between the federal and state

Continued on next page

governments. They chose not to bid on the six tracts near Cape Lookout.

Oil companies were awarded leases on 43 tracts off the coast of North Carolina. A Mobil Oil, Amerada Hess and Marathon Oil consortium bid \$103,775,000 for a tract off the northern coast of the state, where tracts received highest bids.

The threat of a lawsuit came up again in 1982 when Secretary Watt announced plans to include the six tracts near Cape Lookout in a re-offering of leases not bought in the first sale. The following month, amid talk of another lawsuit, Watt announced his decision not to offer drilling rights for those tracts nearest the North Carolina beaches.

Meanwhile, the oil companies were beginning the long, drawn-out process of permitting, and coastal residents waited for evidence that drill ships would one day probe beneath the ocean floor for oil.

Even before companies explored the possibilities of oil on tracts from Lease 56, the government began gearing up to offer more offshore leases. The proposed South Atlantic Sale 78, tentatively scheduled for July 1983, will be the first in this area to be conducted under the Department of Interior's new OCS process—the so-called five-year plan—designed to accelerate the discovery and development of offshore oil. The South Atlantic Region covers an area from North Carolina south to Florida.

The preparatory stages leading up to this summer's sale take about two years to accomplish. The state's Outer Continental Shelf (OCS) Task Force has received and commented on the draft environmental impact statement, which is prepared by the Minerals Management Service of the Department of the Interior. That statement assesses the effects of offshore oil drilling on everything from water quality to recreation and tourism. And it develops various alternatives for the proposed sale, including holding the sale as proposed, delaying or cancelling the sale or deleting certain blocks within the sale.

The OCS Task Force reviewed the document and recommended the governor support an alternative that deletes 151 tracts off the coast of North Carolina. That alternative would eliminate nearshore tracts that represent the greatest risk of oil spills reaching the shores and would delete

the block containing a portion of the USS Monitor National Marine Sanctuary.

According to the draft environmental impact statement, this alternative also ensures that offshore structures would not be visible from the Cape Hatteras National Seashore and reduces the chance of collisions in the heavily trafficked area.

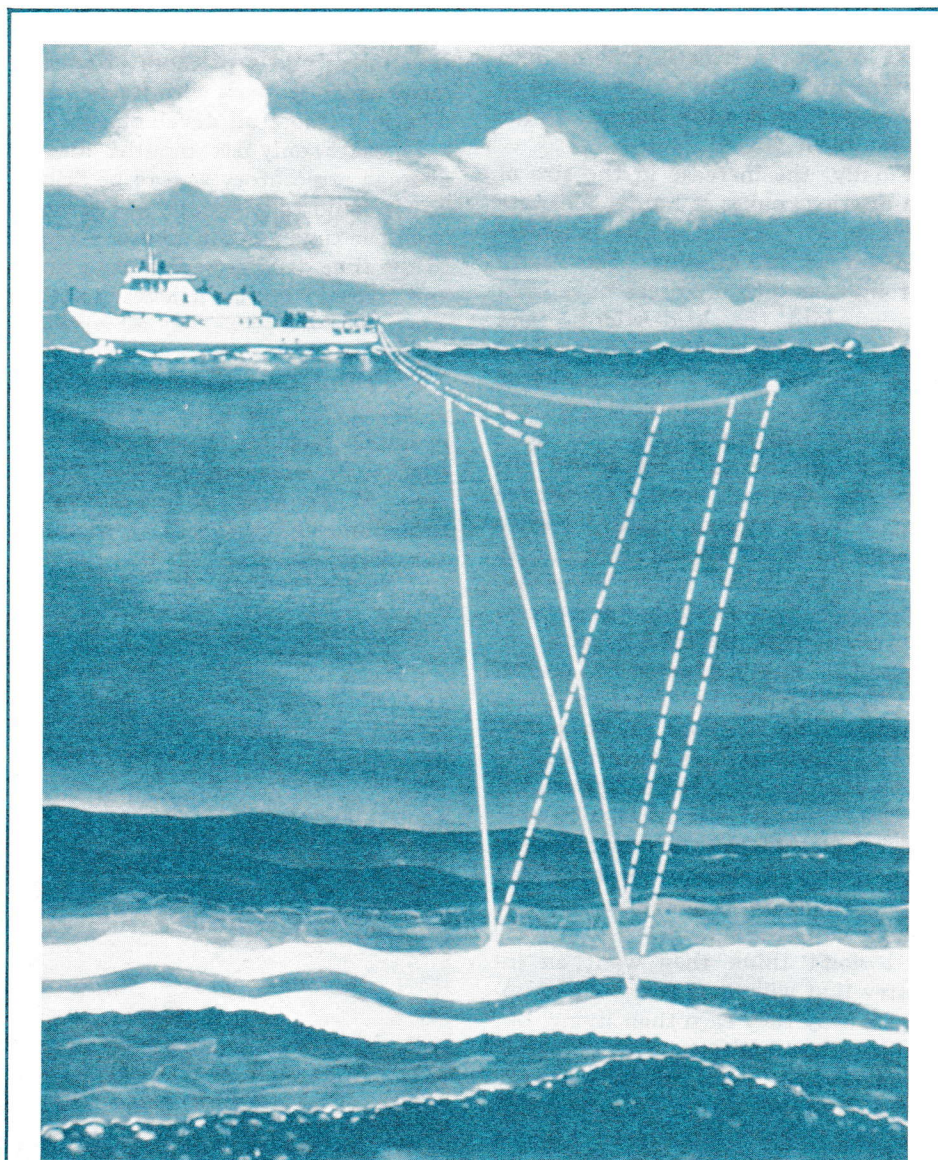
In a letter to Secretary Watt, Gov. Hunt outlined the state's position. The alternative would "eliminate the nearshore tracts which represent the greatest risk of oil spills reaching our shores and thereby protect our fishing and tourist industries," says Hunt in his letter.

By March, the final environmental

impact statement will be issued, reflecting the state's recommendations. At the same time, the Secretary of the Interior will make a proposed notice of sale.

Between the proposed notice of sale and the final notice of sale released in May, the state will establish its position with regard to Lease Sale 78. In Lease Sale 56, this was the stage in which Governor Hunt filed suit because North Carolina's recommendations were not heeded. If the governor feels the state's position has not been reflected, there's always the possibility of litigation and there could be a temporary injunction to actually stop the lease sale.

—Nancy Davis



Searching for signs of oil, geologists use seismic ships to bounce impulses off strata below.

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).



What's in a name? Maybe more than you think. Gagfish, grunts and suckers go begging at grocery counters. An unsavory name can destroy the appeal of an otherwise tasty fish. And with no appeal in the grocery store, these fish bring only pennies a pound at the dock.

But there's one fish that's overcome its unsavory name: croaker. Sam Thomas, Sea Grant's seafood specialist at the NCSU Seafood Laboratory in Morehead City, says promotion put croaker alongside flounder and trout on grocery counters. "Once people realized it was a very acceptable fish to eat we started seeing demand for it," Thomas says. "When demand increased, the fishing effort increased and the fishermen started getting a better price for it."

Thomas says common fish names, usually bestowed by fishermen, reflect some action or habit of the fish (suckers) or perhaps their appearance (toadfish). Fish names may vary from fishing community to fishing community, and bear yet another name at the market. The U. S. Food and Drug Administration (FDA) controls market names. They want to assure consumers that what is being sold as perch is indeed perch.

Ridding a fish of its distasteful name is not easy. Fishermen and seafood dealers along the Pacific coast recently appealed to the FDA to change the market name of Pacific hake to Pacific whiting. The appeal worked. But it wouldn't be worth the time, effort and

expense to change every fish's name that was unpleasant.

Thomas suggests that a lesson be taken from croaker. Promotion and a little experimentation on the part of the consumer could improve the marketability of many unsavory-sounding fish.

The U.S. House of Representatives' Committee on Merchant Marine and Fisheries, chaired by N.C. Representative Walton Jones, will be studying the reauthorization of the National Sea Grant Program during February and March. The program was created by Congress under the National Sea Grant College Act and must periodically be reauthorized by Congress so it can continue to operate as a federal program.

During the study period, Congressmen and committee members would welcome public comment on the Sea Grant College Program.



Fishermen are once again invited to attend the North Carolina Commercial Fishing Show being held in Morehead City. The show, slated for March 12 and 13, will be held in the National Guard Armory at 3609 Bridges St. The in-water exhibits will be displayed behind the N.C. Division of Marine Fisheries building off U.S. 70 East, two blocks away. The show will run from 10 a.m. to 5 p.m. Saturday, March 12 and from 11 a.m. to 5 p.m., Sunday, March 13. Admission is free.

Dealers and manufacturers will be on hand to exhibit the latest in boats, engines, trailers, nets, traps, electronics and other commercial fishing gear. A series of mini-seminars will be offered by experts throughout the two-day event.

The North Carolina Commercial Fishing Show, the only boat and gear show in North Carolina designed especially for commercial fishermen, is sponsored by UNC Sea Grant in

cooperation with the N.C. Agricultural Extension Service, the N.C. Division of Marine Fisheries and the N.C. Fisheries Association. Last year's show attracted over 4,000 people. For more information about the show, contact Sea Grant agents Bob Hines and Larry Giardina at (919) 726-0125.



When it comes to taking it off, blue crabs know their business. The average blue crab will shed its shell 25 to 27 times during its life. And it's just after these sheddings, when blue crabs are soft, that they become a seafood delicacy—soft-shell crabs.

And for fishermen willing to cull out peelers (crabs preparing to shed) and hold them until shedding, the bonus can mean some added dollars in the bank. When prices are peaking, soft-shell crabs can bring over \$12 a dozen. And with a plentiful supply of crabs in North Carolina's brackish waters, more North Carolina fishermen are giving soft-shell and shedding a try.

That's why the UNC Sea Grant and Virginia Sea Grant Marine Advisory Services decided to cosponsor a workshop about soft-shell crabs. The workshop will be held March 5, at the Beaufort County Community College in Washington. The program, which is slated to run from 9 a.m. to 3:30 p.m., will feature panel discussions about crab biology, peeler identification, shedder harvesting methods, shedder facility design and marketing and economics. Discussions will include information on small backyard shedding trays and large closed shedding systems. Collington shedder Murray Bridges and Smyrna shedder Mark Hooper will be on several of the panels, along with UNC Sea Grant agents and specialists, Wayne Wescott, Bob Hines, Larry Giardina and Sam Thomas. Virginia Sea Grant specialist Mike Oesterling will also be a panel member.

Continued on next page

The fee for the workshop is \$5 in advance and \$6 at the door. For a complete agenda and a registration form, write Jim Murray, UNC Sea Grant, 105 1911 Building, North Carolina State University, Raleigh, N.C. 27650 or call (919) 737-2454.

But crabbing isn't just for commercial fishermen. Anyone can do it.

Dipping and Picking: A Guide to Recreational Crabbing, published by the South Carolina Sea Grant Program, describes and illustrates steps for catching (dipping), cooking and cleaning (picking) blue crabs.

For a free copy of this publication, write UNC Sea Grant, P.O. Box 5001, Raleigh, N.C. 27650-5001. Ask for *Dipping and Picking*.



Randy Rouse will replace Johnny Foster as manager and advisory agent at Sea Grant's Aquaculture Research and Demonstration Center in Aurora. Rouse,

who has been working at the center as a fisheries technician, will assume his new position Feb. 1. Ron Hodson, Sea Grant's associate director, will continue to act as director for the project.

Rouse received his undergraduate degree in wildlife biology from North Carolina State University. He has also worked for the N.C. Division of Marine Fisheries. Rouse will continue the biweekly aquaculture newspaper columns begun by Foster. He will also be working closely with Hodson to

construct the center's solar greenhouse.

Foster, who has been with the center for eight years, is leaving Sea Grant to open his own business.

The National Association of State Universities and Land-Grant Colleges (NASULGC) has created a marine division to go along with its agriculture and urban affairs divisions. The marine division will enable member universities to more effectively address national issues pertaining to marine problems.

UNC Sea Grant Director B. J. Copeland will serve on the membership committee within the division. North Carolina State University Chancellor Bruce Poulton will serve on the legislative committee and Dirk Frankenberg, director of the Marine Science Program at the University of North Carolina at Chapel Hill and UNC Sea Grant's coordinator for coastal studies, will serve on the budget committee.

Mini-grant funds have been awarded to John Maiolo, an East Carolina University sociologist, to study the impact of a proposed shortening of the season for harvesting menhaden. Overfishing is a growing problem in the menhaden fishery, and the Atlantic States Marine Fisheries Commission is considering shortening the season as a possible solution. Maiolo will be studying how the shortened season might affect employment, revenues to the menhaden fishing industry and regional economics.



For four days during March, North Carolina's outdoors will be on display indoors at the Raleigh Civic Center. The 1983 Outdoors North Carolina Expo will be held Thursday, March 24 through Sunday, March 27.

The N.C. Marine Resources Centers will have an exhibit entitled, "More than fish in the sea." There, you will be greeted by a giant Portuguese man-of-war mobile. You will be able to touch a sea urchin, starfish or clam and view sea turtles and octopuses in the aquariums. And, if you want to learn more about the shells found along our beaches, there will also be a shell display and shell-identification game.

The expo is sponsored by the N.C. Department of Natural Resources and Community Development along with the Raleigh Civic Center, state and federal agencies, citizens groups and the outdoors-recreation industry.

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