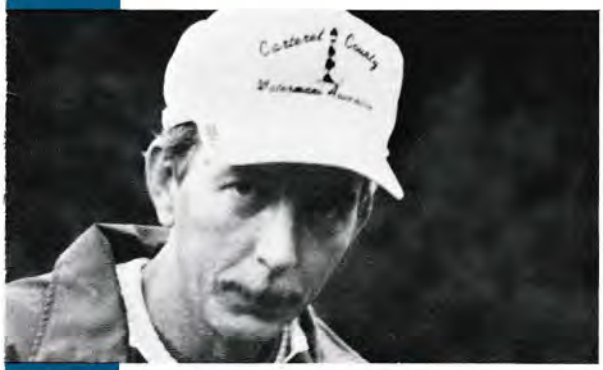
Coastwatch

UNC SEA GRANT • APRIL 1989

FRANK THOMAS

JOE & CELIA BONAVENTURA



CLINTON WILLIS

With the April issue, *Coastwatch* continues its yearly tradition of honoring people who have shaped the North Carolina coast.

Researcher and extension specialist Frank Thomas of North Carolina State University provided more than 30 years of service to North Carolina's seafood industry.

Joe and Celia Bonaventura, scientists at the Duke University Marine Laboratory, have made laboratory discoveries that earned them world acclaim and put new products on the shelves.

And Clinton Willis organizes and speaks out for the fishermen of Carteret County.

Frank Thomas

BY NANCY DAVIS

It's 1958, and Frank Thomas is traveling the back roads of Eastern North Carolina. He's driving a state car—one of those old black ones with an N.C. State College emblem stamped on the door.

The car alone makes him suspect. But he's from the state capital to boot.

Why, he could be a spy. Or worse. . . a revenue agent.

Thomas chuckles at that scenario now. But more than once in those early years, when he stopped to introduce himself, folks ran the other way.

They just weren't sure what to make of that young fella from that college up in Raleigh. Why, he was trying to give them advice on how they ought to operate their seafood plants. Imagine.

But that was more than 30 years ago. Now people in the state's seafood industry can't imagine what it would have been like without Frank Thomas.

They credit him with nothing less than pulling the state's seafood industry into the modern age.

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Frank Thomas

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"I think Frank's principal contribution to the seafood industry is bringing automation, quality control, the overall sophistication and general development to the state that it is today," says Alvah Ward, director of Business/Industry Development with the N.C. Department of Commerce.

"I can remember when quality control was zero. It was a wooden fish box with splinters and rusty shovels," says Ward, who has known Thomas for more than 20 years.

Now, North Carolina boasts some of the most technically advanced seafood processing plants in the country.

Thomas earned his doctorate at Pennsylvania State University in horticulture and completed a prestigious fellowship in seafood technology at the Massachusetts Institute of Technology.

In 1958 Thomas joined the faculty at North Carolina State University as a food processing specialist in the horticulture department.

Before long, he was answering phone calls about processing everything from baby foods to peaches to seafood. But he took a particular interest in the seafood questions.

When the university hired a specialist to handle fruits and vegetables, Thomas was free to concentrate on seafood.

"I realized that the seafood industry needed developing in North Carolina. It was much more disjointed than it is today. And it was really not even recognized as being a great player in the state's economy," Thomas says.

"There was no data available. Pasteurization was a new word. Demand for seafood wasn't there. All these things we know today were very primitive then."

But perhaps his greatest challenge was getting people in the seafood industry to listen to him.

Like a traveling salesman, Thomas took to the roads of coastal North Carolina, spreading the word about advances in seafood processing. Today he claims the distinction of knowing every shortcut in that territory.

"You didn't cut all the ice on your first trip," Thomas says. "It took two or three visits to establish trust. And a few months later, you see that he's adopting what you've been telling him.

"You constantly have to refocus your energy because the resource is always changing."

"When he found out I'd done him a service, eventually the word got out through the industry that I could help them out," Thomas says.

Sea Grant Director B.J. Copeland credits Thomas with establishing one of the country's first seafood extension services. His strong point was recognizing a need, then pulling together the expertise to attack the problem, Copeland says.

Tom Caroon, owner of Tom Thumb Seafood in Oriental and the president of the N.C. Fisheries Association, says the times Thomas helped are too numerous to mention.

Suffice it to say that Caroon knew who to call if his pasteurized crab had a gray color, if he had a bacterial problem or if his equipment wasn't functioning properly.

And if Thomas couldn't answer the question, he found someone who could, Caroon says. "I really looked to him as my troubleshooter."

Thomas was always one step ahead of his time. Early on, he was concerned about pollution problems the seafood industry might create. He convinced industry personnel that they could build their plants at water's edge if they designed them properly to handle the wastes.

A crab plant in Barco is testimonial to that. In 1968 Thomas and colleague Roy Carawan consulted with the plant's owners. "They wanted to run their liquid waste overboard," Thomas says. "So we said, 'Let us design your system.' We put in a huge septic system. They did as we recommended, and they've never had a waste or pollution problem to this day."

By encouraging innovations such as that, Thomas helped usher the seafood industry into the future.

In those days, much of the state's seafood was packed in ice and shipped to other states where it was processed.

By bringing the state's seafood processors up-to-date with new technology, Thomas opened the way for more seafood to be processed here.

"Through the work that Frank did

Photo by Nancy Davis

■ ***Frank Thomas***

with the plants here, it enabled our seafood industry to keep a lot of that value here," Copeland says. "That's been worth a lot of money to the state."

Copeland says Thomas also deserves much of the credit for the variety of species the state now markets. Twenty years ago, only 55 species were harvested.

Today, Tar Heel fishermen haul in 78 species of fish and shellfish, and they market their catch in all corners of the world. Thomas forged the way for fishermen to market such species as eel, squid and tuna.

"You constantly have to refocus your energy because the resource is always changing," Thomas says. "You're also working with long-term payoffs. You can't do these things overnight.

"Sometimes you plant the seeds for a new development or technology, and it's years before you see the result of your work."

Thomas' dedication to the seafood industry has earned him the respect of his colleagues at the university as well as his clientele at the coast. And his awards bear that out.

In 1984, he received the Earl P. McFee Award from the Atlantic Fisheries Technological Conference and an Outstanding Extension Service Award from NCSU. When Thomas retired in December, Gov. James Martin presented him with the Order of the Long-leaf Pine.

But perhaps his most coveted award was one he received from the people he served for three decades. In December, the N.C. Fisheries Association honored Thomas with a plaque of appreciation for his service to the industry.

Thomas' good relationship with the seafood industry has helped pave the way for his successors.

David Green, Sea Grant's seafood extension specialist, says, "The rapport he developed with the industry over the years has helped with our continuing programs today. It's helped me and others establish credibility with the industry."

Joe and Celia Bonaventura

BY SARAH FRIDAY PETERS

After 13 years, it's still there, crunched into a corner of Joseph Bonaventura's pocket.

To look at it, it's nothing special. Just a piece of sponge about the size of a big marshmallow and the color of moss in October.

But to talk with Bonaventura and his wife, you see the sponge is a dramatic symbol of the pair's accomplishments and a good luck charm for their future success.

Joseph and Celia Bonaventura, both 47, are world-renowned biochemists who specialize in respiratory proteins. At the Duke University Marine Laboratory on Pivers Island, they probe the mysteries of these biological agents that use and help carry oxygen in warm- and cold-blooded animals.

Over and over again they've looked at hemoglobin, the red-colored protein in our blood, and similar substances in fish to find ways to improve our health and environment. One of their first dreams was to create a device that could take oxygen from seawater and use it for underwater life-support systems.

The little green sponge was the first step.

In 1976, Joseph Bonaventura mixed his blood with a detergent and a water-loving plastic that looked and flowed like honey. As the mixture solidified, it formed a cherry-red sponge. When the sponge met water, Bonaventura's hemoglobin took in oxygen—just like a fish's gills. The oxygen could be released, too, with a small electrical charge or when washed in a special solution.

Over the years, the original "hemosponge" has turned green from oxidation, like an outdoor statue. But with its invention, the Bonaventuras realized their dream could become reality.

"When I made the sponge," Joseph says, "I realized that it was possible to take hemoglobin . . . and turn it into a plastic—an item that was manipulable."

They patented the hemosponge in 1980. Then Duke University sold it to a San Francisco-based company in 1983 for $1 million.

Using these and other funds, the Bonaventuras developed other products and applied for at least nine more patents by adapting the basic concept of the sponge.

The buyer, Aquanautics Corp., pursued perfection of the artificial gill that could take oxygen from seawater.

So far they've come close. In January 1988, researchers used the gill to produce enough oxygen per minute for two resting people.

"They are very, very innovative in applying marine biology to biotechnology."

And they found that the same basic technology behind the gill could be used for a variety of applications such as propelling underwater vehicles, supporting underwater stations, building portable respirators, and filtering oxygen out of beer and perfume before packaging to keep them fresh.

One test for NASA found that the gill could be used to extract oxygen for use on Mars.

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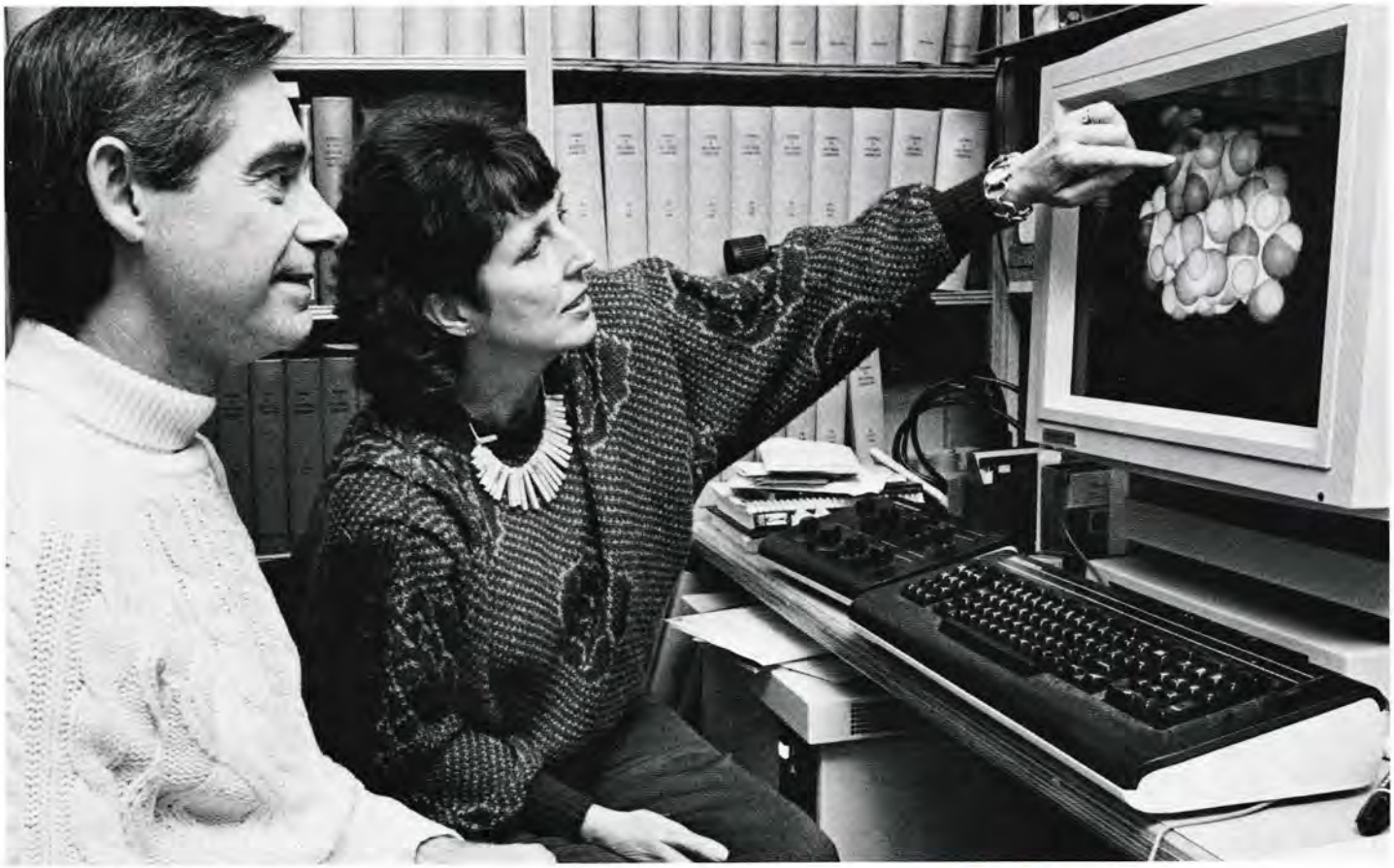

Photo by Scott Taylor

■ **The Bonaventuras**

Joe and Celia Bonaventura

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"We're just beginning to see all the applications," Celia Bonaventura says. To her, this and the initial discovery that proteins could be "mobilized," or manipulated have been the highlights of her scientific career.

Besides meeting Joseph Bonaventura, of course.

It was spontaneous combustion in a San Diego, Calif., high school chemistry class.

She was a straight A student, and he was a class cut-up who left poems in her books. On their first date, they went to an electronics surplus store.

A few years later, in 1960, Celia and Joseph married as freshmen at San Diego State College. Then and there they made a pact to become scientific collaborators for life in biochemistry.

Their interests were so much alike they had to flip a coin before starting graduate school to see who would study what. Fate sent Celia studying photosynthesis and energy transfer and Joseph, hemoglobin and protein chemistry at the University of Texas at Austin.

In 1969, they completed their studies as postdoctoral fellows at the California Institute of Technology, then traveled to Germany and Italy.

Women in science were few at the time. At Cal Tech, Celia was one of only six women doing post-graduate work.

But, Celia says, "I found generally that my work spoke for itself. My work was at the forefront, so people were interested in what I was doing.

"I would say more challenging than being a female was being a female with a family," she says.

In 1965 and 1970, the Bonaventuras had little girls, Marina and Michelle.

With family in tow, the couple finally began professional collaboration in Rome. Here, they realized they had differences in approach, but that they could work together.

"It's really hard not to combine fun and science when what we're doing is so exciting."

"We do think differently," Celia says. "It's interesting to compare insights."

But both assume a serious responsibility for their work. "It's 60-60," Joseph says, "like a marriage."

"There's so much to do, there's no need or reason for a feeling of competitiveness between us," Celia says. "We've been very fortunate in that way."

Their work brought them to Duke Marine Lab in 1972. Now it carries them around the world. All together, they spend about three to four months a year traveling to Brazil, Saudi Arabia, Italy and the likes to give papers, collect samples and work with other scientists.

Three new projects in biomedicine, directorship of the Duke Marine Biomedical Center, foreign visitors, a partnership in a fish food business and continued research and applications fill the Bonaventuras' time.

They work about 16 hours a day, says fellow scientist Dan Rittschof. Until last year, they had never taken a vaca-

tion. But life is never dull around them.

"Things really are dynamic," he says. "You never know what's going to happen."

Words like "gregarious," "dedicated," and "brilliant" pepper his speech.

"They publish a lot and do all kinds of work," says Rittschof, an assistant professor of zoology. "The reason the B's are so well known is because when they say they're going to do something, they do it. You can look at their track record and tell."

Charles Hamner, director of the N.C. Biotechnology Center, has another theory on the couple's success.

"They're very, very innovative in applying marine biology to biotechnology," he says.

They take fundamental science and successfully apply it to products and technologies that benefit us all.

"The Bonaventuras are the most effective people I know who can successfully make that transition," says Joe Ramus, acting director of the Duke Marine Lab. "Almost all of their applied work has come from fundamental science."

Take the jelly fishing worms.

Mann's Bait Company wanted the Bonaventuras to create a lure that would make it easier for a bass fisherman to make a catch.

With a 15-second conversation in the hall, Rittschof became a collaborator. And soon the team came up with a plastic worm coated in a chemical that roused the fishes' taste buds and caused them to swallow.

"It's really hard not to combine fun and science when what we're doing is so exciting," Celia says.

"We've always had so much fun with what we're doing that we've never regarded it as work."

Clinton Willis

BY KATHY HART

It's a pretty day and fishermen around Clinton Willis' neck of waters, Marshallberg, are off by Harkers Island with their engines in full throttle and their nets spread.

But not Willis. He's sitting on a hard chair in a stuffy room in Greenville representing the commercial fishermen of Carteret County before the N.C. Marine Fisheries Commission.

Willis is president of the Carteret County Waterman's Association and has been since it formed four years ago.

It's a position he laughingly says he was elected to while out of the room. But it's one others say he won because he was fair-minded, even-tempered and hard working.

And work hard he has. He's spent hours collecting fishermen's views on everything from size limits on fish to turtle excluders. And he's been to countless meetings and hearings airing those views for public officials to hear.

"I used to be a fisherman," Willis says. "Now, I'm a politician, a lobbyist and a diplomat, too."

When proposed regulations have fishermen riled, Willis may spend almost all day and night on the phone. But even during lulls, he works a few hours of each day on association business.

"He's an unselfish man," says Jerry Schill, executive director of the N.C. Fisheries Association. "He's not paid. Only his expenses are reimbursed. Very few people would be willing to do what he does, and fishermen are better off because of it."

"Very few people would be willing to do what he does, and fishermen are better off because of it."

Bill Fulford, a Beaufort fisherman and a member of the Waterman's Association, says Carteret County fishermen appreciate Willis' time and devotion.

"He's put untold hours into it," Fulford says. "Not anybody else could have done any better. It's a full-time job. He eats, sleeps and breathes the association."

And, Fulford says, Willis is also respected as a fisherman. On the water, he's innovative and experimental—a highliner, says Sea Grant sociologist Jeff Johnson.

Many folks say Willis has performed a feat just short of a miracle by organizing and keeping fishermen, who are notoriously independent, assembled in an organization.

"The Waterman's Association is one of the most effective local groups in the state and a lot of that is due to Clint," Schill says. "A lot of times a local group organizes because of a particular issue. When that issue is lost or won, the group fades away. But not the Waterman's Association."

The association began four years ago with nine fishermen. The next meeting 12 fishermen came, and since then the group has been expanding. Now membership fluctuates between 125 and 300 fishermen.

The association divided the county into nine districts that represent areas such as Salter Path, Harkers Island, Cedar Island and Marshallberg. Each district has two representatives who sit on the executive board.

Willis feels that with formation of the association, fishermen established better lines of communication.

"Now we more or less know what's going on before it's too late," Willis says. "We learned that if you wait to read things in the newspaper, it's too late to fight them or support them. You've got to stay ahead of things."

So Willis uses a network of contacts to stay abreast of proposed regulations, rule changes and catch limits. By doing his homework and speaking

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Clinton Willis

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rationally about topics, Willis is a credible and respected spokesman, Schill says.

William Hogarth, director of the N.C. Division of Marine Fisheries, agrees.

"He's very reasonable," Hogarth says. "He meets and talks with us about issues. He considers all sides, and he doesn't rant and rave. He does a good job representing his fishermen."

Willis puts it like this: "I've always taken up for the little man. I don't know why, but there's a lot of satisfaction in it."

Willis works not only with state resource managers, but federal officials, too. And he doesn't hesitate to pick up the phone to call neighboring fishermen's organizations when issues cross state lines.

By working with groups in other states, he's gained a new respect for North Carolina's management system.

"For better or worse, hate it or not, the North Carolina Division of Marine Fisheries is the best and fastest way to manage the resource," Willis says.

"I don't know how you can manage resources through the legislature like they do in Texas and Louisiana," he says. "By the time you introduce a bill, squabble over it and lobby about it, then it is usually too late for the resource."

And, Willis emphasizes, fishermen are concerned about conserving resources.

"There's a misconception people have about fishermen," he says. "They think we want to catch it all. But they're wrong. We know there should be limits."

Resource management is just one issue Willis sees fishermen facing in the future. He's also concerned about water quality, imports, new licensing regulations and competition between recreational and commercial fishermen.

With such weighty issues to consider, sometimes Willis becomes discouraged.

"We're seeing a way of life dying," he says. "If I had a boy young'un, I wouldn't want him to go into fishing."

But Willis and the Waterman's Association hope to put some promise into the future by establishing a trust to help the public schools with their marine vocation and marine science programs. And they're exploring the possibility of establishing a scholarship in marine science.

The association also helps fishermen in other ways. They provide assistance during hard times, such as last year's red tide or when a waterman is injured or ill.

"We're a fisherman's organization that helps fishermen," Willis says.

To raise money for projects and daily operations, the association charges modest dues. And they sponsor the N.C. Commercial Fishing Show, held every March in Morehead City.

After four years, the Waterman's Association has made a name for itself in North Carolina. And so has Clinton Willis.

Some folks come to Willis for his opinion; others seek him out to hear theirs. Whatever, Willis sorts through the issues and represents his fishermen the best he can.

"I get blamed for a lot of things I didn't do, and I don't always get credit for the things I do do," he says. "But I guess that goes along with the job."

Photo by Jim Strickland

■ **Clinton Willis**

The Back Page

"The Back Page" is an update on Sea Grant activities—on research, marine education and advisory services. It's also a good place to find out about meetings, workshops and new publications. For more information on any of the projects described, contact the Sea Grant offices in Raleigh (919/737-2454). For copies of publications, write UNC Sea Grant, Box 8605, NCSU, Raleigh, N.C. 27695-8605.

After 10 years, *Coastwatch* has changed its look. With this issue, we've updated the masthead and "The Back Page." It will take us and you a while to get used to the new look, but we hope it is something you'll like.

Thanks to the *Coastwatch* subscribers who responded to our survey. More than 550 readers were randomly selected to answer some questions we had about our monthly publication. Of those questioned, 224 responded.

Our survey said that 74 percent of our readers have subscribed to *Coastwatch* three or more years; 20 percent, 1 to 3 years; and 6 percent, less than one year.

Each copy of the newsletter is read by 2.8 people. This means that more than 60,000 people read *Coastwatch* monthly.

Readers learned about our newsletter in various ways: 30 percent at the N.C. Aquariums, 26 percent from a friend, 15 percent from the newspaper, 5 percent at the library, 9 percent from the Sea Grant publications catalog and 24 percent from other sources.

On a scale of 1 to 5, with 1 being best, readers gave *Coastwatch* the following ratings: 1.58 attractiveness, 1.18 timeliness, 1.27 informativeness, 1.2 ease in reading, and 1.14 helpfulness.

When asked what readers liked most about *Coastwatch*, people said they thought it was informative, easy to read, factual, balanced and diverse.

When asked if readers had any suggestions for improving our newsletter, people said they would like to see it lengthened and published more frequently.

Readers wrote that they were most concerned about development, water quality, pollution and erosion problems along the North Carolina coast and would like to see us focus on these topics in *Coastwatch*.

The survey indicated that 62 percent of our readers had ordered a publication from "The Back Page." And, based on announcements in "The Back Page," 26 percent of the respondents said they had participated in a Sea Grant activity—Beach Sweep, a workshop or a conference.

More than 70 percent of the respondents said they were not aware that Sea Grant and *Coastwatch* had been threatened because of federal budget cuts. And of those readers who responded, 26 percent said they had made a contribution to Sea Grant to help support *Coastwatch*, and 86 percent indicated they would pay $5 a year to subscribe to *Coastwatch*.

The survey clearly provided food for thought. We'll certainly take on some of the topics suggested, and we're very happy that so many of you like our format, style and approach.

We, too, would like to expand and publish *Coastwatch* more frequently, but for now, budget and staff constraints limit us to eight pages an issue and 10 issues a year. However, if donations increase or a subscription fee is implemented, we will reconsider these suggestions.

The *Coastwatch* survey indicated many readers wanted to know more about other UNC Sea Grant newsletters. Five free newsletters are available. They're compiled by members of the Marine Advisory Service staff.

If you'd like to be on the mailing list, write Sea Grant and tell us which of the following newsletters you want to receive.

Conchshell, published quarterly, provides new ideas about marine education and an update of events. Editor: Lundie Spence, marine education specialist.

Legal Tides is for lawyers, planners and government officials. It addresses timely legal issues related to coastal and environmental law. Published quarterly. Editor: Walter Clark, coastal law specialist.

Marine Advisory News covers topics relating to commercial fishing and seafood in North Carolina. This bimonthly newsletter provides information on research, gear, fishing techniques and upcoming events. Editor: Bob Hines, marine advisory agent.

Seafood Current, published quarterly, updates seafood processors, retailers and restaurateurs about news from the seafood industry. Editors: David Green, seafood specialist; Skip Kemp, seafood marketing specialist.

Marina Messages is a quarterly newsletter for marina operators, marine equipment manufacturers and boaters that provides information on marina regulations and boating trends. Editor: Rich Novak, marine recreation and business specialist.

Ask any Beach Sweep volunteer from last year's cleanup and chances are they'll be back this Sept. 23 for Beach Sweep '89. It's a good opportunity to join others who care about the coast in cleaning up the beach. And it's a fun and educational event for groups of all kinds.

Scout troups, garden clubs, environmental organizations and science classes were just a few of the groups that joined in the cleanup last year. Sign up your club or organization now for Beach Sweep '89. Or volunteer for Inland Sweep, a cleanup on the same day that will cover the inland shorelines of lakes, rivers and streams.

For more information on Beach Sweep, call Sea Grant. Or call Jane Krupnick at the N.C. Wildlife Resources Commission in Raleigh to sign up for Inland Sweep. Her number is 919/733-7123.

Kudos go to three Sea Grant staff members.

Jim Murray, Sea Grant's Marine Advisory Service director, was elected chairman of the Southeast Sea Grant Marine Advisory Service Network. He will coordinate regional marine extension projects and organize a regional meeting.

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

Name_____

Address _____

City/State/Zip _____

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

I am in the following line of work:

☐ Boatbuilding/repair
☐ City/county government
☐ Commercial fishing
☐ Educator
☐ Farming
☐ Homemaker
☐ Lawyer
☐ Marina operator
☐ Marine recreation
☐ Mass media
☐ Seafood processing/marketing
☐ State government
☐ University professor/researcher
☐ Other_____

Coastal property owner: ☐ yes ☐ no Boat owner ☐ yes ☐ no

$_____ contribution to defray printing costs for *Coastwatch*

Rich Novak, Sea Grant's marine recreation and business specialist, was elected president of the Albemarle Area Development Association, an organization of business and community leaders from 10 counties in the Albemarle area.

And David Green, Sea Grant's seafood extension specialist, received his Ph.D. in food science from North Carolina State University.

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