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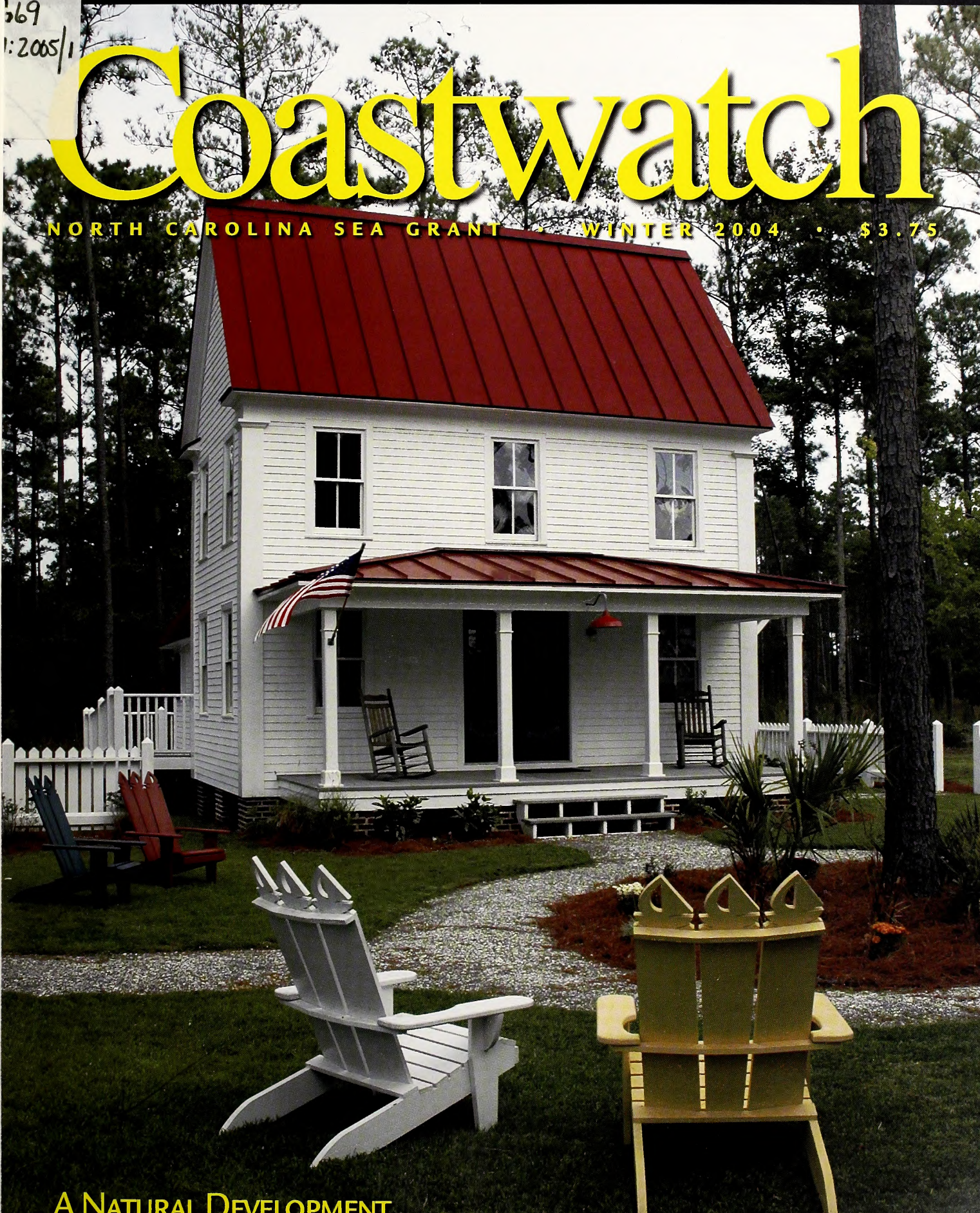
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Coastwatch

NORTH CAROLINA SEA GRANT • WINTER 2004 • \$3.75



A NATURAL DEVELOPMENT

A Fond Farewell

North Carolina Sea Grant is best known for its research, extension and communications projects that address pressing coastal issues.

But our program could not succeed without a strong fiscal framework — and a keen budget officer. For the past decade, Tammy Summer Cox has been that point person for us.

Tammy's title was a long one — assistant director for finance and information systems — in order to try to cover all the hats she wore. In addition to providing budget and grants oversight, she also was our computer guru and webmaster, handling technical issues while the communications team handled content.

But last fall, Tammy got an offer she apparently could not refuse. She is now director of business and financial services for the North Carolina State University Alumni Association.

As transitions go, she didn't have to change her commute — the new office is just about a half-dozen buildings away. And, she had a few friendly faces in the new office — including Kathy Hart, former Sea Grant communications director, and Jeannie Faris Norris, former Sea Grant senior writer/editor.

The Sea Grant staff, on the other hand, found ourselves realizing just how often the phrase "Ask Tammy" had been uttered each day. Also, we will miss Tammy's "cut-to-the-chase" approach to management and staff meetings — and to life in general.

Sea Grant Director Ron Hodson points to the leadership Tammy provided as the program took on new opportunities and responded to evolving compliance requirements at the university, state and federal levels. "We are a better program because of her efforts," he says.

In fact, in the past decade, Sea Grant's total annual budget nearly doubled as we added the state-funded Fishery Resource Grant Program



Pam Smith

Tammy Summer Cox

and Blue Crab Research Program, and staff members and researchers were successful in obtaining National Sea Grant initiatives and other competitive grants.

An Onslow County native, Tammy has seen the changes in our coastal region firsthand — and could offer perspective for us "newcomers" whom have only been in North Carolina a decade or two.

Water quality specialist Barbara Doll, may have summed up Tammy's trademark red hair and personality with one word: Dynamite.

On behalf of the staff, researchers and all who interact with North Carolina Sea Grant, I wish Tammy the best in life.

North Carolina Sea Grant staffers in our Manteo office were pleased to participate in the Outer Banks Hotline "Festival of Trees" held in December.

Sea Grant joined forces with the North Carolina Aquarium on Roanoke Island, the N.C. Coastal Federation, and the University of North Carolina's Coastal Studies Institute, as well as Earth Saver, Dennis Saver's green building and construction company.

Not only was the tree decorated with a coastal theme, including beach treasures and fishing lures, but it also came with gifts, including a variety of Sea Grant publications, as well as an aerial tour of the Outer Banks, and consultations for native landscaping and building/retrofitting to conserve energy and rainwater.

On the night of the auction, the tree went for \$1,500. "We were thrilled," recalls Terri Kirby Hathaway, Sea Grant education specialist. "We were the first tree of the evening to go for more than \$1,000."

About three dozen trees were auctioned through the course of the evening. "It was a great community event," she says.

Katie Mosher, Managing Editor

I N T H I S I S S U E

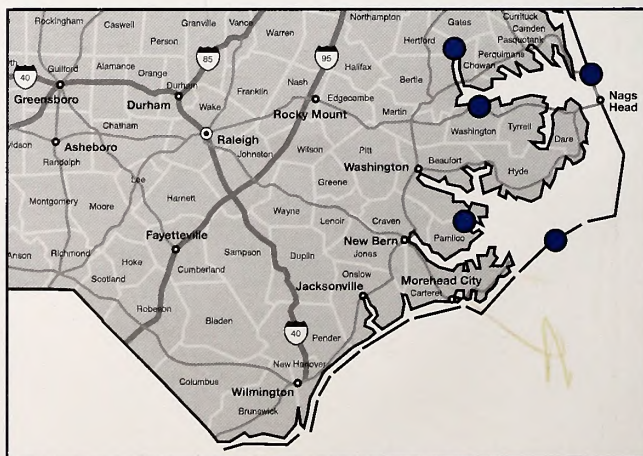
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Paul Stephen □ Scott Taylor □ Nancy White □ Jane Wolf

North Carolina's diverse coast offers countless interesting subjects. The large dots on the locator map indicate story settings in this issue — including Ocracoke, Plymouth and Pamlico County.





Coastwatch

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Coastwatch

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The North Carolina Sea Grant College Program is a federal/state program that promotes stewardship of our coastal and marine resources through research, extension and education. It joined the National Sea Grant College Network in 1970 as an institutional program. Six years later, it was designated a Sea Grant College. Today, North Carolina Sea Grant supports research projects, a 15-member extension program and a communications staff. Ron Hodson is director. The program is funded by the U.S. Department of Commerce's National Oceanic and Atmospheric Administration and the state through the University of North Carolina.

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Cover photo of River Dunes development by Scott Taylor. Table of Contents art from a photo of shrimp by Paul Stephen. Printed on recycled paper. ♻️

COASTAL TIDINGS

Four Knauss Fellows Head to D.C.

Four North Carolina scholars are heading for the nation's capital as Dean John A. Knauss Marine Policy Fellows. They will spend the coming year learning about federal policy-making processes that affect the ocean, coastal and Great Lakes resources.

They are **Sarah Carr**, a doctoral candidate in marine sciences at the University of North Carolina-Chapel Hill's Institute of Marine Sciences; **Elizabeth English**, a candidate in a joint public policy-environmental management master's degree program at Duke University's Nicholas School of Environment and Earth Sciences; **Katherine Eschelbach**, who earned a master's degree in regional planning at the University of North Carolina at Chapel Hill; and **Stephen Workman**, a doctoral candidate in coastal resource management at East Carolina University.

The fellowship, valued at \$40,000, is sponsored by the National Sea Grant College Program.

• **Sarah Carr**, who was selected as an executive fellow, will work in the U.S. Environmental Protection Agency's Office of Wetlands, Oceans and Watersheds.

Carr graduated magna cum laude with a bachelor's degree in economics from Amherst College in 1997.

For her doctoral work at UNC, she is using ultrasonic telemetry to develop models of the movements of spawning female blue crabs in a North Carolina estuary — information critical for siting spawning sanctuaries.

• **Elizabeth English**, who was selected as an executive fellow, will work in the National Oceanic and Atmospheric Administration (NOAA) Fisheries' Office of Sustainable Fisheries as its



STANDING: Elizabeth English and Sarah Carr
SEATED: Katherine Eschelbach and Stephen Workman

International Affairs Coordination Fellow.

English earned a bachelor's degree in environmental policy from Boston University in 1999.

As a student in Duke's joint degree program, English worked on a team in partnership with the North Carolina Zoological Park. The students analyzed the effect of rural sprawl on sustainable development in the region. County

commissioners are using their model as a blueprint for planning initiatives.

• **Katherine Eschelbach**, who was selected as an executive fellow, will be part of the NOAA Oceans Biogeography Program.

Eschelbach earned bachelor's degrees in biology and environmental studies at Denison University in 2001.

Much of her work at UNC focused on hazard mitigation planning. She led a project to conduct a risk assessment for all of North Carolina. Results provided the basis for the state's flood-hazard mitigation plan.

• **Stephen Workman** was selected as a legislative fellow and will work in the office of U.S. Rep. Wayne Gilchrist (R-Md.), who chairs the House Subcommittee on Fisheries Conservation, Wildlife and Oceans.

Workman earned a bachelor's degree in business administration from Minnesota State University in 1973. He was commissioned as an officer in the U.S. Navy in 1978 and spent much of his 23-year career in the intelligence field. During that time, he also earned a master's degree in government from Georgetown University.

At ECU, Workman earned a master's degree in maritime history and nautical archeology before entering the doctoral program in coastal resources management. — P.S.

Piece of History Returns to Fort Fisher

The Fort Fisher State Historic Site is commemorating the 140th anniversary of the end of the Civil War by recapturing part of its history.

The famed 8-ton Armstrong cannon used at the fort during the Civil War will be on display until February 2006. The Armstrong is on loan from the U.S. Military Academy at West Point.

The cannon — capable of hurling 150-pound shells up to five miles — featured innovative technology that helped change the design of artillery in its day. It was an important asset for Fort Fisher, which guarded the Cape Fear River and Wilmington — the last port open to blockade runners that supplied goods to the Confederacy in the waning days of the war.

When Fort Fisher and Wilmington fell to Union troops early in 1865, the South's major port and rail supply line was severed. The war ended in 90 days.

Two additional Civil War-era guns, on loan from the U.S. Navy, also will be displayed for the anniversary year.

Fort Fisher, a National Historic Landmark, is located south of Kure Beach. It is open to the public Tuesdays through Saturdays 10 a.m. to 5 p.m. For information, or reservations for group tours, call 910/458-5538.

— P.S.



USS Monitor Center Groundbreaking

The Mariner's Museum and the National Oceanic and Atmospheric Administration (NOAA) recently broke ground for the *USS Monitor* Center in Newport News, Va.

The new \$30 million, state-of-the-art exhibition and conservation facility will focus on the famed Civil War ironclad *USS Monitor* that engaged in an epic battle with the Confederate ironclad *CSS Virginia* off Hampton Roads, Va., on March 9, 1862.

The center will be a national authority and repository for the recovered artifacts and other materials, research and programming related to the history of the famous ironclad that revolutionized naval warfare.

The wreck site of the *Monitor* was discovered in 1973. Two years later, the *Monitor* site was designated the first National Marine Sanctuary. NOAA began the first expedition in 1977 and continues to sponsor expeditions at the wreck site off Cape Hatteras.

In 1987, NOAA designated The Mariners' Museum as the repository for artifacts and archives from the *Monitor*. Since then, the museum has received more than 1,100 artifacts from the ironclad, including the steam engine, propeller and revolving gun turret.

To find out more about the center, visit the Web: www.monitorcenter.org. To follow the *Monitor* expedition, go online to: www.monitor.noaa.gov.

— A. G.

In the Next Issue of *Coastwatch*

During spring and fall migration seasons, the North Carolina coast is a birder's paradise. Pam Smith updates efforts by agencies and organizations to develop a coastal birding trail.

Ann Green takes readers to an Outer Banks fishing tournament that draws hundreds of visually impaired participants. And Kathleen Angione explores a Fishery Resource Grant study of a new device designed to keep bottlenose dolphins away from gill nets.

ECU to Host Social Science Conference

As seafood industries are shifting to demands of a global marketplace, the culture and economies of North Carolina's coastal communities are changing as well.

East Carolina University will host "Traditional Fishing Communities: Past, Present, And Future" on March 18. The meeting will be at the Greenville Center, 2200 S. Charles Boulevard on the ECU campus.

"We will focus on the impacts of regulations, the global economy, the cost/price squeeze, and declining resources on fishing communities," explains John Maiolo, an ECU professor emeritus and one of the conference organizers.

Speakers will include Barbara Garity-Blake, a member of the N.C. Marine Fisheries Commission, and Kathi Kitner, an anthropologist with the South Atlantic Fishery Management Council.

Other speakers will examine legislation and management initiatives that affect communities, and will discuss competing definitions of the term "community," as well as appropriate research and intervention programs.

This is the second fishing communities conference hosted by ECU. The 2005 meeting also builds upon a socioeconomics meeting hosted by the N.C. Marine Fisheries Commission in 2004.

Cosponsors of the March meeting will include the Thomas Harriot College of Arts and Sciences, the Department of Sociology and the Coastal Resources Management Program, all at ECU.

For registration information, contact Don Bradley at 252/328-4838 or bradleyd@mail.ecu.edu.

— K.M.

N.C. Educators Attend Sciences Institute

This summer, eight North Carolina teachers were introduced to cutting-edge research on island dynamics.

The educators participated in the second annual Ocean Sciences Education Leadership Institute, sponsored by the SouthEast Center for Ocean Sciences Education Excellence (COSEE), which serves North Carolina, South Carolina and Georgia. North Carolina, South Carolina and Georgia Sea Grant are partners in the effort.

The workshop, held at the Skidaway Institute of Oceanography near Savannah, focused on a greater understanding of the South Atlantic Bight, the southeastern seaboard between North Carolina and Florida. Teachers also developed leadership skills and received curricular materials and resources.

All participants will plan and conduct Ocean Awareness Days for other educators in their regions.

The N.C. attendees included: **Doni Angell**, Walter Johnson Middle School, Morganton; **Jane Crosby**, Statesville High School, Statesville;

Carolyn Elliott, South Iredell High School, Statesville; **John Fout**, Wilson Middle School, Charlotte; **Doby Gordon**, Parkwood High School, Monroe; **Linda James**, East Carolina University, Greenville; **Sarah Kuszaj**, Southeast Raleigh High School, Raleigh; and **Janiese McKenzie**, Western Guilford High School, Greensboro.

Instructors included Terri Kirby Hathaway, North Carolina Sea Grant marine education specialist; Lundie Spence, SouthEast COSEE director; and Carrie Thomas, NC State University visiting faculty.

Thirty middle and high school teachers, 10 from each state, will be chosen for the 2005 institute June 19-25 at the Belle W. Baruch Institute for Marine and Coastal Sciences Field Laboratory near Georgetown, S.C. For more information and applications, visit the Web: www.sceagrants.org/se-cosee.

To find out about Ocean Awareness Days in North Carolina, check the North Carolina Sea Grant online calendar: www.nceagrants.org.

— A. G.



Volunteers Needed for Blue Heron Bowl

This winter, North Carolina high school students will test their knowledge of ocean science in a team competition.

The students will answer questions about ocean-related science, technology, history and navigation Feb. 26 at the annual Blue Heron Bowl at North Carolina State University in Raleigh.

Winners of the state ocean bowl will compete in the National Ocean Sciences Bowl, April 22-25 in Biloxi, Miss.

Sponsors also include North Carolina Sea Grant, the Consortium for Oceanographic Research and Education and the University of North Carolina at Wilmington.

Volunteers are needed as moderators and judges for the North Carolina competition. To volunteer, contact Cynthia Cudaback, cynthia_cudaback@ncsu.edu or Laura Berube, t.a.berube@att.net. For more information, visit the Web at www.nosb.org and follow the links to regional sites.

— A. G.

Sea Grant Earns NCAGIO Awards

North Carolina Sea Grant's *Coastwatch* magazine got top honors in the North Carolina Association of Government Information Officers (NCAGIO) "Excellence in Communications Awards." The magazine won first place in the regular color publications category.

Katie Mosher, North Carolina Sea Grant communications director, accepted the award on behalf of the staff at the NCAGIO Awards banquet in Chapel Hill.

North Carolina Sea Grant communicator Ann Green won second place in feature writing for "Core Banks Cottages Rich in History and Tradition" that ran in the Winter 2003 issue of *Coastwatch*.

Green also received third place in special publications for editing *The Dune Book*, written by Sea Grant coastal erosion specialist Spencer Rogers and David Nash of N.C. Cooperative Extension. The publication explains how dunes are formed and their benefits, as well as effective dune

management practices and use of native vegetation.

The NCAGIO communications contest drew entries from its membership, which includes public affairs professionals in government agencies who are dedicated to the principles of open government.

— A. G.



Turtle Nest Count Low at Cape Lookout

The 2004 turtle nesting count on Core Banks and Shackleford Banks is being described as “disappointing” by officials at the Cape Lookout National Seashore.

Overall, Cape Lookout reported finding 74 loggerhead nests and three leatherback nests — the lowest number since 1988 and well below an average of 130 nests over the past decade.

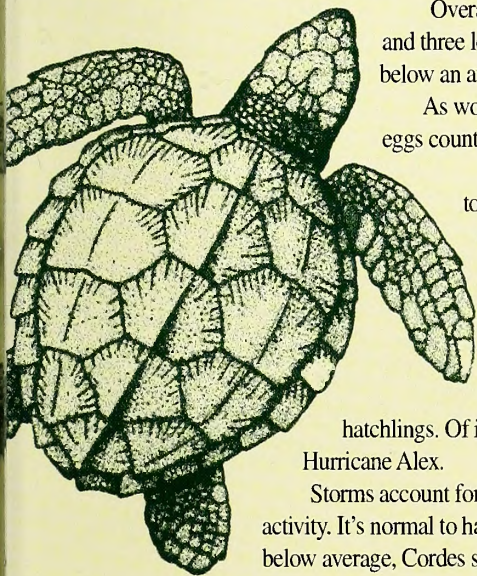
As worrisome is the low success rate of hatchlings. Of the 7,000 eggs counted, only 3,139 hatched successfully.

Hurricanes are part of the hatchling problem, according to Cape Lookout Seashore biologist Jeff Cordes. Storm-eroded dunes are a lot lower and make nests susceptible to flooding, which can wash away eggs before they produce hatchlings.

The success rate was lowest on North Core Banks, which was most impacted by storms. Only 21 percent of the 2,017 eggs counted at North Core Banks produced hatchlings. Of its 25 nests, 18 were either flooded or washed away during Hurricane Alex.

Storms account for hatchling success, but not for the slump in nesting activity. It’s normal to have numbers fluctuate, but the 2004 numbers are well below average, Cordes says.

— P.S.



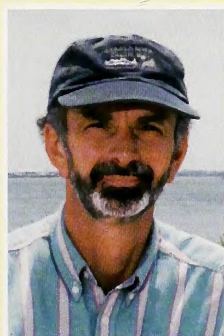
Pate, Daniel Lead Fishery Panels

Two North Carolinians were tapped to lead important interstate fisheries management boards.

Preston Pate, director of the N.C. Division of Marine Fisheries, was elected chairman of the

Atlantic States Marine Fisheries Commission (ASMFC). Louis Daniel, DMF scientist, was elected chairman of the South Atlantic Fishery Management Council (SAFMC).

The ASMFC coordinates management of migratory species for in-state waters from Maine to Florida. Pate sees a need to re-examine how states participate in the Marine Recreational Fisheries Statistics Survey,



Photos courtesy of N.C. Division of Marine Fisheries

LEFT: Preston Pate, N.C. Division of Marine Fisheries director.

RIGHT: Louis Daniel, DMF scientist



which estimates recreational catches.

The SAFMC develops regulations for federal waters from North Carolina through eastern Florida and makes recommendations to the National

Marine Fisheries Service, also known as NOAA-Fisheries. Daniel plans to emphasize an ecosystem approach to fisheries management that considers the biological and socioeconomic aspects of regulations.

The chairmen set meeting agendas, appoint committee members and decide upon which issues the boards should focus.

— P.S.

Strategic Plan Update

North Carolina Sea Grant is currently requesting comments on potential priorities for the program in 2005 to 2010.

“As part of our research funding cycle, we update our five-year strategic plan every two years” explains Sea Grant Director Ronald G. Hodson. “Our goal is to ensure that our research and outreach projects are meeting identified needs here in North Carolina.”

The updated plan will consider goals of the parent funding agency, the National Oceanic and Atmospheric Administration. The North Carolina plan also is expected to reflect a reorganization of the National Sea Grant College Program’s strategic plan, which was released last summer.


“Eleven Sea Grant thematic areas have been identified as critical areas of focus for sustainable resource management in the next decade,” the national plan states. The theme areas are:

- Aquaculture
- Biotechnology
- Coastal Communities and Economies
- Coastal Natural Hazards
- Digital Ocean
- Ecosystems and Habitats
- Fisheries
- Invasive Species
- Marine and Aquatic Science Literacy
- Seafood Science and Technology
- Urban Coasts

To suggest North Carolina priorities within the Sea Grant theme areas, please send your comments to Ronald G. Hodson, North Carolina Sea Grant, NCSU Box 8605, Raleigh, 27695-8605. Or send e-mail to ronald_hodson@ncsu.edu, using the subject line: NCSG Strategic Plan.

Comments are needed by Jan. 28.

For more information on the National Sea Grant College Program, including descriptions of the thematic areas and a download of the updated strategic plan, go online to www.seagrant.noaa.gov. — K.M.



CONSERVATION BY DESIGN: VARIATIONS ON A THEME

B Y P A M S M I T H

By the year 2020, an additional two million people are expected to call North Carolina home. Much of the predicted growth is expected to occur along the coast.

How well cities and counties handle the population explosion depends on how well they are planning for the future now, says Walter Clark, North Carolina Sea Grant coastal community and policy specialist.

Planning is a tool to help communities balance environmental sustainability with economic vitality, he says.

Thanks to the 1974 Coastal Area Management Act (CAMA), coastal counties may be ahead of the planning curve. CAMA requires each coastal county to develop a land-use plan to protect its natural resources. Updates are required every five years.

Kate Ardizzone, water quality planning specialist, joined the Sea Grant team in 2003 just as coastal communities began



Scott Landis

revising land-use plans under the new CAMA rules. The new rules link land use to coastal water quality — with attention to nonpoint pollution sources such as stormwater runoff.

Since then, Ardizone has convened roundtable discussions for local government agencies and developers to explore topics such as land-use compatibility and water quality guidelines. The dialogue begins with identifying natural resource features and their ecological functions — and how they might figure in land-use planning.

Part of the exercise is to help people think about issues in the long term, she explains.

For example, much of coastal North Carolina is still rural, but that could change as large farm and timber operations are sold to real estate developers. Increased numbers of outlying developments stretch any local government's ability to provide services and resources.

"Land-use planning is proactive. It's a vital component in a community's ability to control its own destiny," Ardizone says.

A strong land-use plan could serve as a benchmark for measuring future development proposals.

While CAMA land-use planning has been quietly at work for three decades, other development approaches more recently have made their way into the popular press. Sustainable Development, Green Building, Smart Growth, Low-Impact Design, New Urbanism and Mixed-Use Development have become buzz-words in development discussions.

Each is a variation on a theme: balance environmental and economic goals while creating livable communities.

Specific definitions get tricky. Mary Beth Powell, associate director of the UNC Center for Urban and Regional Studies, defines Smart Growth this way: "Smart

Growth is about making places that are worth caring about, economically sound, environmentally friendly, supportive of community livability, and that enhance the quality of life."

But a definition — even a comprehensive one — goes only so far. The devil is in the details.

Come along on a "tour" of two environmentally friendly building projects to see how — from planning to production — attention to details formed the foundation for success.

One is a large-scale community being carved out of a pine plantation in Pamlico County that takes the sustainable development approach.

The other shows how individual homeowners can build their dream house green and clean.

Continued



Scott Taylor

ABOVE: A low-profile dock stretches over natural shoreline — a hallmark of the waterfront home sites. LEFT: An aerial view of River Dunes shows why attention to land-use planning details is essential for sustained water quality.



Hill-La Aerial Photography

CONSERVATION BY DESIGN: VARIATIONS ON A THEME

RIVER DUNES: A Sustainable Development

There's nothing ordinary about River Dunes, a 1,300-acre pine plantation being transformed into a residential and boating community.

What sets this emerging Pamlico County waterfront project apart from others is the developers' quest to balance environmental concerns with economic goals.

The land was earmarked for development, explains Ed Mitchell, one of four River Dunes Corporation partners who saw the value of keeping the parcel intact. "We wanted to be the ones to develop it using methods to preserve the land and waterways."

Some call it smart growth. Others call it green or low-impact design. Mitchell prefers the term sustainable development — a comprehensive approach that combines the health of the environment with the strength of the economy to enhance the character of a community.

"If it's not economically feasible, it's not sustainable development. It has to go where the market allows," Mitchell adds.

"The real estate market is changing. The demand for environmentally sensitive projects has increased," says Bill Holman, executive

director of the N.C. Clean Water Management Trust Fund. The River Dunes project, he says, is an example of how developers can build attractive communities that protect water quality — and are profitable.

The \$40-million venture is Pamlico County's largest economic development project to date. Some 550-plus homes will be nestled in marina-, creek- and river-side sites, and are expected to generate a \$279-million tax base. What's more, the spending power of its 1,100 residents and marina users should give an economic boost to retail and professional services in nearby Oriental, Bayboro and New Bern.

Still, waterfront development poses special challenges and costs.

The geography of River Dunes — a peninsula surrounded by the Pamlico Sound, Neuse River and Broad Creek — calls for extraordinary measures to protect the waters that have defined the region's history, culture and economy for centuries.

Also needing special consideration are nearly 394 acres of wetlands, as well as the Gum Thicket Creek watershed and major creeks

— Broad Creek, Tar Creek, Cedar Creek, Mill Creek, Paris Creek — that are primary nursery areas for various fisheries. Several are open to shellfishing.

A HEAD START

Collaboration has been the key to moving River Dunes from concept to site design and implementation.

Since the 1930s, the tract was in timber production, most recently owned and operated by Weyerhaeuser. In the 1990s, the company shifted the tract, known as Gum Thicket, from timber production to its real estate division. Mitchell, then the division manager with Weyerhaeuser, became responsible for guiding the project.

Mitchell began meeting with environmental groups, including the Neuse River Foundation (NRF) and the N.C. Coastal Federation (NCCF).

"It was important to get ahead of the curve on environmental concerns," says Todd Miller, executive director of the NCCF. "A big issue was how to accommodate boating along the shoreline of such sensitive waters."

Mitchell brainstormed with representatives



Scott Taylor

ABOVE: Developer Ed Mitchell (right) and marketing director Rich Hudson review the location of a 28-acre inland marina. Its 560,000 cubic yards of sand will be used within the project. RIGHT: Survey flags mark the natural buffer line that rings the River Dunes peninsula.



Scott Taylor

of state agencies that oversee coastal management, water quality and water resource matters. "I asked a lot of questions," he says.

Then, he hired the nationally renowned Land Ethics, Inc. of Ann Arbor, Mich., to design a conceptual site plan that would meet economic and environmental goals. The design disturbs less than an acre of wetland and sets impervious surface goals at 12 percent for the site. There are no curbs and gutters to channel rain into stormwater drains that lead to water bodies. Instead, roadbed grading will enable water to flow in sheets into swales and vegetated shoulders, then drain through sandy soils into the water table.

"It was an impressive plan. But there still were some water resources issues that needed to be addressed. That's when we invited the Clean Water Management Trust Fund folks in to discuss the possibility of a grant to help offset the cost of eliminating house sites in the Gum Thicket watershed," Miller explains.

Discussions led to a \$1.25-million Clean Water Management Trust Fund (CWMTF) grant to NCCF, NRF and Weyerhaeuser to permanently protect nearly 238 acres of wetlands and watershed. The Gum Thicket site plan was reworked to move homesites out of the conservation area.

"We saw a great opportunity to work with a developer and two conservation organizations to create an environmentally sensitive community at River Dunes," says Holman.

At the signing ceremony, Marion Smith, former executive director of the Neuse River Foundation, declared that the partnership "establishes a new benchmark for environmentally compatible development on the North Carolina coast."

The transaction took place in 2001, just before Weyerhaeuser conveyed the Gum Thicket property to Granite Investment Properties. In April 2004, Mitchell and his partners, Jim Adams, Jim Goldston and Kenny Goetze, purchased the property from Granite for \$12 million — and River Dunes officially was launched.

It's an appropriate name change, Mitchell points out, because part of the tract is comprised of an ancient dune line. Besides, he adds, Gum Thicket doesn't have a marketing ring to it.

INNOVATIVE SOLUTIONS

Buffered shorelines facing the sound and river will be kept natural. Individual boat slips in front of houses are prohibited to protect water quality and aesthetics.

So, if the boats can't anchor along the shoreline that outlines the peninsula, where will they go? A tour of the River Dunes property provides the answer.

Mitchell's SUV hugs the slope of the tree-lined "parkway" as a parade of giant earthmovers

lumpers in the opposite direction. The narrow construction road fans out into an excavation site larger than eight football fields. There, a well-choreographed assembly line of earthmovers, bulldozers and compacters are digging, scraping and transporting sand from the site.

Their task is to create a 28-acre inland marina eight feet deep, which will satisfy state water quality and fisheries agencies' requests to "keep the boat slips out of the sensitive waters" and "avoid 250 individual boat slip permits."

Instead, the manmade marina requiring a single permit will accommodate 400 boat slips. Floating docks will hug its 1.7-mile living shoreline, where about 190 homes will be clustered. In addition, the clubhouse front door will open to the marina, while its back porch will overlook a salt marsh — and the Pamlico Sound beyond.

Once the basin is completed, a channel will be dredged to link the marina to Broad Creek and the nearby Intracoastal Waterway.

Along with protecting sensitive sound, river and creek waters, the inland marina provides a safe harbor in storms — a valuable asset.

Continued

In the end, the boat basin excavation will have produced more than 560,000 cubic yards of sand.

The material is being reused within the project for road construction and to elevate the dune field facing the Neuse River, the future site of a recreation and nature center.

Mitchell notes that his company is making an investment of nearly \$2 million in the upgrade to the Bay River Metropolitan Sewer District's (BRMSD) wastewater treatment facility and transmission lines that serve Pamlico County. Combined with grants from the N.C. Rural Development Center and North Carolina Department of Environment and Natural Resources (NCDENR), it will finance capacity expansion to serve River Dunes — and future developments in the growing county.

The upgrade also accommodates one more environmental detail. Reclaimed, treated wastewater will return to River Dunes through a dedicated transmission line to be reused for irrigation of common areas.



TOP: The Tidewater architectural motif is demonstrated in a "model" village. ABOVE LEFT: The developers are challenged to find ways to protect the eroding Neuse River shoreline. ABOVE RIGHT: Mitchell and Hudson stand near the future site of a recreation and nature center.

RECAPTURING HISTORY

Few records or remnants remain of the activity on the land before timber operations began in the early 1930s. A Paris family cemetery near Paris Creek will be fenced and preserved. And, off the banks of the Neuse River, stands the battered remains of the Neuse River Lighthouse platform.

An archaeological study of the site performed by Wake Forest University and the N.C. State Office of Archaeology revealed evidence of Native American and colonial settlements, much of which have been eroded away by the Neuse River.

But, history gleaned from old newspapers for Pamlico County's centennial celebration in 1972 refers to an 1859 advertisement in *The New Bern Weekly Progress* for the sale of land that might have included the River Dunes tract. The centennial publication describes it this way:

Thomas T. Gooding offered to sell 2,500 acres on lower Broad and Orchard Creeks. The description mentioned two crops of turpentine boxes; excellent facilities for shipping; a fine large dwelling, kitchen, smoke house, gin-house, barns, stables and Negro houses sufficient to accommodate fifty Negroes; oysters and fish may

be taken from the creek at back of the garden, and wild fowl abound in the vicinity; a good mill site with dam already constructed; and a good well of water in the yard.

While written records may be sparse, the developers are attempting to recapture part of coastal history by adopting Tidewater architectural style, circa 1920. The motif will be used for recreational facilities, guest cottages and homes throughout River Dunes.

To demonstrate the Tidewater look, the developers built a three-quarter-scale model village — complete with white picket fence, flowers and flag. With its waterfront backdrop, the quaint scene provides an unexpected surprise for River Dunes visitors.

For Miller, though, this attention to detail demonstrates that River Dunes is no ordinary project.

"It's an unusual project that has taken an unusual approach. There's a lesson to be learned for large- or small-scale developments. As a practical matter, engaging in candid discussions with agencies early on in a project can smooth

out potential delay-causing wrinkles down the road. I see this as a model for future development," Miller says.

In fact, Holman adds, the River Dunes project has spurred similar developer-local government-environmental organization collaboration to improve the design of projects. Holman cites Crescent Resources, Burke County and the Foothills Conservancy who are working on a development plan that will protect Lake James and enhance the local economy. CWMTF, Parks and Recreation Trust Fund and the Natural Heritage Trust Fund each contributed to the project.

"Projects like these illustrate that conservation and economic development are not necessarily mutually exclusive," Holman says.

In the long run, it makes good business sense to bring experts and stakeholders together to brainstorm issues and solutions, Mitchell says.

"I never make a business decision on this project without looking at the environmental side. At the same time, I never make an environmental decision without looking at the business side. That really simplifies things," he concludes. □



Roy Wilggett

ABOVE: South-facing solar panels collect energy from the sun. Roofing shingles look like slate, but are made from recycled rubber and plastic materials. RIGHT: The Arizona-style home is nestled among live oak trees.



Roy Wilggett

CONSERVATION BY DESIGN: VARIATIONS ON A THEME

ALL THINGS NEW AGAIN:
Renew, Recycle, Reuse

“**A**t one with Nature” may sound a bit Zen, but it aptly describes the home Nancy White and Dennis Saver designed and built in the Town of Kitty Hawk.

The couple has incorporated environmentally friendly design principles, building materials and systems from foundation to roof — all with minimal disturbance to their one-acre home site.

To achieve and maintain sustainable building goals, the couple draws from their combined expertise. White, founding director of the University of North Carolina Coastal Studies Institute in Manteo, holds a doctorate in forestry and a master’s in landscape architecture. Her research is on water resources and water quality issues. Saver is a licensed

general contractor and owner of Earth Saver, an enterprise that focuses on “green” building and specialty commercial construction.

Even so, it took more than two years for the couple to research and design their home — and to identify sources for materials within a 500-mile radius to help support the regional economy.

“So-called ‘green’ building is really a tool box,” Saver says. “You pick what works best for individual lifestyles and sites. It incorporates renewable resources, recycled or reused materials.”

Building “green” takes patience and planning — and more planning. Inspiration sometimes comes in surprising places, White points out.

“We were on vacation in Barbados,” she recalls. “We drew the house plan out in sand on a beach and began to walk through it to get a feel for the flow.”

“That’s when we decided to move the staircase,” Saver points out. “It added two feet to the middle of the house.”

More importantly, it improved the function of a significant sustainable feature — the central, open stairwell helps circulate warm or cool air through all three living levels.

NATURE’S BOUNDARIES

The home site itself plays an important role in achieving sustainable building goals, says White. A crucial first step is getting to

Continued

know the site's natural features — from its topography and how a heavy rain drains, to its dominant trees and the way the sun moves across the landscape through the seasons.

Working with nature's boundaries makes sense. For example, the transition zone between the live oak-dominated upper dune and the hickory-dominated bottom dune seemed to create the perfect location for their foundation and driveway. Besides requiring the least land disturbance, it opened up the south-facing dune line.

"Due south is the cornerstone of site planning," says White. "It's essential for both active and passive solar."

Nature boosts the efficiency of the house in many ways, including the sun-filled rooms provided by passive solar. The foundation is nestled into the side of the sand dune — its year-round moderate temperature helps heat and cool the house. The roofline of the three-story house is even with the top of the live oak tree canopy, which buffers winds and shades the house from summer sun.

WASTE NOT, WANT NOT

Saver used his mechanical know-how to develop the backbone of the household's innovative rainwater reuse system — a high-tech adaptation of cisterns used in bygone days.

A dedicated gutter and downspout channels rainwater off the roof, through a filter and into an outdoor 2,100-gallon storage tank for use in toilets and landscape irrigation.

For personal consumption and other household water needs, the system is more complex. Gutters and down spouts also route rainwater from the roof, through two filter systems, and into two, 2,100-gallon tanks in the garage/basement area. A final pass through an ultraviolet purification system, and sweet-tasting water is delivered to sink taps.

The filtered water also feeds two, 80-gallon tanks located in the laundry room — otherwise known as Command Central. It's here that rainwater reuse and renewable solar energy technologies meet.

Simply put, in a compactly engineered system, an antifreeze solution flows through a closed system from the roof-mounted solar panels to heat coils in the tanks. And, presto, hot treated rainwater on demand for sinks, tubs,

showers and laundry.

In addition, solar-heated water is pumped to a unique radiant heating system. The water circulates through tubing installed beneath floors throughout the house to provide a healthy, evenly distributed, ductless heat source. Like traditional systems, it is controlled by a two-zone thermostat system.

They have planned for "what-if" contingencies, such as a drought. Saver installed a back-up system to enable them to tap into city water during dry spells. So far, that has not happened. In fact, shortly after moving into their home in August, they recorded two, frog-strangling rainfalls, each more than six inches.

Still, they are not taking the abundance of rain for granted. The tanks can store two months worth of water, but the couple is carefully monitoring daily water use to develop a consumption "track record." Rainfall is



Ray Whitgett



Ray Whitgett

CLOCKWISE FROM TOP OF THIS PAGE: The tree-top deck wraps around the main living level. • The house was constructed from top to bottom and from inside out with environmentally friendly materials. • Nancy White and Dennis Saver welcome guests into their 'clean and green' home. • Dennis Saver, left, explains to Walter Clark how renewable solar energy and reusable rainwater converge in a compactly engineered system.



Nancy White

house design.

“We have had a lot of sun for solar collectors so far, but this is our first winter in our home, and we just don’t know,” says White.

They chose wall-mounted heat pump/air conditioner units for various regions of the home. The

units are economical to install and operate on an as-needed basis. They virtually are noiseless and require no duct work that might harbor molds and mildew.

“Clean” is as important as “green” for the allergy-prone couple, White says. They used low-emission paints and stains for interior and exterior walls. The insulation for the upper level is reused denim and cotton batting. The masonry block exterior walls of the first and second stories are filled with nontoxic Perlite for insulation. The foundation waterproofing also is a nontoxic, nonleaching material.

The roof is both clean and green. The shingles are made from recycled rubber and plastic, and impart hardly any residue in collected rainwater.

White also is proud that they have been able to incorporate North Carolina culture in their quest for reusable material. Many interior doors have been milled from lumber

salvaged from tobacco barns; ceiling light fixtures once were DC-powered nautical lamps; and bathroom vanities are converted antique sideboards.

In addition, the wood floors are from suppliers who practice sustainable forestry, and the subflooring is a product of an environmentally sound manufacturing process. Their unpaved driveway is meant to help recharge the water table, and the

landscape plantings are drought-resistant native species and well-adapted cultivars that require minimum watering.

WRITING THE BOOK

“It has been a challenge,” Saver admits. “There are no manuals or books to go to. No blueprints to follow.”

Saver is no novice when it comes to building “green,” though his work has centered on commercial projects. He attended numerous solar energy workshops sponsored by Southface Institute in Atlanta and HealthyBuilt Homes workshops conducted by the North Carolina Solar Center. He also completed Leadership in Energy and Environmental Design (LEED) courses offered by U.S Green Building Council. LEED, which set national standards for high-performance, sustainable commercial building, also is developing residential building standards.

So, White and Saver literally compiled a book for residential application of clean and green design and implementation. Their binder is bulging with pages of calculations, product research notes and downloads from the Internet.

The key to success, they say, is to establish a team early in the project. They worked with Sam Olin, a friend and faculty member at the Savannah College of Art and Design, to design their open, Arizona-style home that suits their lifestyle. Ideas for the healthy and sustainable approach came from Gail Lindsay, a North Carolina consultant who is a major player in the U.S. Green Building Council.

“Dennis is the mechanical guy, and I am the design person,” White notes.

“No one person can do it all,” Saver adds.

“The end result is a home that is clean and green — and inviting — without being crunchy granola,” White says.

The cost of building a sustainable home is slightly higher than traditional methods and material. The cost for their home — 2,550 square feet of finished space with a 1,240-square-foot basement and below-ground garage — was \$350,000. However, they expect a return on their investment in reduced energy and utility bills, and a healthy indoor environment.

“The house will take care of us,” says White. □



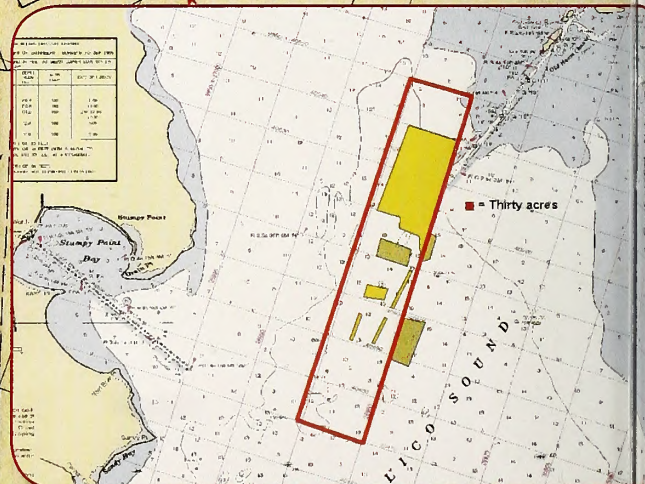
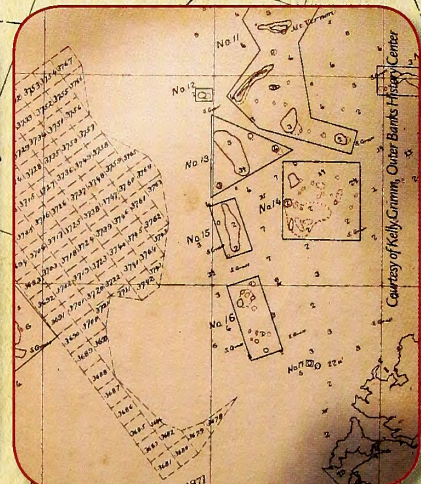
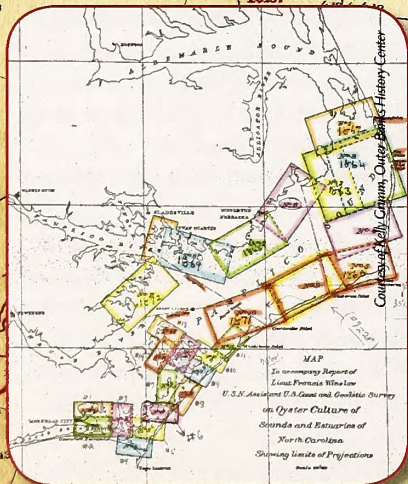
Pam Smith

recorded and measured, with levels between rainfalls marked on storage tanks with blue tape. They plan to share their monitoring data with others to help improve future designs.

GREEN AND CLEAN

In addition, White and Saver have installed a back-up HVAC heating/cooling system to augment the radiant heating in winter and the natural air circulation facilitated by the

LEARNING FROM THE PAST:



OLD MAPS HELP BUILD A NEW FUTURE FOR THE EASTERN OYSTER

BY KATHLEEN ANGIONE

In the age of online mapping services, paper maps may seem obsolete — but try telling that to Eugene Ballance, an Ocracoke fisherman who is transforming 118-year-old survey maps of Pamlico Sound into blueprints for restoring the Eastern oyster.

Using satellite mapping and sonar imaging technology, Ballance is modernizing a dozen maps created in 1886-1887 by Lt. Francis E. Winslow, a naval officer who surveyed the sound's then-abundant oyster reefs.

The projections, or intersecting coordinate lines, on Winslow's oyster maps are impeccable, says Ballance, who is also a mathematician. "They are better than anything that's been done since then," he insists.

Although Winslow's projections remain accurate, the large, productive oyster beds he described are gone.

Eastern oysters (*Crassostrea virginica*) have declined steadily in Pamlico Sound for more than a century, mostly due to habitat destruction, water pollution and disease. The

disappearance of these "ecosystem engineers" — which filter water and provide habitat for dozens of aquatic creatures — is a trend Ballance and others in coastal North Carolina are trying to reverse.

To transform Winslow's work, Ballance is using Geographic Information Systems (GIS), a computerized mapping program that combines thousands of data points from a certain place into "layers" of information. The result will be multi-layered, digital maps that show where oyster reefs once thrived and where they could likely thrive again — information that helps scientists and policymakers better focus restoration efforts and dollars.

Ballance received funding for the project from the N.C. Fishery Resource Grant Program (FRG), funded by the N.C. General Assembly and administered by North Carolina Sea Grant.

To get the thousands of data points required for each layer, Ballance begins by locating an oyster reef that appears on a scanned version of Winslow's map. Next, he digitizes

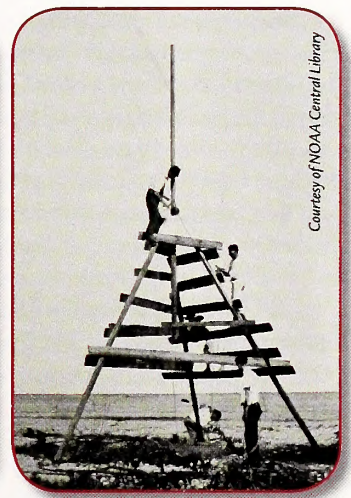
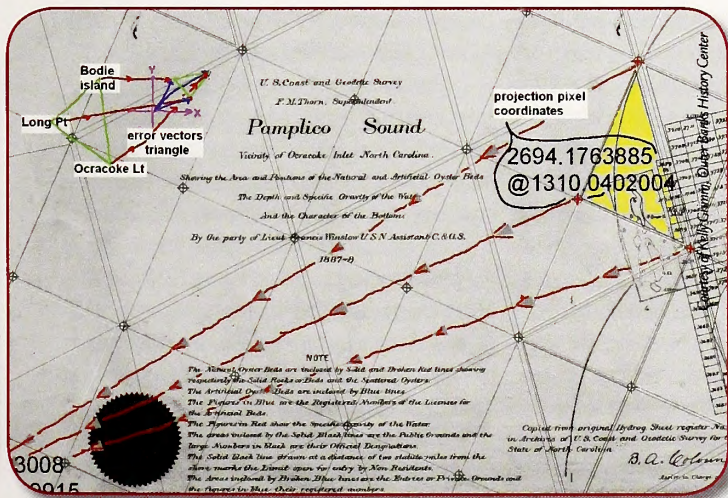
areas in the pixel coordinates of the scanned map. Ballance then projects this information to latitude and longitude coordinates using "control points," or features on the map that remain in today's surveyor databases.

After completing these steps, Ballance must field-check the new coordinate files. First, he transfers the files to a hand-held computer and verifies the coordinates using Global Positioning System (GPS) technology. GPS uses satellite signals to calculate exact positions of objects on earth. Then Ballance samples the area with a small, toothless scallop dredge to determine how much of the reef is left. Finally, he uses sonar imaging to take a picture of the sampled area.

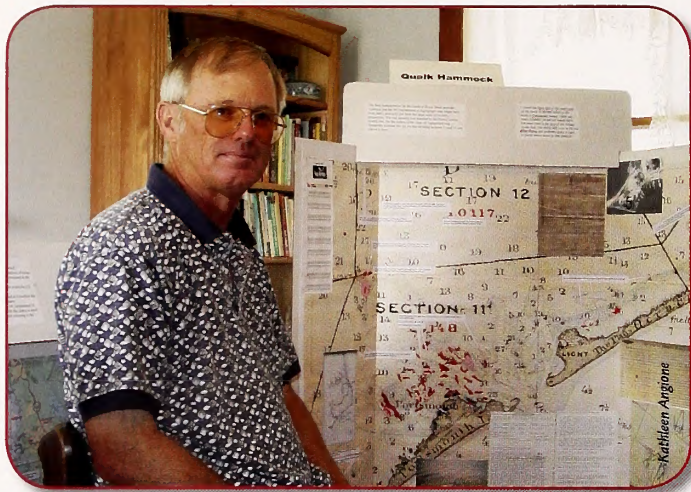
REFORMING RESTORATION

Although the process is complicated, the results simplify choosing a restoration site, notes Jeffrey DeBlieu, director of The Nature Conservancy's (TNC) Pamlico Sound Oyster Reef Restoration Project.

Continued



FULL-PAGE LEFT: A SOLID BED OF 240 ACRES SHOWN ON ONE OF WINSLOW'S PROJECTIONS IN PAMLICO SOUND. • FROM LEFT TO RIGHT: AN ORIGINAL ILLUSTRATION OF WINSLOW'S OYSTER SURVEY MAPS FROM 1886-1887. • A MAP DEPICTS OYSTER BEDS AND PRIVATE LEASES AT THE TIME OF WINSLOW'S SURVEY. • A MODERN NAUTICAL CHART OF CRAB HOLE SHOWS CURRENT AREAS USED BY TRAWLERS AND POSSIBLE OYSTER SANCTUARY AREAS. • AN ILLUSTRATION OF HOW PIXEL COORDINATES ARE MATHEMATICALLY TRANSFORMED TO LATITUDE AND LONGITUDE. • THE "MATCHLESS," A SCHOONER SIMILAR TO THE "SCORESBY" USED BY THE WINSLOW PARTY. • WINSLOW'S CREW CONSTRUCTED TRIPODS SIMILAR TO THIS ONE WHEN THEY NEEDED TO CALCULATE AN EXACT POSITION ON THE WATER.



Courtesy of The Nature Conservancy

LEFT: BALLANCE'S WORK HAS HELPED IMPROVE THE SITE SELECTION PROCESS FOR OYSTER RESTORATION. RIGHT: A BARGE EMPTIES SEVERAL HUNDRED TONS OF LIMESTONE MARL TO CREATE A RESTORATION SITE.

"It removes some of the guesswork about where we should be restoring oysters," he says. And that's a good thing, he adds, because restoration isn't cheap.

In 2001, TNC received a multimillion-dollar grant from the National Oceanic and Atmospheric Administration (NOAA) to begin working in coastal systems. The North Carolina chapter of TNC received some of that grant to restore the Eastern oyster population in Pamlico Sound. The organization is cooperating with several partners, including the N.C. Division of Marine Fisheries (DMF) and North Carolina Sea Grant.

Before Ballance's mapping project, site selection lacked a solid historical baseline. "But Gene's work provides a very strong foundation for us to work from," says DeBlieu. And the early results have already proved useful.

"We've utilized some of Gene's information to do the first large-scale oyster sanctuary up in the Crab Hole area, between Oregon Inlet and Stumpy Point," notes Craig Hardy, the DMF section chief for resource enhancement.

DMF and TNC also used Ballance's data to help develop a sanctuary at Clam Shoal, located behind the southeast corner of Hatteras Island, and another in waters just north of Ocracoke Island.

The Clam Shoal and Crab Hole restoration sites are about 30 acres apiece, and each now contains numerous five- to six-foot-high oyster reefs built of limestone marl.

"It takes five or six years for a pile of limestone to become an oyster reef," says DeBlieu. The new reefs are developing on schedule. Baby oysters, barnacles, fish and

shrimp are already a regular sight, notes DeBlieu, who went scuba diving at Clam Shoal last summer and at Crab Hole in the fall.

"It's not a beautiful place, like a coral reef," he admits. "It's kind of dirty and muddy and crummy looking — but that's an oyster reef. It's not real photogenic."

The Pamlico Sound project will support additional reefs at each site next summer. The hope is that Clam Shoal and Crab Hole one day will be restored to large, continuous reefs similar to those documented by Winslow, says DeBlieu.

A SUPERIOR PIECE OF HISTORY

In 1998, Ballance was mapping sea grass beds near Ocracoke and Hatteras Inlet as part of another FRG project when he was inspired to apply GIS to Winslow's oyster maps.

But it wasn't until several years later that he met DeBlieu, who also had thought of applying GIS to Winslow's maps. Pooling their collective resources and knowledge, Ballance and DeBlieu identified their first hurdle: obtaining the original maps.

Because each map is roughly the size of a large kitchen tabletop and hand-drawn on tracing cloth — "it's like wax paper with fibers in it," describes Ballance — they weren't allowed to leave the N.C. Archives. Instead, state officials agreed to scan them at the Outer Banks History Center on Roanoke Island and give digital copies to Ballance and DeBlieu.

Archives technician Kelly Grimm scanned each chart in eight sections, making sure certain points on each of the scanned sections overlapped so she could "stitch" the digitized pieces back together. Just as in Winslow's time,

precision was critical: "If one section is off kilter, it throws the whole map off kilter," she says.

Luckily, finding distinct points on the maps was fairly easy. In addition to Winslow's meticulous drawings, he and his crew also left some personal touches behind.

"I can tell through the fine detail that different people worked on different projections," says Ballance, noting subtle variation among handwritten letters and numbers.

Accidental details were equally distinct.

"You can see the stains on the maps where the men were working," says DeBlieu, referring to the occasional ink smear.

After the maps were scanned successfully, Ballance received an FRG in 2003 and began applying GIS technology to Winslow's work.

During the past two years, Ballance has spent countless hours checking, or "ground-truthing," Winslow's projections and determining how much of the historic oyster reefs remain.

Ballance has verified about a third of the area depicted on Winslow's survey maps. The biggest documented reef measured 230 acres in continuous area, but now only exists in small patches. But no matter the current condition of a reef, Ballance is continually impressed by Winslow's projections.

"I'm amazed every time I go to one of these beds and see that they could maintain that accuracy through the whole project," he says.

Winslow and his crew probably worked from a sailing schooner for days on end, only going to shore for food and supplies, Ballance says. Winslow calculated the projections using horizontal sextant angles, measurements taken from three fixed, visible objects on the water that



ABOVE: OYSTERS RECOVERED FROM AN AREA MARKED ON WINSLOW'S MAPS.

also were identifiable on a nautical chart.

"Without electronics, that was state-of-the-art back then," explains Ballance. And when he puts the projections on Winslow's maps up against modern maps, Winslow remains superior. "They [Winslow's maps] were doing better than my nautical chart!" exclaims Ballance.

WINSLOW'S BIGGER PLAN

But Winslow wasn't surveying oyster reefs simply for historical record.

He had been hired by the state legislature to determine if Pamlico Sound contained enough oysters to support a commercial fishery. The oyster business already was booming in Maryland and Virginia's Chesapeake Bay in the 19th century. North Carolina hoped similar economic gains could come from its waterways.

Almost immediately after completing the survey, Winslow retired from the Navy and started the Pamlico Oyster Company, appointing himself chief operating officer, according to Kathleen Carter, a historian at High Point University. He planned to sell areas near larger, more productive reefs as private leases. He designated the bigger reefs as "Public Grounds," hoping they would provide spawning stock for nearby private leases.

When the survey results were released in 1888 confirming an abundance of oysters, it created what Carter calls an "oyster bonanza" in Pamlico Sound. Companies and private fishers from the crowded Chesapeake began arriving in droves. Sales of leases skyrocketed.

Some historians blame Winslow's survey as the beginning of the end for North Carolina's

natural oyster reefs. But Ballance believes that's a matter of perspective. "That's like saying if someone had killed Christopher Columbus, then the New World never would have been discovered. It may have delayed it a few years, but that's about all."

Despite the economic gains from oysters in the late 19th and early 20th centuries, tensions escalated among local fishers and transients. By 1891, the state tightened its oyster harvesting laws, even authorizing the use of force to remove "oyster pirates," a term for fishers from outside the state, notes Carter.

By 1892, Winslow had a severe public image problem. Many accused him of omitting details about the Public Grounds beds from his written survey reports. One senator from Hyde County said Winslow "defrauded North Carolina of its richest oyster beds," according to Carter.

Some of Winslow's survey reports appear questionable. In one report, Winslow wrote: "Another small unimportant bed lies between Ocracoke Island and Howard's and Clark's Reef."

The survey maps show that this "unimportant" reef indeed existed; yet nearby was the fifth largest oyster reef in the entire sound, notes Ballance. "He just sort of left that out."

As suspect as the omission seems, Ballance points out that it may have had more to do with politics than personal greed. He cites one of Winslow's survey reports from a November 1887 meeting with the state's shellfish commission: "The fourth meeting of the board was held on November the 26th, and the areas, limits and locations of the Public Grounds of the Counties of Hyde and Carteret were determined."

Despite his role as surveyor, Winslow didn't have the final say on Public Grounds, contends Ballance. Whether or not the allegations were true, outside skepticism remained such that the Pamlico Oyster Company shut down in 1892. Winslow eventually retired to Connecticut, where he died in 1908.

BRINGING BACK THE OYSTERS

Today, there are no more political squabbles over the abundance of oysters in

Pamlico Sound. Instead, tensions more likely are fueled by the declining stock.

In 2003, the amount of oysters commercially harvested barely reached 49,000 bushels, according to the DMF. That figure is considerably lower than the record 1.8 million bushels landed in 1902, the year many consider the peak of oyster harvesting in North Carolina.

Habitat loss, pollution, overharvesting and diseases like Dermo (*Perkinsus marinus*), a tiny parasite that kills oysters when they reach reproductive age, all have contributed to the decline.

"If we can bring a healthy oyster population back, it will benefit not only commercial harvest, but also habitat for other important finfish and crustaceans," says Hardy.

Moreover, oysters play a critical role in the overall health of estuarine systems, adds DeBlieu. "Oysters aren't simply to be dredged up and eaten," he says.

As the Pamlico Sound Oyster Reef Restoration Project continues, Ballance's GIS maps will help focus the restoration effort. "I think any oyster reef we build out there will be at a site based on Gene's work," says DeBlieu.

"It gives us another layer in our selection process," concurs Hardy.

Once a potential restoration site is identified, scientists assess the area's water quality, substrate and salinity. Sometimes they find healthy, natural oyster rock and try to expand that area by restoring adjacent sites, explains Hardy. At other times, they find only piles of old shells with some struggling spat, or baby oysters, attached. In those cases, scientists must weigh the odds for successful restoration against the overall restoration effort.

"The ultimate goal is to restore the resource," says Hardy.

Reaching that goal may take decades, even centuries, but Ballance's vision for Winslow's maps elucidates the interim steps. The mathematician is more than happy to share the credit though:

"His [Winslow's] party in the 1880s accomplished in two years a feat that has yet to be equaled to this day, even with all our electronic gadgetry," says Ballance. "It failed in its original purpose of promoting the oyster industry in North Carolina, but may — in this century — succeed in reversing the decline in our remaining oyster habitat." □



SHRIMP ECONOMICS: Coastal Tradition and Global Economy Converge

By Tasha Petty

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cean creatures have provided a way of life for the Hopkins family for many generations. "This is my heritage," explains Glenn Hopkins, who lives in the small, Pamlico County shrimping town of Vandemere. "This is what my dad, and my granddad, and my great-granddad did. I was born and raised into this."

But, times are changing along the coast. As domestic shrimp prices plummet to compete with imported supplies, and the cost of gas and insurance continue to rise, Hopkins and other North Carolina shrimpers are struggling to maintain tradition.

Hopkins has known no other life. By the time he was 6 years old, he was going out with his dad on their trawler. The boat was an entertaining place for the curious youth — he would cause all sorts of trouble talking on the radio and playing with his dad's catch.

Now he recalls watching his dad work. "It just seemed natural, like what you were supposed to do. There's no other way to describe it."

It wasn't long before Hopkins was going out on his dad's boat by himself. And not long after that he had his own boat — a 25-foot schooner — on which he still prefers to work solo.

Why?

Freedom.

"It's the freedom of being out on the water by yourself, doing your own thing, making your own way," says Hopkins.

For that reason, Hopkins continues crabbing and shrimping — not because it pays the bills. He drives a gas truck in the winter to make ends meet.

"I don't want to do it no more, but I have to," laments Hopkins, who has tried to find a better job to no avail.

Last spring Hopkins sat in the lobby of a nursing home. He was there to apply for a maintenance job. Hopkins, who never finished high school, was told that the three people who applied in front of him had college degrees. Hopkins, frustrated and discouraged, turned in a blank application and went home.

Daunting Issues

What challenges do shrimpers like Hopkins face? The issue is complicated, but industry and government officials often point to the global economy that brings increasing amounts of imported shrimp to the United States.

"We are not a player in the market anymore," says Doug Cross, co-owner of Pamlico Packing. "The days of being able to compete on a commodity level are over."

Shrimp consumption in the United States has almost tripled since 1980, and imports have accommodated the expansion in the market, according to a report by the Trade Adjustment Assistance for Farmers (TAA) program.

A survey conducted by the National Fisheries Institute (NFI) indicates that for the first time in 2002, American consumption of shrimp, at 4 pounds per person, exceeded canned tuna consumption, at 3.1 pounds per person.

To meet consumer demands, shrimp imports not only have been part of the U.S. market, but also have dominated for more than two decades. An unprecedented increase in the supply of imported shrimp occurred between 2001 and 2003 — such that foreign shrimp now account for 90 percent of the market, according to the TAA report.

Several factors — mainly an increase in European Union tariffs and food safety requirements, along with a weak U.S. dollar — caused shrimp exporters all over the world to become more focused on the U.S. market, says Scott Baker, a North Carolina Sea Grant fisheries specialist based in Wilmington.

When adjusted for inflation, shrimp prices are at a 30-year low, according to statistics from the N.C. Division of Marine Fisheries (DMF). The dock price in 2001 of \$2.27 per pound adjusts to only 53 cents per pound in 1972 dollars. By 2003, the

price dropped even farther — \$1.77 per pound dockside or 40 cents per pound in 1972 dollars.

While he cannot statistically prove that the increase in foreign shrimp directly caused the domestic price to drop, it certainly looks like a primary factor, says Brian Chevront, a DMF economist.

Lagging Supplies

The majority of shrimp imports are farm-raised, whereas most domestic shrimp are wild-caught.

Imported farm-raised shrimp are desired in some market sectors because of the uniformity of the product and its consistent availability. As domestic catches often are subject to nature's whims, the U.S. market is simply unable to offer a competitive product on an international scale, says DMF Director Preston Pate.

"You can order popcorn shrimp at Red Lobster," Pate explains. "And when you get your dinner, it's 30 little shrimp — and they are all exactly the same size."



Continued

International competitors also have the economic advantage of low production and labor costs, according to South Atlantic Fishery Management Council fisheries anthropologist Kathi Kitner.

Many shrimpers in the South Atlantic and Gulf of Mexico find it is not cost effective to fuel up their boats, repair their nets and go out on the water, Kitner adds. Other costs, including insurance and boat maintenance also are on the rise.

Markets and restaurants have been able to make profits as wholesale shrimp prices have dropped, but prices to the consumer stay steady, according to Chevront. Thus, domestic shrimpers have felt the brunt of the price drop impact.

But others are affected by rising costs as well.

Fish markets, packers and restaurants face high property taxes on their prime waterfront property, Kitner explains. As more people move to the coastal regions, the cost of real estate rises. In turn, the property taxes increase. Many fisheries-related business owners on the waterfronts seriously consider offers that they are receiving for their property.

Here in North Carolina, Cross has received inquiries about his property from developers of marinas and condominiums. Potential buyers are not looking for the business, but rather for the land. "There is no doubt that the land we sit on is worth more for other applications, but as of now I haven't accepted any offers," Cross says.

Keeping Afloat

The future of North Carolina shrimping is not all grim. People like Cross and those at DMF and Sea Grant are exploring solutions to the difficulties facing the industry. Several plans are already in the works.

In response to falling prices, Congress allocated \$35 million in disaster relief for U.S. shrimpers in February 2004. The TAA program, which was approved by the U.S. Department of Agriculture (USDA) Foreign Agricultural Service, provided monetary relief for North Carolina shrimpers — 5 cents per pound harvested in 2002 for those who could prove that they were economically impacted by the increased imports.

About 900 North Carolina commercial shrimpers sold their catches in 2002, but only about 90 met the initial TAA requirements, applied and



attended workshops. Even fewer met final reviews to receive the assistance.

The TAA program also provided free training for the participants. Organized in North Carolina by Sea Grant, the training program gave an overview of the world market, along with general business education to assist shrimpers in dealing with recent changes

— how to address problems, cut costs or possibly exit the business if they choose.

The North Carolina shrimp fishery also has been certified for the TAA program for shrimp landings in 2003. Now individual shrimpers must reapply for the new round of assistance by mid-February.

On another front, in January 2004 the Southern Shrimp Alliance (SSA) filed a petition to federal regulators accusing six large exporting countries of illegal "dumping" on the shrimp market. That includes imports that are sold substantially below market price or are given price advantages through foreign government subsidies.

The SSA petition is especially important because it has turned into the largest trade action in American history, says Kenny Lewis, North Carolina representative to the SSA Board of Directors.

The International Trade Commission (ITC) can impose tariffs on countries that they find to be in violation of anti-dumping provisions of U.S. trade law. Responding to the SSA petition, the ITC ruled that the U.S. shrimp industry has been harmed by imports. The final ruling, expected in mid-January, could result in shrimp import tariffs.

If tariffs are imposed, Lewis anticipates importers likely will absorb most of the cost.

The tariffs would cause shrimp prices to stabilize during the next few years, to just above current levels, Cross says. "It will not offer permanent relief. Some see it as the savior of the industry, but it isn't. Other things have to be done if this industry is going to survive."

Finding a Niche

So what does Cross suggest be done? "We have to reinvent the wheel on marketing," he says, adding that shrimpers must be willing to help market their product on a consistent supply and price basis.



TOP: Shrimp trawls off the North Carolina coast.

BOTTOM: Glenn Hopkins now devotes more time to crabbing than shrimping.

As Pate sees it, most of the imports are fairly low-value, small shrimp, while the strength of North Carolina shrimp lies in the taste, quality and size.

For that reason, North Carolina shrimp could be marketed towards higher quality, niche markets — such as high-end restaurants and caterers. To reach these markets, shrimpers and processors are looking at ways to provide specialized and “value-added” products to the consumer.

The overall goal is to increase the visibility of — and an interest in — local products, says Barry Nash, Sea Grant seafood technologist. “Market research indicates that consumers want to buy locally grown foods and are willing to pay a premium for regional commodities if these products satisfy consumers’ expectations for quality, consistency, healthfulness, taste appeal or uniqueness,” Nash explains.

There are several programs in the works that will address quality and consistency.

A “Mark of Quality” program has been proposed as a cooperative effort among Sea Grant professionals in eight southeastern states with viable shrimp industries. The program would establish quantifiable quality standards.

“The standards would include measures for product attributes such as piece size, salinity, water content, aroma, appearance, flavor and color,” Nash explains. “The program’s objective would be to harness measurable quality standards that reinforce a recognizable brand image for wild-caught shrimp — similar to what has been done for the Vidalia Onion or the Angus Beef marketing programs.”

North Carolina Sea Grant specialists also hope to work with local captains and processors to test the handling methods advocated by the TAA curriculum for enhancing the quality of shrimp at the time of harvest.

They are developing a proposal to compare batch-process handling methods recommended by the TAA program to conventional on-board handling and product transportation techniques. The batches would be evaluated by a trained panel who would look for statistically significant sensory differences between the two handling regimes.

If results indicate that the quality of wild-caught shrimp can be enhanced with improved handling practices, the next step would be to



TOP: Pomlico Pocking sits on the waterfront in Vondemere.
BOTTOM: Doug Cross, in his office at Pomlico Pocking, is looking at niche markets and value-added products for North Carolina shrimp and other seafood.

access its price potential in the marketplace. If shrimp perceived as higher quality can command a higher price than farm-raised shrimp, North Carolina shrimpers would realize greater revenue for their harvests, Nash explains.

North Carolina Sea Grant also is participating in a community-based seafood branding effort, where restaurants in Carteret County will be

encouraged to buy — and highlight on their menus — a variety of locally caught seafood, including shrimp. The project is funded in part by a Rural Community College Initiative grant from Carteret Community College and support from North Carolina Sea Grant.

“The project team comprised of community volunteers is working to establish a group of local fishermen, dealers and restaurants who will develop a business relationship to sell and promote local seafood commodities,” Nash says.

Future Prospects

Many shrimpers along the North Carolina coast will fight for their livelihood — fitting into whatever niche market here or value-added product there that they can, all

the while holding out hope that things will get better.

Others are not so sure. Glenn Hopkins doesn’t expect his traditional livelihood will continue for his children, who were just youngsters when they first came on his boat. “They could swim before they could walk,” he recalls. Yet, he doesn’t want them to go into the family business because there’s “no future in it.”

Doug Cross believes that the next generation of shrimpers will have to be willing to adapt and change. So, too, will the processors.

Cross already has adjusted to the new marketplace by developing value-added product lines and looking for niche marketing opportunities. Yet, he doesn’t anticipate his children will take over the business.

“It has sustained me, but it will not sustain them,” he says. “There is no ‘Forrest Gump’ story” for the North Carolina shrimping industry, he adds.

Part of the cultural heritage of the East Coast may be dying as people and industries struggle to meet the demands of a global economy.

“Some consider the changes on the coast progress,” Cross says. “Part of me hates to see it go, but part of me knows it’s inevitable.” □



LIVING HISTORY: Plymouth's Civil War Battle

By Ann Green

Along the Roanoke River in historic Plymouth, the sound of gunfire echoes across the waterfront. In the middle of the river, a sleek replica of the ironclad ram CSS Albemarle, decorated with a Confederate flag, glides through the water. Further up the river, a small white boat, decorated with a 19th-century U.S. flag, heads toward the ironclad. As the replica of the Yankee steam launch — packed with Yankee sailors in dark navy and white uniforms — approaches the Confederate boat, a sailor fires another gunshot. This naval demonstration is part of the annual Battle of Plymouth Living History Weekend.

Each year, Civil War buffs replay scenes that happened during the war in Eastern North Carolina — including the Battle of Plymouth, where the *CSS Albemarle* rammed and sunk a Yankee gunboat.

More than 200 re-enactors fill the Washington County community during the weekend. Some march with units on downtown streets. Others perform essential services like sewing, cooking and repairing iron work in the period encampment along the river. A large number of sailors battle it out on replicas of the original vessels.

"The living history weekend has come into its own in the last few years," says Plymouth businessman Tom Harrison, who spearheaded the construction efforts for the *Albemarle* replica. "This year, we had 50 sailors to supplement the infantry and artillery. The Navy aspect of the battle makes this event unique and not just a land battle."

More than 3,000 Union troops fought in the original Battle of Plymouth, including 208 white and 300 black soldiers from Bertie County along with 300 black troops from Washington County, according to Harry Thompson, director of the Port O'Plymouth Museum.

"Plymouth was the leading area for recruitment of black troops," he says.

During the re-enactment, two brothers, James and Joseph White, were dressed as Union soldiers.

"This is our third year to participate

in the weekend," says Joseph White of Leland in Brunswick County. "I enjoy history and learning about the war."

CIVIL WAR CAMPSITES

To relive the second largest Civil War battle in North Carolina, many re-enactors set up A-frame tents across from the riverfront business district. The encampment is organized by military units, with Union and Confederate soldiers separated by streets.

Members of the 12th Confederate Infantry Troop from Virginia are housed in one area. Just back from a street skirmish, Russ Riter of Richmond, Va., stands guard with an 1853 Enfield rifle in front of a tent.

"I do it for fun," says Riter. "I also do it to honor my heritage. I had a great-grandfather who was in the Army in Northern Virginia."

To recreate the period, the 12th Virginian members cook and eat meals together. The menu may be Brunswick stew and ham biscuits cooked in a brick oven. "We try to be authentic," adds Riter.

The wives and children of the unit members also participate in festivities. While Ken Perdue is preparing for battle, his wife, Jenny, is learning to play the dulcimer and making a scarf.

"We have been coming for three years," says Ken Perdue of Chester, Va. "I always loved Civil War history. When I was a boy, my father took me to a Civil War battlefield, and it struck a spark."

While the battles are raging, some of the enlisted men stay back at the camp to repair or make equipment.

Pieces of ironwork — from cooking utensils to cannons — stand outside Ray Britt's tent. "I reproduce the pieces from old photographs," he says.

Dressed as a blacksmith in a period hat, vest, colored shirt, tan pants and apron, Britt is making a flag stand for soldiers. "As a teenager, I got interested in blacksmithing," he says. "My family was interested in the Civil War. So I put the two together."

Not far from the blacksmith, Donna Prosser of Richmond, Va., is selling period pieces of ladies' clothes and accessories — from parasols and hats to full-length dresses and hoop skirts.

"My husband and I do re-enactments whenever we can," says Prosser.

PLYMOUTH HISTORY

Located in northeastern North Carolina on the Roanoke River and near the Albemarle Sound, Plymouth got its name from the early shipping industry.

Ships, captained by men from Plymouth, Mass., stopped for cargo at what was often referred to as "Plymouth Landing." In 1787, the town was incorporated as Plymouth.

The shipping industry brought prosperity to Plymouth. During the early 1800s, the town was one of six main ports in North Carolina.

Continued

When the Civil War broke out, the town became a focal point for both Union and Confederate forces because it was an important port for the rich farm produce grown in northeastern North Carolina. Also, the Roanoke River provided access to a vulnerable bridge of the Wilmington and Weldon Railroad that ran from Wilmington past Weldon in Halifax County to Richmond, supplying Lee's Army of Northern Virginia.

Between 1862 and 1864, Plymouth was occupied twice by the North and twice by the South, underscoring its strategic importance, says Thompson.

In early 1864, Confederate Gen. Robert E. Lee ordered Brig. Gen. Robert Hoke to engage in an attack on Plymouth that was under Union control.

Later in the afternoon of April 17, 1864, Hoke began his attack on Plymouth with 13,000 troops and promise of the new ironclad.

By the second day of hard fighting, the Confederate troops were enduring heavy casualties.

Then in the early hours of April 19, Confederate Commander James W. Cooke led the ram down the Roanoke River and sank the *Southfield*, driving away the rest of the Union Navy. This was the first of the *Albemarle's* two victories over the Union.

In October of that year, a Union steam launch made its place in history by ramming the *Albemarle*.

Later, the Union made a successful attack that left only a few buildings standing in Plymouth.

"All but seven buildings in Plymouth were destroyed," says Thompson. "Six homes were left standing."

During the war, 2,800 men lost their lives in the port town.

"Most soldiers were killed on the ground and buried in mass graves," adds Thompson. "Some were wounded and sent away to hospitals. The bulk of casualties were Confederate soldiers."

One of the burial sites was Grace



ABOVE: Confederate re-enactors participate in a street skirmish. LEFT: Sailors check out equipment on the waterfront. RIGHT: A replica of the CSS Albemarle is docked on the Roanoke River.

Episcopal Church in downtown Plymouth.

During the Living History weekend, Thompson reads a letter from a Union boy describing the destruction at the church.

"It breaks my heart to see a horse tail hanging from the window," he reads. "They used the church as a stable. The floor was used for coffins, and the pews wrecked for use as coffins. Nothing was left but the brick wall on the church."

After seeing the town's destruction, a Union soldier wrote the U.S. government, requesting a new roof for Grace Episcopal Church.

"The federal government sent the money," says Thompson. "But the biggest shock was the 16 ex-Union soldiers who came back to Plymouth and put their own time and money into the building of the church roof."

LIVING HISTORY WEEKEND

To honor the men lost in battle, the town began the Living History Weekend in 1990.

Plymouth businessman Jimmy Hardison says that he and other residents started the event because of a personal interest in the Civil War.

"My ancestors fought in the war," says Hardison. "I had been a re-enactor and shooter. I could see great vision for the weekend."

In 2001, Harrison organized a campaign to build a replica of the *Albemarle*.

As a Civil War buff, Harrison wanted the public to know about the important role of the *Albemarle*.

"The *CSS Albemarle* was the most successful ironclad of the Civil War," says Harrison. "It twice defeated the Union Navy — once at the Battle of Plymouth and once on May 5, 1864 in the Albemarle Sound — where

it took on seven larger Union gunboats that had 62 guns to the *Albemarle's* two guns.”

The last page in the boat’s colorful history took place on Oct. 27, 1864. Twenty-year-old U.S. Navy Lt. William Cushing led a raid and destroyed the boat with a torpedo.

Built by 19-year-old Gilbert Eliot of Elizabeth City, the original *Albemarle* withstood attacks because of its solid construction — two layers of two-inch iron plats rolled out of a railroad track and applied at 30-degree angles, according to Harrison.

“The castmate that housed the gun deck was sloped at a 30-degree angle so that shells

fired by enemy gunboat would be deflected off it and not absorbed in gun blast,” Harrison adds.

Plymouth craftsman Guy Macken led the construction of the *Albemarle* replica that is 63 feet, compared to 158 feet for the original. More than 6,000 furniture nails with heads that look like rivets were used to secure the boat.

“The *Albemarle* is powered by an outboard motor hidden under the casemate,” Harrison says of the replica. “The shutters on the gun ports are operable, and a gun crew inside the casemate can actually roll out the guns and fire them.”

Marvin Spencer of Brush Creek Yachts in Plymouth built the Yankee steam launch replica.

2004 RE-ENACTMENT

During the Living History Weekend, visitors ride on the passenger pontoon boat, *Capt. Johnny*, operated by Stuart Wescott of Manteo and get a close view of the *Albemarle* and Yankee boat.

Throughout the weekend, soldiers also participate in street skirmishes, but use black gun powder instead of bullets as a safety precaution.

On one side street, Confederate soldiers, including a boy with a drum, are marching down the street. One man yells, “Yankee got silver out of house.”

Then gunfire echoes through the smoke-filled street.

As the Confederate soldier moves

forward, one soldier yells, “Ready, aim, fire.”

Immediately, a Union soldier in a navy blue uniform fires a shot, and a Confederate soldier falls to the ground.

For spectators like Zach Jennings of King, the re-enactment offers him a chance to see history come to life.

“It is awesome and interesting,” says Jennings.

The weekend includes more than street skirmishes. Sometimes, participants replicate 19th-century celebrations.

During one afternoon, re-enactors, Terry Harwood and Jimmy Phillips of Middlesex exchange vows at the historic Latham House.

The bride is wearing a long off-the-shoulder ball gown. Phillips is dressed in a brown and blue Confederate sergeant’s uniform.

Before the ceremony, the bride descends the stairs and then walks onto the porch.

The couple chose a period wedding to showcase their Civil War hobby to friends and family. The groom has been attending the Civil War event since 1996 and portrays a 1st sergeant with the 47th N.C. Volunteers. The bride serves as a commissary sergeant, cooking three meals a day over an open fire.

“My husband’s great-great-grandfather was in the Confederacy,” she says. “So it all fits together.”

Continued

LEFT: Union and Confederate units set up campsites across the street from the waterfront. RIGHT: James and Joseph White are re-enactors in the Union Army. BELOW: Two blacksmiths set up shop at a campsite.





Michael Halminski



Blenda Mentry/The Roanoke Beacon

ABOVE: Civil War soldiers are buried in the Grace Episcopal Church cemetery. LEFT: Confederate re-enactors perform an arch of sabers for Terry Harwood and Jimmy Phillips at their wedding.

RE-ENACTMENTS PLANNED

In northeastern North Carolina, Civil War battles included Plymouth and Roanoke Island.

To celebrate the historic battles, both communities are holding living history weekends in 2005.

In commemoration of the 143rd anniversary of the Battle of Roanoke Island, the Roanoke Island Festival Park will host a re-enactment Feb. 19-20. The event includes Civil War street skirmishes and living history demonstrations.

Along the Roanoke River, the 15th Annual Battle of Plymouth Living History Weekend will be held April 15-17 in downtown Plymouth. The event includes re-enactments, period crafts and other activities.

Visitors can see relics from the Port O'Plymouth Museum and other sites in downtown Plymouth throughout the year. Those who cannot attend the weekend may watch for an upcoming History Channel show on the Battle of Plymouth.

For more information about the Roanoke Island event, call 252/475-1500 or visit the Web: www.roanokeisland.com.

For more information about the Plymouth event, call the museum, 252/793-1377; the Washington County Chamber of Commerce, 252/793-4804; or go online to: www.livinghistoryweekend.com. — A. G.

NIGHT TOUR

One of the weekend's highlights is the torchlight tour that begins at the historic Plymouth United Methodist Church. Women in long period gowns and men in old suits greet visitors.

Inside the church, a woman in a black dress and black lace coverlet on her head reads a soldier's letter. "Tonight, my attire is black for those who have given their lives," she says.

During the war, the original wood-framed Methodist Church played an important role in the community.

"The Methodist Church was torn down in the war, and the wood was used for firewood and coffins for dead soldiers," she adds. The church was rebuilt after the war.

After the choir sings period songs, a tour guide leads visitors around the historic district in Plymouth, using a torch to light the way.

Their first stop is the white-framed

Windley-Ausbon House, one of only four surviving houses from the War Between the States still standing. Built around 1830, the house is still marked by Civil War bullet holes.

At the house, a Confederate petty officer reads a letter that he is penning to a friend. "I am not a picture of health," he says. "I am preparing to fight.... Write often."

After stops at several more houses, a Union soldier in blue uniform hobbles down a dark street and yells at two Confederate officers.

"Get out of my way," he yells. "You shot and killed our men. You dirty rebels."

Then a girl in a striped dress guides a wounded soldier to the hospital.

"Doctor, doctor, here's a wounded man," she says.

The doctor yells back, "I am trying to run a hospital. I have got men on straw beds. I am not a miracle worker."

Each year, the battle lives on through tours, street skirmishes and other events.

By participating in these living history events, Thompson hopes that children and others will develop pride in the region.

"The modern trend is to minimize history," he adds. "If we don't teach children about their history and heritage, they will drift away from the region. It is important that students learn to appreciate their roots. We need young people to save and protect what we have." □

The Odyssey of the *Periauger*

By Ryan Reynolds

Even in Bath, the oldest city in North Carolina, residents and tourists may have done double takes when they saw a colonial-style boat sail into the town harbor.

They weren't imagining it, though. The boat was the *Periauger*, a replica of a small cargo vessel that frequently cruised Carolina waterways during the 18th century.

But the 30-foot vessel, equipped with two masts for sails and up to eight sweeps for rowing, wasn't in Bath to deliver goods. It was heading toward Hertford to complete its Odyssey — a three-week trip up North Carolina's inner coast that was planned and commanded by John Ernst of Hertford, a volunteer in the project since 2002.

The vessel's real odyssey began almost four years ago, when the principal movers behind the project started the planning.

BUILDING HISTORY

Much like an architect who depends on blueprints, a boat builder may rely upon some sort of written plan when building

a ship. But when the Perquimans County

Restoration Association (PCRA), the

N.C. Maritime Museum and the East

Carolina University Maritime Studies

program decided to create the *Periauger*

replica, they didn't have that luxury.

The project partners had been

inspired by a reference to such a vessel in

the 1751 inventory of Abraham Sanders, who built the

Newbold-White House in 1730. To fund the dream, the PCRA raised

more than \$100,000 in private donations and a grant from the N.C.

Department of Transportation.

Continued

Despite the abundance of periaugers in the 18th century — they transported goods along shallow rivers and sounds — none of the original boats remain. There are but a few sketches on old maps.

Mike Alford, the designer hired by the PCRA, and Larry Babits, director of the ECU Maritime Studies Program, collaborated on researching the history and possible designs for the replica. Alford concluded that French Protestant sailors introduced these two-masted split dugouts to the American colonies in the late 1600s. Babits has been researching periaugers since 1984 and had a special interest in seeing this working replica created.

The final link in the cooperative effort was hiring Craig Wright, an experienced wooden boat builder from Connecticut.

The original boats were not built out of blocks of cypress as the replica is, explains Paul Fontenoy, curator of maritime research at the Maritime Museum. “The original was cut out of one or two [cypress] logs. In terms of structure, we tried to be as close as we could to what was likely. Some parts may be a little fancier, but they have a lot of practical aspects.”

The construction of today’s *Periauger* was time-consuming — a volunteer crew worked on the boat hull each day, five days a week, at the museum’s watercraft center in Beaufort, notes Fontenoy.

Construction of the masts, booms, sweeps and rudder had been accomplished in the winter of 2002-2003 by eight volunteers in Hertford, under the direction of Monty Spindler, the PCRA’s *Periauger* Project director.

After nearly four years of planning and nine months of construction, the *Periauger* was christened in the Beaufort waterway last July in front of a crowd of coastal officials, residents and tourists.

GETTING ITS SEA LEGS

No one was quite sure how *Periauger* would handle during its sea trials in mid-July, but the first few outings satisfied the designer, the builder and

the owners-to-be.

“It’s not exactly like any other boat I’ve sailed,” says volunteer John Vang, who’s been sailing replica ships for 20 years. The most similar feel was with a shad boat, he added.

The speed of *Periauger* on the open water was a surprise to the builders. Historic, flat-bottomed boats aren’t known to cut through the open water with such swiftness, according to Fontenoy.

“It’s faster than I expected it to be,” admits Fontenoy. “The flat bottom is a great way of getting lots of capacity. This is a cargo carrier, so if you make this kind of boat anything but flat bottom, you’re reducing the amount it can carry,” he adds.

Despite its easy handling, the *Periauger* crews still managed some close calls during sea trials. A motor boat was always available to assist *Periauger* in case of trouble.

During one particular trial in August, the *Periauger* narrowly escaped sailing into a concrete barrier. Nevertheless, the boat made it through the trials without damage. The crew wasn’t so fortunate during the *Odyssey*, though. During the three-week trip, it went aground twice, got tangled in a support boat’s anchor line and hit its towboat once.

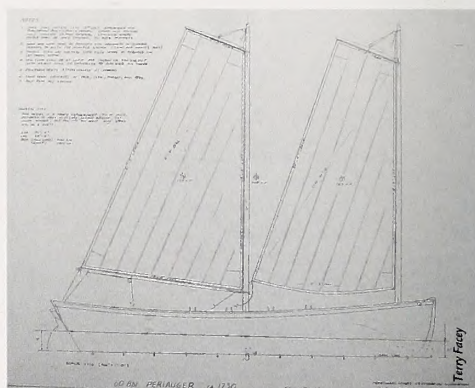
Although Vang, along with other Beaufort volunteers, captained the sea trials for *Periauger*, he did not guide the boat on its *Odyssey*. “It’s a tradition that the builders do the sea trials to make sure everything works, then we’ll turn it over to the owners,” says Vang.

RELIVING HISTORY

Nothing was going to stop *Periauger* and its crew, dressed in colonial garb, on its three week *Odyssey* — not even Hurricane Charley, a crew with a steep learning curve or even Blackbeard.

Hurricane Charley was the first to strike, delaying the voyage by one day. This forced Ernst, commander of the voyage, to put *Periauger* on a trailer for the trip to New Bern, but it didn’t cause any changes to the rest of the sailing schedule.

He arranged for *Periauger* to sail for five



TOP TO BOTTOM: Construction drawings included a sail plan by Mike Alford. • By Spring 2003, construction was in advanced stages. • The builders put the finishing touches on the interior hull. • A large crew pushes off the dock to practice rowing trials in the Beaufort waterway. • Swamping tests are performed to see how well the *Periauger* floats when flooded with water.



Neal McKelvie



John Ernst



John Ernst



John Ernst

hours each day in order to arrive at preplanned destinations. The six-member crew rotated daily, drawing from a roster of 26 volunteers from towns all over North Carolina. Two larger yachts from Hertford, with a total of seven sailors, also accompanied *Periauger*.

Over the course of the Odyssey, the flotilla visited the historic ports of New Bern, Oriental, Washington, Bath, Belhaven and Manteo.

For the crew, the trip became a three-week learning experience. "There was a lot of on-the-job training," says Emst. "Everybody was willing to learn about it, though."

The flotilla stayed at each of the port cities for at least one day to do sailing and rowing demonstrations.

In Bath, almost 100 people greeted them. "Bath was the party town," Emst recalls. "They had a wine and cheese reception at the dock when we arrived. On the second evening we were there, they had a homemade pizza party and everyone in the town was invited."

It was also in Bath where the *Periauger* had a run-in with the dreaded pirate Blackbeard. Although this wasn't the same pirate that sailed along the Outer Banks in the late 1600s terrorizing ships, the look-alike still managed to startle members of the crew.

"We let Blackbeard come on the boat when we were in Bath to put on a show for the people on the dock," says Emst. "Then all of a sudden he let off an 'arr-nrgg-hhh' and fired one of his guns right next to my crew. They almost went overboard jumping out of their skins."

The water portion of the Odyssey came to an end after two days in Manteo. The *Periauger* then was hauled onto its trailer and driven to Hertford.

"It was a lot of work but very satisfying," says Emst. "It was a great adventure, and people stepped in and helped out. It was terrific."

WHAT'S NEXT?

Periauger didn't have much time to rest after it arrived in Hertford. It was displayed at the Moth Boat Regatta in Elizabeth City, the Plymouth Wooden Boat Show and a sailing

regatta on Albemarle Sound. It will be featured at other shows and history programs in the years to come.

The boat alternates being on display in the water at the Hertford town pier, built by the town for *Periauger*, or on its trailer at the Newbold-White House Museum. Situated on the Perquimans River six miles from downtown Hertford, the museum plans to build a dock in an old turning basin after some archeological excavation has been done on the site, according to Ann Jones, the site manager.

"Then it will really be home," says Jones. "Maybe the ghost of Abraham Sanders will come down and get on his *Periauger*."



Courtesy of the Newbold-White House

NEWBOLD-WHITE HOUSE: A Colonial Quaker Homestead

- Hertford, NC
- Attractions: 1730 Newbold-White House tours, Quaker gravesite from the 1600s, seasonal herb garden and the *Periauger*.
- Tickets: Adults \$3, Students \$1. Children age 5 and under, free.
- March 1 - Thanksgiving: 10 a.m. - 4 p.m. Tuesday-Saturday; 2 p.m. - 5 p.m. Sunday.
- Online: www.newboldwhitehouse.com contains a link to *Periauger's* construction, launch, sea trials and Odyssey.
- For more information, including winter group tours, call 252/426-7567.

TOP TO BOTTOM: The *Periauger* touches the sea for the first time. • The crew catches a stiff wind in New Bern during an early stage of the Odyssey. • The *Periauger* cuts through the water during its Odyssey. • The *Periauger* slowly sails amid the natural environment of a North Carolina waterway.



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BIRDS OF A FEATHER



Challenges, Opportunities for Indonesia

The Indian Ocean tsunami may have been thousands of miles from North Carolina, but the news of the devastation hit home.

Our hearts immediately went out to hundreds of thousands of victims and their families. And we knew that our colleagues with the Indonesian Sea Partnership Program (SPP) would have their work cut out for them for months — even years — to come.

Coastwatch readers will recall that in 2002, North Carolina Sea Grant hosted a visiting delegation from Indonesia.

Widi Agoes Pratikto, director general of coasts and small islands in the Indonesian Ministry of Marine Affairs and Fisheries, knew that with the country's newly decentralized power structure, provincial leaders would need technical support — to provide sound science groundwork for future policy decisions.

And he had a model in mind: his doctoral work in coastal engineering at North Carolina State University had been funded in part by North Carolina Sea Grant.

Since the 2002 visit, we have kept up with the astoundingly rapid growth of SPP — from its pilot universities to the full-fledged program that, in just two years, has 10 regional centers in place and seven additional provinces seeking to join the program.

In light of the tsunami, the university/community partnership model will see some of its greatest challenges — and greatest opportunities.

"Material damage has been considerable, about 1.3 million houses, 120 kilometers of road and 18 bridges have been destroyed. This means that 97 percent of Aceh's GDP or 2.2 percent of the national GDP of Indonesia has been lost," Adiyatwidi Adiwoso Asmady, Indonesia's deputy permanent representative to the United Nations, reported in January.

"The harder task will be to rebuild the lives of the people who have not only been displaced and deprived of their livelihood, but also traumatized by the calamity," she continued.

Additional reports cite 70 percent of the fishing fleet destroyed,

crippling the industry that normally generates about 100,000 jobs. The government's fisheries agency lost 90 percent of its assets in the tsunami areas. Water and sewer destruction in the tsunami region ranged from 40 to 75 percent on the eastern coast to 80 to 100 percent on the western coast.

National, regional and local leaders will be looking at immediate efforts to cope with the inundation of salt water and coastal sand up to 5 kilometers inland, as well as extensive debris in coastal waters.

In coming months, the rebuilding process will need short- and long-term plans — coastal management policies that consider mitigation, disaster prevention, building codes and other aspects included in the state and local planning process along our shorelines.

And, of course, there will be great need for education and communication efforts. Plans have been initiated for the technical aspects of a global tsunami warning system. This system will need to be complemented by a public awareness campaign to tell coastal residents what to do when another tsunami — or other natural hazard — is forecast or reported.

Back in the 1970s, North Carolina Sea Grant's fishery extension program was nurtured through the support of "highliners" — fishing captains who held the respect of the community. On a similar note, I expect the SPP will be looking for community leaders to become bridges to the universities. Their trust in the technical information — and assistance in sharing it with local residents — will be crucial to the success of a new program.

Another model may be Sea Grant's response to devastating hurricanes and flooding — joining state and local officials in determining initial, intermediate and long-term damage assessments. Those tallies may then factor into policies during the recovery.

We wish our SPP colleagues the best in these trying times. Not only will they be helping the devastated communities in Indonesia, but they also could become a model for potential university/community partnerships in neighboring countries.

Katie Mosher, Managing Editor

I N T H I S I S S U E

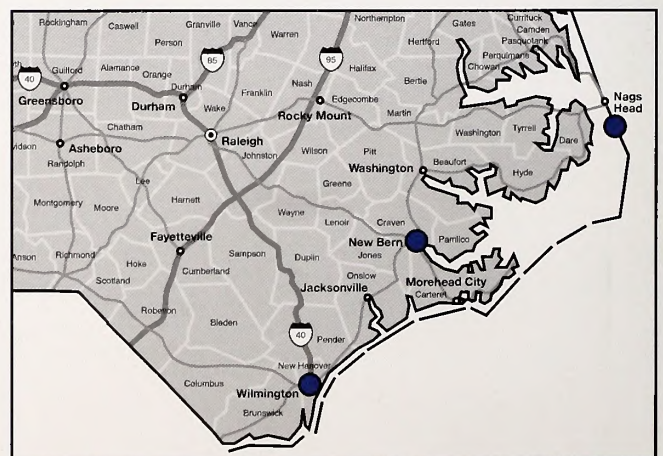
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North Carolina's diverse coast offers countless interesting subjects. The large dots on the locator map indicate story settings in this issue — including the Outer Banks, New Bern and Wilmington.



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Coastwatch

FEATURES

COASTAL TIDINGS 2

BIRDS OF A FEATHER

It's a hawk. It's a heron. Even an eastern phoebe. Pam Smith joins a Wings Over Water birding event — and learns how the Outer Banks has sparked interest in a North Carolina Birding Trail Initiative. 6

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Coastwatch

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The North Carolina Sea Grant College Program is a federal/state program that promotes stewardship of our coastal and marine resources through research, extension and education. It joined the National Sea Grant College Network in 1970 as an institutional program. Six years later, it was designated a Sea Grant College.

Today, North Carolina Sea Grant supports research projects, a 15-member extension program and a communications staff. Ron Hodson is director.

The program is funded by the U.S. Department of Commerce's National Oceanic and Atmospheric Administration and the state through the University of North Carolina.

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COASTAL TIDINGS

Fogg: New Sea Grant Finance Director

Kim Fogg has taken over the financial reins at North Carolina Sea Grant.

As assistant director for finance, Fogg will provide budget and grant oversight.

Fogg replaces Tammy Sumner Cox, who became director of business and financial services for the North Carolina State University Alumni Association.

Fogg has worked at NC State University since 1992. Before coming to Sea Grant, she was operations manager of the Mechanical and Aerospace Engineering Department.

"I spent seven years at Contracts and



Kim Fogg

Grants where I fell in love with research," says Fogg. "So North Carolina Sea Grant was a good match for me."

Fogg is a native of Baltimore. She attended California State Polytechnic University, Pomona. In February 1992, she moved to North Carolina.

"We are very pleased to have found someone with

Kim's experience and knowledge," says North Carolina Sea Grant Director Ronald G. Hodson. "In addition, her pleasant personality and good humor fit well with the relaxed atmosphere in our office." — A.G.

Marine Fisheries Fellow Delves into Data

Since being named the 2004-2005 Marine Fisheries Fellow, Stacy Luthy has been busy analyzing 30 years of historical data and generating biological information that will be used to assess the stocks of various estuarine and marine finfishes.

The focus of her one-year fellowship — supported by North Carolina Sea Grant and the N.C. Division of Marine Fisheries (DMF) — is to interpret historic DMF monitoring data for future fishery management plans.

So far, the data set is yielding valuable information about both white and yellow perch. And, Luthy is developing indices of abundance by age class for both species.

"I am getting great information on white and yellow perch. The time series dates back to the 1970s, and provides a good record of recruitment over that time," Luthy points out. She is looking closer at factors at play in the late 1980s when white perch recruitment levels appear to have been the lowest in the DMF 30-year monitoring period.



Stacy Luthy

Her findings will be valuable to officials developing management plans for white and yellow perch, whose status is listed as "concerned" by DMF.

Fisheries management plans were mandated by the 1997 N.C. Fisheries Reform Act. They address stock status and socio-economic concerns, as well as water quality and habitat needs.

Luthy earned her doctoral degree in marine biology and fisheries in 2004 from The University of Miami, Coral Gables. As a graduate research assistant, her focus was on the biology of billfish larvae. She created a key to identify marlin and sailfish larvae to species, estimated ages of the larvae, and used current calculations to identify potential spawning areas for blue marlin, white marlin and sailfish.

"This information could help define sensitive billfish spawning areas for future protection," Luthy says.

Luthy is based at North Carolina State University's Center for Marine Sciences and Technology in Morehead City. — P.S.

NC Aquariums Earn National Designation

The North Carolina Aquariums recently received an elite designation: "Coastal Ecosystem Learning Center" (CELC) from the Coastal America program. The partnership of 12 federal agencies is working to protect, preserve and restore America's coastal resources and watersheds.

The three N.C. Aquariums — at Roanoke Island, Fort Fisher and Pine Knoll Shores — are the 18th CELC to receive the designation since 1996, and the first multiple-site organization to be honored.

"We're delighted to be included in this forward-thinking network," says David Griffin, director of the North Carolina Aquariums Division. "This designation will make it



Students from Carolina Beach Elementary offered a skit to close the ceremony.

possible for us to deliver our conservation message to far more people, far more effectively, than ever before."

A ceremony, held at the Fort Fisher Aquarium in January, highlighted what the North Carolina CELC could expect from its new federal partners: unique access to expert speakers, exhibit information, educational publications, teaching and training

materials, field trip sites, and scientific data from around the country.

U.S. Rep. Mike McIntyre (NC 7th District) was among the state and federal dignitaries who cited pride in the N.C. Aquariums for the example they set within the state and across the country. — K.M.

Carteret Teacher Honored

Each year, East Carteret High School teacher Barbara Waters introduces her students to a variety of coastal experiences — from exhibits at the N.C. Maritime Museum to trips on university research boats.

To honor her contributions to marine education, Waters received the 2004 Mid-Atlantic Marine Educators Association Teacher of the Year Award. Each year, the award is given to an outstanding teacher by peers.

"Barbara continuously seeks out professional development opportunities and takes the information back to the classroom for her students to benefit from," says Amy Sauls, coastal education specialist for the N.C. Coastal Reserve Program. "She also helps and encourages students to excel, and makes scholarship suggestions and many other opportunities available to students."

Waters has worked as a science, marine biology and earth science teacher at East Carteret High for 10 years. In this position, she has volunteered as a National Ocean Science Bowl coach for several years. In 2003, the Carteret team won first place in the Blue Heron Bowl, the state competition. Last year, the team placed second. — A.G.

In the Next Issue of *Coastwatch*

Pam Smith considers the socio-economics of commercial fishing in North Carolina. Meanwhile, Ann Green checks in with river and harbor pilots at the state ports. And Kathleen Angione joins a shrimp bycatch research expedition.

Ballast Water Technology Earns Honors

New technologies to treat ballast water, developed in part with funding from the National Oceanic and Atmospheric Administration's (NOAA) invasive species program, took honors in *The Wall Street Journal's* first "Global Technology Innovation Awards."

The awards recognize technological breakthroughs by individuals, companies and organizations around the world in 12 categories, including medicine, software, security and transportation.

In the environmental category, Nutech-O₃ was a runner-up for its ozone-based treatment to remove aquatic invasive species from ballast water. Nutech-O₃ and its academic partners — including Bill Cooper of the University of North Carolina at Wilmington — have received several grant awards over the past three years from the Ballast Water Technology Demonstration Program and the NOAA Sea Grant Aquatic Invasive Species Research Program.

The ozone research projects were featured in the Holiday 2003 issue of *Coastwatch*.

The first-place winner in the environmental category also has received NOAA funding. Ferrate Technologies LLC won for its work to develop ferrate-based wastewater and industrial effluence treatment without toxic byproducts. This group received a 2004 grant from NOAA through the Ballast Water Technology Demonstration Program to adapt this technology to ballast water treatment.

"Through these awards, *The Wall Street Journal* seeks to recognize innovation — and each of these winners embodies the creative thinking that enabled them to rise the top of their respective industries," said Karen Elliott House, publisher, *The Wall Street Journal*, and senior vice president, Dow Jones & Company.

— K.M.

Shades of the Old West

Finding a Silver Lining

Researchers at the University of North Carolina at Wilmington's Center for Marine Science (CMS) have uncovered a benevolent side of the usually deadly red tide — antitoxins that could be useful in treating lung ailments, such as cystic fibrosis and asthma.

For more than five years, Daniel Baden, CMS director, and his team of researchers have studied the toxins produced by red tide — algae that disperse toxins into the air during photosynthesis, contaminating shellfish, killing fish and mammals, and causing respiratory irritation.

The team discovered that the red tide produces at least two antitoxins to help neutralize its own toxins. Because red tide toxins cause respiratory distress similar to asthma, the team tried the antitoxin on asthmatic sheep. It worked at considerably lower concentrations than traditional asthma drugs, the researchers report.

The discovery could lead to a new class of drugs to treat chronic lung disorders, such as cystic fibrosis, a genetic disease with limited treatment paths.

Baden, whose study is supported by the National Institute of Environmental Health Sciences, is working with a private pharmaceutical company to develop the potential use of the antitoxins.

Although it may take years for the antitoxin to reach the market for human use, Baden is excited by the serendipitous discovery. He told *The Wilmington Star-News*: "We weren't looking for this. It's one of those things where you put observation together with opportunity and you make discoveries." — P.S.



A scene from the old west played out on the Outer Banks in early January with the roundup of 128 horses at Cape Lookout National Seashore.

The roundup is part of a multi-faceted management strategy to maintain a healthy herd of the legendary wild horses of Shackleford Banks. A combination of birth control, roundups and adoption are used to control the population. The goal is to hold the herd to 110 — the number of horses the island's natural resources can sustain, according to experts.

What of the additional 18 horses? After getting a clean bill of health, two are joining the Cedar Island Wildlife Refuge wild herd that was severely thinned by disease in the early 1990s. The new additions bring the Cedar Island census up to 22, including eight Shackleford horses moved there two years ago.

The Foundation for Shackleford Horses, which shares responsibility for herd management with the Cape Lookout National Seashore, will oversee the adoption of the remaining 16 wild horses.

For information about the Shackleford Banks wild horse adoption program, contact Anita Kimball at 252/728-1224 or Joy Lawrence at 252/728-8574. — P.S.

Strange Days on Planet Earth

Want a new view on Earth Day? Tune in to *National Geographic's Strange Days on Planet Earth*, which will air in April on UNC-TV and other public television stations.

Or head to the Earth Day celebration at the North Carolina Museum of Natural Sciences in Raleigh April 23, where the series will be showcased.

Hosted by actor, writer and director Edward Norton, the television series includes four one-hour segments designed to show impacts humans have on the environment and ecosystems.

The first episode airs April 20 at 9 p.m. *Invaders* looks at how invasive plants and animals arrive in our communities and locations around the world. The show also offers steps that can be taken to avoid the introduction and spread of invasive species.

The One Degree Factor follows that evening at 10 p.m. It will consider disparate phenomena that all may be linked to global climate change — from dust clouds building high over the Atlantic, to declining populations of caribou and

a respiratory illness among children in Trinidad.

Two more episodes will air April 27. *Predators* takes viewers to Venezuela and Yellowstone National Park. Both are lacking in top predator species — with dramatic consequences.

Finally, *Troubled Waters* looks at impacts of toxins in our waters — which have been linked to dwindling populations of frogs and beluga whales, as well as increasing populations of sea stars at the Great Barrier Reef.

The series Web site — www.pbs.org/strangedays — will offer educational materials and links to a consortium of zoos, aquariums, botanical gardens and science/technology centers.

For more information on the N.C. Museum of Natural Sciences' ongoing outreach programs on invasive species and other topics, go online to www.naturalsciences.org.

National Geographic's Strange Days on Planet Earth is a Sea Studios Foundation production for Vulcan Productions, Inc. and National Geographic Television & Film. WGBH Boston presents the series on PBS. — K.M.

Habitattitude™ Designed to Stem Invasive Introductions

Go on, try to say *Habitattitude*™. Campaign partners hope this new word will become common among home aquarium owners and water gardeners.

Habitattitude™ is the name for a national public education campaign launched last fall. It is designed to help consumers become part of the solution in preventing the release of aquatic fish and plants. The campaign's logo and "don't release" message soon will appear on fish bags, new aquariums, brochures and ads in hobbyist magazines. The cooperative effort includes the pet and water garden industries, academia and the federal government.

Most invasive species come into the country as hitchhikers through commercial trade. But some home aquarium owners and water gardeners have unknowingly contributed to the challenge invasive species pose for conserving America's wildlife and landscapes.

U.S. Fish and Wildlife Service, along with the National Oceanic and Atmospheric Administration (NOAA), through the Great Lakes Sea Grant Network, and the Pet Industry Joint Advisory Council (PIJAC) have teamed up under the auspices of the national Aquatic Nuisance Species (ANS) Task Force to create the Habitattitude™ campaign.

NOAA Administrator and retired Navy Vice Admiral Conrad C. Lautenbacher sees Habitattitude™ as a proactive program that promotes responsible consumer behaviors and raises awareness about invasive species.

Habitattitude™ suggests these simple actions when faced with the disposal of an unwanted aquatic plant or fish:

- Contact a retailer for proper handling advice or for possible returns.
- Give/trade with another aquarist, pond owner or water gardener.
- Donate to a local aquarium society, school or aquatic business.
- Seal aquatic plants in plastic bags and dispose in the trash.
- Contact a veterinarian or pet retailer for humane disposal of animals.

The partnership focuses on raising public awareness, engaging people and promoting consistent environmental messages with beneficial actions, says Marshall Meyers, PIJAC executive vice president and general counsel.

To find out more about the campaign, go online to www.habitattitude.net.

— M.Z.

Go Native on Earth Day

The North Carolina Coastal Federation's "Go Native Plant Sale" is scheduled for April 22-23 as part of the Earth Day weekend celebration. The two-day event will take place at NCCF headquarters on N.C. 24 in Carteret County.

More than 3,000 plants — flowers, shrubs and trees — native to the coastal plain will be offered for sale for \$10 or less. Each plant will come with planting instructions and a fact sheet listing its landscape uses and wildlife benefits.

Free workshops will be conducted



throughout the day on Saturday to help educate the public about the benefits of using native plants for home landscaping.

All of the shrubs and flowering plants come from nurseries in North Carolina that specialize in

coastal natives. Trees, including the rare white cedar, are from the N.C. Division of Forest Resources.

To learn more about the "Go Native Plant Sale," or for directions to NCCF headquarters, go online to www.nccoast.org.

— P.S.



Coastal Workshops

This summer, the Center for Ocean Sciences Education Excellence SouthEast (COSEE SouthEast) in Charleston will offer two coastal workshops for teachers.

The "Estuaries and the Coastal Margin Institute," targeted for middle and high school science teachers, will be held June 19-25 at the University of South Carolina Belle W. Baruch Marine Field Laboratory and Kimbel Center in Georgetown, S.C.

Participants will receive state education renewal credits and a stipend of \$200, plus lodging and some meals.

The application deadline is April 1. For more information, contact Margaret Olsen, COSEE SouthEast education specialist, UGA MECA, 30 Ocean Science Circle, Savannah, GA 31411; e-mail, olsen@uga.edu.

The Second Annual Coastal Legacy Workshop for elementary and middle school teachers will be held July 25-30 at the Penn Center, St. Helena Island, S.C.

Participants will receive state education renewal credits, a stipend, lodging and meals. They also will receive educational resources and lessons, access to scientists and community leaders, as well as opportunities to become regional leaders in their home states.

The application deadline is May 13. For more information, contact Elizabeth Rogers, 843/727-2078; or e-mail, elizabeth.rogers@scseagrant.org.

Funded by the National Science Foundation, COSEE SouthEast helps develop partnerships to integrate ocean science research from North Carolina, South Carolina and Georgia into high quality education programs in kindergarten through the 12th grade. North Carolina, South Carolina and Georgia Sea Grant programs support COSEE SouthEast's efforts.

For more information, visit the Web: www.scseagrant.org/se-cosee/education. — A.G.

Birds of a



Birds of a Feather

by Pam Smith

It's one of those days that make you glad to have outdoor plans.

Crisp. Calm. Cloudless. The uncluttered blue sky is the perfect backdrop for flights of snow geese rising from the salt marsh fringe of the Outer Banks.

Thousands of migratory snow geese, tundra swans and myriad other waterfowl find North Carolina's diverse coastal environments ideal winter quarters. Songbirds and shorebirds stop to rest and feed. Some stay. Others continue their long, southward journeys along the Atlantic Flyway.

And so it is on this brilliant day, that hundreds of birdwatchers make a pilgrimage to the region to witness the seasonal avian spectacle during the fall Wings Over Water Wildlife Celebration known as WOW.

The ritual will be repeated for spring migration. But today, the Pea Island National Wildlife Refuge Visitor Center — one of dozens of WOW field trip staging areas — is abuzz with activity. The mixed group of novice and experienced birders compares field guides and checks the roster for birds spotted each festival day.

Continued



Red knots are among diverse waterfowl at the coast.

Photo by Michael Halmnski

A promising start

Binoculars and high-powered scopes are trained on North Pond, where migrants and year-round resident flocks congregate, seemingly unaware that they are the objects of such ardor. The excitement level increases when a WOW coordinator detects two American white pelicans — unusual sightings this far south.

At a nearby parking lot, Ricky Davis and John Wright, veteran field trip leaders, leap from a car with a rare bird alert. They've spotted a northern goshawk. An uncommon winter visitor here, the goshawk's range spans Alaska, Canada and parts of New England.

Wright, a high school science teacher from Greenville, heads south with a few seasoned birders who hope to catch a glimpse of this extraordinary bird.

Davis, who works at a printing business in Zebulon, stays behind to lead a band of beginning birders on an excursion to the South Pond, a refuge area usually off-limits to the public.

"All the birds we see today won't be rare ones. But remember, there is no such thing as a bad bird," Davis says.

The neophytes include a teacher from Plymouth, a couple from Georgia, another from Cary, and a family of five from Rocky Mount. The group's diversity reflects the broad appeal of birding — one of the fastest-growing outdoor activities, according to national tourism experts.

"I'm a backyard birder," says the teacher, Jane Morrow. Birds on her life list — a personal inventory of birds encountered — are mostly common state birds. She has spotted snow geese and swans during Lake Mattamuskeet Swan Days, the only other formal birding outing she has taken.

"When it comes to birding, I'm a rank amateur," confesses Bill Deans, a Rocky Mount neurologist by profession and a naturalist by avocation. "I've studied insects all my life. Birds are more of a challenge, because they don't stand still long enough for close scrutiny."



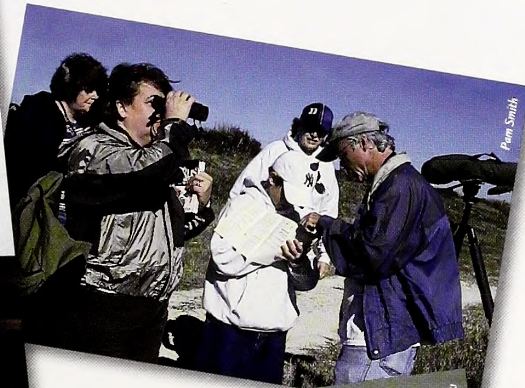
CLOCKWISE FROM ABOVE: An eastern meadowlark makes a showy appearance. • Snow geese rise from an Outer Banks salt marsh. • Neal Moore, a member of the Cape Hatteras Bird Club, sets his scope on an interesting bird at The Point. • Ricky Davis, right, guides a group of beginning birders during the fall WOW. • A red-breasted merganser drake bobs in coastal waters. • A swan strolls along the ocean beach near Duck. • Bonnie Strawser and Pat Moore enjoy the view at Pea Island National Wildlife Refuge.



Checklist:

Novice birders enjoy beginners' luck at WOW:

- ✓ An American white pelican — one of the largest birds of North America
- ✓ A belted kingfisher hovers, dives headlong into the water, and flies away with its catch.
- ✓ Greater yellowlegs, a member of the sandpiper family, true to form, chase food in the shallow marsh waters.
- ✓ A solitary eastern phoebe flies back and forth between the nearby shrubs and the rafters of an open work shed.
- ✓ Double-crested cormorants — too numerous to count — some diving for fish, others sitting on sand bars drying their wings in the sun.
- ✓ A great blue heron
- ✓ A tricolored heron
- ✓ An eastern meadowlark
- ✓ A snowy egret
- ✓ A cluster of royal terns
- ✓ Yellow-rumped warblers and palm warblers flit around low shrubs
- ✓ Greater snow geese — lesser snow geese winter at Lake Mattamuskeet.
- ✓ An American coot, a member of the rail family
- ✓ A great black-backed gull
- The great black-backed — one of the largest gulls in the world — often preys upon American coot.



Still, he adds, birding is a likely extension of his family's yearly nature-based vacations that have taken them to some of the best-known wilderness areas in the nation.

Beginners' luck

Davis says that a good bird identification book and a pair of binoculars are the basic birding "tools." He prefers a field guide with color illustrations showing the array of plumage the male and female of a species displays throughout their lives.

Preparation also contributes to a successful outing. The night before, look up possible sightings for the geographic locale.

season and habitats. Tab the book for easy reference in the field, he advises. During the excursion, keep a list of sightings and make field notes to indicate time of day, habitat and other details. Later, go back and look up the bird to learn more.

"Getting out in the field over and over is the best way to build up knowledge. I guarantee it will become a passion, if not an obsession," he says. "Now, let's go see some birds."

The Pea Island South Pond complex is comprised of a shallow body of water that is ringed with marsh and sandwiched between N.C. 12 and Pamlico Sound. Davis uses his spotting scope to visually isolate an interesting species from the crowd scene on the open water, as well as shyer ones veiled by tall marsh grasses and shrubs.

David Deans, 11, the official group recorder, uses "Birds of the Outer Banks." Compiled by North Carolina naturalist John Fussell, III, it lists nearly 400 species of birds that have been sighted in the region.

Close encounter

Lengthening shadows fall across the shrub-lined path as the group begins the

return trek to parked cars. The talk is about experiencing an enjoyable and enlightening day.

"I got to see birds I have never seen before, and others that I have seen, but couldn't identify," says Richard Deans, 14.

Animated chatter suddenly stops as a hawk lights in the dead limbs of a tree not more than 25 yards away. The group slowly advances, hoping to close in on a positive identification. They thumb through the field guide. Not a red-tailed, they agree. Perhaps a broad-winged or red-shouldered?

They'll need a better look. The hawk obliges and flies down to the path, closer still. Hawks are difficult to identify because of changes in coloration with age, Davis points out. He ventures a cautious call: an immature broad-winged hawk.

The close encounter with the curious hawk provides a memorable grand finale for a group of beginning birders. It also could become the focal point of a story they'll carry with them about the day they got hooked on birding.

From pastime to passion

Every birder seems to have a story.

Davis remembers when his pastime became a passion. He was 12, and an adult cousin and his wife gave him a bird feeder and bird identification book.

"I put up the feeder and the birds immediately began coming — and I began trying to identify them," he recalls. On walks around Zebulon, primarily a rural community at the time, he listened and looked for new discoveries.

The next year, 1971, his cousins invited him along for the fall meeting of the Carolina Bird Club at Nags Head. His addiction broadened to include coastal birds — a passion he would pursue on vacations at Carolina Beach and later as a biology student at the University of North Carolina at Wilmington.

He leads WOW field trips as a way to introduce others to birding as an activity that can give a lifetime of pleasure, and to help them learn about, appreciate and help protect the environment.

Pat Moore, an Outer Banks resident who is one of WOW organizing forces, confesses that

Continued

she used to laugh at bird names like yellow-bellied sapsucker, horned grebe and red-footed booby.

"My parents began birding when I left the nest," she recalls. "On a visit home in 1956, they invited me on an excursion. Once I heard a pileated woodpecker, I was hooked, and the rest is history."

Moore is an avid birder. Of the more than 800 known North American birds, she has chalked up 530 on her life list. "And, I have not ever visited Florida or Alaska," she is quick to say.

Before moving to the Outer Banks in the 1980s, Moore belonged to the Montgomery County Bird Club in Maryland. Once here, she began participating in bird walks at Cape Hatteras National Seashore and Pea Island National Wildlife Refuge to learn about the avian populations.

Like Davis, Moore generously shares her passion with others at WOW — and every other chance she gets. On Tuesdays, she and members of the Cape Hatteras Bird Club head out to survey bird populations at Cape Hatteras Point. She also helps lead a Friday morning walk at Pea Island.

Outer Banks photographer Michael Halminski says coastal North Carolina is a paradise for nature photography. "When I moved to Hatteras Island in 1973, photography was just a hobby for me. I was inspired at once by the raw nature of the island. With hardly a dollar in my pocket, I worked odd jobs to save for a 400-mm telephoto lens for shooting birds," he recalls.

Some of the rarest birds he has seen on the Outer Banks include a migrating scarlet tanager and some piping plovers. His favorite birds to watch and photograph are wild ducks that winter here. "Their shyness makes them a huge challenge to approach and photograph," he explains.

Early on, Halminski honed his skills by imitating techniques of local waterfowl hunters.



wild again and again until he can check the bird off his life list.

Local birders turn their passion into tangible support of refuges, state and national parks and nature preserves,

"Over the years, I have employed camouflage and blinds to get close. Birds that are busy feeding often are easily approached. Nesting sites are another opportunity for photography, but deserve utmost care for the birds' well-being," he says.

"No photograph is worth risking the welfare of the subject."

Follow that bird

Bonnie Strawser, wildlife interpretive specialist at the Alligator River/Pea Island National Wildlife Refuge and WOW organizer, claims not to be a bird expert. "I love birds. I love to watch them. But, I don't always know their names."

Nevertheless, she understands why so many people are passionate about birding. "I fell in love with pintail ducks while banding them. Their feather coloration is indescribable," she says.

Many of the more than a million people who visit Pea Island each year do so to bird watch.

"I know people who literally will go to great lengths to respond to a rare bird alert," Strawser says. "One gentleman from California journeyed to Pea Island for three consecutive years in order to see the curlew sandpiper that had been spotted in South Pond."

To her knowledge, he missed the elusive bird each time. She suspects a "near miss" won't deter him from answering the call of the

Strawser points out.

At Pea Island, for example, volunteers built a fully accessible, half-mile nature trail along North Pond, complete with overlooks, towers and spotting scopes. They also conduct interpretive programs and assist with biological work.

Nationally, volunteers play a significant role as "citizen scientists" by participating each year in the Audubon Christmas Bird Count and Cornell's Great Backyard Bird Count.

Volunteers also are the driving force behind Wings Over Water festivals. "It's a community effort that was launched in 1997," Strawser says. "The festival is a way to celebrate the natural resources we are blessed with — and to bolster the local economies during the tourism shoulder season on the Outer Banks."

Since then, dozens of dedicated volunteers have led fall birding field trips, paddling and natural history tours — from Mackay Island to Ocracoke, and inland to Alligator River and Mattamuskeet National Wildlife refuges.

Organizers are planning a spring version for the first time. The 2005 Spring Wings, May 12-15, will include butterfly and wildflower excursions. Spring Wings details are posted at www.wingsoverwater.org.



On the Birding Trail

The coastal plain of North Carolina supports diverse natural habitats — from the open ocean to black water streams — and a rich assemblage of birds. More than 400 species have been recorded, according to Audubon North Carolina.

So, where does a bird lover go to see a tricolored heron, a seaside sparrow or an elusive black rail?

Connecting birdwatchers with birding sites is about to get easier, thanks to the North Carolina Birding Trail Initiative. The effort is being spearheaded by North Carolina Sea Grant, Audubon North Carolina, North Carolina State University, N.C. Cooperative Extension, and the North Carolina Wildlife Commission's Faunal Diversity Program.

Their goal is to produce a user-friendly map linking great birding spots in the coastal plain. Future plans are to expand westward to include the piedmont and mountain regions.

Birds and other wildlife thrive in great expanses of the region's undisturbed lands held in public trust by national wildlife refuges and seashores, coastal reserves and state parks, says Jack Thigpen, North Carolina Sea Grant extension director. Tracts in private ownership and those managed by conservation groups, such as Audubon, The Nature Conservancy and land trusts, augment habitat protection.

The North Carolina Birding Trail Initiative goes beyond enhancing the birding experience, Thigpen explains.

The steering committee is working to build partnerships with local business communities to stimulate economic growth through ecotourism. Birding trail maps will provide information on local lodging, restaurants, shops, as well as historic and educational attractions.

Texas pioneered birding trails in the 1990s when public and private groups realized that the growth of birding as a popular national pastime could translate to opportunities for conservation education and economic growth. In 1996, the Great Texas Coastal Birding Trail was created. It uses maps and corresponding road signs to link 300 sites. Since then, Texas added three trails, and another 20 states have developed birding trails.

Two years ago, Thigpen and Ronald G. Hodson, North Carolina Sea Grant director, learned the value of Texas' well-organized birding guide. Following a national Sea Grant meeting in Galveston, they struck out with a pair of Sea Grant colleagues, both experienced birders, for a four-day swing across south Texas.

"The region is famous for its subtropical native birds and is in the flyway of many migratory species," Hodson says. Trail maps describe what birds and facilities — such as accessible observation decks — visitors can expect to find at various locations.

"We got lucky at a wastewater treatment plant," Hodson recalls. "A butterfly garden was being installed near a pond. That's where we caught sight of a black-chinned hummingbird."

All told, they saw 140 species. "It was the most exciting birding excursion I've ever been on," Thigpen says.

A short time later, Sea Grant joined forces with other partners at work to establish a birding trail system for North Carolina, Hodson adds.

Organizational meetings are being scheduled for various coastal locations to involve communities in the effort. The steering committee is asking individuals and organizations to nominate potential birding trail sites.

For the latest updates on the North Carolina Birding Trail Initiative, and for details on the nominating process, go online to www.ncbirdingtrail.org.



CLOCKWISE FROM

ABOVE: Neal and Pat Moore enjoy the view from North Pond Overlook at Pea Island. • Pintail ducks are known for their feather coloration. • Tricolored heron shyly steps out from veil of marsh grass. • Volunteers at Pea Island National Wildlife Refuge designed and built an accessible half-mile nature trail around North Pond. • Teresa and Earl Staley spot a blue heron at WOW.

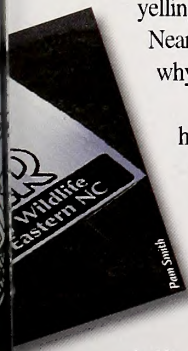
And, oh yes, Davis says the wildlife festival is a safe venue to pursue birding. He recalls a past off-trail adventure with his sidekick John Wright.

"We were near Jordan Lake in Chatham County searching for a previously reported gray flycatcher in a cow pasture," he recalls.

The pair climbed the pasture fence hoping to spot the very rare winter visitor from western North America. "We suddenly heard the farmer yelling 'Get out. Get out.' Nearly too late, we saw why."

"The fence didn't have a 'no trespassing' sign," they explained sheepishly to the farmer.

"Yes," the farmer replied, "but anyone with half a brain could have seen that bull coming." □



VIPs: FRIENDLY FISHING COMPETITION

by Ann Green
Photographs by Michael Halminski

Along a crowded Nags Head Fishing Pier, Sylvia Baldwin runs her fingers up and down the locks on her rod'n'reel.

"I am not used to fishing like this," says Baldwin, who lost her sight more than five years ago when she was assaulted.

To learn to fish again, Baldwin is getting assistance from Ida McGill, a Scotland and Richmond County social worker for the blind.

"I will do it for you one more time," says McGill, while throwing out the line into the ocean and reeling it in.

Then McGill baits the line with a bloodworm, shows Baldwin where the handle is and hands over the rod'n'reel. As mossy green waves break onto the shore, Baldwin tosses the line into the ocean that is choppy enough to attract surfers in wetsuits.



"We will write your name on the first fish," jokes McGill.

After feeling a tug on the line, Baldwin reels in a small spot. "It was exciting feeling the fish on the line," she says. "I thought I had caught a really big fish."

Baldwin is legally blind and competing in the annual N.C. Lions Visually Impaired Persons (VIP) Fishing Tournament.

Each fall, volunteers are paired with legally blind persons for the tournament. Some fish at piers. Others go on head boats into the sounds.

"It is a great opportunity for recreational experiences for the blind and also helps them gain independence," says Debbie Jackson, director of the N.C. Services for the Blind. "It is important for blind people to get involved."

Mary Carlyle, a VIP participant from Richland, agrees.

"It is a lot of fun," says Carlyle. "You get to meet a lot of people."

LIONS EVENT

Sponsored by the First Flight, Nags Head, Manteo, Wanchese, Columbia and Plymouth Lions clubs, the 2004 tournament attracted almost 400 blind or visually impaired people ages 12 to 91.

"This is one of the few projects that you can walk next to those you serve and feel their excitement and appreciation," says Gwen White, president of First Flight Lions Club and tournament director.

The tournament, which drew people from 77 counties, is the largest gathering of blind and visually impaired people in North Carolina, according to the Services for the Blind.

In North Carolina, about 23,700 blind or visually impaired people are registered with the state division.

Continued



Because many people are not registered, it is believed that this figure represents only about half of the number of people with significant vision loss in the state, according to division officials.

Of the number registered, about 16,500 are residents age 55 and older. This is not surprising because vision loss is one of the most common disabilities among the aging population. Macular degeneration, glaucoma and vision loss as a secondary effect from diabetes are among the common eye diseases in the older population.

"This tournament gives many older participants the chance to return to something they once enjoyed doing — fishing," says Jackson. "And, it gives others the chance to develop a new leisure activity after losing their vision."

Because the VIP Fishing Tournament involves a special population, the N.C. Division of Marine Fisheries waived all catch limits for participants.

With ideal weather conditions for fishing — 71 degrees and winds between 10 and 15 mph — participants caught a record number of fish.

The winner of the Bill Reynolds trophy for the heaviest fish was Hubert Ward of Watauga County, who reeled in a 2.4-pound croaker on the Avalon Pier.

Lisa Trent of Lexington caught the most fish at 40 pounds. Participants caught a total of more than 701 pounds of fish. All three winners for the total amount caught — Trent, Emily Smith and Linda Swain — were at Nags Head Pier.

"It was the first year that participants had caught so many fish," says White. "They were impressed that they could reel in two fish at a time."

For Trent, it was only the second time that she has fished. "It was wonderful and made me feel good catching that many fish," says Trent.

Some of the participants on the boats were experienced anglers and even baited their own hooks.

"I spent my whole life saltwater fishing on the West Coast," says 49-year-old Kevin Jenkins of Durham, who placed third on the *Miss Virginia Dare*.

TOP: Sylvia Baldwin, left, checks out her first fish with Ida McGill. MIDDLE: Volunteer Bonnie Phfennighaus, right, baits Linda Swain's line with bloodworms. BOTTOM: As a Lions Club member, Gwen White has been involved with the VIP tournament for many years.





ABOVE: Anna Young fishes with her guide dog, Natalie.

"I had a good time on the boat. We were out in the sound for four hours. I caught a bunch of drum fish. One time, I caught two fish at once," adds Jenkins, who lost his vision because of a stroke.

The three-day event included the tournament, as well as educational workshops, exhibits and a banquet. Walter Suggs of Sanford, who lost his sight because of macular degeneration, says he had a lot of fun meeting other blind people and attending the workshops and exhibits. "I learned about new gadgets that can help me," says Suggs.

More than 250 volunteers, including Lions members, high school students, social workers and nurses, helped with a variety of tasks — from cutting up 50 pounds of shrimp and more than 2,880 blood worms for bait to cooking more than 400 pounds of fish and 200 pounds of barbecue.

"This is my first year to help," says Cynthia Harris, a social worker for the Services for the Blind in Jones and Onslow counties. "It is a

fantastic event. Even if a person doesn't like fishing, it is wonderful opportunity to socialize."

FRIENDLY COMPETITION

On the day of the fishing tournament, the participants arrive early in the morning.

Some use canes or guide dogs to walk alone. Others hold on to volunteers' arms as they take their places on the pier. A few like Linda Swain of Lexington scoot around in motorized wheelchairs.

For Swain, who lost her sight because of juvenile diabetes and multiple sclerosis, the tournament gives her a chance to showcase her fishing skills.

"I have been looking forward to this for so long," says Swain. "I used to compete for money for catfish and carp in small local lakes and make my own bait. I would fish all night long."

Now, she says she only goes out when she has doctors' appointments or special events like the tournament.

Nearby, a volunteer baits the line for Anna Young, who has her guide dog, Natalie, by her side. Young, who is fishing for the second time in her life, throws out her line.

As she reels in a small fish, Young says to Natalie, "So you and I got one."

Toward the middle of the morning, the area around Young becomes so crowded that participants' lines get tangled up like a spider web.

"There were so many people and lines that the volunteers nearby had to untangle them," says Swain.

Around lunchtime, volunteers bring sandwiches to the participants.

As the wind picks up, Swain's husband, Delbert, rubs her fingers to warm them up.

Although most of the participants are matched with volunteers, some of the anglers on the pier also help out.

Not far from Swain, Thomas Wolosuk of Yale, Va., is baiting a hook for Emily Smith of Charlotte. "I just happened to be here and saw the way she was catching fish," says Wolosuk. "I realized she needed some help. Now, she has three-quarters of a bag full of fish."

For Smith, this is her best year for fishing.

"The weather is beautiful, and fishing is good," she says. "This year, I have learned how to tighten my line and look out for fish."

Some participants, like Swain, fish nonstop until the tournament ends.

"I had a woman stand with me the whole time," says Swain. "I don't know who she was. But she was like an angel for me."

Continued

TOURNAMENT HISTORY

The tournament was started by the First Flight Lions Club in Kill Devil Hills in 1983 with 12 participants. "We started it locally at the Nags Head Pier," says Dave Grana, VIP board member.

"By word of mouth it has expanded. It is a really gratifying to help with this event."

Over the years, the tournament has become so popular that there is a waiting list for participants.

"We put out applications around the first of May," says White. "By the first of June, we are filled up and have a waiting list."

The tournament has become so successful that is being used as a model program by Lions members in other states.

"It is our understanding that South Carolina and Virginia would like to start a tournament on a smaller scale than the one in North Carolina," says Sid Scruggs, past director of the Lions Clubs International. "Because of the success of the North Carolina tournament, other coastal states also are considering this type of tournament for the visually impaired in their state. Our ultimate goal is to get more states involved and develop an interstate championship."

One of the keys to the tournament's success is community involvement. Each year, the N.C. Lions Foundation, Outer Banks businesses and the Lions' Adopt-A-Fisherman program fund the tournament.

"This tournament is a great example of a public/private partnership," says Jack Thigpen, North Carolina Sea Grant extension director. "It really pulls the community together and gives the participants a memory that will last a lifetime."

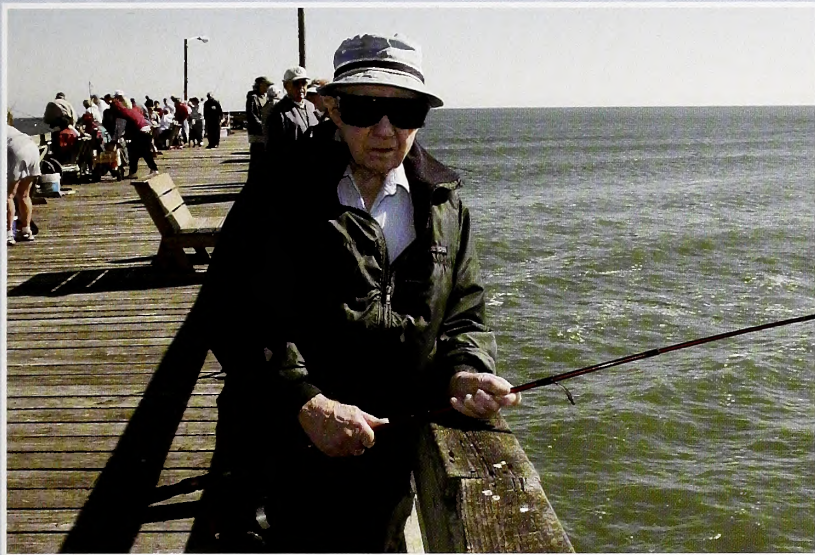
Over the years, tournament officials have overcome a number of obstacles.

During the aftermath of Hurricane Isabel that damaged Hatteras Island in 2003, officials moved the tournament from all but one oceanfront fishing pier. They were able to use the Washington Baum Bridge public pier operated by U.S. Fish & Wildlife Service.

Manteo High School students served as volunteers on the bridge. "They interacted with the visually impaired so well," says White. "They were able to sit and visit with them and weren't intimidated. It was a great experience for both the teens and the participants."

TOP: Volunteer Kerri Good unhooks a fish for a VIP. BOTTOM: Judi and Sid Scruggs enjoy helping with the tournament.





TOURNAMENT ANECDOTES

Stories about about humanitarian efforts at the tournament.

One year, a participant dropped his cane off the dock while fishing, says Ed Shivers, past district governor of the Lions Clubs in North Carolina.

"A swimmer tried to retrieve it but was unable," he adds. "However, a surfer came to the rescue. He retrieved the cane and passed it to the swimmer who returned it to the owner."

The tournament also has brought joy to many participants.

One year, a gentleman from Bertie County had tears running down his face as he held a trophy, according to Sally Syria, chief of the division's independent living and medical services. "He said, 'I'll be back next year.'"

For others, it has been a life-changing experience.

When Cathy Goodnight of Rowan County lost her sight, she gave up trying. Goodnight was encouraged to attend the fishing tournament with the Rowan Ramblers.

"What I saw, felt, did and learned at the VIP Fishing Tournament actually turned my life around," Goodnight wrote in a letter to the board of directors. "People with little or no sight can still actually do things, can learn to do for themselves, feel independent again, and can take charge of their lives."

"I was amazed," she continued. "I came home with a completely different attitude about my future. As a result of this marvelous event, I have now regained my sense of self-worth and am much more positive about life. I wonder if the Lions know that this isn't just a 'vacation' for visually impaired people, but at least in my case, a life-saving event."

For volunteers like Angelo Sonnesso of Colington Harbor, the tournament offers an opportunity to inspire others. "Life isn't the same, but it doesn't have to stop because you are blind," says Sonnesso, who is a social worker, amateur musician and VIP board member.

"You just have to learn to do things differently." ■

The 2005 VIP Fishing Tournament will be held Oct. 10-12 on the Outer Banks. To register or volunteer, contact Gwen White, 252/441-4966, whiteink1@earthlink.net or write: Gwen White, PO Box 676, Kill Devil Hills, NC 27948.

TOP: Walter Suggs fishes along Nags Head Fishing Pier.

BOTTOM: Volunteer Ean Armstrong, right, helps Leroy Fair bait a line.



by Lilly Loughner

Forecasting Waterspouts

New Service Aims to

Waterspouts in North Carolina waters can form quickly and be dangerous for boaters and swimmers.

Ken Blevis/Wilmington Star News

It was a cloudy summer day on the

Morehead City Waterfront when the crew of *Atlantis IV* heard a booming sound not more than 50 feet from their vessel.

The crew had docked at the Olympus Dive Center to refill its scuba air tanks when a waterspout appeared. The sea-spun funnel had formed quickly in the adjacent channel and began to chum on the surface.

Increase Safety

“You could see the tail coming out of the cloud, and it stopped traffic on the bridge — those people had a really good view,” Renate Eichinger, first mate on the *Atlantis IV* recalls. “I could see the swirl on the water, and I kept my eyes on it. Luckily it wasn’t coming straight at us, but still, it’s not somewhere you want to be.”

The spout spun across the docks and onto the roof of the building that was once Ottis’ Fish Market. Over land, the spout-turned-tornado grabbed loose shingles and tossed them through the air, before whirling off into the distance and dissipating.

“It didn’t seem enormous, but it was strong enough to throw things around,” says Eichinger, who had helped undock the boat and back it out of the spout’s damaging path.

Atlantis Charters runs 90 to 100 diving and fishing trips annually, and the crew spots waterspouts on roughly five of those trips. While Eichinger has no qualms about going out to sea everyday, and even enjoys watching the spouts dance beneath the distant cloud line, she’s no storm chaser.

“You don’t want to mess around with them. They’re beautiful, but from a distance,” Eichinger warns.

REPORTING SPOUTS

Boaters, who are most likely to spot waterspouts, may not think to report their sightings to forecasters: “It’s just part of the day, like getting in a traffic jam on the way to work — we’ll hit rough waters and not think much about it,” says Eichinger.

But tales of these “traffic jams” are just what Tim Armstrong, forecaster with the National Weather Service (NWS) office in Wilmington and local waterspout expert, wants to hear. Stories like

Eichinger’s, if reported, can improve the accuracy of waterspout risk forecasts, a new service provided by the NWS in Wilmington.

The Wilmington forecast office oversees five coastal counties, from Surf City in North Carolina to the South Santee River in South Carolina, and monitors marine weather up to 40 miles seaward.

“We’re trying to forecast fair weather waterspouts, usually the kind we see over water off the Carolinas,” says Armstrong.

A second type of waterspout, or tornado over water, is less common. Spawned by massive thunderstorms, “tomadic-type” waterspouts are more easily detected by radar, with warnings broadcast in advance.

The waterspout risk forecasts first became operational last summer as part of the Surf Zone Forecast. Accessible on the Web, the forecast provides information about coastal hazards, such as lightning and rip currents, as well as daily weather and surf conditions.

Wilmington’s online Surf Zone Forecast is enhanced by graphics that display various hazards, including a color-coded map detailing waterspout risk levels — none, low, moderate and high. Mariners and beachgoers can check the waterspout risk forecast, which is issued twice daily during spring and summer months, the peak times for waterspouts.

“Last year was our first run with the waterspout forecast. We’ll look things over and see how we can make it better,” says Tom Matheson, warning coordination meteorologist with the NWS in Wilmington. “It’s a good estimate, at this point, based on science.”

The forecast is modeled after a five-year effort in the Florida Keys. The world’s capital for waterspouts, the Keys experience up to 500 waterspouts each year due to warm sea surfaces surrounding the heated islands.

Although waterspouts along North Carolina are not as frequent as in the Keys, they are dangerous and sometimes even tomadic, according to Joseph Golden, senior meteorologist and waterspout expert with the National Oceanic and Atmospheric Administration (NOAA).

“The primary warm axis of the Gulf Stream and large coastal bays and inland waterways are favored regions of waterspout occurrence,” Golden explains in the *Encyclopedia of Atmospheric Sciences* chapter dedicated to waterspouts.

Currently offered nowhere else along the North Carolina coast, the waterspout forecast draws interest from other NWS offices. In Morehead City, Thomas Kreihn, NWS meteorologist-in-charge, is following the Wilmington prototype to see how it functions this year.

SPREADING THE WORD

As waterspouts form and fade in the Atlantic — each a slender, spinning column anchored only by limits of cloud and sea — they are difficult, if not impossible, to predict.

Less-established weather systems rarely show up on radar. “Weaker, smaller waterspouts are pretty much undetectable,” says Jeff Orrock, warning coordination meteorologist with the NWS in Raleigh, who formerly worked with the Morehead City office. Therefore, forecasters often must rely on boaters’ reports to spread warnings.

Waterspouts are visible, often from miles away, and last for only minutes. “Most of the time you see them before a warning comes out,” says George Punifoy, owner of Olympus Dive Center.

Punifoy has seen up to five or six in clusters on diving or fishing trips and has learned to “just steer away from” threatening spouts. “Usually we’re the ones that call in the warning,” he explains.

The NWS in Wilmington issues a special waterspout forecast over NOAA Weather Radio on high-risk days. For maximum safety, all vessels should be equipped with VHF marine band radios that receive warnings from frequencies within the weather band or rebroadcasts of warnings from the U.S. Coast Guard.

Open communication is a boater’s best protection against fair weather waterspouts, according to Jim Bahen, former North Carolina Sea Grant fisheries specialist who now works as a recreational fishing guide.

“We’re all the time, constantly, talking on the radio. Everyone’s always looking out for the other person — that’s what you have to do out there,” he says of boaters.

Although they generally can’t identify waterspouts as they occur, the forecasts do help people better plan a day on the coast, and safeguard life and property when risks are high. But, according to Armstrong, the forecast can’t work to its full potential without input from those it serves.

Continued

NATURALIST'S NOTEBOOK

"Basically we make a forecast every day, and we never hear whether or not a waterspout occurred unless someone reports one," Armstrong explains. "[The reports] help us grade and verify our forecast and help improve the service we provide our public."

The NWS receives reports of 6 to 10 waterspouts on average per year through the Wilmington office. However, "if you look at the entire North Carolina coastline, I'm sure that there are a couple dozen waterspouts forming a year," says Armstrong.

DISSECTING THE SPOUT

"On the still summer mornings, when there's nothing going on, when its perfectly peaceful night around sunrise, you may see a waterspout out there spinning — kind of Oz-like," Matheson describes the more benign fair-weather beauties.

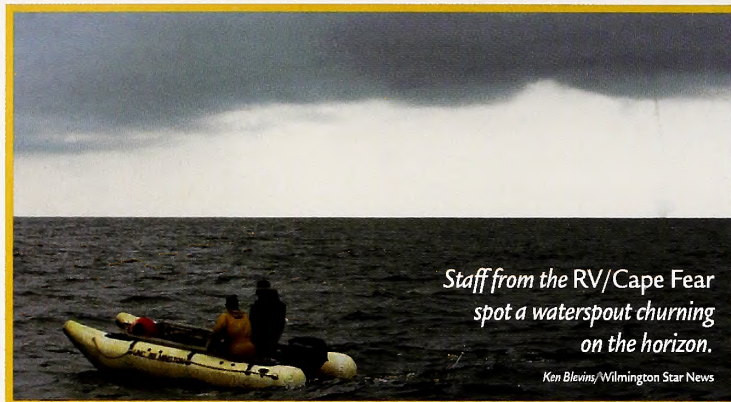
For Matheson, these waterspouts seem "almost miraculous." They usually don't come ashore, but rather, sit over the water for a few minutes, stabilizing the early morning atmosphere as the land breeze carries the nighttime drift of cooler air out to the ocean.

When the cooler air of the land breeze front undercuts the warmer air over the warm summer ocean, the atmosphere becomes unstable because the discontinuity in temperature creates a horizontal spin. These waterspouts become less of a destructive force than an "efficient vertical mixing process," Matheson explains.

"The spinning process is a more efficient way to transfer mass, to transfer the warm air upward," he adds.

Tall, puffy cumulus clouds with flat, dark bottoms are formed by updrafts and are signs that air is rising and could spin up a waterspout on the water surface. As the air rises beneath the cloud and above the surface-fed vortex, a connection between sea and sky is made, and a waterspout is formed.

"The updraft grabs the spin and stretches it out. It's kind of like skaters pulling their arms



in, which causes them to spin faster and faster," Orrock explains.

Sunrise to noon is the most conducive time for waterspout formation — before the afternoon sea breeze creates enough wind shear to break up fair weather waterspouts. Wind shear is the tendency for winds to change direction and speed between slightly different altitudes.

According to Orrock, fair weather systems are fragile, and require low wind shear to form and remain stable.

Once formed, waterspouts are an impressive sight, as their winds can reach 100 mph and travel at a speed of about 10 knots. The lifespan of a waterspout varies but usually lasts no more than 20 minutes. "The bigger, the more impressive it looks, the longer it will last," Orrock says.

PROMOTING OCEAN SAFETY

When atmospheric conditions are right, forecasters can predict the risk of waterspouts on any given day. But you don't have to be a trained meteorologist to take safety precautions.

Safety Tips for Boaters

- ◆ *Be informed:* Know the time of day that waterspouts form, the typical cloud structures and associated weather patterns.

- ◆ *Be prepared:* Check forecasts for storms and threatening weather and always give a float plan to your local marina before leaving safe harbor.

- ◆ *Be aware of your surroundings:* Pay attention to weather inland to avoid surprise thunderstorms. Listen to weather radio alerts and warnings issued for storms brewing inland as well as at sea.

- ◆ *Steer dear:* If you do cross paths with

a waterspout, remain calm. Remember the typical waterspout affects a very small area. "Observe its motion or direction and move away from it in a straight line as fast as you can," Armstrong advises.

- ◆ *Seek safe harbor:* "If you're dealing with a true thunderstorm that is becoming a tomado, that's a whole different story," says Orrock. A large, tomadic thunderstorm

could produce lightning and many different waterspouts.

Coastal communities and visiting beachgoers also should watch the forecasts for waterspout risks. "It's not uncommon for them to skirt onto the beach," Orrock says.

While onshore, waterspouts can do the same damage associated with small tomados. However, since waterspouts thrive best over the smooth, frictionless ocean surface, they don't survive long on land. The sand, dunes, trees and buildings found along most beaches usually rip a waterspout's circulation apart within a few seconds.

Boaters may worry about imploding windows or tom canopies. But according to Punifoy, waterspouts also could be armed with slippery projectiles — raining schools of fish.

"The waterspout could be a mile away, and you'll actually see fish landing and things hitting the water — it's rare, but it does happen." □

FORECASTERS NEED YOUR HELP!

Visit the National Weather Service (NWS) in Wilmington online. The new waterspout risk forecasts can be viewed at www.erh.noaa.gov/ilm/beach.

To report a waterspout, immediately call the NWS office, 910/762-4289, with details on the time and location of the sighting.

Information and pictures also can be sent to Tim Armstrong at Timothy.Armstrong@noaa.gov.



Scott Taylor

Rediscovering New Bern

by Pam Smith

It's likely that a visitor's first sight of New Bern is a quick windshield glance at the picturesque waterfront — a panorama of tidy marinas, handsome architecture, church spires, and the city's signature clock tower.

The raised highway/bridge complex offering the spectacular view is itself an awesome engineering feat. Its multi-arms reach east toward the coast, arch across a wide expanse of the Neuse River to Bridgeton, and

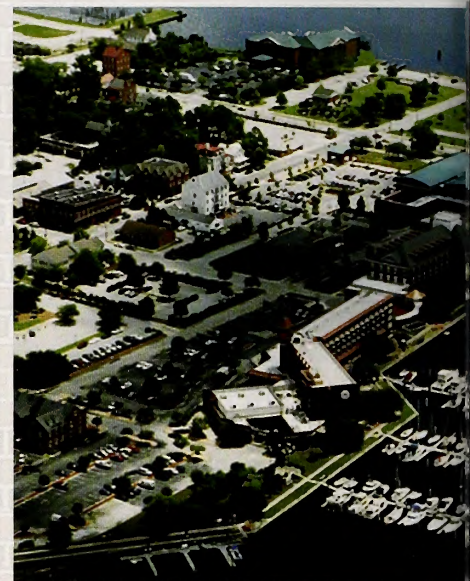
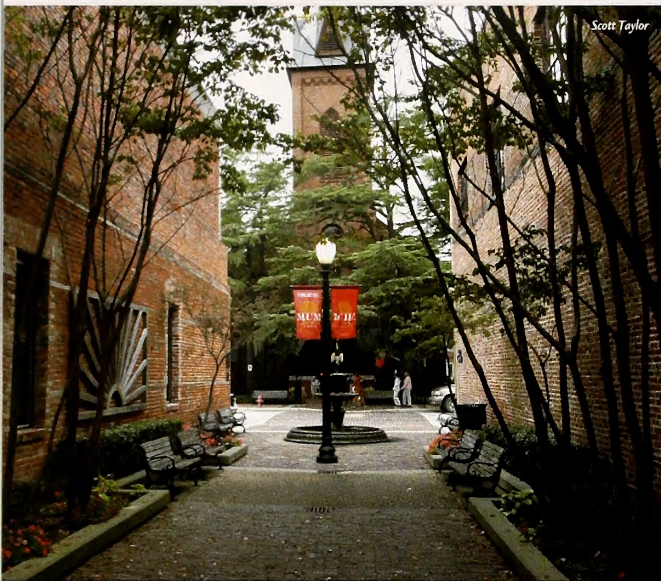
loop into New Bern to deliver motorists to the heart of the downtown historic district.

To travel New Bern streets is to retrace its nearly 300-year history. New Bern was founded in 1710 by Swiss and German immigrants, who named it for the Swiss capital of Bern. It would become the colonial capital of North Carolina; cultivate seeds of revolution; host President George Washington; and serve as the first state capital.

For history buffs, New Bern offers more than historic markers along tree-lined streets. Upward of 150 significant homes, churches and other buildings — places where history was made — already have been restored. And, you literally can smell the paint drying on additional projects in nearly every part of town — from residential to commercial quarters.

Continued

PEOPLE & PLACES



LEFT TO RIGHT: This pocket park is a pleasant pass-through in the bustling business district. • Tryon Palace is the centerpiece of New Bern's history-based tourism. • New Bern's waterfront has

Ongoing restoration is part of a much bigger picture. Some 25 years ago, community leaders adopted a long-range revitalization strategy to re-establish New Bern, the seat of Craven County, as a vibrant coastal center.

PAST AS PROLOGUE

From its earliest days, New Bern thrived — first as an important colonial port city, and later as a bustling railroad center. But like many small cities, New Bern's pulse began to fade in the mid-1900s when industry abandoned rails and rivers for superhighways, and citizens opted to drive away from city centers to settle and shop in the suburbs.

By the 1960s, New Bern's once vital waterfront was in sad shape, and its downtown on the verge of collapse.

"Visionaries in the business community pulled citizens together in 1977 to devise a plan that would breathe new life into New Bern," recalls Susan Moffat, executive director of Swiss Bear Downtown Development Corporation.

That first downtown revitalization plan would become a blueprint for sustainable economic development that emphasized a "sense of place." To manage and coordinate New Bern's renaissance, city, county and community leaders created the private nonprofit Swiss Bear in 1979.

Sad as the waterfront was, Moffat says, the community saw its potential as a catalyst

— along with the city's historic assets — for expanding the tourism industry, developing recreational opportunities, and stimulating a housing market to attract retirees.

The downtown plan gained momentum in 1980 when New Bern became one of the first North Carolina cities to participate in the Main Street Program, created by the National Trust for Historic Preservation. Now administered through the N.C. Department of Commerce, the program provides technical support to smaller cities like New Bern that use historic preservation to promote economic development.

Twenty-five years later, New Bern is the "poster child" for the program, says Rodney Swink, who oversees the Main Street Program.

He attributes the success to the public-private partnership of elected officials, the business community and Swiss Bear's consistent leadership.

For example, an earlier federal urban renewal program helped clear derelict warehouses, buildings and debris from 14 acres of land along the Trent River for new development. In 1983, Swiss Bear recruited a developer to construct the \$13-million Sheraton waterfront hotel and marina, and helped the city secure a \$1.9 million federal action grant for infrastructure essential to the project's success. The complex expanded in the early 1990s with the construction of a luxury inn. And, in 2000,

the 30,000-square-foot New Bern Riverfront Convention Center opened next door.

PARTNERSHIP FOR PROGRESS

"Grants have been important, along with fundraising, investment tax credits and low-interest loan pools," Moffat says. "But the most powerful tool has been the involvement of the business community."

"We're all moving together toward a common goal — New Bern," says Harold Talton, a retired banker and past chairman of the Swiss Bear board of directors. "Local merchants in a 10- to 12-block area of downtown voted double taxation on themselves to do (2004-2005) street improvements, bury utilities, lay sidewalks and install planting strips."

Talton says the New Bern Historical Society, Historical Preservation Foundation and Chamber of Commerce are working with Swiss Bear and city and county governments in what he calls a "partnership for progress."

Talton notes that plans are moving forward for the Tryon Palace \$50-million visitors' center and history education complex. It will be built along the Trent River on the former Barbour Boat Works site. The state acquired the six-acre parcel for \$1.75 million, with \$750,000 of that raised by private donations. Once complete in 2009, Tryon Palace officials estimate that attendance figures will soar from its current 90,000 to 200,000 annually.

New Bern/Craven County Convention and Visitors Center



Scott Taylor



and a major facelift in the past 25 years. • Bear Plaza once was an unattractive alley filled with debris and discarded appliances.

“New Bern is a community where people truly believe that a rising tide floats all boats. People do things not necessarily to reap personal rewards, but to see that all benefit,” says Mike Avery, New Bern’s planning director.

Case in point: A New Bern businessman served as a liaison for the city to purchase a building that was needed as a vital part of the downtown improvement plan.

“It was a modern building that filled in between two historic buildings,” Avery explains.

Once the sale was complete, the city demolished the building. Swiss Bear raised \$60,000 to redevelop the site as a pocket park. Known as James Reed Lane, it provides a pedestrian connection to interior parking between two streets in the business district.

SUCCESS BREEDS SUCCESS

Revitalization efforts in many parts of the country and state have fizzled due to lack of interest over time, but not in New Bern, says Main Street’s Swink. That might be attributed to the fact that, while New Bern has taken a long-term approach, community leaders have formulated a new urban design plan decade-by-decade. “Setting out a series of improvement goals is more manageable,” he says.

And, success has bred success. Since New Bern adopted its first urban design plan, Moffat says there has been a major increase in

downtown property values — from \$8.75 million in 1979, to \$42.3 million in 1994, and \$63 million in 2003. Property values have increased an average of 440 percent. Approximately 200 downtown businesses employ 2,300 people. Tourism, now a major industry, generates more than \$70.4 million annually.

More than \$70 million has been invested over the past 25 years in new construction and renovation in the downtown area — four new hotels, three marinas, seven blocks of streetscape improvements, four new parking lots, and the creation of two mid-block pedestrian parks. The riverwalk that parallels the historic district along the Trent River has given the public easy access to the waterfront.

In addition to storefront improvements, the city has seen the renovation of upper-story commercial building space for residential and office use.

The expansion and redevelopment of the Union Point Park, a promontory at the confluence of the Neuse and Trent rivers, provides a scenic gathering place for community events. Its picturesque gazebo is a popular site for wedding ceremonies.

NEW URBAN PLAN

An ambitious urban design plan adopted in 2000 includes more than \$100 million in projects, according to Moffat. Swiss Bear’s role

will be to continue to build partnerships to attract investments to implement the far-reaching ten-year agenda.

The new plan expands revitalization efforts into Riverstation, an industrial area north of the old railroad depot that includes many vacant and underutilized buildings, and Five Points, a mixed commercial and residential area.

Also on tap is a 90-unit condo project, streetscapes and a bridge replacement — all to be completed by 2010 when New Bern celebrates its tercentenary.

For his part, Talton believes it all will happen on schedule. “A lot has happened in 25 years, and a lot more is planned that will absolutely happen because everyone bought into the plan. Everyone is on board,” he says. □

For information, contact:

- Susan Moffat at Swiss Bear Downtown Development Corporation, 252/638-5781; or
- Rodney Swink, N.C. Main Street Program, 919/733-2853, ext. 226.

WANT TO GO?

New Bern is a year-round destination for tourists. More than 150 sites in New Bern are on the National Register of Historic Places.

Tryon Palace, built in 1770 by British Colonial Gov. William Tryon, is the centerpiece of the historic district. The palace and gardens were restored in the 1950s by the New Bern Preservation Foundation.

Popular tourist events include the Spring Home Tour, April 8-9, sponsored by the New Bern Historical Society (NBHS) and the New Bern Preservation Foundation; New Bern at Night Ghostwalk, Oct. 26-27, sponsored by the NBHS; and Mumfest in October, sponsored by Swiss Bear.

Contacts:

- Tryon Palace and Gardens, 252/514-4900;
- Craven County Convention and Visitors Bureau, 252/637-9400;
- New Bern Area Chamber of Commerce, 252/637-3111; and
- New Bern Historical Society, 252/638-8558.

SOUND



Bottlenose dolphins have been included in seafarer legends for centuries, but today's fishing captains are worried more about the charismatic creatures getting caught up in nets than folklore.

Entanglement is a major issue for the mid-Atlantic coastal gill net fishery, which is comprised of several smaller, seasonal fisheries. The fishery ranks among the highest in the Western North Atlantic for entanglement-related dolphin deaths. From New Jersey to North Carolina, an estimated 210 bottlenose dolphins were killed between 1992 and 2001, according to the National Oceanic and Atmospheric Administration's (NOAA) most recent stock assessment.

Dolphins may get tangled while eating fish from nets, a behavior known as depredation. But it is also possible they run into nets accidentally, says Andrew Read, a Duke University marine scientist who studies bottlenose dolphin behavior.

Either way, it's a lose-lose situation — and not just for dolphins.

"Fishermen don't want to experience depredation because it costs money," says Read. "And, fishermen don't want to catch dolphins. It's a big regulatory headache for them."

Last summer, Read and Hatteras fisherman Dave Swanner received a grant from the N.C. Fishery Resource Grant (FRG) program to

study whether acoustic deterrent devices called "Save Waves" effectively keep dolphins away from gill nets. The FRG program is funded by the North Carolina General Assembly and administered by North Carolina Sea Grant.

Used widely in Mediterranean fisheries, Save Waves produce random pulses of sound at the same level of intensity a dolphin uses to echolocate, a physiological process that involves emitting sound waves to locate distant objects, such as prey.

Save Waves are anecdotal successes in Europe, but there has been very little scientific study to assess their effectiveness, says Read. If such devices can deter hungry or wayward dolphins, depredation and entanglements could be reduced, he adds.

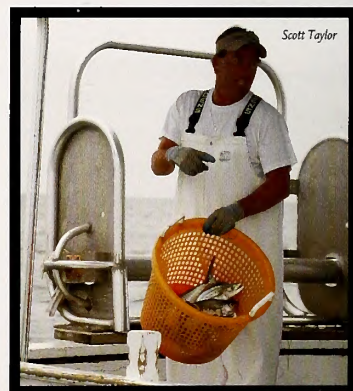
Read decided to study the Spanish mackerel fishery in North Carolina because it experiences both dolphin depredation and entanglement. Bottlenose dolphins are capable of reducing Spanish mackerel catches by nearly 40 percent, according to one of his reports. And about one or two dolphins become entangled in the fishery's nets each year.

These bycatch numbers may seem low, but the Spanish mackerel fishery is part of the larger mid-Atlantic coastal gill net fishery, and



TOP: A bottlenose dolphin surfaces near the Endurance. MIDDLE: Dave Swanner hauls in his nets as Erin Burke documents his catch.

BOTTOM: Swanner holds a basket of Spanish mackerel from his first set.

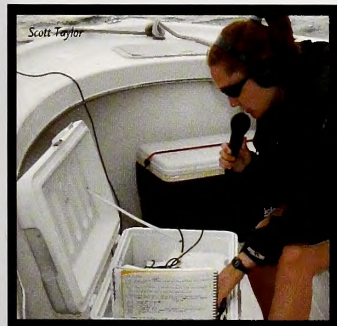
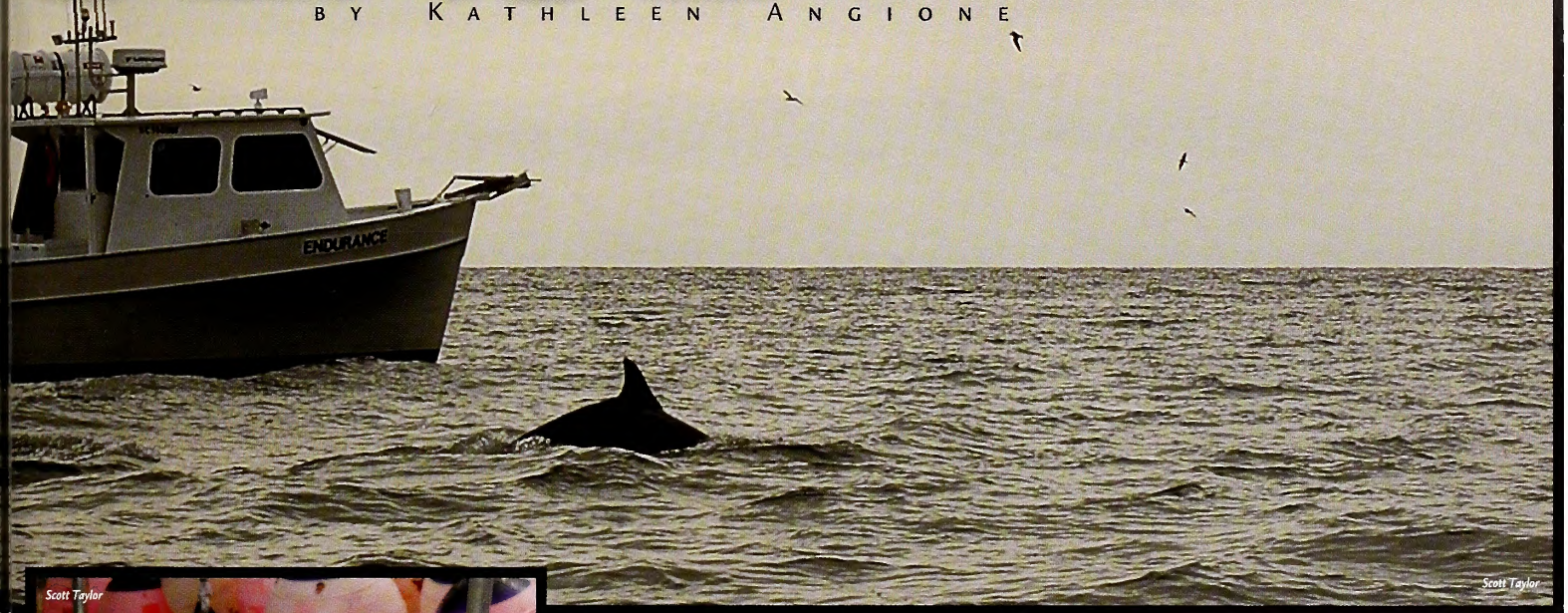


the numbers must be factored into the collective fishing effort among all the mid-Atlantic's individual gill net fisheries, explains Read. The resulting totals for dolphin bycatch often exceed thresholds set by the National Marine Fisheries Service (NOAA Fisheries) for ensuring that bottlenose dolphin populations remain stable.

SENSE

BY KATHLEEN ANGIONE

SEA
SCIENCE



TOP: Each Save Wave has a microcomputer that produces sound either between 60-150 kHz or 5-90 kHz. BOTTOM: Lynne Williams uses a hydrophone to listen for echolocation behavior.

Deterrent or Dinner?

One of the biggest unknowns about Save Waves is whether bottlenose dolphins will get used to the noise with time, says Read.

In previous studies, different acoustic devices called "pingers" initially kept harbor porpoises away from gill nets in the Gulf of Maine. But pingers produce noise at a constant interval, and the porpoises adapted.

In a 2000 FRG study, Read worked with two Hatteras fishermen to study bottlenose

dolphin behavior around pingers. When the devices were on, dolphins barely altered their travel patterns. Read speculated that, like the porpoises, the dolphins would grow accustomed to the constant pinging noise. Moreover, Read believed they might eventually associate the sound with a net full of fish — a response he calls the "dinner bell effect."

But the noise from Save Waves changes frequency, hopefully making it harder for dolphins to acclimate.

"Bottlenose dolphins can be stubborn creatures, and they've proven to be in these situations," Read cautions.

On an overcast morning in Hatteras, Erin Burke, a Duke graduate student, joins Dave Swanner, captain of the *Endurance* and Read's co-investigator. Burke is responsible for attaching Save Waves to Swanner's nets and documenting his catch.

To properly randomize the study, Burke flips a coin to decide if the Save Waves will be activated during this trip. The coin lands on tails, meaning the devices will be silent today. Meanwhile, researcher Danielle Waples of Duke joins Paul Dunn, captain of the *Shannon D*. Her coin toss comes up heads, so the Save Waves on Dunn's nets will be activated.

Nearby, Read, researcher Kim Urian and

graduate students Ari Friedlaender and Lynne Williams board the *Proteus* and begin scouting the area for dolphins.

Swanner turns up his marine radio and listens as a nearby captain reports only three mackerel on the last set. Another voice chimes in, reporting zero. Shaking his head, Swanner decides to try his luck near Frisco.

"It's basically a guess fishery," he says. "You set a net and see if there is anything you like."

Swanner turns on the hydraulic net reel, mounted on the back of his boat. The reel looks like an oversized spool of thread, wrapped with layers of green mesh netting that eventually will stretch the length of the water column.

Larger fish, like mackerel, are too big to pass through the net and instead become entangled in the mesh.

As Swanner feeds the net into the water, he halts the reel periodically so Burke can clip a Save Wave onto the net's floatline.

"The problem is we've got to take them on and off every step of the way," she explains.

Each Save Wave must be spaced 150 yards apart to create optimum sound. But Swanner has four 300-yard nets, meaning each net requires two Save Waves. Come fall, it will be too time-

Continued

TOP: A mother and her calf swim near the *Proteus*. BOTTOM LEFT: Andy Read and Ari Friedlaender spot a dolphin in the distance as Kim Urian records its location. BOTTOM RIGHT: A leftover fish head in a gill net is a telltale sign of dolphin depredation.



consuming to attach the devices; he can't afford to experiment during the height of Spanish mackerel season. Leaving Save Waves on the nets also is out of the question, as the powerful net reel would shatter them.

"They're not very robust," says Read. Save Waves are designed for European fisheries, which typically haul in nets by hand. If Save Waves were ever to be used in the United States, they would have to be redesigned to withstand hydraulic equipment, he adds.

The Blame Game

Soon, researchers on the *Proteus* spot a group of dolphins heading for Swanner's boat. Read and Urian quickly record the dolphins' position using an onboard Global Positioning System (GPS) unit, and Williams, the group's acoustic expert, drops a hydrophone in the water to record the dolphins' echolocation clicks.

As each dolphin surfaces, Friedlaender photographs its dorsal fin for later identification.

"Knowing who's who is important in our work," says Read.

The team is fairly sure these dolphins mostly live in estuarine areas, traveling from inlet to inlet.

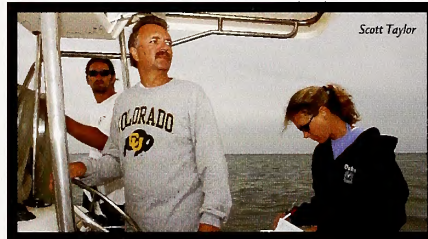
Read suspects the animals are not trying to grab a free meal from Swanner's nets, however. Data from past observations and photo identification indicate dolphins living primarily in the open ocean are more likely to depredate than their estuarine counterparts.

Even so, the team must wait until Swanner pulls in his nets to be sure the estuarine dolphins weren't snacking.

"You'll know there was depredation because there will just be mackerel heads in the net," says Burke.

"Dolphins get blamed for most of the depredation because they're very visible," explains Read. Sea turtles, sharks and crabs are other likely suspects, but dolphins usually take the fall because of their highly visible, high-energy behavior.

Yet the dolphins' speed and gymnastics don't seem to increase their risk of entanglement,



says Read. In a previous study, he and Urian observed a group of dolphins swim alongside as many as 10 gill nets without getting tangled.

"How are they figuring out the nets are there?" Urian wonders rhetorically.

To try and answer that question, Swanner designed a fake gill net — a corkline with floats but no actual netting. The dolphins aren't quite sure what to make of it, says Urian.

"A couple go under, but most of them go around," says Read. "It really does seem like they are confused by it — they expect to see a net there."

Navigational Nuances

Eventually, the dolphins investigating Swanner's nets lose interest and swim away.

Williams' hydrophone didn't pick up any echolocation clicks. Many of the estuarine dolphins don't seem to use their powerful sonar ability while transiting the Hatteras shoreline, she says.

The team has recorded the same dolphins in both Hatteras and Beaufort, and they echolocate more in Beaufort, she says.

The reason for this variation isn't entirely clear, but water clarity may be a factor, adds Read.

If the water is turbid, dolphins may be forced to echolocate more frequently, he says. Read suggests that dolphins use a range of senses to navigate their environment, including vision and passive listening.

"If the net isn't visible, and it doesn't produce any sound, they might run into it," he reasons.

Without a clear understanding of how dolphins detect nets, it is difficult to develop



new fishing gear or methods to reduce entanglements. In addition to acoustic alarms, Read hopes to study whether altering net design would affect entanglement rates.

"Nets with larger mesh [holes] tend to be more dangerous to dolphins because they are designed to catch larger animals," he explains. Mesh with smaller holes and made of thicker material would be stiffer, possibly making it easier for dolphins to escape.

But Read cautiously balances what is good for the ocean versus what is good for those who depend on it: "The bigger question is how would thicker nets with smaller holes affect the catch?"

More than an hour after his first set, Swanner pulls in the nets and finds only four mackerel, three bluefish and one blue crab. Dunn and Waples report similar luck from the *Shannon D*.

Bad weather and unusually low fish catches last summer made it difficult to gather enough data to draw conclusions about dolphin response to Save Waves, says Read. However, data from Burke's observations show that the devices did not affect fish catches.

Read and his team plan to return to Hatteras this summer to continue researching the devices, produced by SaveWave Dolphin Savers.

"We'd rather not be introducing all that sound into the environment," he admits. "But I also don't think it is fair to provide fishermen with a potential means of reducing depredation and then not assess whether it works." □

Blowin' in the Wind

Solar Center Studies Potential Energy Source

By Ryan Reynolds

Action fills the air at the McKimmon Center on a windy afternoon.

North Carolina State University's conference center is best known for the meetings and activity inside — but today the action is outside in a nearby field.

Atop a 30-meter tower in an open field, a weather vane spins with each wind gust. It is not a relic of the past, but a possible symbol of the future: its built-in anemometer could lead to a new type of renewable energy in North Carolina.

"Anemometers could lead to people putting up wind turbines in wind-efficient areas of North Carolina," says Beth Mast, renewable energy specialist for the North Carolina Solar Center, headquartered at the McKimmon Center.

Installed last summer by the N.C. Solar Center as part of its Coastal Wind Initiative, the anemometer collects wind speed data every two seconds for 10-minute intervals.

The Coastal Wind Initiative is attempting to educate and create excitement among national developers and local residents about areas where wind speed has the potential to produce power. Wind maps of eastern North Carolina have been created for the Coastal Wind Initiative over the past couple of years. They have proved to be a useful tool for judging where wind power might be greatest in the state.

Until recently, the only wind speed measurements in North Carolina were from generalized wind maps and didn't paint an accurate picture of larger areas. But experts say that certain regions in eastern North Carolina have great potential to harvest wind and convert it into energy.

Most land areas in the coastal counties of Carteret and Hyde have Class 4 wind areas, according to a map created by NC State's Center for Earth Observation. The map also shows Class 5 wind areas in some spots off the coast, as well as Class 6 wind areas — the highest on the scale — offshore of the Outer Banks.

The Solar Center, with funding from the U.S. Department of Energy and N.C. State Energy Office, started an anemometer loan program last summer to target areas in the eastern part of the state that potentially have sufficient wind.

The on-loan anemometers include wind vanes, data loggers and towers measuring 20 to 50 meters tall.

"The program is for small businesses, entire towns or just a home," says Mast. "The anemometer needs to be there for a year to collect data. You need to have one year to see what all four seasons look like."

As part of the loan program, temporary anemometers have been installed by the N.C. Solar Center at a number of sites, including Carolina Soy Products in Warsaw, the N.C. Aquarium at Fort Fisher, an island in Bogue Sound near Atlantic Beach, and a municipal sewage treatment facility in Onslow County.

Continued

The Solar Center also installed an anemometer at North River Farm, a restoration site in Carteret County acquired by the N.C. Coastal Federation, according to Mast.

FUTURE WIND ENERGY?

When Jim Bacchus peers out the window of his car, he can't help but notice the poor air quality in Charlotte. "We do not do well from a pollution standpoint," he says.

When in a metropolitan area like the Queen City, Bacchus can't help but think about his house in Topsail Island, a far cry from city life. There, traffic problems are limited to the summer tourist season.

Not far from his beach house is the anemometer he received from the N.C. Solar Center's loan program. He had it installed at the nearby sewage treatment facility to keep it out of view.

But the state is several years away from creating large-scale wind facilities, according to Bacchus, managing director of Terrapin Wind, a company that hopes one day to create what he calls "wind farms" in eastern North Carolina.

Developers are having difficulty receiving long-term commercial financing right now, he says. "The longest financing available is for five years," Bacchus explains. "Nothing is going to happen unless there's many more years put on the contract. It will be a catalyst for wind power if tomorrow someone started serving a seven-to-10 year contract."

The availability of affordable long-term financing is only one aspect to consider regarding wind energy, says Walter Clark, coastal communities and policy specialist with North Carolina Sea Grant.

With tourism as one of North Carolina's biggest industries, perhaps the most critical issue is aesthetics, he adds.

"People come to our mountains and coast to see the undulating ridges of the Blue Ridge and vast openness of our coastal sounds and the Atlantic," says Clark.

"If wind turbines threaten to clutter the horizon of our ocean vistas and mountain ridges, there will likely be substantial opposition from those that depend on beautiful views to nourish

the soul and tourism dollars to line the pocket," he says.

"On the other hand, if wind turbines are designed and located so as to minimize aesthetic impacts, wind may become a viable alternative energy supplement," Clark explains.

Bacchus also cites visual appearance as a critical factor. "North Carolina residents want wind farms to be out of sight," says Bacchus. "You toil your whole life for a beautiful view at the beach."

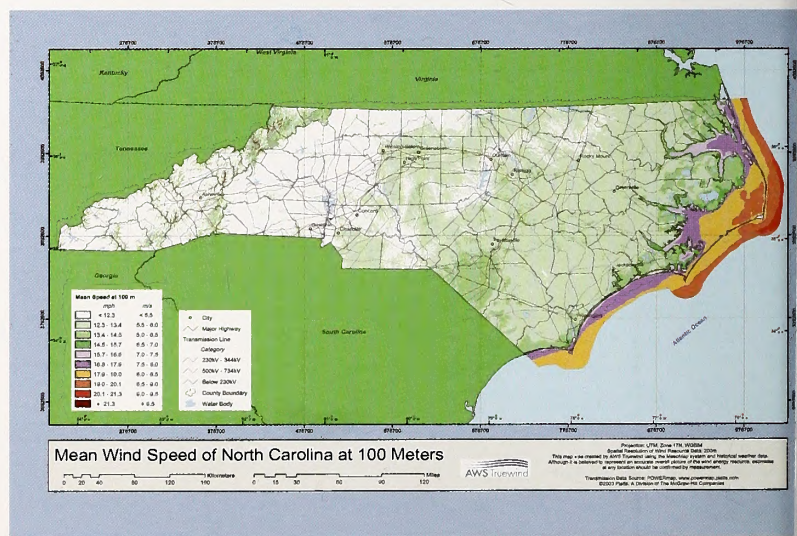
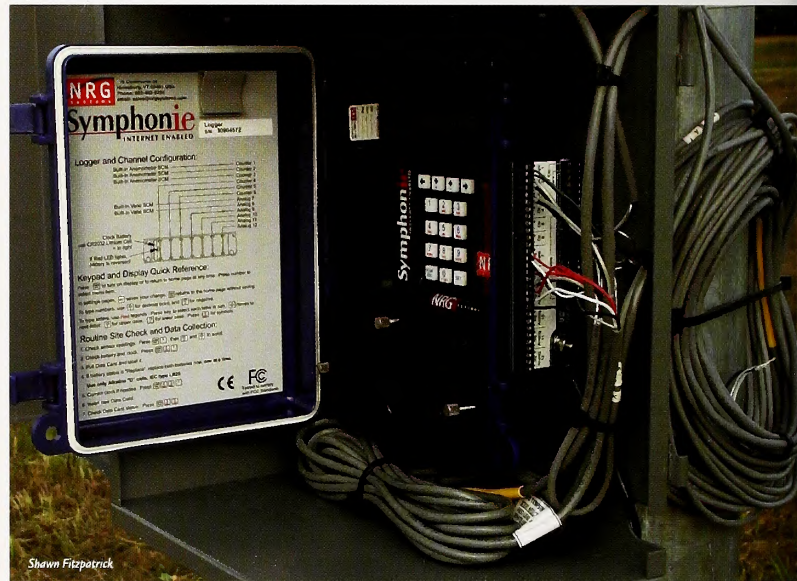
Aesthetics have been part of the problem with the proposed Cape Wind project, a much-publicized effort to build a wind farm four miles off the Cape Cod shore in Massachusetts. The developers hope to place 170 wind turbines within a five-mile by five-mile area and supply enough electricity to power half of Cape Cod.

The Cape Cod project is well received by most of the locals, says Steve Kalland, deputy director of

TOP: N.C. Solar Center solar energy specialist Shawn Fitzpatrick wires the wind vane on a 20-meter tower.

MIDDLE: The NRG

Symphonie logger, mounted at the base of a 50-meter tower, was installed in Sneads Ferry. BOTTOM: The Coastal Wind Initiative provides data, such as maps identifying wind speeds. TOP RIGHT: Shawn Fitzpatrick (left) and Beth Mast stand in front of an anemometer outside of the McKimmon Center. BOTTOM RIGHT: A 50-meter tower is being raised at Sneads Ferry as part of the anemometer installation process.





currently does not allow for large-scale private leasing of state-owned coastal waters," he says.

In an effort to balance and protect public uses of coastal waters, North Carolina only allows private leasing for shellfish aquaculture and on a limited per-acre basis.

"To encourage large-scale offshore wind energy generation, state policy would need to be refocused. This likely would require the support of other users of coastal waters such as commercial and recreational fishers and boaters," Clark says.

DATA, POLICIES NEEDED

Despite the financial barrier of large-scale wind, Kalland says small-scale turbines like the ones Carter installs may get the public's attention and ultimately lead to large-scale wind farms at the coast operated by utility companies.

But the first step will be deciphering the data from the anemometers.

Those numbers will determine if developing wind power sites in eastern North Carolina would be feasible. And right now it's hard to gauge the potential, notes Mast.

"I can't say that it's been a breakthrough at this point," says Mast. "No one is going to put up a turbine until we have a year's worth of data to show for it."

The N.C. Coastal Resources Law, Planning and Policy Center is examining policies related to coastal wind power development. The center is a collaboration of North Carolina Sea Grant, the UNC Law School and the UNC Coastal Studies Institute.

Clark cites several complicated questions that need to be addressed before large-scale wind power is introduced to North Carolina. These include:

- Will policy be changed to encourage individual, small-scale wind turbines, or will changes go further to support and encourage larger, utility-scale wind facilities?
- How much energy can wind produce and how does it compare to other conventional and nonconventional energy sources — today and in the future?
- What is the source of North Carolina's air pollution and will wind energy measurably mitigate the problem?
- Regarding the coastal sounds and ocean waters, can North Carolina develop a policy that allows for balance between public and private uses of state-owned coastal waters?
- What will be the overall impression of local communities regarding large-scale wind farms?

"Until these, along with many other issues, can be answered, large-scale wind energy in North Carolina will continue to be a thought instead of reality," Clark says. □

For more information on the North Carolina Coastal Wind Initiative, go online to www.ncsc.ncsu.edu.



SMALL-SCALE WIND

Chns Carter says wind and other renewable resources — such as the sun — need to be utilized if humans want to be "clean and green and not out of the race." That's why he's been installing small-scale wind power and solar energy projects for businesses, homeowners and farms for more than a decade.

Carter is president of Solar Village, a company in Saxapahaw in Alamance County. The wind turbines he installs run through a battery and need a much lower-grade

wind to produce electricity for a single location.

"That's the way my house has been running for 12 years," says Carter. "We have our own gourmet wind power here. They [wind turbines] are very cost-effective and a lot of fun."

The total cost of installing small-scale wind power equipment ranges from about \$45,000 to \$55,000, according to Carter. The initial cost may sound expensive, but he cites one major long-term return: there aren't any more power bills to pay.

Carter has installed wind systems all over North Carolina, South Carolina and Virginia.

"A variety of people want renewable energy," Carter says, rattling off a list of potential clients. "Somebody with remote property, or the first person on the block who wants this type of technology to set a standard. It's unstoppable. Wind power is the cheapest electricity in the world right now, and we've got to get it."

development for the N.C. Solar Center. But, he acknowledges, those who are opposed to the project have been very vocal.

"The developers went forward without talking to anybody," says Kalland. "We don't want to do that in North Carolina."

The key to having people accept wind farms at popular areas like the beach is to talk to the residents to familiarize them with the process and the proposed project, says Bacchus. "But right now we're basically on hold until we receive the proper financing," he adds.

The Coastal Wind Initiative also includes a study to gauge public perceptions of wind power in eastern North Carolina.

Another issue centers on the use of North Carolina's coastal sounds and ocean waters as a platform for wind energy generation, according to Clark. "Some of the most promising wind energy sources lie offshore, but state policy



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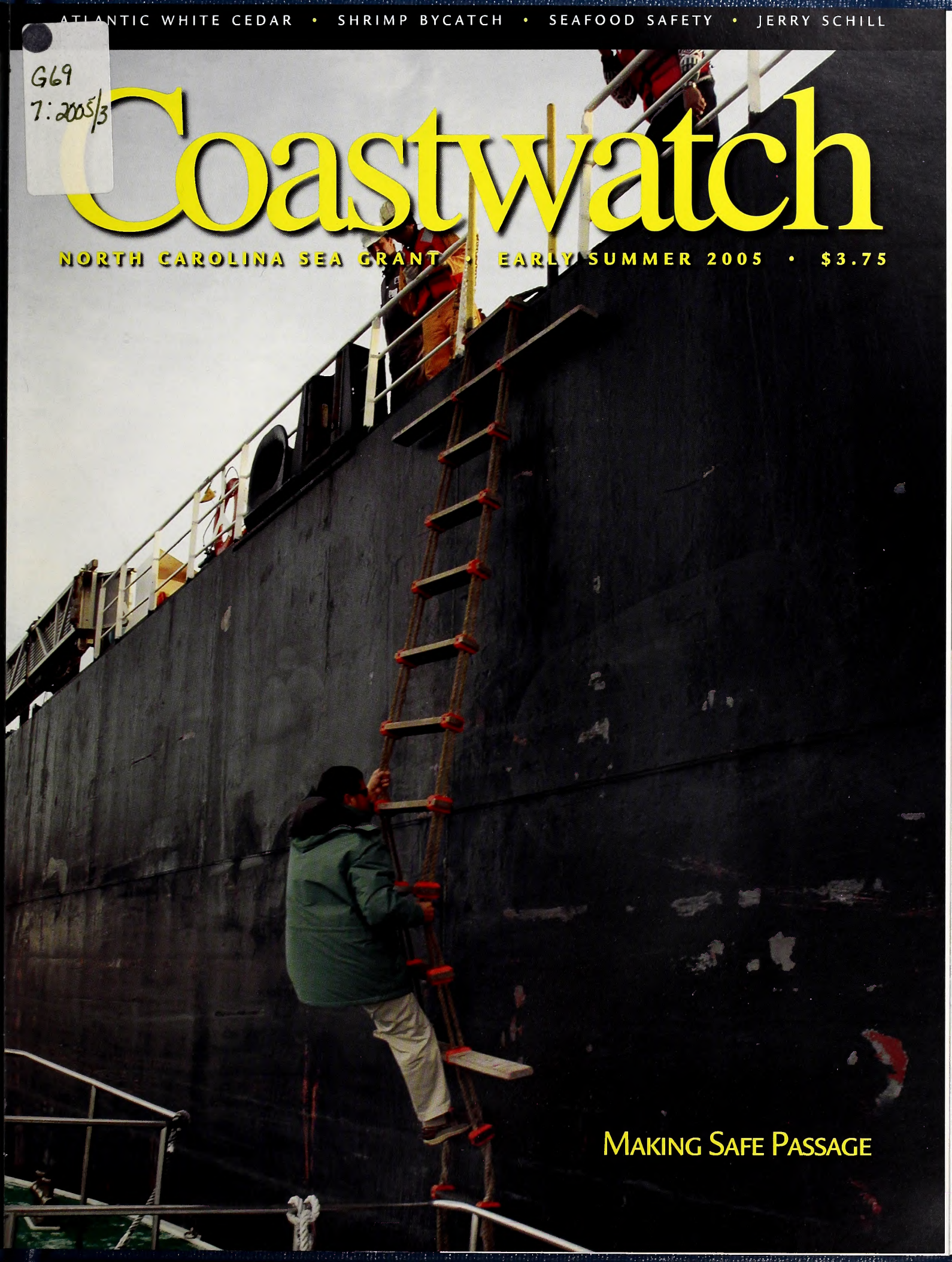
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MAKING SAFE PASSAGE

Breaking the Grip

Even Mark Trail — of comic strip fame — wants you to avoid rip currents this summer.

The first national Rip Current Awareness Week will open June 5 with safety tips in the Sunday Comics, courtesy of Mark Trail.

The awareness week continues the National Oceanic and Atmospheric Administration's national *Break the Grip of the Rip*™ campaign that was launched in Wrightsville Beach last year.

The emphasis this year is on unguarded beaches. Many stretches of North Carolina's beaches have no lifeguards. And most communities with guards often have them on duty for limited hours during the prime beach season.

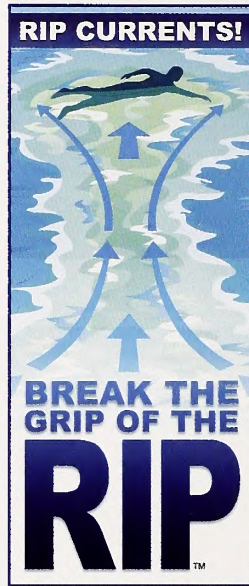
Thus, NOAA programs — including the National Sea Grant Network, the National Weather Service (NWS) and the National Ocean Service — join community leaders to encourage beachgoers to learn to spot and avoid rip currents that can pull even Olympic swimmers.

Tips on how to get out of a rip current — or help someone in trouble — go out to *all* beach visitors, including inland firefighters and rescue personnel taking well-deserved vacations.

In fact, this summer North Carolina ocean rescue teams have a special message for their inland counterparts: Instincts to help are not enough when it comes to rip currents. Too often, the experts say, those attempting a rip current rescue become victims themselves.

Instinct may alert firefighters to problems on the beach. *But* even these professionals need to know the simple steps of rip current safety.

If no lifeguards are on duty, the first step for would-be rescuers is to call 9-1-1. Then find a floatable object — a boogie board, surfboard or even a child's "noodle." Try throwing it to the person in trouble and tell them help is on the way.



If the rescuer goes into the water, he or she should take a flotation device. Upon reaching the person in trouble, float together and try to keep the person calm.

Often rip currents are only a few feet wide. Thus, those caught in a rip could swim parallel to the shore until safely out of trouble. Then swim toward shore at an angle.

Break the Grip of the Rip was developed as a cohesive national beach safety message. It was modeled after successful state-based efforts, including North Carolina programs led by Sea Grant, NWS and beach communities since the 1970s.

The North Carolina partnerships continue. In particular, Sea Grant is supporting ongoing efforts in Dare and New Hanover counties, intended as prototypes for other counties and communities.

In Dare County, Sea Grant will work with Sandy Sanderson, Dare County emergency management director, and other local officials, to capture rip currents on video, as well as to tape rip current rescue training. These materials can be used for public service announcements, lifeguard

training and other awareness programs.

In New Hanover County, Sea Grant and the NWS are active in the Rip Current Awareness Strategies Team — known as RCAST. The team also includes representatives of town, city and county agencies, the public schools, chambers of commerce and individual businesses. Efforts will include distributing *Break the Grip of the Rip* posters and brochures to schools and businesses, as well as refrigerator magnets for beach rentals and hotels.

Watch for announcements of Rip Current Awareness Week events. Go online to www.ripcurrents.noaa.gov. Also check the North Carolina Sea Grant Web site at www.ncseagrant.org.

Katie Mosher, Managing Editor

I N T H I S I S S U E

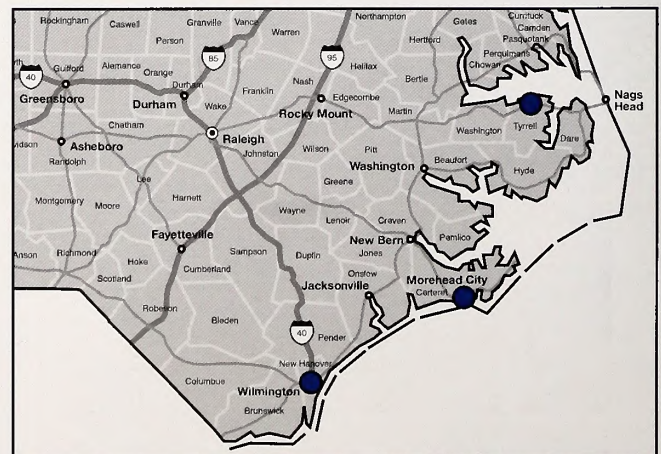
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North Carolina's diverse coast offers countless interesting subjects. The large dots on the locator map indicate story settings in this issue — including Tyrrell County, Wilmington and Morehead City.



Coastwatch

F E A T U R E S

COASTAL TIDINGS 2

**SAFEKEEPERS: RIVER, HARBOR PILOTS
HELP ENSURE SAFE PASSAGE**

Follow a harbor pilot as he steps from his boat onto a U.S. Navy ship to guide it into the Port of Morehead City. Ann Green also shares the history — and current “homeland security” duties — of the state’s river and harbor pilots. 6

**ATLANTIC WHITE CEDAR: RESTORATION CONNECTS
COASTAL CULTURE TO ENVIRONMENT**

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PEOPLE & PLACES:

Jerry Schill Heads North

As he winds down his 18-year stint as president of the N.C. Fisheries Association, Jerry Schill reflects on the status of commercial fishing in the state. Soon, he and his wife, Pam, will return to their Pennsylvania roots. 27

Coastwatch

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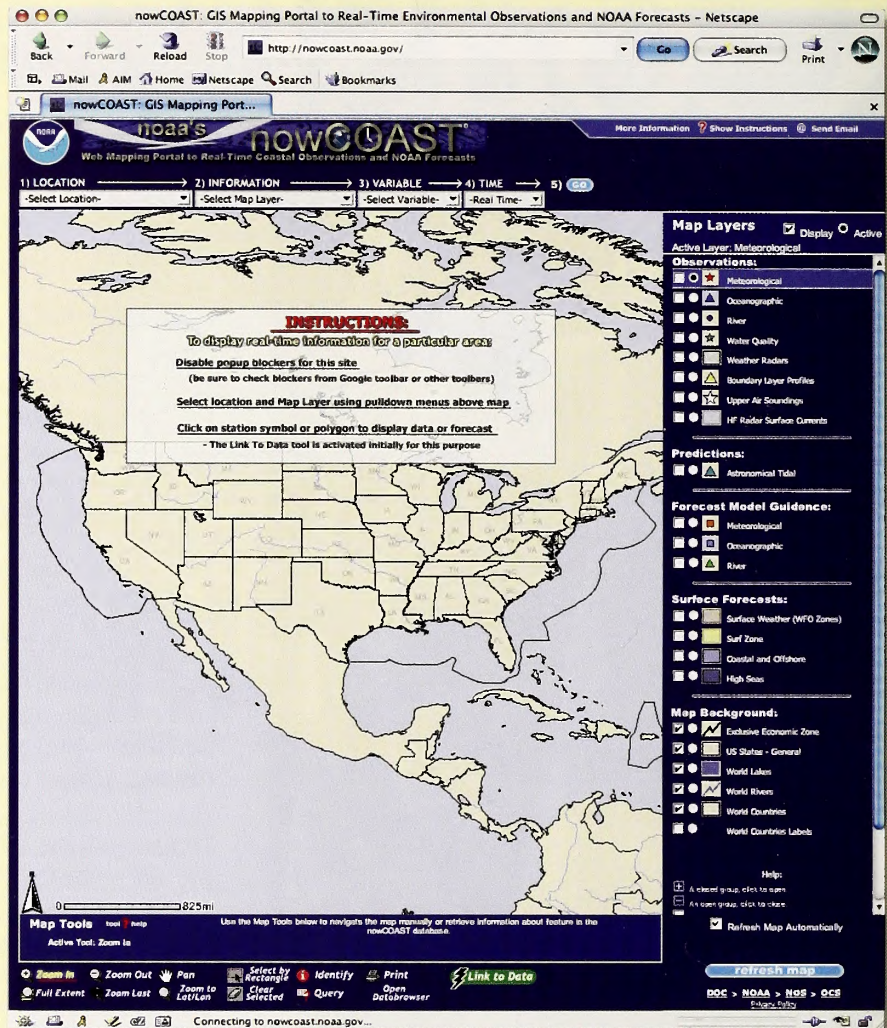
The North Carolina Sea Grant College Program is a federal/state program that promotes stewardship of our coastal and marine resources through research, extension and education. It joined the National Sea Grant College Network in 1970 as an institutional program. Six years later, it was designated a Sea Grant College. Today, North Carolina Sea Grant supports research projects, a 15-member extension program and a communications staff. Ron Hodson is director. The program is funded by the U.S. Department of Commerce's National Oceanic and Atmospheric Administration and the state through the University of North Carolina. *Coastwatch* (ISSN 1068-784X) is published six times a year by the North Carolina Sea Grant College Program, North Carolina State University, Box 8605, Raleigh, North Carolina 27695-8605. Telephone: 919/515-2454. Fax: 919/515-7095. Subscriptions are \$15. E-mail: katie_mosher@ncsu.edu World Wide Web address: <http://www.ncseagrant.org> Periodical Postage paid at Raleigh, N.C.

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Cover photo of harbor pilot and
Table of Contents photo of rope
by Scott Taylor.
Printed on recycled paper. ♻️

COASTAL TIDINGS



NOAA Mapping Site Debuts

Want access to more real-time coastal observations and weather for the North Carolina coast and other regions?

Visit a new National Oceanic and Atmospheric Administration (NOAA) "now COAST" online mapping portal, which provides coastal communities with meteorological, oceanographic, hydrological and water quality information. It also includes the NOAA National Weather Service forecasts from major U.S. estuaries, seaports, coastal regions and the Great Lakes.

The new Web site is a valuable tool for safety and commerce, providing easily accessible and up-to-date information for everyone, according to Richard W. Spinrad, assistant administrator,

NOAA National Ocean Service. "Mariners, students and those living in coastal communities will appreciate the convenience of finding all of this information at this Web site."

Developed by NOAA National Ocean Service's Coast Survey Development Laboratory, the new site can be reached at <http://nowcoast.noaa.gov>.

Through the Integrated Ocean Observing System, there will be a sustained and comprehensive ocean observing system.

In an upcoming issue of *Coastwatch*, find out about the new Southeast Atlantic Coastal Ocean Observing System (SEACOOS), including a new weather buoy and other projects in North Carolina and the region.

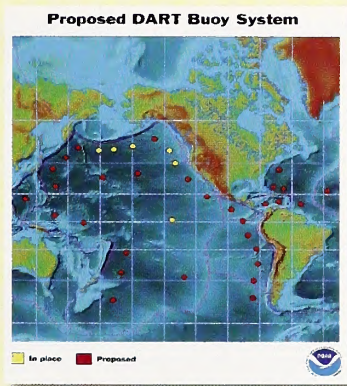
— A.G.

Improved Tsunami Detection

The National Oceanic and Atmospheric Administration (NOAA) is expanding tsunami detection and warning capabilities across the United States, including the North Carolina coast.

The system is part of the Global Earth Observation System of Systems (GEOSS), the international effort to develop a comprehensive, sustained and integrated Earth observation system. The U.S. plan will require a total of \$37.5 million over the next two years.

With this new investment, NOAA will deploy 32 new advanced technology Deep-ocean Assessment and Reporting of Tsunami (DART) buoys for a fully operational tsunami warning system by mid-2007.



In addition, the U.S. Geologic Survey will enhance its seismic monitoring and information delivery from the Global Seismic Network, a partnership with the National Science Foundation.

The new system will provide the United States with nearly 100 percent detection capability for a U.S. coastal tsunami, allowing response within minutes.

To find out more about tsunamis, visit the Web: www.noaa.gov/tsunamis.html. For information about the Pacific Tsunami Warning Center, go to: www.prh.noaa.gov/ptwc/bulletins.htm. For DART background, go to: www.ndbc.noaa.gov/Dart/dart.shtml. — A.G.

CD Focuses on Oyster Culture

Want to get started in oyster farming? *Culturing Oysters in North Carolina*, a new interactive CD from North Carolina Sea Grant, offers an important first step.

Jim Swartzberg of J&B AquaFood and Skip Kemp of Carteret County Community College developed the “show-and-tell” manual especially for individuals who are serious about oyster farming. It was produced with support from North Carolina Sea Grant and the N.C. Fishery Resource Grant Program.

The how-to guide is the result of several years of research and consulting with folks who have years of hands-on experience. Coauthor Kemp is a former North Carolina Sea Grant shellfish specialist.

The authors address what to do and how to do it; where to go for help; and the rewards and pitfalls of oyster farming.

The CD includes links to video images and graphics to enhance the understanding of equipment, methods, economics and state regulations. The manual also may be printed and kept on hand as a quick reference.

To order the *Culturing Oysters in North Carolina* CD (UNC-SG-04-12), send \$5 to North Carolina Sea Grant, NC State University, Box 8605, Raleigh, NC 27695-8605. — P.S.



Harmful Algal Blooms Testing Expands

Since 1998, the N.C. Division of Public Health has been monitoring human health effects from harmful algal blooms (HABs) in North Carolina and other coastal states. Last fall, the state HAB program expanded testing to include water samples from public water supply reservoirs and treatment plants. The State Laboratory of Public Health will be testing for microcystin, a toxin produced by some species of blue-green algae commonly found in North Carolina reservoirs.

At high doses, microcystin can cause liver damage and even death. Although no human illness due to microcystin has been documented in North Carolina, other countries have reported cases, according to Ann N. Chelminski, medical epidemiologist with North Carolina's HAB program.

But, Chelminski cautions people to avoid swimming and eating shellfish or seafood collected from waters with an algal bloom.

In the near future, the program hopes to implement testing at the State Lab for other algal toxins such as saxitoxin that causes Paralytic Shellfish Poisoning.

If you are concerned about an algal bloom and are interested in toxin testing, call a regional Division of Water Quality Office or the HAB Hotline, 888/823-6915. For more information on HABs, visit the Web: www.epi.state.nc.us/epi.hab.

— A.G.

In the Next Issue of *Coastwatch*

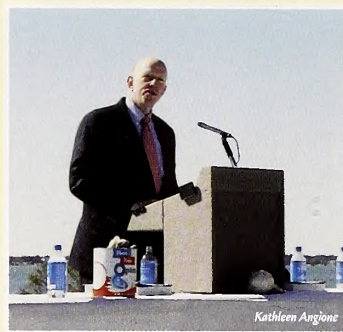
The number of full-time commercial fishers in the state continues to decline. Pam Smith examines the winds of change in commercial fishing. Ann Green takes readers on a tour of historic Bath as the town celebrates its 300th anniversary. And she also visits a well-known Perquimans County cabinetmaker who continues local tradition.

Coastal Habitat Protection Plan Signed

The N.C. Department of Environment and Natural Resources (DENR) officially accepted the Coastal Habitat Protection Plan during February ceremonies at the N.C. Division of Marine Fisheries.

The plan, known as CHPP, was mandated by the N.C. General Assembly's 1997 Fisheries Reform Act. CHPP includes a set of recommendations to help the recovery of declining fish stocks. It describes critical habitats where marine fish and shellfish feed, spawn and grow. The plan also identifies threats to those habitats and makes recommendations to address the threats.

DENR guided the CHPP development, engaging the three commissions and the public in the process. To that end, an Intercommission Review Commission (IRC), with two members from each commission, was formed. The IRC worked with staff members from state agencies and other



Bill Ross spoke at the signing ceremony.

scientists to draft plans and hold public forums.

In December, North Carolina's three environmental rule-making commissions — the Marine Fisheries Commission, the Environmental Management Commission and the Coastal Resources Commission — approved

the plan for the long-term enhancement of the habitats critical to the health of coastal fisheries.

To jumpstart the CHPP implementation, DENR Secretary Bill Ross developed a list of 23 actions state agencies can take — without new legislation or rule making.

The DENR action list cites enforcement of existing rules that protect fish habitat; development of indicators of habitat health; restoration of oyster shell bottoms; and the education of the public about important habitats.

For more information about CHPP, go online to www.ncfisheries.net and click on CHPP.

— P.S.

New Roanoke Marshes Lighthouse

During the late 1800s, more than a dozen cottage-style, screw-pile lighthouses were erected in North Carolina marshes and rivers.

The Manteo waterfront is now home to a replica of the historic Roanoke Marshes lighthouse.

Operated by the N.C. Maritime Museum on Roanoke Island, the replica lighthouse has an enlarged deck that overlooks Shallowbag Bay.

The original was built in 1877 and sat on seven iron piles screwed into the bottom of Croatan Sound. It remained in service until it was decommissioned by the U.S. Coast Guard



Courtesy N.C. Maritime Museum

lighthouse by barge.

Today, the only original screw pile lighthouse stands near a canal in Edenton.

The replica lighthouse is at the end of Queen Elizabeth Street in downtown Manteo. To find out about the hours of operation call, 252/475-1500 or visit the Web: www.obxmaritime.org.

— A.G.



Blue Heron Bowl winners from East Carteret High School: Back row, left to right, Barrett Snipes, coach Barbara Waters and Daniel Feagle. Front, left to right, Kayla Lewis, Taylor McCune and Emmett Keeler, captain.

BLUE HERON BOWL WINNERS

East Carteret High School took top honors in the 2005 Blue Heron Bowl, held in February at North Carolina State University.

Myers Park High School in Charlotte placed second, and Raleigh Charter High School won third place. The Sportsmanship Award went to Ashley High School in Wilmington.

Twelve high school teams participated in the academic competition focusing on ocean science, technology, history and navigation.

The North Carolina winners advanced to compete in the 2005 National Ocean Sciences Bowl in Biloxi, Miss., in April.

— A.G.

HANDS-ON CURRICULUM HIGHLIGHTS WATER

"It's Our Water," a multimedia curriculum produced by the Environmental Education Fund (EEF), is designed to help high school students understand the importance of water quality and quantity.

All materials and activities are North Carolina specific and align with the state's Earth/Environmental Science Curriculum.

"It's Our Water" showcases field activities in local streams that lead to final reports and recommendations by students. Activities are coordinated with videos, demonstrations, classroom activities and teacher guides.

Materials are made available through workshops across the state. For information, call 919/733-0711 or go online to www.eefund.org.

The nonprofit Environmental Education Fund was created in 1998 to encourage partnerships that support environmental education programs across the state.

— P.S.

Study Focuses on Fish Parasites

North Carolina Sea Grant researchers have found that costia — an important parasite in many freshwater and marine fish — actually consists of many species.

Costia or *Ichthyobodo necator* — which attacks a fish's skin and gills — is often fatal and causes significant aquaculture losses across the world.

"Different species appear to have multiple hosts, which has implications for the aquaculture industry," says Heather Callahan,

former graduate student at the NC State College of Veterinary Medicine. "If different species of fish are kept in the same facility, they may be able to share infections."

Ed Noga of the NC State College of Veterinary Medicine, and R.W. Litaker of the National Oceanic and Atmospheric Administration, National Ocean Service, Beaufort, also collaborated on the study.

The work was published in the February issue of *Journal of Fish Diseases*.

This study confirms earlier work by J.A. Todal from Norway and other Norwegian, South African and Japanese researchers who found more than one species of costia.

During the Sea Grant study, the same species was obtained from both marine and freshwater fish, further suggesting that certain *Ichthyobodo* species may not be limited by salinity.

The researchers also demonstrated that DNA sequence differences between costia species can be used consistently for identification.

"With more research, DNA sequence differences may help determine the types of fish that can be stocked together," says Callahan. "They also might be used to determine risks involved with using water from local waterways that may provide a way to transfer *Ichthyobodo* between feral and cultured fish species. In addition, DNA differences between species could be used to differentiate more virulent or treatment-resistant species and strains prior to the importation or exportation of fish."

To read the article: visit the Web: www.blackwell-synergy.com. Click on "journals" and follow the link to *Journal of Fish Diseases*. — A.G.

Hatteras Fresnel Lens Restored

For centuries, the Cape Hatteras Lighthouse has been a beacon to captains transverse treacherous shoals. But this spring it was the Graveyard of the Atlantic — Museum, that is — coming to the rescue of the famed Hatteras Light. Volunteers joined experts to restore the "first order" Fresnel lens — including

400 sea-green crystal prisms. The original 6,000-pound lens, was state-of-the-art technology when it was built in Paris in 1853. Removed from the Hatteras lighthouse during the Civil War, the lens was thought to be lost — until 2002, when author Kevin Duffus' search through the National Archives revealed that the lens was in storage at the National Park Service. — K.M.



Photos courtesy of the Graveyard of the Atlantic Museum



Scott Taylor

Sport Fishing School Set for June

The 53rd Annual Sport Fishing School, sponsored by North Carolina State University, is set for June 5-9 at Hatteras. The school is open to individuals who wish to learn more about fishing for offshore big game fish.

Students will learn about equipment, bait and techniques of big game fishing, as well as surf fishing. On the agenda are two major excursions to Gulf Stream waters to pursue blue marlin, dolphin, sailfish and yellowfin tuna.

Due to the nature of the school, registration is limited, and early applications are suggested. The \$1,095 fee includes a Sunday evening social, Wednesday night fish fry and Thursday evening banquet.

Lodging and other meals are not included.

To reserve a place, call 919/515-2261, or e-mail continuingeducation@ncsu.edu. For more information, go online to www.continuingeducation.ncsu.edu and click on seminars.

— P.S.



Safekeepers:

RIVER, HARBOR PILOTS HELP ENSURE SAFE PASSAGE

By Ann Green • Photos by Scott Taylor

In the greenish-blue waters of Beaufort Inlet, Bill Baily stands on the side of a pilot boat ready to jump ship.

As the *Rough Point* slows down, getting within a few yards of the port side of a U.S. Navy ship, Baily watches the position of his boat.

Timing is everything when stepping from the pilot boat to a big ship, says Baily.

"You time your jump when the boat is coming up with a wave," he adds. "On a calm day, you just have to step across a few feet. When it is rough, the boat can be rolling so much that it is a 15-foot difference between when it is going down and up."

When the pilot boat rises and gets so close to the ship that it appears the two could collide, Baily steps a couple of feet across the water onto a ladder.

With a Navy crew watching, he climbs the ladder to the bridge of the *USS Ashland*, which is heading to port to pick up U.S. Marines.

As a veteran harbor pilot, Baily will help guide the ship from the sea buoy that is six miles

offshore into the harbor at the Port of Morehead City.

"Harbor pilots are very important in maintaining safe passage of ships — from sea buoy to dock," says Rex Edwards, director of business development and operations at the Morehead City port. "Local knowledge is invaluable to a ship's captain, especially if it is a captain's first time in the Morehead City port. The harbor pilots make the ship's transit through the channel safe for all of us."

Baily is one of three Morehead City harbor pilots who guide both Navy and commercial vessels through a 450-foot wide channel dividing the sand bars of Beaufort Inlet.

North Carolina requires every foreign vessel and every registered U.S.

Continued



vessel more than 60 tons to utilize a state-licensed pilot—incoming and outgoing—in the waters of the Morehead City harbor and Beaufort Bar, says Walter Clark, North Carolina Sea Grant coastal communities and policy specialist. “Any master of a vessel violating this law is guilty of a Class I misdemeanor,” he adds.

Harbor pilots also help protect the environment from cargo spillage and property damage.

“The pilot is the advisor, but the captain is ultimately in charge,” says Baily.

Because of the strong presence of Navy ships at the Morehead City port, tugboats also are used to bring ships into berth.

For Navy ships that are 1,000 or more feet long, three tugboats are used to turn the ship around so it can head straight into the port berth.

To avoid damaging the ships, the tugboats are equipped with fenders that have rubber tires.

RIVER PILOTS

In the Port of Wilmington 90 miles south of Morehead City, eight river pilots guide ships from a sea buoy in the Atlantic Ocean, past Bald Head and Jaybird shoals, and up the Cape Fear River.

“You have to navigate all the turns and bends in the river,” says Wes Kirby, president of the Wilmington/Cape Fear Pilots Association. “Every bend has localized shoaling.”

At times, particularly with a wind speed of more than 30 knots, Kirby says the jumps from the boat onto a ship can be quite challenging.

“We have boarded vessels in winds up to about 60 knots,” he says. “However, one pilot was caught in a sudden gale and boarded a ship in 60 knots of wind and brought the ship across the bar in 110 knots of wind. I doubt he would volunteer to ever do that again.”

“The pilot boat was jumping up and down like it was a canoe,” Kirby adds. “Luckily, we have never lost a pilot here, but we have had several injuries.”

As river pilots bring the ships close to their berth in the Wilmington port, the docking pilots take over and use tugboats to push the vessel alongside its berth. Docking pilots also use tugs to undock vessels and turn them around so they can head down the river and out to sea.



Other ports across the United States also require state-licensed pilots to bring in boats. In 2004, there were 1,170 state-licensed maritime pilots in the United States, according to the American Pilots' Association (APA), the national trade association.

“We are generally seeing more traffic in U.S. ports,” says Scott Rainey, APA deputy director. “The ships are getting larger. We expect water commerce will increase over the next 20 years.”

In the Wilmington port—which handles commodities such as lumber and grain, as well as container business—the amount of vessel traffic has remained about the same for the last several years.

“We brought in 700 ships in 2004,” says Kirby. “Our business went down in 1998 when we lost a main container line to Charleston. Before that, we used to bring in 800 to 900 ships a year.”

At Morehead City, ship traffic dropped after Sept. 11, 2001, when phosphate exports to China were halted temporarily, leaving military, food and metal products as the primary exports and rubber as the primary import.

In 2001, the harbor pilots brought in 179 ships, compared to 170 in 2003.

Because of the drop in business, Baily's





CLOCKWISE FROM TOP LEFT: Pilot boats carry harbor pilots to visiting ships. • Tugboat crews work closely with the harbor pilots. • Many commercial boats come into the Port of Morehead City. • Bill Baily must jump from the pilot boat in order to climb the ladder to the bridge of a Navy ship.

uncle, Buddy Midgett, reduced his hours to part-time. "Our income was cut," says Midgett. "So I thought it best to step back."

Since the 2001 terrorist attacks, security precautions at U.S. ports have increased. Also, pilots — widely recognized as the "eyes and ears of a port" — have added responsibility.

Often the only U.S. citizen on a foreign ship, pilots are in a unique position to watch for threatening situations.

"After 9-11, pilots had to start carrying I.D. cards," says Baily. "Sometimes, we have to wait for ships to be boarded by the Coast Guard. We also are more aware of what the crews are doing and the possibility of terrorist attacks."

PILOT TRAINING

In North Carolina, as well as other coastal states, state-licensed pilots are highly trained. Most have either extensive deep-sea or tugboat experience. Others go through an extensive apprenticeship program.

Midgett, a member of the Morehead City Pilots Association, started out at age 19 as a deck hand aboard a tugboat involved in shiphandling in Norfolk.

"I just like being on the water," he says while looking at a tugboat picture in his Morehead City home. "It is like throwing Brer Rabbit in a briar patch. As a kid, I had a skiff or boat. I grew up on the water. We are just big boys with bigger toys."

While working on the tugboat, Midgett got pilot's and master's licenses and then moved up to a docking pilot. Later, he moved to Charleston to work as a docking pilot for a private towing company.

In 1967, Midgett accepted a job with the Piner family, who had guided ships around Morehead City for many years. "The port was booming then," he says. "There was almost a ship a day. Tobacco was king and was being exported."

Baily began working as a pilot boat captain with the Morehead City Pilots Association in 1974 and later moved to Norfolk, where he was a docking pilot. He came back to the Morehead City association full-time in 1986.

Baily vividly recalls riding his first ship with "Capt. Buddy" — and disembarking from the ship that was headed out to sea onto the pilot boat.

"I had sweaty palms, and the boat was drifting back," Baily says. "Capt. Buddy had a walkie-talkie and told me the boat was out of gas and three feet from the ladder."

But Baily and Midgett made it safely onto the boat.

By the time Baily had been captain of the pilot boat for several months, he was hooked.

"It is not a like a 9-to-5 job," he says. "I like running boats and being on the water. However, sometimes, it is a real pain when it is windy, rainy or foggy or dark. It also can be beautiful and sunny. With 15-foot seas, it takes a lot of expertise."

Early in his career, Baily had to rescue Midgett, who fell into the water while jumping onto a ship.

"We were bringing in a big tanker," Baily recalls. "There was a big swell from the south. The wind had shifted and was blowing a gale out of the north."

The ship tried to "make a lee" on the side of the ship exposed to the swell, he adds.

"Capt. Buddy was on the bow of the pilot boat when a large swell hit the side of the ship, rebounded and coincided with another large incoming swell," adds Baily. "The pilot boat rolled severely down on her side, and Capt. Buddy lost his footing."

Continued

When the boat rolled back in the opposite direction, Midgett was thrown overboard into 55 feet of water, Baily adds. "But he wasn't in the water long."

In 1984, Buddy's son, Andrew Midgett, joined the pilots' association.

"It is hard not to do it if your dad does it," says Andrew Midgett. "I loved being on a boat as a kid. I grew up on Bogue Sound and working around tugboats. It was in me."

Despite the pilots' training and knowledge of local waters, mishaps occur.

Two or three years ago, Baily was guiding a ship that went aground. The ship's variable pitch propeller got stuck in the full ahead position. The ship hit a sand shoal and rose out of the water eight feet, he says.

"However, within 24 hours, the ship was floating free and fortunately had no bottom damage," Baily adds.

RICH HISTORY

Pilots have been around North Carolina ports for hundreds of years.

When North Carolina's first major port development began in the 1850s at Morehead City, harbor pilots began bringing in ships through Beaufort Inlet.

In Wilmington, the river pilots became crucial during the Union blockade of the South during the Civil War. They would steam down the coastline and bring back needed supplies to the port, making Wilmington the last port open to blockade runners.

When the town finally fell in early 1865, it signaled the end of the Confederates' hopes.

However, the takeover by Federal troops during the Civil War and a damaging storm in 1876 hampered the port development for many years, according to the North Carolina Ports Authority Web site.

In the years before modern dredging and channel deepening of the river, known ominously as the Cape Fear, captains used local pilots to maneuver the sandbars at the entrance of the harbor and of Frying Pan Shoals, more than 20 miles offshore.

CLOCKWISE
FROM TOP LEFT:

Tugboat fenders feature rubber tires.

- Harbor pilots head away from Morehead City docks.

- From left, Bill Baily, Bill Davis and Andrew Midgett all work on the pilot boat.

- Tugboats turn around Navy ships.



"Think of the captain of a large ship at Cape Fear as a blind man entering an immense, strange house, cluttered with unfamiliar furniture and other hazards, with only one entrance and one exit," writes Jim McNeil in *Masters of the Shoals*.

Because of the pilots' daring runs and narrow escapes, they often were romanticized in publications as "dandies of the town," according to an article excerpted in *Masters of the Shoals*. "They wore fine ruffled shirts, tight fitting boots, long black coats and plug hats," the author writes. "Every boy hoped some day to become a pilot."

20TH CENTURY

The river pilots, who sailed schooners and hung out on the Bald Head Island beach, were

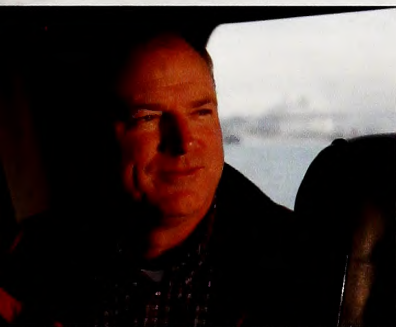
the guides to these "blind men" and kept the captains from wrecking their ships.

"Before 1921, pilots worked for themselves and competed for business," says Kirby. "They would race out to the ships. People would shoot at one another getting to the ships. It got crazy."

Many pilots only worked part-time. Competition between pilots reduced their incomes to the point that they had to work in other occupations to support themselves and their families, according to Kirby.

"This resulted in a system where pilots would not go to ships in rough weather or to small ships with lower pilot tariffs because they could make easier money in other occupations."

By 1921, the modern Wilmington/Cape



To attract more container lines, Moore says the port plans to increase the terminal space and the number of container cranes.

Other port expansions now on the drawing boards include the development of Radio Island at Morehead City with a 2,000-foot dock, 300,000-square-foot warehouse and 40 acres of paved, open storage.

Despite port improvements, technological advances and consolidation of shipping lines, pilots continue to play an important role as safekeepers of harbors.

“Without pilots, captains would be burdened. There is so much paperwork involved in every port visit, and (captains) go to so many ports around the world that they can’t know each river and port,” says Kirby.

“Without pilots, shipping would come to a halt.” □



Fear Pilot’s Association was started. Today, the organization is housed in an old lookout tower that overlooks the mouth of the Cape Fear in Southport. The association is governed by the Board of Commissioners of Navigation of the Cape Fear River, originally set up by the state legislature in 1784.

During the early part of the 20th century, the Piner family began running the pilot boats around Beaufort Inlet.

“There was a lot of activity,” says Buddy Midgett. “Tugs and equipment were marginal. Both the pilot boats and tugs were smaller than the ones used now.”

In 1947, the Morehead City Pilots Association was formed. Now, the group is governed by the Morehead City Navigation and Pilotage Commission, set up by the state legislature in 1981. The governor appoints both commissions.

Over the years, there have been a number of port improvements, including the deepening of the Morehead City channel in 1994.

“The channel has improved dramatically from years ago when it was shallow and not maintained,” adds Buddy Midgett. “Around the Shackleford area is the most difficult part.”

In 2004, the Wilmington channel was deepened from 38 to 42 feet on 26 miles of the Cape Fear River from the ocean to the Port of Wilmington.

“The completion of the channel to the port has allowed our customers to carry more cargo because of the deeper draft,” says Jerry Moore, Port of Wilmington operations director.

In February, a new container line from North China began weekly service, adding to the South Asia and Korea trade route already served by another line.

PILOT ARTIFACTS, RESOURCES

Opportunities abound for folks who want to learn more about river and harbor pilots.

The North Carolina Maritime Museum at Southport has a variety of photographs, books and artifacts, including a sextant used for celestial navigation, bullhorn and chronometer that was used to measure distance.

The navigational aids and other artifacts are in the museum’s “River Pilots, Rescues and Aids to Navigations” section.

“Ports & Pilots,” a video of Morehead City harbor pilots, by Buddy Midgett’s daughter, Linda Midgett, is available for viewing at the Southport museum and the N.C. Maritime Museum in Beaufort. For more information, call the Southport museum, 910/457-0003, the Beaufort museum, 252/728-7317; or visit the Web: www.ah.dcr.state.nc.us/sections/maritime/default.htm.

— A. G.



Logging roads, ditches and canals crisscross the drained pocosin habitat in Pocosin Lakes National Wildlife Refuge.

Pockets of Atlantic white

ATLANTIC WHITE CEDAR

Restoration connects coastal culture to environment
By Lilly Loughner

Atlantic white cedar trees grow to about 50 feet in height, and their fragrant, lightweight, rot-resistant wood is valued by woodworkers.

From the top of the old firetower overlooking Pocosin Lakes National Wildlife Refuge, the forests appear to stretch to the horizon — with Lake Phelps a far-off line of blue. There are no shopping centers or housing developments in sight. The only sound is the wind sweeping through the tower bars, ruffling the feathers of perching vultures.

It is easy to imagine a time when pocosins dominated the land, and towering Atlantic white cedars supported a thriving ecosystem and growing coastal culture.

Pocosin, a term coined by native Algonquians, describes the bog ecosystems of the southeast. Such ecosystems are known for their unique soil type, vegetative community and fire regime that once, under the right conditions, bred large glades of Atlantic white cedar, *Chamaecyparis thyoides*. Historically, cedar-dominated pocosin soils were waterlogged and rich in peat — partially decayed plant material accumulated over time.

A mainstay of life on the coast, Atlantic white cedar “traditionally has been the wood of choice preferred by boat builders and decoy carvers,” says Don Pendergraft, exhibits designer with Core Sound Waterfowl Museum on Harkers Island.

Also known as juniper, the soft, fragrant wood carves easily, is lightweight and extremely resistant to rot and insect disease, says Pendergraft. Perfect for woodworking, the cedar was valued for its multiple uses, from siding and shingling to channel markers.

Atlantic white cedar became too popular, however. “People liked it so much they just overharvested it,” explains Wendy Stanton, refuge biologist with Pocosin Lakes National

Laura Fygo



Lilly Lovghier



Lilly Lovghier



Eric Hinesley

cedar now thrive on refuge land – 800 acres worth.

Refuge officials work to restore 10,800 acres of pocosin habitat by reflooding peatlands.

At an NC State greenhouse, Eric Hinesley grows seedlings for restoration efforts.

Wildlife Refuge. According to Stanton, the pocosin ecosystem has been reduced to less than 5 percent of its original range, and designated “globally threatened” by The Nature Conservancy.

THE CEDAR’S DEMISE

Pocosin Lakes, located in Tyrrell, Hyde and Washington counties, experienced the timber rush in the late 1890s that cleared much of an estimated 200,000 acres of Atlantic white cedar found in eastern North Carolina. Commercial timber companies ditched and drained pocosin wetlands to allow more accessibility for timber harvesting.

“If you look at an aerial photo of the refuge, it’s just a matrix of ditches and canals,” says Stanton as she drives along dirt roads once traveled by logging trucks.

Logging efforts were exhausted by the 1960s. The area then was used for corporate agriculture for several decades.

There was also an attempt to mine peat from the area in the 1980s. However, plans to construct a large peat-to-methanol synthetic fuel plant were abandoned, along with the agricultural enterprise. Thousands of acres were left ditched and drained, exposing eight-foot peat deposits that were 9,000 years old.

By the late 1980s, The Conservation Fund had acquired much of the degraded pocosin habitat, and donated about 93,000 acres to the U.S. Fish and Wildlife Service (USFWS). The donation helped establish Pocosin Lakes National Wildlife Refuge in 1990.

Now, Atlantic white cedar restoration is an ongoing mission for Pocosin Lakes and other refuges in the southeast, where most of the

estimated 10,600 remaining acres of Atlantic white cedar are found. Smaller pockets are scattered throughout the cedar’s native range — from Maine to northern Florida and west to southern Mississippi.

REBUILDING THE POCOSIN

When the Pocosin Lakes refuge was first established, officials there partnered with USFWS and North Carolina State University to restore 10,800 acres of pocosin habitat.

The strategy involved returning natural water flow to the pocosin by installing water control structures within the network of canals that would flood the habitat, helping support reforestation efforts of white cedar, bald cypress and other native pocosin vegetation.

Today, about 2,000 acres of pocosin are restored — with 800 acres of white cedar planted and thriving.

“It’s a very high priority to try to restore as much healthy pocosin wetlands as possible to the most natural state as possible,” says Stanton. “The Atlantic white cedar is a large component of that.”

Refuge officials expect to see wildlife associated with the cedar return to the restored area, including nesting songbirds and declining species, such as the black-throated green warbler, woodcock, black bear and eastern diamondback rattlesnake.

WATER QUALITY BENEFIT

Pocosins, specifically Atlantic white cedar bogs, naturally hold and filter runoff before it enters surrounding waterways, improving water quality downstream. Water from a pocosin wetland is often cleaner than rainwater.

However, when the refuge’s peat lands were ditched and drained for logging and peat mining, they became aerated, causing an increase in microbial activity that accelerates decomposition and nutrient release.

As a result, runoff from Pocosin Lakes exceeded North Carolina water quality standards for mercury. Excess nitrogen also contributed to excessive plant and algal growth in downstream areas of the Albemarle-Pamlico Sound. Known as eutrophication, this process reduces dissolved oxygen content in the water, and can harm fish and other animals.

“We would like to see the whole site become nonpolluting and actually beneficial to the sound,” says Mike Wicker, Albemarle/Pamlico coastal ecosystems coordinator for USFWS.

Mercury runoff has been the easiest to reduce, Wicker notes. After restoring just one 640-acre plot, previously toxic mercury levels quickly became better than the state standard. “The restored sections of that site now are just as clean as rainwater,” he adds.

Reductions in nitrogen also have occurred, but reaching the ultimate goal — site runoff with mercury and nitrogen levels equal to, or less than, that found in rainfall — will take an estimated 10 to 15 years. For the pocosins to achieve their full clean-up potential, the remaining 10,800 acres must be restored, says Wicker.

However, funding is scarce. “It would be a real bargain to restore the remaining acreage,” Wicker says.

Education would help the project move forward, he suggests, adding that the public is

Continued



Jim Savory, former refuge manager; Feather Phillips, executive director of Pocosin Arts, and David Kitts, deputy refuge manager, are happy planters.

Wendy Stanton, PLNWR biologist, believes Atlantic white cedar can make a comeback on refuge land.

In celebration of the Millennium Forest's final planting, Alan Barnhardt, of the Carolina Raptor Center, returns a juvenile bald eagle to the wild.

Efforts to reintroduce red wolves into the wild may help limit deer populations. Deer browsing is the largest threat to juniper seedlings.

not familiar with deep peat wetlands in North Carolina.

"If they were more aware, they'd be begging us to restore it," Wicker says.

STRUGGLING TO TAKE ROOT

The project is a long-term effort with many challenges — including awareness, funding and restoration. But some point to the high population of deer on the refuge as the biggest problem — a deer can chew a 4-foot-tall seedling down to just inches.

"They make it like a little bonsai tree," says Bill Pickens, silviculturalist with the N.C. Division of Forest Resources (DFR). "There are way too many deer in eastern North Carolina where white cedar is found."

In efforts to find ways to protect seedlings from animal damage, Eric Hinesley of NC State's horticultural department has worked with USFWS at the refuge and the DFR. They

have tested tree shelters, wire cages, electric fences and other devices, but the overall costs exceeded the benefit for large-scale plantings. The best defense for the refuge, according to Stanton, may be the recent introduction of the red wolf back to the area — the only natural predator left to control deer.

Restoration also has been thwarted by a scarcity of cedar plants.

Two years ago, DFR was producing about 20,000 plants per year — barely enough to support restoration in Pocosin Lakes. Current demand is much greater.

"There's been a lot of interest in restoring white cedar," says Hinesley. "Longleaf pine is an excellent example of a tree that has come back because of efforts to restore it and replant it, and I think the exact same thing can be done with white cedar."

By experimenting with Atlantic white cedar plants in a nursery setting, DFR, in

collaboration with Hinesley, now provides several hundred thousand good quality, containerized seedlings to university, industry, private and government personnel for planting and regeneration each year.

"We've been working hard to find the best way to grow containerized white cedar, and I think there will be a lot more plants available in the future," Hinesley says.

JUNIPER OF THE MILLENNIUM

In the late 1990s, Feather Phillips, executive director of Pocosin Arts Folk School and Gallery, envisioned "a project of millennial proportions" that would suit small Tyrrell County and places like it on the North Carolina coast.

Touted as "unspoiled, uncrowded, uncomplicated," Tyrrell is the least populated county in the state, according to the 2000 census. The county is home to three protected

WORLDWIDE MODEL

The Millennium Forest is a model for restoration efforts across the eastern United States and worldwide.

Last summer, the Pocosin Arts Folk School and Gallery was invited to the annual Smithsonian Folklife Festival in Washington D.C. to present a 10-day exhibit on the Millennium Forest. The exhibit was part of a tribute to mid-Atlantic maritime communities, with topics including the eastern oyster, American shad and Atlantic white cedar.

"There are people who come to this part

of the world to see Atlantic white cedar because it's such an amazing tree," explains Feather Phillips, director of Pocosin Arts.

Also, this spring, the Tate Gallery in London is offering a retrospective of Joseph Beuys' life and work, and is interested in sharing information about North Carolina's 7,000 Juniper project. Working with the Tate Gallery "underlined the global connections this small local project has made," says Phillips.

Check out the Tate Gallery site online at www.tate.org.uk/ and click on the link "Joseph Beuys: Actions, Vitrines,..."

To learn more about the Millennium Forest, contact Phillips at Pocosin Arts by e-mail at info@pocosinarts.org or visit the Web at www.pocosinarts.org.

For information on Atlantic white cedar restoration at Pocosin Lakes National Wildlife Refuge, contact Wendy Stanton at 252/796-3004, extension 224, or wendy_stanton@fws.gov.

Visit the Pocosin Lakes National Wildlife Refuge headquarters and Walter B. Jones, Sr. Center for the Sounds, located on the Scuppernon River, off U.S. 64 in Columbia.

TYRRELL COUNTY BOASTS NEW PRESERVE

Tyrrell County's third protected area, Palmetto-Peartree Preserve, is now open to visitors. Like its neighbor Pocosin Lakes National Wildlife Refuge, the new preserve boasts unique habitat in need of conservation.

Established in 1999 as a partnership between The Conservation Fund, the N.C. Department of Transportation and the U.S. Fish and Wildlife Service, the preserve spans 10,000 acres of forests.

Best known for birding, the preserve's quarter-mile boardwalk leads visitors through a

wetland forest to the Albemarle Sound — where myriad opportunities await for spotting rare red-cockaded woodpeckers.

"We really want people in the community to get out there and see what the preserve has to offer and utilize it as much as possible," says Jill Simonetti, ecotourism program coordinator with The Conservation Fund.

"It is a beautiful property that has great opportunity for recreation and community development," says Simonetti.

The new preserve provides habitat for the largest population of endangered red-cockaded woodpecker on private land in the state, she

adds. Bald eagles, peregrine falcons, black bears, red wolves, bobcats and more than 100 migratory bird species also seek shelter at the preserve.

An April celebration — including a red wolf howling, birding competition, hikes, and races — launched the ongoing development of the preserve as a public park.

By working to integrate economic, cultural and environmental efforts at the preserve, The Conservation Fund eventually hopes to establish an "ecotourism destination" in Tyrrell County.

To learn more and plan a day trip, visit the Palmetto-Peartree Preserve Web site: www.palmettopeartree.org. — LL



Preserve visitors take the shoreline boardwalk trail out to Albemarle Sound, where a canoe pier is located.



Hidden Lake, accessible from Albemarle Sound, offers sport for paddlers. It is also the site for a future camping platform.



Visitors catch a spectacular view of Palmetto-Peartree Preserve from the shoreline boardwalk.

areas — Pocosin Lakes National Wildlife Refuge, the Emily and Richardson Preyer Buckridge Coastal Reserve, and the new Palmetto-Peartree Preserve. Each is devoted to environmental conservation and preservation of coastal heritage.

In concert with the mission of Pocosin Arts — a traditional arts education center located in Columbia and dedicated to "connecting culture to environment through the arts" — Tyrrell residents gathered with friends and partners to plant a "Millennium Forest" of 7,000 young juniper trees.

The project — *7000 Juniper: An Art Action for the Millennium* — was inspired by Joseph Beuys, a German artist famous for planting 7,000 oak trees in Kassel, Germany, in 1982. The *7000 Oaks* project symbolized a movement to reforest the country and left a legacy that continues to spread across the world — with plantings in the British Isles, France, Holland, Italy and the United States.

On March 20, 2000, the dawn of the vernal equinox, Phillips initiated the first of four plantings for the millennium forest, creating a place where both residents and

visitors of the pocosin region could find solace under a quiet cathedral of juniper trees.

Handmade clay markers were buried with each new juniper, expected to last 1,000 years as a memorial of the day, of the care taken by the project and people involved, and of loved ones celebrating in spirit.

"Combining ritual with the planting and initiating of the forest was part of the imprinting in the minds of the children that this was special, this was powerful, this was worth our care," says Phillips.

The last juniper in the millennium forest was planted on April 7, 2004, in Pocosin Lakes. A public celebration marked the event, complete with the release of a young bald eagle by the Carolina Raptor Society in honor of life and an effort to give back to nature.

Watching the eagle circle overhead and take flight was a pinnacle moment for Phillips and others present. But the vision is not yet complete — the trees are still growing. Some have reached 12-foot-tall, others only 12 inches.

"It's a work of art that you can have in your imagination...A Stonehenge idea...A

place of ritual," Phillips explains. "I'm still imagining, and it looks like it's going to be great."

The millennium project is now a budding seven-acre forest. Shedding the exactitude offered by tape measures and technological gadgets, Carl Twarog and Eva Roberts, faculty members at East Carolina University's School of Art, designed the plantings in concentric circles to emphasize the human dimensions of this visionary forest.

To form the circles, the volunteers — including more than 500 students — held hands, and the seedlings were planted at their feet. Two giant steps measure the distance between each circle in the imperfect, yet successful, pattern.

"The idea of a perfect anything was thrown out the window," says Phillips of the unusual planting method. "We really wanted to pay honor and tribute to the way trees really grow."

In 100 years or so, when the junipers are overhead, the small center circle will remain — tended as the tree cathedral Phillips first envisioned — a sacred place. □

TRAWLING FOR ANSWERS

STUDY EXAMINES BYCATCH RATES IN SOUTH- EASTERN NORTH CAROLINA

BY KATHLEEN ANGIONE

PHOTOS BY PAUL STEPHEN

Denny McCuiston lives in North Carolina and trawls for shrimp in North Carolina — his 24-foot Diamond boat, “*DrawPlay*,” was even built in North Carolina.

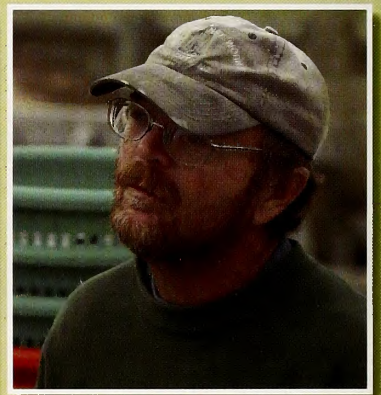
“There’s not many people left like me,” says McCuiston, a Wrightsville Beach resident. For more than 30 years, he has trawled the inside waters of the state’s southeastern coast.

But some area residents and policymakers believe trawling in the region’s narrow waterways unintentionally captures and kills large amounts of commercially valuable fish and

invertebrates, known as “bycatch.” Logothetis designed the project to examine bycatch generated by the trawling patterns of an actual commercial shrimper — in this case, McCuiston.

“Bycatch is *the* issue in the shrimp industry,” he says.

The issue made headlines in 2003 when state Rep. Bonner Stiller, a Republican from Brunswick County, introduced legislation to ban all shrimp trawling in the Intracoastal Waterway (ICW) in Brunswick and New Hanover counties. A contentious public debate erupted, revealing a



lack of scientific data on area bycatch.

“There has always been a question as to the magnitude of the bycatch generated by small commercial operations in the southern parts of the state,” notes Rich Carpenter, DMF Southern District manager.

The bill eventually was withdrawn, but the controversy continued to simmer, prompting the DMF to speed up development of a statewide Shrimp Fishery Management Plan.

Data from Logothetis and McCuiston’s research has proved invaluable to the plan’s development, adds Scott Baker, a Sea Grant fisheries specialist based in Wilmington.

“Until this study, we had to refer to studies in other areas that may or may not have been applicable to these situations,” observes Baker.

EXAMINING THE QUESTION

Although McCuiston is a commercial shrimper, Logothetis is quick to point out they aren’t taking sides.

“We are here to examine the question:

“The concerns with inshore shrimping mostly have to do with commercially and recreationally valuable finfish, primarily croaker, spot, gray trout — such as weakfish — and flounder,” says Elaine Logothetis, a biologist from Wilmington.

Some fear that if large numbers of these species end up as bycatch, their populations will decline and hurt the state’s other fisheries, she explains.

In 2004, Logothetis and McCuiston received an N.C. Fishery Resource Grant (FRG) to assess the bycatch generated in the state’s southeastern shrimp fisheries. The FRG program is funded by the North Carolina General Assembly and administered by North Carolina Sea Grant.

“We are here to examine the question:

EXAMINING THE QUESTION

“We are here to examine the question:

“We are here to examine the question:

What is the bycatch?"

From April through November 2004, Logothetis accompanied McCuiston twice a week as he trawled in areas from the New River to the South Carolina border, including Onslow, Pender, New Hanover and Brunswick counties and the Cape Fear River.

McCuiston didn't trawl in all of these areas throughout the entire season, partly due to restrictions. DMF closed different areas at different times to let juvenile shrimp and finfish develop. But sometimes McCuiston avoided

temperature, depth and tide phase.

After hauling in the nets, McCuiston and Logothetis separated the shrimp from the bycatch, and Logothetis weighed all of the shrimp and measured a subsample to record their size. She then grouped the bycatch according to species, weighed each group, and measured the lengths of individuals from different subsamples.

"We looked at the total weight of the shrimp compared to that of the bycatch and then further categorized the bycatch based on

separately, she and McCuiston found the catch rates for bycatch were fairly similar across all the months of the project. But shrimp catch rates increased dramatically in July, she notes.

"This is important because it shows that the quantity of bycatch itself changes little during the shrimp season...by contrast, the quantity of the shrimp changes significantly," says Logothetis.

"When the shrimp are abundant, generally the catch is more shrimp than bycatch."



LEFT TO RIGHT:
A SINGLE-RIG OTTER TRAWL
FISHES FOR SHRIMP IN
THE CAPE FEAR RIVER. •
DENNY MCCUISTON,
A COMMERCIAL SHRIMP
TRAWLER IN INSIDE WATERS
AND THE ATLANTIC OCEAN.
• MCCUISTON HAULS IN
HIS NETS AND RAISES THE
DOORS OF THE TRAWL. •
ELAINE LOGOTHETIS AND
MCCUISTON SEPARATE
SHRIMP FROM BYCATCH.

certain areas simply because there weren't any shrimp.

"We were trying to mimic what typical shrimpers would do — they are not going to be in a place where there are no shrimp," says Logothetis.

McCuiston trawls for pink shrimp (*Peneaus duorarum*) in the spring, brown shrimp (*Peneaus aztecus*) in the summer and white shrimp (*Peneaus setiferus*) in the fall. He uses a single rig otter trawl — a long, cone-shaped net with a wide-open mouth at the front that tapers to a closed end or "tailbag."

The trawl is dragged behind the boat, and a chain near its mouth stirs up the bottom. Two large, heavy, flat wooden panels, or "doors," on either side of the net hold it under water and keep the mouth open. McCuiston's net also is fitted with a turtle excluder device (TED) and bycatch reduction device (BRD), as required by law.

For each tow, Logothetis recorded their location using a Global Positioning System (GPS) unit, as well as water salinity,

dominant species," explains Logothetis.

Of the top 10 bycatch species determined by weight, five were commercially or recreationally important species: blue crab, Atlantic croaker, gray trout, spot and summer flounder.

In addition to catch ratios, Logothetis determined the catch per unit effort (CPUE) for shrimp and bycatch. CPUE is the weight of a species caught over a unit of time, such as two kilograms of shrimp per 30 minutes.

Overall, Logothetis concluded the catch ratio and CPUE for shrimp were higher than for bycatch.

But she also found that more bycatch was caught in the spring, during the pink and early brown shrimp seasons.

"The beginning and end of shrimp seasons are when shrimpers are most likely to catch a lot of finfish bycatch," says McCuiston.

"The shrimp just are not as abundant then," adds Logothetis.

By looking at the shrimp and bycatch

MANAGING THE RESOURCE

Most states prohibit trawling in estuarine, or inside, waters. But North Carolina's distinctive coastline makes the state an exception.

At the northern end, the wide waters of the Pamlico and Albemarle sounds stretch nearly 100 miles from north to south and — in some places — more than 25 miles from east to west. Shrimp catch here is plentiful, averaging 50 percent of the state's total shrimp landings between 1999 and 2003, according to DMF records. Only about a quarter of total landings were from the Atlantic Ocean.

But south of Onslow County, inside waters are much narrower. Some areas stretch only a few hundred feet across in New Hanover and Brunswick counties. The shrimp catch in southeastern inside waters is limited, averaging slightly more than 7 percent of North Carolina's total shrimp landings between 1999 and 2003.

Continued



LEFT TO RIGHT:

LOGOTHETIS SORTS BYCATCH BY SPECIES AND WEIGHS EACH GROUP. • GRAY TROUT, A COMMERCIALY IMPORTANT FISH, WAS AMONG THE STUDY'S TOP 10 BYCATCH SPECIES. • LOGOTHETIS MEASURES A SUBSAMPLE OF INDIVIDUALS FROM EACH SPECIES GROUP. • BLUE CRABS WERE THE MOST ABUNDANT BYCATCH SPECIES RECORDED DURING THE STUDY PERIOD. • AFTER BEING WEIGHED AND MEASURED, THESE ATLANTIC CROAKER WILL BE TOSSED OVERBOARD.



Although trawling is legal in inside waters, it is not without restrictions. Shrimping is prohibited in the state's primary nursery areas, the shallow, low-salinity waters in the upper portions of creeks and bays that are sources of food and shelter for juvenile fish and shellfish.

As juveniles develop, they eventually move into lower portion of the creeks and bays, designated as secondary nursery areas. Trawling also is prohibited here. Areas adjacent to secondary nurseries are classified as "special secondary nursery areas."

"They only let us shrimp there a very small part of the time," says McCuiston of the special secondary areas. "And when they do, they wait until the shrimp are a certain size."

Currently, DMF manages shrimp catches based on count size. If 20 shrimp equal a pound, then the shrimp are fairly large. If 100 shrimp equal a pound, the shrimp are small, and DMF will close certain areas to trawling.

In Pender County, most of the inside waters are managed as special secondary nursery areas. As part of developing the Shrimp Fishery Management Plan, DMF recommended designating more of these areas in New Hanover and Brunswick counties.

Logothetis' findings on count size supported some of DMF's long-term data on shrimp in New Hanover County: mainly they're not very big.

There is not much viable habitat left along the county's heavily populated, 20-mile stretch of the ICW, she says. "The shrimp get washed out into the Intracoastal Waterway and never really become a marketable size."

In the draft of the Shrimp Fishery Management Plan presented to the Shrimp Advisory Committee — a panel of various interests helping to develop the plan — DMF recommended trawling be prohibited in the ICW

from Rich Inlet to Wrightsville Beach Bridge.

That didn't cause too much protest, says McCuiston, who sits on the committee. The majority of shrimping in New Hanover takes place further south near William's Landing, he explains, in an area between Wrightsville and Carolina beaches.

In 2003, only 10 small commercial shrimpers trawled in the William's Landing area, generating about 6,000 pounds of shrimp, according to DMF records. Since 1994, landings in the area have averaged only 4,000 pounds.

Logothetis and McCuiston discovered that the bycatch to shrimp ratio was only 0.7 pounds of bycatch for every pound of shrimp at William's Landing, the second lowest catch ratio among all of their study areas.

The DMF also recommended designating part of William's Landing — from channel markers 139 to 146 — as a special secondary nursery area. Given the small fishing effort, the Shrimp Advisory Committee supported the option.

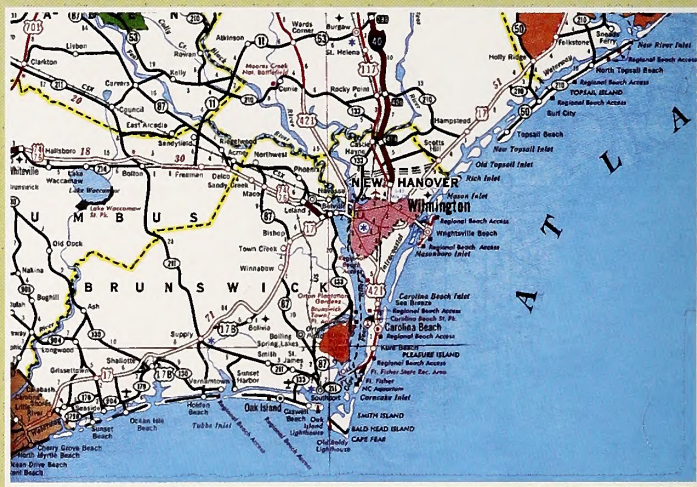
The committee was less willing to compromise for Brunswick County, however. Panel members decided sporadic availability was better than no availability.

The DMF recommendation was to prohibit shrimp trawling in the Eastern Channel, Shallotte River and the ICW from the Sunset Beach

Bridge to South Carolina, and near the Lower Calabash River.

Currently, the DMF only opens these areas when shrimp reach harvestable size. But different shrimp species develop at different times. Sometimes they are ahead — or behind — schedule.

"Prior to brown shrimp reaching a harvestable size, you may have smaller white shrimp drop in," explains Carpenter.



These smaller shrimp interfere with the count size, and the DMF closes the area. Lengthy closures of Brunswick County waters last year meant Logothetis and McCuiston collected a limited amount of bycatch data in that area.

They determined about 1.5 pounds of bycatch was generated per pound of shrimp, but nearly all of their trawling in Brunswick took place in May, the beginning of the season when shrimp are not as abundant. They also trawled a handful of times in late July and late August, when small or juvenile fish are most abundant.

"We don't have a complete season to look at for Brunswick," says Logothetis, noting they were

Agile Acrobats

By Ryan Reynolds

River otters are social creatures, often playfully chasing and wrestling each other in the water and along muddy banks.

Such slippery areas are perfect for “bound sliding,” a technique for gliding into the water on their stomachs.

River otters can bound slide up to 18 feet — reaching speeds upwards of 20 mph.

“They may be having a little bit of fun doing it, but it might be the easiest way to the water,” says Lisa Gatens, mammal specialist at the N.C. Museum of Natural Sciences. “River otters do it repeatedly.”

Muddy banks provide more than an easy route into the water. Tree roots and abandoned beaver dams along the edge of rivers are their homes. River otters can’t dig their own burrows, so those underground shelters play a pivotal role in their survival.

Back in the 1800s and early 1900s, there were barely enough river otters to occupy even a handful of beaver dams. Uncontrolled trapping, water pollution and destruction of the natural environment proved to be major contributors in the decline of the river otter population in the eastern United States.

By the 1970s, successful reintroduction efforts were beginning — making the river otter a mainstay not only in lakes and rivers in North Carolina, but also along our coast.

“The only concerns I have heard now are otters being introduced where there’s stream fishing activity,” explains Gatens.

“The fishermen are complaining about [river otters] eating game fish like trout,” she says. But, she adds, trout aren’t common in a river otter’s diet.

Whether or not river otters prefer trout, their ability to stay under water for long periods of time — up to four minutes — allows them to catch other fish species. River otters eat smaller fish under water, but bring larger meals to shore.

“They have incredibly sharp teeth and a real strong carnivorous design,” says Gatens.

Lack of natural predators is another factor that has helped the river otter populations increase.

“River otters are so fast and so elusive,” says Gatens. “They’re not susceptible to predation by larger land animals.”

In fact, river otter populations have grown large enough that 27 states have river otter hunting seasons. River otters now can be trapped in season in many eastern and coastal counties in North Carolina, except parts of Roanoke Island, according to the N.C. Wildlife Resources Commission.

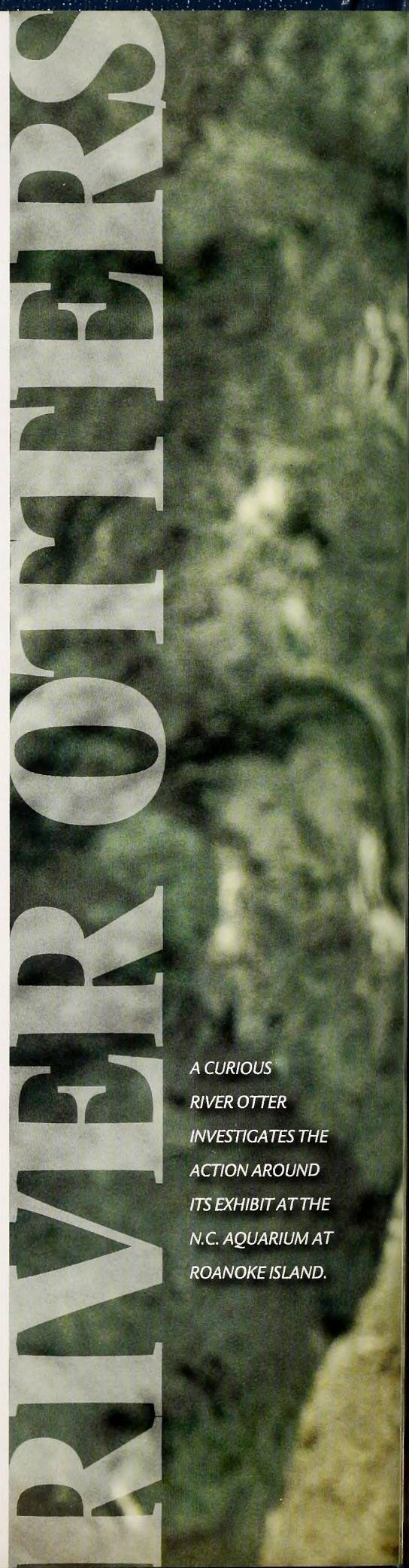
Narrow, brown bodies and white patches around their face distinguish river otters from other species in the Mustelid family, such as minks and weasels. Strong swimmers, otters use their muscular tails and webbed feet to glide through rushing water.

“River otters have streamlined bodies, and their tails are so strong,” says Gatens. “Their bodies are similar to the shape of a trout’s, which are adapted to swim through strong currents.”

But their bodies are longer than even the biggest trout.

River otters grow to around three to four feet, with long tails accounting for nearly one-fourth of their body length.

Continued



A CURIOUS
RIVER OTTER
INVESTIGATES THE
ACTION AROUND
ITS EXHIBIT AT THE
N.C. AQUARIUM AT
ROANOKE ISLAND.

North Carolina Aquarium

NATURALIST'S NOTEBOOK

CROWD PLEASERS

Belly flops. Underwater flips. These are just a couple of the tricks river otters perform for aquarium visitors.

The N.C. Aquarium at Roanoke Island, boasts an 8,000-gallon water tank and a 25-foot-by-4-foot land area that are home for three river otters.

River otters can weigh more than 40 pounds and live from 10 to 15 years in the wild, sometimes longer in captivity.

A river otter's curiosity is another reason for its popularity. "They're very intelligent, and curiosity comes with that," says Gatens.

"River otters are near-sighted," adds Lauren Jozic, aquarist at the Roanoke Island facility. "That may cause them to come close to a boat or person, but it also helps them see under water."

But don't plan on seeing a wild river otter playing during the day. As nocturnal animals, they do most of their playing and hunting at night.

The aquarium's river otters wouldn't be able to keep up with their investigative and playful demeanor if it wasn't for a balanced diet. Jozic does her best to give them the nutrients they would receive in the wild.

Each day she mixes one pound of meat — generally boiled chicken — with fish, one fruit, one vegetable, tomato juice and dry exotic feline chow. The aquarist feeds the otters half of the mixture in the morning and the other half in the evening.

For a mid-day snack, the river otters may receive peanuts, dried fruit or dog treats.

River otters are scavengers in the wild and mainly feast on fish, but will eat anything from bird eggs to mice.

"We make sure they're getting adequate nutrition," explains Jozic. "Frozen fish don't provide as many vitamins as living fish in the water, so we give them several types of food at once."

The aquarists do their best to make river otters feel as though they're back in the streams.

CLOCKWISE FROM TOP LEFT:

River otters bound slide down slippery banks and into rivers. • *The 8,000-gallon water tank is a favorite for the river otters at the Roanoke Island Aquarium.* • *A hungry river otter glides through the water, chasing after fish.* • *Two river otters at the N.C. Aquarium at Roanoke Island rest on rocks in their exhibit.*



Small fish are introduced to the aquarium for the river otters to catch and eat.

"It's a good way for the river otters to receive enrichment," says Jozic. "Goldfish are their favorite to chase around."

Like other animals that have high metabolisms, river otters love to sleep, napping for several hours during the day.

Naps give aquarists an opportune time to clean the exhibits.

"Every two weeks we totally drain the exhibit and pressure wash all the algae off," explains Jozic.

But when the exhibit is clean and the river otters are active, crowds quickly accumulate around the entertaining exhibit.

Working with river otters can be challenging. When Jim Lanier first met a river otter named Fisher in 1984, it was anything but heartwarming.

WILD AT HEART

It could have been the unfamiliar surroundings for Fisher. Or new faces like Lanier, then director of the N.C. Aquarium at Fort Fisher.

"She was running loose in the back of the aquarium," recalls Lanier. "Fisher's handler was going to give her a dog biscuit but dropped it on the ground. I went to pick it up and Fisher came at me. I almost lost my hand."

It took time for Fisher, a river otter that recently had been rehabilitated at Sea World in Orlando, Fla., to adjust to her new setting. But she eventually became a featured attraction at the



N.C. Aquariums



David Williams

Fort Fisher aquarium.

The cost of the exhibit created for Fisher was only \$1,500 — a mere fraction of the expense for building an exhibit today. Nonetheless, the river otter entertained crowds with her acrobatic underwater behavior.

Fisher passed away long ago, and Lanier retired in 2003. However, river otters continue

to be a popular attraction at aquariums and zoos here and throughout the United States.

“They’re real crowd-pleasers,” says Lanier. “When they’re out there playing, they really put on a show.”

But the attack on his hand isn’t the only not-so-fond memory Lanier has of river otters, especially Fisher.

Once, he took her to the veterinarian because of an illness. She didn’t appreciate the doctor’s presence and took a bite at him, as well.

“I couldn’t imagine river otters as pets — not to mention it’s highly illegal to have one without a permit,” says Lanier.

An aquarist’s biggest problem is putting objects in a river otters’ exhibit that the animals won’t destroy, according to Lanier.

“One time they completely dismantled an air conditioner in the exhibit,” says Lanier. “If someone had river otters as pets, they would make a mess of the house.”

But is having a river otter exhibit really worth all the trouble?

“Absolutely,” exclaims Lanier. “Everything is a problem of some sort, but they’re well worth it.” □

SEE FOR YOURSELF

River otter exhibits in North Carolina include:

- **The N.C. Aquarium at Roanoke Island, Manteo:** This river otter exhibit boasts an 8,000-gallon aquarium and a 25-foot-by-4-foot land area for one female and two male river otters. Contact: 866/332-3475, www.ncaquariums.com.

- **Western N.C. Nature Center, Asheville:** The river otter habitat includes a viewing area from a variety of angles. The landscape includes man-made rocks, trees, a stream and a pond. Two male river otters inhabit this exhibit. Contact: 828/298-5600, www.wildwnc.org.

- **North Carolina Zoo, Asheboro:** A tunnel connects two exhibit sections, so the river otters have access to both sides. One section has a pool with glass viewing for the public. The other is an outdoor exhibit with a public viewing from above. This exhibit houses two female river otters. Contact: 800/488-0444, www.nczoo.org.

OTTERLY FASCINATING

- **Latin name:** *Lutra canadensis*.
- **Average size:** 3- to 4-foot long, including tail.
- **Average weight:** 40 to 80 pounds.
- **Range:** All over United States.
- **Preferred habitat:** Lakes, ponds, rivers. They live under tree roots and in abandoned beaver dams.



Onboard Handling Techniques Key to Safer Seafood

By Ann Green

Seafood safety starts early. As soon as a bluefish, tuna or other scombroid species are landed, the fish should be properly chilled to prevent bacteria spoilage, which can lead to histamine poisoning.

Lowering a fish's temperature also will extend its shelf life, according to Dave Green, director of the North Carolina State University Seafood Lab in Morehead City.

"Because commercial harvesters and charter boat operators are often the first receivers of this type of fish, they are the best defense against formation of histamine or scombrotoxin poisoning," says Green, a North Carolina Sea Grant researcher and director of the NC State's Center for Marine Sciences and Technology.

Scombrotoxin poisoning — which occurs when people eat fish that contains histamine as a consequence of bacterial spoilage — is one of the three most common causes of food-borne illnesses associated with America's seafood consumption.

Through a National Sea Grant College Program display, Web site and brochures, extension specialists are educating commercial fishing and charter boat captains about preventing scombrotoxin poisoning.

Led by Thomas Rippen of Maryland Sea Grant, the National Oceanic & Atmospheric Administration's (NOAA) National Sea Grant Program project is a collaborative effort between North Carolina, Maryland, Florida, Georgia, Louisiana, New York, Oregon, Rhode Island and Virginia Sea Grant programs. In North Carolina, Barry Nash and Greg Bolton of the Seafood Lab are working with Green.

"This program is aimed at the first receivers of seafood," says Nash, North Carolina Sea Grant seafood technology and



ABOVE: Gaffing a fish is an option at landing.

LEFT: Temperature limits are critical.

marketing specialist. "Harvesters in North Carolina and other states can request workshops in their area."

The goal is to provide more accountability — from harvest to the dinner table. "In this case, the control measure is temperature," Green explains. "Histamine is chemically produced by spoilage bacteria. If you ice fish or maintain a low temperature, you inhibit the growth of bacteria that produce histamine. Good quality, fresh fish is free of histamine."

SCOMBROID POISONING CASES

The Centers for Disease Control and Prevention in Atlanta reports approximately 69 outbreaks in the United States of scombroid poisoning, involving 297 cases, from 1993 to 1997. In North Carolina, there was one case of histamine poisoning in Dare County in 2004, according to state health officials.

Symptoms of histamine poisoning, which include flushing of the face and neck, a tingling sensation of the tongue, vomiting and or diarrhea, can occur within two to four hours and last up to two days if not treated. Asthmatics may experience more severe cases, which can

lead to anaphylactic shock and potential death.

Scombrotoxin poisoning may be produced in fish due to inadequate temperature control. Temperatures above 40 degrees F promote the formation of histamine. Certain naturally occurring bacteria may grow and produce enzymes that convert histidine in the fish muscle into histamine and other compounds that cause scombrotoxin poisoning.

The Food and Drug Administration (FDA) identified amberjack, escolar, mackerel, shad, bluefish, herring, mahi mahi, tuna, bonito, jack, marlin and wahoo as types of fish likely to cause scombrotoxin poisoning.

In a U.S. Department of Agriculture study, Green and other researchers monitored yellow fin tuna and dolphin fish from the time of harvest through delivery and processing.

"We found no histamine in fish when the point of harvest to filleting was less than 48 hours," says Green. "However, we did find bacteria on the boat, fish dock and processing house. The key to preventing histamine is good temperature control so that bacteria do not have time to grow."

Prevention is the key.

"Once histamine is formed, it does not go away," says Bolton, the Seafood Lab's seafood research technologist. "No amount of washing or cooking will remove or destroy it. Also, freezing will not reduce or destroy histamine after it has formed."

CONTROL MEASURES

The FDA requires all seafood dealers and processors to follow strict monitoring and control procedures to prevent histamine development.

Continued

The Hazard Analysis and Critical Control Point (HACCP) food safety monitoring program is used by dealers and processors to protect their seafood against bacterial, chemical or physical hazards that could harm consumers.

To comply with HACCP, dealers first evaluate their seafood and their processing operations to determine where they are most vulnerable to food safety hazards that can be chemical, biological or physical.

Next, processors identify as critical control points (CCPs) the characteristics of their seafood and the steps in their manufacturing process where they can apply specific controls to prevent, eliminate or minimize risk of food safety hazards. Typical manufacturing CCPs are receiving, cooking or storing seafood.

Dealers then establish maximum or minimum boundaries or "critical limits" at given CCPs. Time and temperature measurements or rapid chemical tests help monitor CCPs such as the 40-degree F limit for histamines.

Processors must implement corrective actions whenever monitoring shows that a CCP critical limit has been violated. For example, if a cooler fails, a dealer could ice fish to keep it cold or move it to another cooler.

All wholesale seafood dealers and processors are subject to HACCP regulations.

"Fishermen are exempt from the regulations," says Green. "But the industry's cooperation is critical to ensure the quality and safety of domestically harvested seafood."

FISH HANDLING

The Sea Grant histamine display includes suggestions on using adequate tackle to ensure proper handling and chilling of fish. Gaffing or



Laura Childress, NC State Seafood Lab



Chris Taylor, NC State Seafood Lab



Greg Bolton, NC State Seafood Lab

TOP: Anglers use a sharp object to stun the fish.
MIDDLE: Gutting is preferred for some species.
BOTTOM: After gutting, fish need to be put on ice.

spearfishing fish in the edible flesh is discouraged.

Extension specialists recommend stunning the fish with a club or mallet, making the fish easier to handle and preventing bruising and internal bleeding. Recreational anglers also can follow these procedures for fish that will be

brought back to dock.

Aboard the boat, gutting the fish is optional, but preferred for some species, according to the display. "For example, gutting large fish, such as tuna, may be necessary to speed the process."

When packing and chilling the fish, remove fish from ice water and rinse off blood before packing with clean, crushed or flaked ice.

"Pack the belly of eviscerated fish with clean ice," according to Sea Grant experts. "Containers should drain easily to prevent fish from sitting in ice melt. The amount of ice depends on the number and fish species, air and water temperatures, and the length of time fish will be stored."

Two pounds of ice per pound of fish is recommended.

"It is always better to have too much ice than not enough," the experts advise.

HACCP guidelines also recommend placing histamine-forming fish in a cooling container, depending on species, and then rapidly chilling to an internal temperature of 40 degrees F or less.

"The amount of time for cooling depends on the chilling method, size of fish, air and water temperature, and whether the fish was bled and/or gutted," according to Green.

When harvesters follow these control measures, they become a critical part of the program that keeps seafood safe, adds Nash. □

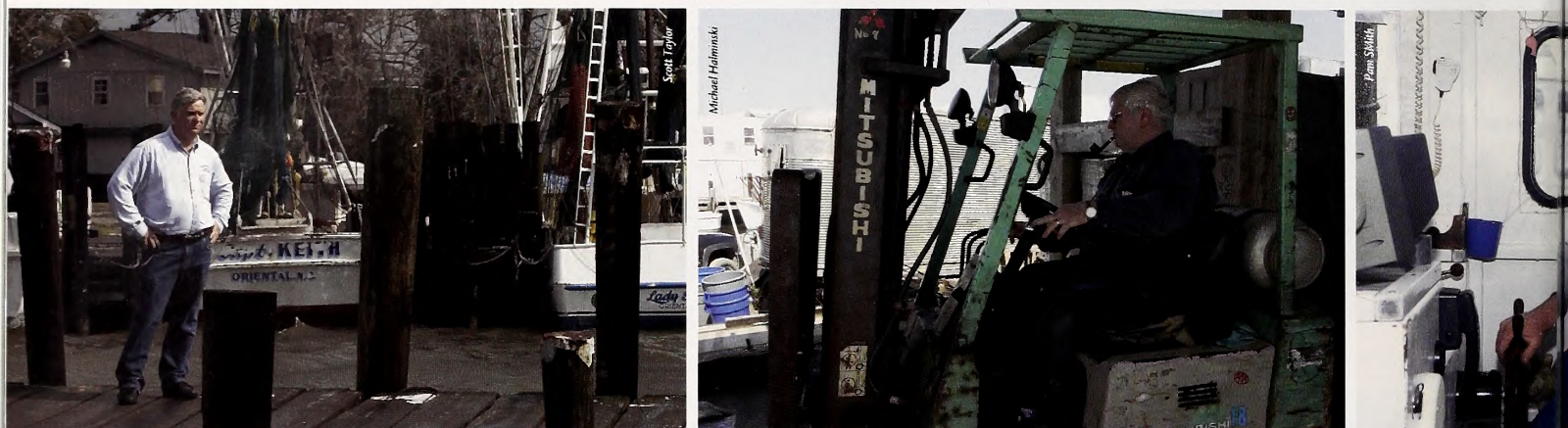
For more information: visit the Web: www.iceyourfish.seagrant.org. To set up a workshop in North Carolina, call 252/222-6334 or e-mail Barry Nash at barry_nash@ncsu.edu or David Green at dave_green@ncsu.edu.

Jerry Schill Heads North

By Pam Smith

Q: What do fish and cows
have in common?
A: Jerry Schill.

North Carolina
Fisheries
Association



Left to Right: Jerry Schill ends his 18-year tenure at the helm of the NCFA this summer. • Billy Carl Tillett will miss the feisty NCFA spokesman. • Denny Hooks of Carolina

In late summer, Jerry Schill will end his 18-year stint as president of the North Carolina Fisheries Association (NCFA) — the trade organization that has represented the state’s commercial fishing interests since 1952.

He and his wife, Pam, will retire to a 100-acre dairy farm in Pennsylvania — but not before electricity, plumbing and bathrooms and a modern kitchen are installed in the nine-bedroom, Amish-built farmhouse.

They plan to transform the house into the Joshua Christian Family Center, a place where families can retreat from the quick urban pace to find solace in its bucolic setting. Schill explains that the name is derived from a line in the Book of Joshua that reads: “As for me and my house, we will serve the Lord.”

If guests are not interested in milking cows, planting or harvesting, they can work with the Belgian draft horses or explore the farm’s rippling streams and 45 woodland acres.

“This is a place for people to get in touch with their spirituality and our country’s agrarian roots,” Schill says.

The forthcoming move means the Schills will reconnect with their own roots in Pennsylvania, where Schill grew up on a dairy farm and married Pam, his high school sweetheart. After a four-year stint in the U.S. Air Force, he became a professional photographer.

In the 1980s, the family moved to North Carolina when Schill became a sales representative for an agribusiness covering

Pamlico and Carteret counties. It would be Schill’s first introduction to the state’s commercial fishing community.

“I got the political bug in 1986,” says Schill, recalling his unsuccessful bid for the North Carolina House of Representatives. “I was beaten, but I didn’t do too badly for a Yankee Catholic Republican.”

The campaign got him noticed by the NCFA, which at the time was looking for someone to be a spokesperson for a faltering industry. Still, he recalls many of his new constituents had no problem letting him know straight away that they had not voted for him.

Through the years, he would forge a relationship based on mutual trust and respect.

PUBLIC AWARENESS

Schill learned early on that the industry could benefit from more public exposure that, in turn, would foster an appreciation for the folks who deliver safe seafood to the market. It begins with education, he says.

For several years, Schill has participated in the Provider Pals, a program that brings fishers, farmers, miners and foresters into urban schools to show youngsters about the people who provide food and other essential goods.

He recalls a Provider Pal trip to Washington, D.C. with Billy Carl Tillett, NCFA board chair. They helped students put on fishing slickers and the iconic Hatteras boots. Students handled fishing gear, including nets.

“Fishing is so removed from the public eye. This is one thing the industry can do to help folks connect with the source,” he says.

The industry also can use more political clout, Schill observes. Commercial fishing is facing a “death by a thousand cuts,” he says. Watermen are caught in a tug-of-war between regulations and global competition on the one side and user conflicts on the other.

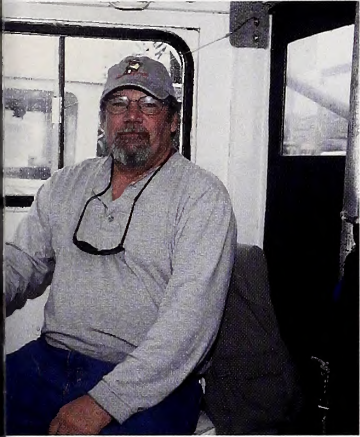
Schill is not one to mince words. He has been vocal in reminding policymakers that the federal Magnuson-Stevens Act of 1976 and the state’s Fisheries Reform Act of 1997 have dual purposes: to preserve fishery stocks and the folks whose livelihood depend on fishing.

He fears that apathy will contribute to the collapse of the state’s commercial fishing industry. Schill challenges commercial fishers to step up and show unity at what he sees as a critical time.

Supporting NCFA is one way for their voice to be heard by policymakers, Schill says. Membership rolls, which include fishers and dealers, have ebbed and flowed in the organization’s 52 years. At one time, the rolls boasted 1,500 members. Now, there are 750 dues-paying members.

In an NCFA *Tradewinds* publication editorial, Schill wrote:

Part of my job is to give advice. And, while I sincerely believe that many of our problems are the result of an overzealous bureaucracy, I also know that the attitudes of our own people are the cause of much of our



Each says the industry needs unity • Jeff Aiken supports NCFAs ongoing efforts for the industry • Jerry Schill visits with Sherrill Styron of Oriental, a long-time NCFAs member

grief. This isn't about NCFAs directly. It's about the future of commercial fishing as we know it. Will it survive? Does commercial fishing have a future?

The North Carolina Fisheries Association has a bleak future if the rank and file doesn't wake up. And I can assure you of this: if NCFAs falters, so goes the commercial fishing industry.

INDUSTRY UNITY

For Danny Hooks, a veteran commercial fisher from Carolina Beach, having a strong voice for the industry is more important than ever before.

"The commercial fishing industry is losing numbers in our ranks. That weakens our political clout," says Hooks, a NCFAs board member. "That's all the more reason for unity from within the industry. For once in our lives, we must pull together up and down the coast, those who fish inland waters and those who fish ocean waters. Unless we show unity, we are going to be at a disadvantage when it comes to rules."

Tillett agrees. "As an industry, we need to quit worrying about self interests and look at the common good of the whole industry."

But he also knows that the NCFAs will need to have greater participation by key players in the industry to be heard by policymakers. "If you have a big voice, then ears will turn in your direction," he says.

With Schill, Tillett has presented the

industry's message at countless federal and state forums. "I wish we didn't have to sit through meetings that chafe the bottom out of your pants. But you have got to be there to defend the industry."

He credits Schill for building a working relationship with the N.C. Division of Marine Fisheries and the Marine Fisheries Commission. "I think we can talk about issues and try to work out solutions. The feds are a different matter. We're bitter about the regulations they keep throwing at us. They seem to have blinders on when it comes to the economic impacts on the industry."

Hatteras fish dealer Jeff Aiken fears some commercial fishers are losing their will to fight. "There are lots of rallying points. I've seen them come and go," he says. "But it's difficult to organize commercial fishers. They like their independence."

Like Hooks, he'll continue to support the NCFAs to lobby for commercial fishing interests. The message he wants policymakers to hear is simple: "We want responsible science and responsible regulations, not just politics," Aikens says.

CHANGES AHEAD

Jerry Schill is quick to point out that his family has been the constant during the years he guided the association through both turbulent and calm waters. Pam Schill, now in the insurance business, has provided organizational support. Daughter Amy Schill

Willis has served as NCFAs vice president of administration, overseeing day-to-day business and helping to organize meetings and events. She and her husband soon will move to the North Carolina foothills.

"I'll miss seeing and working with my dad on a daily basis," says Willis. "I have learned a lot about commitment and dedication from him. I'll also miss the association members. They are like family to me."

The Schills' other children include Andy Schill of Raleigh, Sarah Schill Midgett of Manteo, and Adam Schill, who is serving in the U.S. Air Force in Korea.

Though Schill is sentimental about leaving family, the association and North Carolina behind, he is confident that it's the right time for change.

Schill expects incoming president Sean McKeon will bring new vitality and ideas to lead the industry through changing times.

"Jerry will be missed," says B.J. Copeland, a member of the N.C. Marine Fisheries Commission and former North Carolina Sea Grant director. Though Schill and Copeland have not always seen eye-to-eye on issues, Copeland says, "Jerry has been a very effective spokesperson for the industry."

Tillett, who has been a member of the NCFAs from its earliest days, says he'll miss Schill's perseverance.

"I hate to see him go. He has seen us through some tough times with his dedication. We've got some big shoes to fill," he says. □



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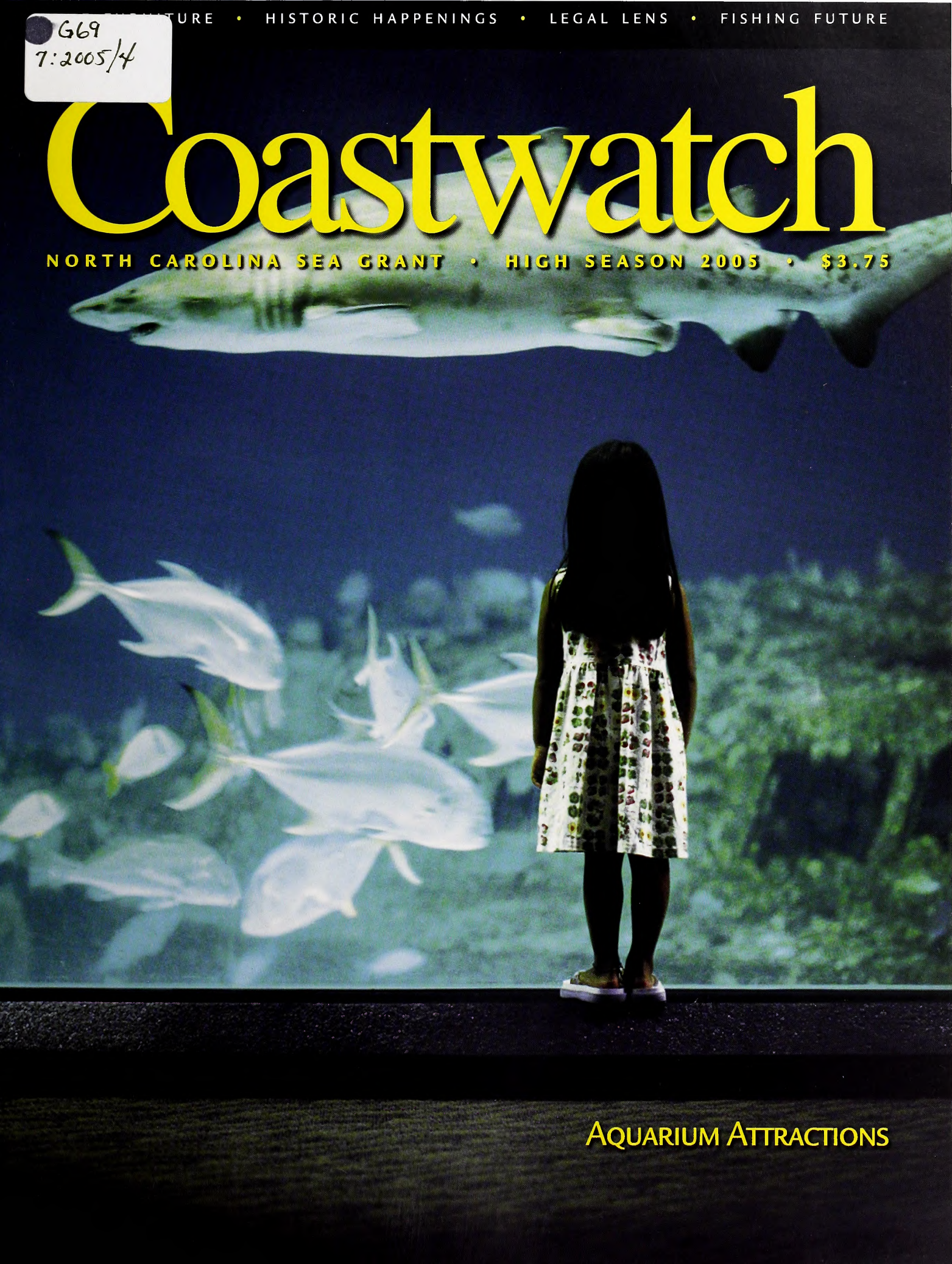
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AQUARIUM ATTRACTIONS

International Experiences

Since Fall 2002, North Carolina Sea Grant has had the privilege of mentoring — and learning from — the growing Sea Partnership Program (SPP) in Indonesia. I personally had the privilege of visiting SPP this year not only to see how the program has grown within Indonesia, but also to witness discussions of a potential regional program based on the Sea Grant/SPP model.

The official request for my visit was to highlight Sea Grant's strategic communications processes and products, which could then be adapted to serve the specific needs and audiences in Indonesia. But, as you would expect, I learned more than I could share during those two weeks. In particular, I gained perspective on regional issues in Thailand, Malaysia and the Philippines. Indonesia and neighboring countries are developing their program paradigms in terms of 21st-century coastal communities. They face myriad challenges and opportunities.

My experience was priceless. During my visits to islands off the coast of South Sulawesi, I saw firsthand the SPP efforts to recognize the value of "local wisdom" while also providing communities access to current scientific results. Working with Nurliah Buhari, the first SPP fisheries extension officer, communities on the three islands have established local marine protected areas. This is quite a feat, as I have observed and attempted to report on the protracted discussions regarding MPAs in the South Atlantic region in the United States.

I also got a chance to visit with Billy Wagey, the first extension officer in North Sulawesi, who is working on varied efforts, including coastal conservation and sustainable tourism opportunities. I am thrilled

Herman Lankford



to know that other SPP regional centers anticipate adding extension and communications specialists — the outreach portion of the university-based program.

Just a few weeks after my return, a SPP delegation visited North Carolina prior to Sea Grant Week 2005. I again was challenged to explain not only what we do, but also how and why we do it. We also provided university and community members opportunities to learn about tsunami recovery directly from Widi Pratikto, director general of coasts and small islands in the Indonesian Ministry of Marine Affairs and Fisheries.

North Carolina Sea Grant takes particular pride that our program funded Pratikto during his doctoral studies in coastal engineering at North Carolina State University. During those studies, he took the Sea Grant concept to heart and pledged that he could start a similar program when he returned home to Indonesia. He has done just that, with 19 regional centers that have been established since the SPP was initiated in 2002.

Watch for details on my Indonesian visit in a future issue of *Coastwatch*.

In the meantime, the National Sea Grant office, the Sea Grant Network and the OAR International Affairs office all can take pride in providing models for not only the Indonesia program, but also for growing programs in Korea, the Caribbean and a potential program in North Africa. I look forward to continued international exchange opportunities not only for North Carolina Sea Grant, but also for our colleagues across the Sea Grant network.

Katie Mosher, Managing Editor

I N T H I S I S S U E

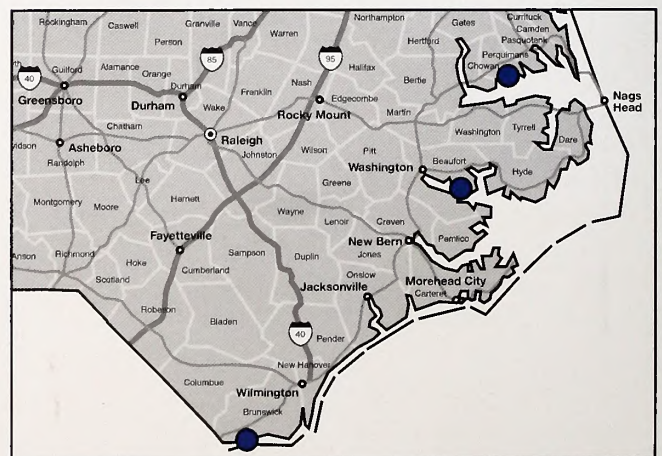
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North Carolina's diverse coast offers countless interesting subjects. The large dots on the map indicate story settings in this issue — including Perquimans and Brunswick counties, and Bath.



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Coastwatch

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Coastwatch

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The North Carolina Sea Grant College Program is a federal/state program that promotes stewardship of our coastal and marine resources through research, extension and education. It joined the National Sea Grant College Network in 1970 as an institutional program. Six years later, it was designated a Sea Grant College. Today, North Carolina Sea Grant supports research projects, a 15-member extension program and a communications staff. Ron Hodson is director. The program is funded by the U.S. Department of Commerce's National Oceanic and Atmospheric Administration and the state through the University of North Carolina. *Coastwatch* (ISSN 1068-784X) is published six times a year by the North Carolina Sea Grant College Program, North Carolina State University, Box 8605, Raleigh, North Carolina 27695-8605. Telephone: 919/515-2454. Fax: 919/515-7095. Subscriptions are \$15. E-mail: katie_mosher@ncsu.edu World Wide Web address: <http://www.ncseagrant.org> Periodical Postage paid at Raleigh, N.C.

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courtesy of N.C. Aquariums.
Table of Contents photo of boats
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COASTAL TIDINGS

Sea Grant Science Fellow Named

Erin Seiling of Raleigh is the 2005-06 Science Communications Fellow for North Carolina Sea Grant.

In the one-year fellowship, Seiling will develop communications products for the N.C. Fishery Resources Grant Program and the N.C. Blue Crab Research Program. The two programs, funded by the N.C. General Assembly and administered by Sea Grant, highlight fishery and habitat topics that are important, not only along the North Carolina coast, but across the state in terms of economic and environmental value.

A native of Gates County, Seiling holds a bachelor's degree in zoology from North Carolina State University and a master's degree in environmental management from Duke University.

As an NC State undergraduate, she



Erin Seiling

completed a coastal processes class at Morehead City.

"In the class, I was inspired to concentrate on coastal management. We took field trips across the North and South Carolina coasts," Seiling says. "At Sea Grant, I am looking forward to writing and communicating with different groups from the coast."

Seiling has conducted research for the Atlantic States Marine Fisheries Commission and the N.C. Coastal Federation. She also worked as a weekend coordinator at the N.C. Museum of Natural Sciences.

"The fellowship will enable Sea Grant to use Erin's coastal ecology expertise and museum experience to create innovative communication products for the Fishery Resource Grant Program and Blue Crab Program — and share them with the public," says Ronald G. Hodson, North Carolina Sea Grant director. —A.G.

Knauss Fellow Takes Award

Katherine Eschelbach, a 2005 Knauss Fellow, was tapped for the Walter B. Jones Sr. Memorial/NOAA Excellence Award for Coastal and Ocean Resource Management in the Coastal and Marine Graduate Study category. The award recognizes student achievements that contribute to the development of new or improved approaches to coastal or ocean management.

Eschelbach is a 2004 graduate of the University of North Carolina at Chapel Hill with a master's degree in regional planning.

For her master's project, she conducted a



Katherine Eschelbach

statewide natural hazards risk assessment. Her results played a fundamental role in advising statewide policy formulation for the North Carolina natural hazards mitigation plan. She also led a hazard mitigation planning project to analyze flood damage-prevention policies at a river basin scale for the

UNC Department of City and Regional Planning.

Eschelbach is one of four North Carolina scholars selected for the 2005 Dean John A. Knauss Marine Policy fellowships. She is serving as an executive fellow with the NOAA Oceans Biogeography Program. —P.S.

In the Next Issue of *Coastwatch*

Teachers find personal renewal during a sailboat trip in Beaufort Inlet. Ann Green takes readers along on the ride. Kathleen Angione explores an oyster shell recycling effort in Carteret County funded by the N.C. Fishery Resource Grant Program. And just in time for fall planting, Pam Smith introduces readers to native coastal plants.

Fishery Resource Grants and Blue Crab Research Grants Awarded for 2005

North Carolina's fishers and scientists will team up to study the state's rich coastal resources this year, thanks to the N.C. Fishery Resource Grant Program (FRG) and the Blue Crab Research Program.

Funded by the N.C. General Assembly and administered by North Carolina Sea Grant, the FRG and Blue Crab programs support cooperative research based on ideas from the fishing community. The program helps partner fishers with academic researchers to ensure useful results for fishers and resource managers.

"The FRG and Blue Crab programs provide a unique opportunity for fishers to be involved in research activities that directly affect their livelihoods," says Ronald G. Hodson, North Carolina Sea Grant director.

Fifteen FRG projects, totaling \$633,998, and 13 Blue Crab projects, totaling \$314,780 were approved for 2005. The projects encompass a variety of topics and coastal

areas, ranging from an assessment of spiny dogfish populations along the Outer Banks to an examination of blue crab distributions in the Cape Fear River Estuary.

Two previous FRG projects were so successful at generating data that they have been funded for a second year.

One project, led by Ocracoke fisher and mathematician Eugene Ballance, will continue using satellite mapping and sonar imaging technology to modernize 118-year-old oyster survey maps of Pamlico Sound.

Another project to continue assessing shrimp fishery bycatch in North Carolina's southeastern inside waters will be conducted by Wrightsville Beach shrimper Denny McCuiston and Wilmington biologist Elaine Logothetis.

For more information on the FRG and Blue Crab programs, visit North Carolina Sea Grant online at www.ncseagrant.org and click on "Research Areas." —K.A.



Day at Docks Celebration

On Hatteras Island, fishing traditions flourish — from fishing for flounder with pound nets to long-lining for sharks far out in the Atlantic.

To honor the island's fishing heritage, the First Annual "Day at the Docks: A Celebration of Hatteras Island Watermen" will be held Sept. 17 at the town waterfront off N.C. 12, in the heart of Hatteras Village.

The festival will include exhibits and demonstrations of fishing boats and seafood cleaning, as well as competitions, including a survival suit contest.

The Blessing of the Fleet on the evening of Sept. 16 will kick off the celebration.

Day at the Docks is sponsored by the Hatteras Village Charterboat Association, the Hatteras-Ocracoke Auxiliary of the N.C. Fisheries Association, North Carolina Sea Grant, the Hatteras Village Civic Association and the Outer Banks Visitors Bureau.

For more information, contact Susan West, 252/995-4131, ridgeroad@earthlink.net.

—A.G.

Leatherback Nesting on Bogue Banks

Two leatherback sea turtle nests on Bogue Banks beaches are drawing attention.

The first leatherback nest was laid in mid-May on Pine Knoll Shores, according to Matthew Godfrey, coordinator of the N.C. Wildlife Resources Commission's Sea Turtle Project.

Leatherbacks, which are the largest sea turtles in the world, are an endangered species and are more common in Florida than in North Carolina. However, in the past few years, some leatherbacks have nested in Cape Hatteras and Cape Lookout, according to Godfrey. The adults average 6 to 8 feet long and 1,000 to 2,000 pounds.

Leatherbacks have dark leathery skin covering a thin bony layer on the hard shells. Other sea turtles — including loggerheads, which are more common in North Carolina — have hardened scutes or plaques on their shells.

Find out more about the leatherback nesting: www.floridaleatherbacks.com or www.seaturtle.org.

—A.G.



N.C. Crab, Shrimp Harvests Decline

In 2004, North Carolina's two largest commercial fisheries — blue crabs and shrimp — experienced declines in harvests while oyster harvests increased, according to the N.C. Division of Marine Fisheries (DMF).

The 2004 commercial harvest of finfish and shellfish totaled 134 million pounds, valued at \$79.7 million — an 11 percent decrease from the previous five-year average of 149 million pounds, DMF reports.

Landings fluctuate for a variety of reasons — availability of wild stocks, weather, market demand, prices, low-cost imports, the number of people fishing and harvest restrictions, according to DMF.

The top species was blue crab, valued at \$20.2 million, followed by shrimp at \$9.4 million, the report says.

The state's oyster harvest was 69,479 bushels — 24,814 bushels more than the previous five-year average of 44,666 bushels, according to DMF. The increase in oysters is likely attributed to higher levels of rainfall than in previous years, which created better growing conditions.

In 2004, the number of recreational fishing trips in coastal waters continued to expand, resulting in a record high catch.

The number of estimated hook-and-line fishing trips in North Carolina coastal waters increased to 7 million in 2004, a 7 percent increase over 2003. The additional trips contributed to increased catch estimates totaling 24.5 million pounds — the highest recreational catch estimate on record.

For more information on harvest statistics by species, visit the DMF Web site: www.ncdmf.net/statistics/index.html. — A.G.



Possible Blackbeard Shipwreck Opens to Diving

Beginning this summer, the state will permit limited recreational scuba diving on what many believe is the wreckage of Blackbeard's famous pirate ship, the *Queen Anne's Revenge*, sunk in 1718.

The "Dive Down" program will allow 320 divers per year to visit the shipwreck for a \$500 fee. Dive shops will organize trips to the 25-foot-deep wreck, located off Beaufort Inlet near Atlantic Beach. Divers must attend a two-day educational program that includes classes on archeology, history, marine ecology and coastal geology.

"Participants will get a whole perspective on shipwrecks and what they mean in the

maritime environment," says Mark Wilde-Ramsing, manager of the state's *Queen Anne's Revenge* Shipwreck Unit.

State officials hope that opening the wreck to supervised diving will increase tourism and awareness about North Carolina's rich maritime history.

Since its discovery in 1996, the wreck — which once may have been the largest pirate ship to sail in North American or Caribbean waters — continues to provide archeologists with a gold mine of cultural and material artifacts.

Much of the wreck is encrusted with marine growth, but divers likely will be able to identify major features like cannons, anchors and barrel hoops from their obvious sizes and shapes, according to the N.C. Maritime Museum's exhibit on Blackbeard and the *Queen Anne's Revenge*. More obscure features will be detailed to divers via submersible MP3 players. — K.A.

NOAA's Atlantic Hurricane Outlook

National Oceanic and Atmospheric Administration (NOAA) hurricane forecasters are predicting another above-normal hurricane season for the Atlantic region.

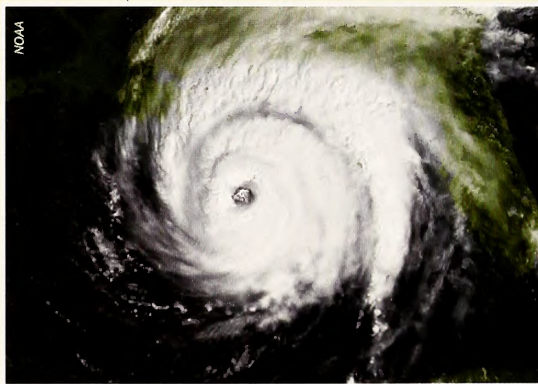
"NOAA's prediction for the 2005 Atlantic hurricane season is for 12 to 15 tropical storms, with seven to nine becoming hurricanes, of which three to five could become major hurricanes," according to retired Navy Vice Adm. Conrad C. Lautenbacher, undersecretary of commerce for oceans and atmosphere and NOAA administrator.

NOAA's Atlantic hurricane outlook reflects an expected continuation of above-average activity that began in 1995. Since that time, all but two Atlantic hurricane seasons have been above normal. Hurricane season began June 1 and ends Nov. 30. Although it is too soon to predict where and when storms may hit, NOAA officials caution the public to be prepared.

"Impacts from hurricanes, tropical storms and their remnants do not stop at the coast," explains retired Brig. Gen. David L. Johnson, director of NOAA's National Weather Service (NWS).

While preparing for another highly active season, the public should remember that these storms carry severe weather — such as tomadoes and flooding — while moving inland, he adds.

For more information about hurricanes, visit the NWS National Hurricane Center Web site: www.nhc.noaa.gov. — A.G.



Eastern Oysters on Federal, State Agendas

A small bivalve is making a big impression in both federal and state government this year.

The National Marine Fisheries Service (NMFS) is reviewing a petition to list the eastern oyster (*Crassostrea virginica*) as endangered or threatened under the Endangered Species Act.

At the state level, several bills regarding oyster restoration and protection have been submitted to the N.C. General Assembly.

Proposals include:

- Creating two new oyster sanctuaries per year;
- Planning an oyster hatchery and public education program at each of the state's three



- aquariums;
- Prohibiting stormwater discharges into prime shellfish growing areas; and
- Banning oyster shells from landfills.

Another bill proposes an income tax credit to those willing to donate oyster shells, which are prime substrate for young oyster growth.

Gov. Mike Easley didn't forget about oysters either. His 2005-06 and 2006-07 budget requests include funding for more oyster restorations and no-take sanctuaries, along with support for oyster shell recycling and public outreach programs.

— K.A.

New Aquaculture Research has Commercial Potential

A new project in aquaculture research, education and potential commercial production is underway at Sturgeon City, Jacksonville's budding environmental learning center.

Partnering with the University of North Carolina at Wilmington's Center for Marine Science, the city is converting drying beds from its old wastewater treatment plant for use in the study.

The Sturgeon City project is an extension of a UNCW facility operating at Wrightsville Beach, according to Wade Watanabe, North Carolina Sea Grant researcher and UNCW aquaculture program coordinator. By utilizing the latest technologies and added space, researchers plan to improve the grow-out techniques of important marine finfish, such as sea bass and flounder.

The infrastructure at Sturgeon City, Watanabe says, "gives us a chance to upscale our laboratory research on marine finfish aquaculture to a pilot commercial endeavor." For example, commercial practitioners will be invited to train and develop on-site expertise — demonstrating the commercial viability of the project.

The research project also will aid staff at Sturgeon City in plans to cultivate submerged aquatic vegetation and marsh grass in several of the drying beds.

"We hope to gain from this body of knowledge on site to eventually raise striped bass, flounder, and various coastal species — therefore widening the possibilities of what you can do at Sturgeon City," says Glenn Hargett, Jacksonville's community affairs director.

For more information, contact Watanabe at 910/256-3721 or visit the Sturgeon City Website at www.sturgeoncity.org. Also, watch for information this fall on the grand opening of the UNCW aquaculture facility at Sturgeon City.

— L.L.

Sea Grant Adds Safety Info Items

This summer, the National Oceanic and Atmospheric Administration (NOAA) continues its rip current awareness campaign with new safety items.

NOAA programs — including North Carolina Sea Grant and National Weather Service — have added *Break the Grip of the Rip*™ refrigerator magnets.

The magnets continue the *Break the Grip of the Rip*™ campaign launched in Wrightsville Beach last year.

"The magnets are yet another tool to meet the demand from businesses, community agencies and the public for more beach safety information," says Spencer Rogers, North Carolina Sea Grant coastal erosion specialist.

Rogers has a lofty goal — to get magnets in every hotel room and beach rental property, and eventually to each residence along the coast.

Sea Grant's first printing — 15,700 magnets — is already moving quickly.

The magnets are \$1 each for single requests; 75 cents each for 10 or more; and 50 cents each for 100 or more.

"It is a small investment with an important message. And it could save a life," Rogers adds.

In addition to the magnets, Sea Grant offers metal signs and brochures with the *Break the Grip of the Rip* theme designed by Michigan Sea Grant for the national campaign.

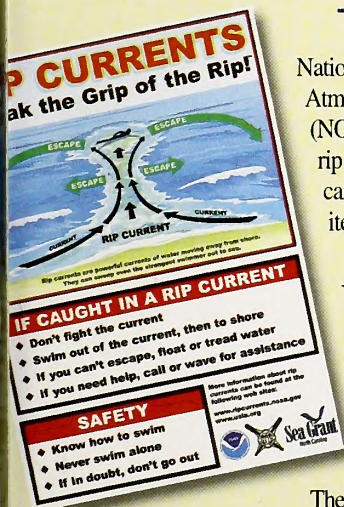
The color signs — available in English and Spanish — are 12 inches by 18 inches and cost \$25 each. A 25 percent discount is available for orders of 10 or more.

Up to 30 *Break the Grip of the Rip* brochures can be requested at no charge. Additional brochures are available for 20 cents each. Call Sea Grant for pricing on 100 or more brochures.

Templates for the brochures and signs also can be downloaded from www.ripcurrents.noaa.gov.

For additional ordering information, call North Carolina Sea Grant at 919/515-9101.

— A.G.





EXTREME MAKEOVERS:
NOT YOUR DADDY'S

By Pam Smith



A toddler explodes into the dimly lit “Graveyard of the Atlantic” exhibit hall at the North Carolina Aquarium on Roanoke Island. He squeals with excitement, “Mommy, Mommy, Sharks! See the sharks!”

He presses his face against the see-through wall of the two-story ocean tank, mesmerized by the motion of the sharks and a silvery array of aquatic life before him. As one of the sharks swims close to his vantage point, the boy exclaims with delight. “Wow!”

The “wow” factor is an important part

help raise public interest and financial support for the three aquariums.

Attendance grew as coastal tourism flourished.

“The three aquariums have become a major component of North Carolina’s tourism industry,” says Robert Roush, public information officer at the Fort Fisher Aquarium. “With about a million visitors combined annually, they are among the top attractions in the state. Studies show they directly contribute more than \$27 million to

the state’s economy each year,” he says.

EXTREME MAKEOVERS

By 1989, state officials recognized

that the aging aquariums couldn’t keep pace with increasing attendance — and visitor expectations.

So the N.C. General Assembly budgeted money to implement “extreme makeovers” at all three sites. The aquarium society pledged to raise additional donations from the private sector to augment the \$15 million state allocation for each project. In addition, part of the admission fees from each aquarium would be dedicated to the building program.

The expansion program would enable each facility to grow in size, increase live animal exhibits, create state-of-the-art interactive displays, and multiply education programs and events. Each could portray the biodiversity of aquatic life within varied habitats — from freshwater streams, ditches and swamps to tidal rivers, shallow sounds and ocean depths.

The challenge for today’s aquariums, zoos and living museums is to grab the attention of a generation accustomed to the multimedia world of entertainment and education, says JP McCann, director of the Roanoke Island facility. “New facilities allow us to integrate education into an entertaining delivery system,” he says.

A transformed Roanoke Island aquarium — first to come on line in 2000 after a two-year rebuilding process — highlights aquatic life in “The Waters of the Outer Banks.” Four sand tiger sharks prowl its 285,000-gallon ocean tank that is complete with a sunken model of the Civil War ironclad, the *USS Monitor*.

Then came Fort Fisher in 2002, featuring “The Waters of the Cape Fear.” Its 235,000-gallon tank features inhabitants of an offshore ocean reef, including sharks, stingrays, groupers and moray eels.

The timetable for the Pine Knoll Shores Aquarium hit a snag in 1999. Renovation funds were diverted to help with recovery efforts when multiple hurricanes, including Hurricane Floyd’s historic flooding, devastated Eastern North Carolina.

The wait will be over in May 2006 when the new facility opens its doors on a “Mountains to Sea” theme, complete with a two-story mountain waterfall. Other features include a 310,000-gallon ocean tank, with a full complement of sea life swimming about a replica of *U-352*, a German submarine that sank off Cape Lookout in 1942.

While the aquarium is closed to the public during the construction, the Pine Knoll Shores staff is operating programs from a former Atlantic Beach supermarket. Part of the aquarium’s collection waits out the makeover in holding tanks in refitted grocery store space. Others are being cared for at sister aquariums.

NATURE AND NURTURE

There’s much more to these aquariums than meets the public eye, Griffin says. The first thing you notice as you push through any “staff only” door is the hospital-like environment. Cleanliness rules.

A small, efficient and highly skilled team of specialists is dedicated to the health and welfare of more than 2,500 living creatures, Griffin adds. The work of a core staff of full- and part-time employees is amplified by a cadre of trained volunteers, junior aquarists

Continued

AQUARIUM

of the visitor experience at the state’s three aquariums, says David Griffin, director of North Carolina Aquariums. The state-supported public education facilities at Roanoke Island, Fort Fisher and Pine Knoll Shores are designed “to inspire appreciation and conservation of North Carolina’s aquatic environments.”

“Our approach to environmental education can’t be cut and dry. We have to make it fun, entertaining and engaging, so that visitors walk out knowing more about North Carolina’s aquatic life because of their experience,” Griffin says.

Somewhere between the toothy sharks swimming in the ocean tank and grinning alligators soaking in a freshwater pond beneath a soaring conservatory roof, one thing becomes clear: This is not your daddy’s aquarium.

A lot has changed since the three sites opened in 1976 as Marine Resource Centers meant to enhance coastal and marine science and education for researchers, teachers and the public.

With the renaming of the centers as aquariums in 1986 came modest expansion and an evolving educational mission. That same year, the North Carolina Aquarium Society, a statewide nonprofit group, was established to

and summer interns who assist in nearly every phase of operation.

What's the most basic life support system in an aquarium? Water, of course. But Frank Hudgins, director of husbandry and operations at the Roanoke Island site, will tell you that it's not that simple. Sophisticated systems filter water and regulate temperatures for each exhibit. Saltwater is "manufactured" on site to control species-specific salinity needs and to ensure a disease-free environment.

Mother Nature plays a key role in providing more than 270 indigenous species, says Paul Barrington, Hudgins' counterpart at Fort Fisher. Along with members of their respective husbandry teams, Barrington and Hudgins make frequent "fishing" trips with local commercial or recreational anglers to net catch or trap needed finfish or shellfish species. Local dive clubs also help fill specific needs.

Permits from the N.C. Division of Marine Fisheries (DMF) authorize species collection from the state's saltwater bodies. The aquariums also have special permits and help from the N.C. Wildlife Resources Commission to gather freshwater species from the mountains to the coast.

What can't be found in the wild must be acquired from other aquariums by purchase or an exchange agreement — or bred in-house. A successful captive-breeding program at Fort Fisher addresses the supply side of some hard-to-collect species.

Nature obliges in the case of sea horses, which can release hundreds of babies each month. Finding suitable "baby food" is another matter. Aquaculture researchers at the University of

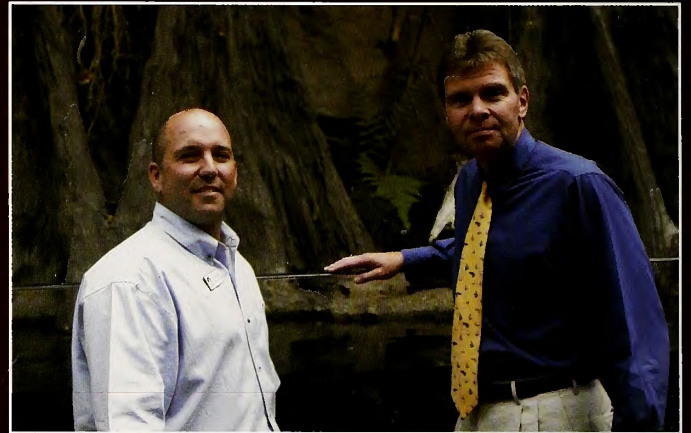
TOP: Expansions at the state's three aquarium sites provide opportunities to enhance the educational and entertainment experience of visitors, say JP McCann (left), director of the N.C. Aquarium on Roanoke Island, and David Griffin (right), director of North Carolina Aquariums.

The take-home message is simple: All aquatic and human life is connected, dependent upon water quality and deserves protection.

MIDDLE: Lindsey Ewinger (left), a husbandry intern from Iowa State University, works with husbandry staff member Julie Kamp (right) to prepare food for freshwater fish and turtles at the Roanoke Island Aquarium. Lunch, three times

a week, includes bite-sized pieces of smelt and a gelled concoction of assorted fish, veggies and vitamins. Alligators dine on quail, chickens and rats twice a week, says Kamp.

BOTTOM: Dive team coordinator Patrick Murphy (right) prepares for an exhibit maintenance dive into the Graveyard of the Atlantic Ocean tank. Staff divers Wayne Spivey and Tony Wilcox and volunteer diver Lou Browning accompany Murphy. Aquarium divers train to dive standards for 20 sharks, so one sand bar shark and four sand tiger sharks are 'a piece of cake,' says Murphy.





TOP: Donna Moffitt, director of the N.C. Aquarium at Fort Fisher, points out sea horses to a visiting family. The sea horses are born and bred at the aquarium, thanks to a successful captive breeding research program. The female lays her eggs in the male's pouch. 'Male sea horses can deliver hundreds of miniature replicas,' Moffitt explains.



MIDDLE: Samantha Johnson prepares to feed rotifers and brine shrimp to a brood of moon jellyfish at Fort Fisher. In-house 'farming' of jellies and sea nettles supplies sister aquariums and facilities across the country. 'They will sting the hand that feeds them,' says Johnson, who wears elbow-length rubber gloves at feeding time.



BOTTOM: The birth of five yellow stingray pups at Fort Fisher in 2004 took a bit of help from science and technology — through a collaboration with the North Carolina State University College of Veterinary Medicine. Here, a husbandry team member performs an ultrasound on the pregnant yellow stingray to estimate when gestation would be complete.

North Carolina at Wilmington suggested microscopic animals called rotifers might be just the ticket. Now, rotifers are "cooked" up to nurture the tiny creatures.

The in-house breeding programs for sea horses, moon jellyfish and sea nettles is so successful, the aquarium provides animals to sister aquariums as well as aquariums around the country.

But nature needs more scientific coaxing when it comes to breeding yellow stingrays. That's where a collaborative agreement with the North Carolina State University College of Veterinary Medicine comes in. A joint study to learn more about yellow stingrays' reproduction process yielded the live birth of five healthy pups in 2004. An ultrasound borrowed from the North Carolina Zoo helped determine the due date. And, the veterinary college's Craig Harms administered a human hormone to induce labor and make local history.

Often, research opportunities literally come to the doorstep of the aquariums. That's how Joanne Harcke became involved with turtle research while serving as research coordinator at Roanoke Island. What began as an informal partnership with state and federal agencies to rehabilitate stranded or injured sea turtles now is a far-reaching research project. Before being released, turtles are fitted with transmitters so scientists — and the public — can track them online at www.ncaquariums.com/turtletrails.

Harcke, now at Fort Fisher, says the program is providing new information about turtles' mysterious migration patterns.

Continued

“Research, whether applied or incidental, is an important part of the aquarium mission. We observe, document and relay our findings to the scientific community through aquarium and university networks,” Barrington explains.

The North Carolina Aquariums soon could have an expanded research role to play in efforts to restore failing oyster populations in state waters. A bill introduced in the state senate seeks \$300,000 to study the creation of oyster hatcheries at the aquariums in collaboration with North Carolina Sea Grant, DMF and university scientists.

“It’s an exciting prospect,” Griffin says.

THE TAKE-HOME MESSAGE

At Roanoke Island, a crowd of mostly adults encircles the touch tank where stingrays play follow the leader. Volunteer Fred Bamonte encourages the visitors to reach down to touch the cruising animals.

“Go ahead. Put your fingers in the water and touch their wings. They are as soft as velvet. Don’t ignore them — or they’ll come up to you and splash you for attention,” he warns.

On cue, the largest ray pops up and makes a splashing motion with its wings. Surprised visitors shyly dangle fingers and hands in the shallow tank to experience the velvet touch. Bamonte points out the guitarfish, a small shark, making lazy circles near the tank’s bottom. “Go ahead, touch it so you can tell your friends you touched a shark,” he jokes.

Then, Bamonte lifts a menacing-looking horseshoe crab from the bottom to give his now-captive audience a close look at a creature that has stood the test

TOP: Pine Knoll Shores

director Jay Barnes (left) and intern Thomas Revelle check on a loggerhead being cared for at a temporary facility.

Holding tanks in a converted Atlantic Beach grocery store provide healthy environments for dozens of aquatic animals waiting for their new home to be completed in May 2006.

MIDDLE: The replica of U-352, a German submarine that went down off Cape Lookout in 1942, will be a featured attraction of the 310,000-gallon ocean tank under construction at Pine Knoll Shores. Follow the extreme makeover online at www.ncaquariums.com.

BOTTOM: Joe Malat, exhibit curator at the Roanoke Island Aquarium, points out the path of Hurricane Isabel to Storm Room visitors Kenzie and LeRue Marshall and Ashleigh Davis of Mocksville. ‘Weather is another side of living on barrier islands,’ Malat says.





LEFT: The plant life in aquarium exhibits helps to tell the story of habitats that sustain important wildlife both above ground and below the water's surface. Conservation gardening principles are used to protect the animals and environment. At the Roanoke Island Aquarium, Kathy Mitchell places a sign beside newly installed rainwater collection cisterns. Wrapped in cedar for a traditional Outer Banks look, the tanks draw rain from acres of roof surfaces. The water will be used to irrigate native plants in the freshwater conservatory. The collection system also reduces runoff into the nearby sound. The aquariums, the Albemarle-Pamlico National Estuary Program and DENR fund the water conservation demonstration project.

WANT TO KNOW MORE?

North Carolina Aquariums is a division of the N.C. Department of Environment and Natural Resources (DENR). They are grouped with the N.C. Zoological Park, the N.C. Museum of Natural Sciences, N.C. Coastal Reserve and N.C. State Parks, which play similar roles in environmental education in the state.

In 1990, the aquariums first became accredited members of the American Zoo and Aquarium Association. And this year, they collectively were designated as the 18th Coastal Ecosystem Learning System by the Coastal America Program. The federal partnership opens the door to a variety of resource- and information-sharing possibilities.

The Fort Fisher and Roanoke Island aquariums are open daily to the public year-round, except Thanksgiving, Christmas and New Year's Day.

The Pine Knoll Shores Aquarium is closed to the public until May 2006. Summer programs are available at a temporary site.

Go to www.ncaquariums.com to learn about North Carolina Aquariums, link to individual sites, follow progress of the Pine Knoll Shores project, and to track turtles released from the aquariums' collaborative rehabilitation program.

Toll-free numbers for each facility are:

- Fort Fisher, 866/301-3476
- Pine Knoll Shores, 866/294-3477
- Roanoke Island, 866/332-3475

of time. He explains the horseshoe crab's prehistoric genealogy and its modern pharmaceutical benefits.

"That's why protecting aquatic life is so important. Who knows what other creature may hold a potential cure for cancer," he asks rhetorically.

The touch tank galleries, popular spots for visitors, play an important role in helping visitors see aquatic life and the environment in a new way, says McCann.

Like his fellow aquarium directors, he makes daily rounds through the aquarium to get a first-hand read on visitor satisfaction — from a youngster's fascination with sharks to a senior citizen's awe at the first touch of a stingray.

"Some spend hours reading every word at every exhibit," McCann says. "Some rush from exhibit to exhibit."

The important thing, the directors and staff members agree, is that visitors leave with a foundation of knowledge about the abundance and diversity of aquatic life in North Carolina.

"The public gets a larger environmental picture by viewing these animals in relation to other species within a certain habitat. We have an opportunity to show our visitors the wonders of these waters and where they fit into the story," Barrington observes.

Each animal serves as a messenger for its brethren in the wild to show they are something of value and deserve to be respected and protected, he adds.

"We especially want our visitors to make the healthy environment/healthy animals/healthy people connection," Griffin says. "We want to truly inspire an awareness for the personal role each of us plays in protecting the environment." □



FINE FURNITURE: Hobbs' Reproductions Echo 18th Century

By Ann Green • Photographs by Michael Halminski

Perquimans County cabinetmaker Ben Hobbs pauses while standing on a floor covered with sawdust, and explains that it takes patience to make furniture the old-fashioned way.

"You can't cross the line," says Hobbs while looking at the back of a student's unfinished Chippendale chair. "A piece is not done until it is right."

In his classes for aspiring cabinetmakers, Hobbs teaches students how to use hand tools, traditional techniques and designs from the 18th century.

"There was a big group of furniture makers here in Perquimans County," says Hobbs. "They didn't make backwater furniture here. It was a takeoff on the Chippendale style in England."

In the classes, students learn how to make fine American reproductions — from Chippendale chairs to pencil post beds. "Chippendale" applies to much of the well-made English furniture of the 18th century.

"My furniture is definitely English style — neat and plain, but this doesn't mean there is no ornamentation," says Hobbs. "Some pieces have carved feet."

Hobbs' classes are held in an old building within a complex in rural northeastern North Carolina between Hertford and Edenton. The workshop, which offers the aroma of new wood, is filled with a woodstove and numerous tools, clamps and unfinished pieces of furniture.

While taking the classes, students stay in fully restored pre-Civil War cottages moved from Gates and Perquimans counties. The 16 buildings — which include his home, the cottages, a smokehouse, milk house, jail and restaurant open for dinner to the public — are furnished in antiques and period pieces made by Hobbs.

For example, the red-sided Bennetts Creek House was built around 1750 and has modern conveniences. The cottage is decorated early American style with blue wainscoting and a pencil post bed, wing chair, high boy and armoire — all made by Hobbs. The floor is made of the original, wide-plank heart pine boards. The winding stairs lead to a loft bedroom with timbered beams, a twin bed and chest of drawers.

"The students can go back after class and examine the furniture and compare it to what they are making," he says. "Being around the pieces makes the students appreciate this style of furniture more."

Over the years, Hobbs has developed a reputation as an expert in early American reproductions. He has conducted workshops at the N.C. Museum of History and for the American Period Furniture Makers.

"Ben is a true hand crafter," says Patricia Marshall, curator of furnishings and decorative arts at the N.C. Museum of History. "He is making sure the lost art of cabinetmaking survives into the 21st century."

Albemarle Region's Furniture Heritage

During the 1700s, Perquimans County was one of the most prolific rural producers of furniture in eastern North Carolina and southeastern Virginia, according to Marshall.

Thomas White was one of the county's most well-known cabinetmakers.

"Thomas White established himself early on," says Marshall. "There was a trade route along the Chowan River that he followed."

White's style of furniture was tasteful and stylish and without the excessive details of French furniture that had a lot of foliage and scrolls, she adds.

One of White's pieces was a walnut desk that was made for Thomas Newby of Belvidere Plantation in Perquimans County.

"The desk shows a strong link between the Albemarle and New England region," says Marshall. "Its block and shell interior is similar to 18th-century furniture from Newport, Rhode Island."

This dominance of trade between New England and North Carolina continued through the American Revolution, according to Ben Hobbs' son, Matthew Hobbs, who wrote a thesis on the trade relationship while he was a fellow at the Winterthur Museum in Delaware.

Also, many Englishmen settled in northeastern North Carolina.

"Importantly, the bonds between the Quaker communities in Perquimans County, North Carolina, in southside Virginia, in Rhode Island and elsewhere in the colonies provided a conduit for trade and cultural exchange, involving correspondence, intervisitation and even intermarriage," he writes. The religious and mercantile connections between the Albemarle and other regions also contributed to sophistication in furniture production, according to Matthew Hobbs.

Continued

Sharrock Family

In neighboring Bertie County, the Sharrock family designed furniture from the late 1700s to 1800s.

"The Sharrock furniture was from the Roanoke River Basin School — neat, plain and straightforward — because that is what people preferred in this region and in Virginia," says Marshall. "They didn't use carvings on furniture like in Philadelphia and Rhode Island."

Sharrock furniture is highly sought after by collectors because many of the pieces were sold during the Depression to northern collectors, according to Marshall.

In 2002, the N.C. Museum of History bought a china press — used to store ceramics and other household items — for \$45,000, she adds.

The Roanoke River region also was home to a mystery cabinetmaker, "WH," who carved his initials on pieces.

"His initials have been found on many pieces, but historians have never been able to identify who WH was," according to Marshall. "He did neat and plain style and blockings, suggesting that he was a German American. WH also used distinct carvings over raised panel and black substance to imitate ebony. His initials were inlaid in white putty."

From 1785 to 1795, WH made a lot of furniture with Masonic symbols and squares.

WH's furniture has become quite valuable.

"A bookcase by WH sold for around \$98,000 in New York City," adds Marshall.

By the early 1800s, cabinetmakers had almost died out in northeastern North Carolina.

"From 1840 to 1850, there was a shift of cabinetmaking to the Piedmont and western part of the state," adds Marshall.

Restoration Efforts

Hobbs' furniture business evolved when he and his wife, Jackie Hobbs, developed an interest in old buildings.

While working as math teachers in Perquimans County during the 1970s, the couple found a 1700s home on a neighboring property and moved it to the family farm.

That first acquisition was the Pratt House, a two-story home that required three years of

renovation and now is used as their home and an office for the Beechtree Inn.

Gradually, they began to add to the complex.

"I got interested in early houses and then started repairing antiques," says Hobbs. "Building reproductions was a natural progression. Then I began studying the style of furniture here in Perquimans County."

After a few carpentry and woodworking classes, Hobbs left his teaching job and began his cabinetmaking career. Over the years, he has made hundreds of pieces of furniture — from tables that sell for \$500 to chests of drawers that sell for up to \$5,000.

"I learned about furniture making mostly from reading books," he says. "I collected good furniture and used it as examples. If I study a piece, I can tell how to make a copy."

In 1994, the Hobbs family opened the Beechtree Inn as a bed and breakfast where guests stay in cottages.

A year after that, he started the school for aspiring furniture makers. The classes are for all skill levels. Five to eight students per class learn how to use hand planes, scrapers, rasps, handsaws and a host of tools.

Tim Schreiner, then editor of *Fine Woodworking* magazine, completed a Chippendale-style chair class.



CLOCKWISE FROM TOP LEFT: Ben Hobbs works on a Chippendale chair along with students from left, Bill House and Curt Ivey. • This building is used as a restaurant. • The handsome sideboard was made by Hobbs. • Guests stay in the Bennetts Creek House and other restored cottages. • Hobbs shows House and Ivey how to cut a pattern for a chair.

"Hobbs is a natural teacher with an easy smile and a just-firm-enough approach to woodworking," says Schreiner in the October 1999 issue of *Fine Woodworking*.

Because of the large number of historic buildings, restoration of the Hobbs' complex is ongoing. Several buildings, including the jail, aren't finished.

While showing the jail, Jackie Hobbs says that the studs are close together to prevent a



person from getting through the bars. "There also is a four-inch subfloor that kept prisoners from getting out," she adds.

Presently, the couple is renovating two houses from the 18th century and one from the early 19th century.

"It is very time consuming," she adds. "It took us three years to restore the restaurant."

Furniture Class

To get to the Hobbs complex, turn off N.C. 17 north to Hertford onto Snug Harbor Road. The road is flat with endless farm fields and little traffic. The only sign of life is a country store and church at the end of the road.

Turn the corner and the complex is on 30 acres next to his family's farm.

His workshop is in a building behind his home.

During a recent class, Hobbs, sporting a plaid shirt and green apron, gives a lesson in cutting a mortise and tenon for a joint on the back of a chair.

"You cut it to the width and then to the length," he says. "Then find the center line."

After the demonstration, Hobbs shows his

is thinner than parts in the front of the chair.

While teaching a class, Hobbs always works on a piece alongside his students.

"Every time I do a class I make a chair," says Hobbs. "I teach four or five classes a year."

Most of the students make furniture as a hobby.

"This is my first woodworking class," says Curt Ivey, who works for the U.S. Navy in Virginia. "It is a jump in my skill level. I promised my wife that I would make her a set of chairs."

The class is intense — running from 8 a.m. to 6 p.m. Monday through Friday and a half day on Saturday. The students break at lunch, when they walk across the yard to the restaurant in the complex. They eat lunch together at a large table in the restaurant decorated in an early American style with a black-and-white checkered floor and Hobbs' fine reproductions.

"I painted the floor," says Hobbs. "I made every piece of furniture in the restaurant but the bench and highchair."

After lunch, the students smooth the edges of the backs of their unfinished chairs.

two students the back of a finished cherry and walnut chair.

"This is not angled," he says while pointing to the splat that is shaped so that it

Then Hobbs gives step-by-step instructions in cutting out a pattern for the back of the chair, including marking the pattern on the wood.

"You always work from the center with a pattern," says Hobbs. "You have to use a pattern with a chair and make it reasonably close to the pattern."

Then Hobbs shows the students how to pierce out a hole with a saw.

"You need to saw everything at a 90-degree angle," he adds.

After the demonstration, the students use the saw to cut a piece of wood.

Hobbs, who is a perfectionist, eyes every inch of their work.

"You want gentle curves and no bulges," says Hobbs. "You need to work from the back."

By the end of the week, the students have graceful Chippendale chairs for their homes.


Ivey learned so much in the class that he is coming back for an armchair class.

"I thought I was a good woodworker, but Ben's knowledge of making furniture is almost overwhelming," says Ivey. "In the old days, I would have been called an apprentice. Ben would have been the master who was passing on his skills." ■

Hobbs' classes are taught throughout the year. For more information, call 252/426-7815, e-mail bhobbs@hobbsfurniture.com, or visit the Web: www.hobbsfurniture.com.



From a photo by Michael Halimski



Winds of Change

Blow Through Commercial Fishing Industry

By Pam Smith

We've survived red tide and a whole lot worse," says Dave Beresoff, who has been fishing for a living in the state's southern coastal waters since the 1980s.

As Beresoff dresses a fat catfish he pulled from the Lower Cape Fear River, he exchanges good-natured banter with a customer.

His wife Lisa retrieves a container of fresh-picked crabmeat from the walk-in cooler of their Sunset Harbor Seafood Market to complete the order.

The Beresoffs opened the small Brunswick County market in 2002 and already are talking expansion.

"We just closed on a piece of property down the road. We want to separate the retail and the wholesale spaces. Word-of-mouth has helped both sides of the business grow," explains Lisa Beresoff, who manages the shop and the finances while her husband supplies the fresh seafood products.

Their seafood market provides a market for Dave — and other small commercial fishing outfits facing low prices and few fish dealers in the region. But, it's more than an entrepreneurial endeavor. It's a survival tactic.

The Beresoffs are among a growing number of fishing families exploring ways to stay afloat amidst winds of change blowing through the state's fishing communities.

Continued

For more than a decade, declining fish stocks, along with increasing regulations, global competition, fuel and maintenance costs, user conflicts, storms, coastal development and closures of polluted harvesting grounds have buffeted the commercial fishing industry.

Surveys by the N.C. Division of Marine Fisheries (DMF) show few are getting rich through commercial fishing. Only 6 percent earned more than \$30,000 annually; 26 percent earned between \$15,001 and \$30,000; 26 percent earned between \$5,001 and \$15,000; 31 percent earned from \$1 to \$5,000; and 11 percent reported \$0 or lost income.

Once the pillars of North Carolina's coastal economies, now 70 percent of commercial fishers hold land-based jobs to help make ends meet.

Caught in the middle

While the number of commercial fishing licenses has not declined significantly, fewer license holders are fishing full time today than in 1999, when the state adopted a new licensing system, according to DMF data.

That doesn't surprise Billy Carl Tillett, a fifth-generation waterman from Wanchese.

"It's because of the uncertain future. Fish haven't changed. The weather hasn't changed. They both run in cycles. What has changed is the number of regulations," says Tillett, who moved off the water in 1989 to help run the family's fish-packing house.

"We can live with size limits or net regulations. But when it comes to quotas and the number of days any given fishery season is open, that's another story," says Tillett, chairman of the North Carolina Fisheries Association (NCFA), a trade organization representing the commercial fishing industry.

"It's simple economics. If you don't catch it, you don't get paid," he says.

Much of the industry's resentment is aimed at the layers of rules that govern when and where certain finfish or shellfish may be harvested. Regulations also spell out gear requirements or restrictions to safeguard marine mammals and endangered species, such as sea turtles.

North Carolina's mid-Atlantic geography is blessed with a diversity of fisheries, thanks to the convergence of the colder Labrador Current from the north and the warmer Gulf Stream from the south. In addition, many lucrative species follow north-south migratory routes through offshore waters.

It adds up to a complex management strategy.

The National Marine Fisheries Service (NMFS), with the Atlantic States, Mid-Atlantic and South Atlantic Marine Fisheries commissions and councils, manage fisheries in federal waters from three to 200 miles offshore.

The N.C. Marine Fisheries Commission (MFC), with the DMF, oversee fisheries from inland saltwater bodies to three miles into the Atlantic.

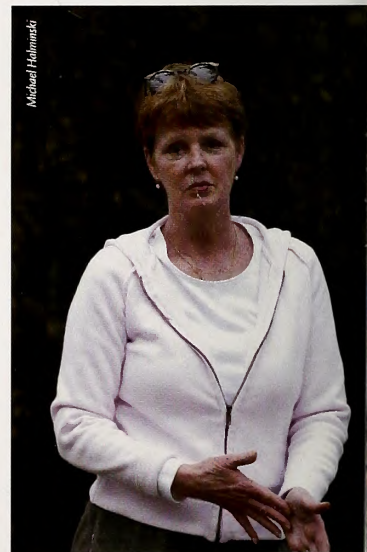
Susan West, whose husband Rob West is a full-time commercial fisher from Hatteras, would like to see MFC, as well as state appointees to national and regional councils and advisory boards, become more assertive in making the case for North Carolina.

"Our representatives are in a better place to balance science with economic realities for the state, but they often get caught in the middle," she points out.

And so do the fishers. Like many in the industry, her husband moves seasonally among fisheries. He once held a license to target the commercially lucrative snapper-grouper complex.

"However, at the time the new federal limited-entry permit system went into effect, he could not qualify for a license to fish snapper-grouper because he didn't have *enough* annual landings necessary," she says. "It was a catch-22. The rules that were meant to prevent over fishing penalized him for low landings."

He wasn't alone. DMF statistics show that 227 commercial fishers harvested snapper-grouper in North Carolina in 1994. By 2002,



CLOCKWISE FROM TOP LEFT: Dave and Lisa Beresoff are branching out to create a market for locally caught fish.

- Use of various nets is frequently reviewed by regulators.
- Jeffrey Aiken of Quality Seafood (left) lends Rob West (right) a hand aboard West's commercial fishing boat, the *Lucy B*, on Hatteras Island.
- Susan West is an outspoken advocate for the Outer Banks fishing community and an organizer of the first "Day at the Docks" festival.
- Billy Carl and Ryan Tillett, who operate Moon Tillett Seafood in Wanchese, are riding the tides of change in the industry.



only 87 of the original license holders remained in the fishery.

“We can deal with Mother Nature’s capricious ways, but not capricious regulations,” says West.

Matters of public trust

Managing the nation’s marine resources is bound to be controversial, because fish living in public waters are a common property resource — a public trust — explains B.J. Copeland, a MFC member and scientist.

“It’s a public trust with millions of owners — and every single one of them knows exactly how to manage the resource.”

Copeland observes. “Yes, indeed, it becomes very complicated. The feds and state are faced with tremendous pressure from dozens of interest groups, not just folks in commercial fishing.”

North Carolina’s 1997 Fisheries Reform Act followed a three-year moratorium on new commercial fishing licenses — and a comprehensive study of the state’s coastal resources and commercial fishing industry.

These were the first steps toward sustainable fisheries in the state, says Copeland, former director of North Carolina Sea Grant. The act required overhauling the commercial licensing process and streamlining the MFC, which includes commercial and recreational fishers, scientists and interested “at-large” citizens.

The commission sets up stakeholder advisory boards to help develop individual fishery management plans (FMPs) meant to ensure the long-term viability of the state’s commercially and recreationally significant species or fisheries.

Before FMPs, management was piecemeal, says Copeland. Now, there are opportunities for stakeholders to voice their concerns and opinions in open forums.

Jimmy Johnson, who chairs the commission, explains that each plan must take into account management goals and objectives, current and projected status of fish stocks, habitat and water quality considerations, user conflict issues, and social and economic impacts of the fishery on the state.

Preston Pate, DMF director, says, “The needs of the fishermen are always considered in our management decisions and are accommodated to the extent they can be without compromising our primary responsibility.”

Often, decisions come down to allocation issues within and between various fishing sectors, Pate adds.

Disappearing infrastructure

If it’s true that “an ill wind blows some good,” then the collective network — including fishers plying coastal waters, boat builders, net makers, dealers packing the day’s catch for markets near and far, and all of their families — is ready for “some good” to come their way.

“It’s not about a single fishery,” says Barbara Garrity-Blake, an anthropologist and MFC member.

Garrity-Blake and her husband Brian Blake, a boat builder and musician, live in Gloucester, a tight-knit, Carteret County fishing community. Like Hatteras’ Susan West, Garrity-Blake became involved with the politics

Continued



of commercial fishing during the moratorium era.

“And, it’s not about a single big issue. But cumulative impacts are eroding the infrastructure of the commercial fishing industry,” Garrity-Blake observes.

One case in point: the blue crab fishery. A steady decline in crab harvests since the late 1990s — blamed in part on the flushing effects of major hurricanes — shut down many crab-processing plants.

Of the 42 plants, *each* operating with up to 100 employees in 1995, 12 remain with a combined labor force of about 100, says Johnson. The commission chair managed the family-owned Washington Crab Company until its sale in 2000.

Ironically, he says, there will be too few processing plants left to handle a comeback of the important “cash crop.”

Outside forces also are compounding the issue.

“Alarms went off when imports began overtaking domestic crabmeat markets — then, shrimp,” Garrity-Blake recalls. “Now, rising waterfront property values are either taxing working waterfronts out of the game, or enticing owners to sell.”

Traditional commercial fishing communities that once dotted the coastline from Currituck to Brunswick counties are being squeezed off the waterfront by heavy development and tourism.

According to DMF data, mainland Hyde County is one of the few counties to have relatively untouched commercial fishing communities. Dare County, except for Wanchese, is heavily developed. Carteret

CLOCKWISE FROM ABOVE: Idle fishing boats line the docks at Hatteras Island. • Herbert and Pam Morris come from a long line of Carteret County fishing families. • Danny Hooks, who fishes out of Carolina Beach, is concerned about the disappearance of working waterfronts.

County is feeling increasing pressure from tourism. And, commercial fishing has all but disappeared in New Hanover County.

Danny Hooks is among the disappearing breed of commercial fishers in New Hanover County, where access to a working waterfront is a growing concern.

Hooks moors his *Reel Job II* at a slip below the Blackburn Brothers Fish House in the Carolina Beach Yacht Basin. He fears that it’s just a matter of time before some well-

heeled developer will make an offer for prime waterfront property the fish dealer can’t refuse.

For now, Hooks enjoys “one stop shopping” — a place to dock at a reasonable rate and to sell fish and buy fuel, ice and bait.

In spite of the uncertainty, Hooks is determined to stick it out in commercial fishing. He’s been able to hang on to commercial permits that give him seasonal flexibility.

“You can’t fish just a single species and make a living. You’ve got to go with what’s



showing,” he says. “The fishing part is good. It’s the bureaucracy that’s running many out of the business.”

Riding it out

A turning point for many Outer Banks operations came in 2000 when NMFS closed the spiny dogfish fishery, says Jeff Aiken,

socioeconomic program. But the occupational transition is not always easy for commercial fishers, he says.

DMF surveys reveal that some find work at the military port, state ports or with the ferry system. Others work on dredge boats. Some convert their vessels to charter boats for sportfishing.

More than a job

“There is little doubt that commercial fishing is at a crossroad,” says Pam Morris, whose family ties to Davis, a Carteret County community, date back to the 1700s.

Morris began advocating for the commercial fishing community during the moratorium era and continues to support NCFCA efforts.

She’s often frustrated by the perception that commercial fishermen are “backward thinking and enemies of the environment.” Nothing can be further from the truth, says Morris, whose husband Herbert operates the shrimp boat *Pamela Rose* out of Davis.

“The problem is that no one knows who we are. We are faceless,” says Morris.

In her work as exhibit curator at the Core Sound Waterfowl Museum on Harkers Island, she portrays fishers as part of a broader Down East culture that respects and relies on a healthy environment.

Each year Morris also helps organize the North Carolina Seafood Festival to celebrate the commercial fishing industry’s contribution to the state’s economy, as well as to dinner tables across the country.

Jack Thigpen, North Carolina Sea Grant extension director and coastal community specialist, says the fishing community is a powerful symbol of traditional values — hard-working, independent people who live in close harmony with nature.

“These values,” he says, “may provide the political clout and power at the state and federal

level to enact some legislation to protect U.S. fisheries products from foreign imports and to protect fishing villages and dock space from development.”

Thigpen notes that one Sea Grant project is under way to focus on the economic and community changes in Hatteras Village as it moves from commercial and sportfishing to tourism and service economies. Along with a socioeconomic study, the project will help sponsor a Hatteras Island “Day at the Docks” festival later this year to call attention to its water-based traditions.

But Morris knows that festivals will go only so far.

Like their Brunswick County counterparts Lisa and Dave Beresoff, Pam and Herbert Morris believe that fishing families must explore new ideas or niche markets to stay afloat in the changing global marketplace.

Recently, the entire Morris family joined a Carteret County contingency that went north on a different kind of fishing expedition. They visited waterfront operations in Massachusetts, Connecticut, New York and Virginia to garner ideas for promoting wild-caught seafood.

They were encouraged to see places where towns designate dock space for commercial fishing boats and lease nearby storefronts to seafood retailers who buy the catch from the boats.

Pam Morris is working with Barry Nash, North Carolina Sea Grant seafood technology and marketing specialist, the Carteret County Community College, the Carteret County Economic Development Council and local restaurant owners on a variation of that idea to promote locally caught seafood.

“Down East is all about the water. We live on the water. We live off the water. That combination makes us good at fishing,” Morris says. “Fishing is more than a job. It’s a way of life. It’s a heritage worth saving.” □

See Book Market, page 28, to read about Fish House Opera, a book by Susan West and Barbara Garrity-Blake that examines the lives of commercial fishing families along a changing coast.



a Hatteras seafood dealer. Cut off from a lucrative world market for this small shark — the main ingredient of fish and chips — some dealers shut down completely. Trucking and other support services also lost out.

“In the opinion of many, there was not enough science to close the fishery,” he says. NMFS cited declining spiny dogfish stock in its decision.

Still, selling out is not an option, says Aiken, who once operated a fleet of fishing boats. “I’m riding a dinosaur, but I have little choice but to ride it out. Not many people are interested in buying into an industry where there is zero recruitment, no young blood.”

While some in the industry are determined to hang on, others are getting out completely.

“Those who leave fishing altogether do so only as a last resort,” says Brian Chevront, who leads the DMF

Historic Bath Celebrates 300 Years

By Ann Green
Photos by Scott Taylor

During the 1700s, the fiery revivalist George Whitefield placed a curse on the town of Bath because he felt mistreated, according to a town legend.

While shaking the dust of the town from his feet on leaving, Whitefield condemned Bath “forever to the life of a small village,” says the *Bath Town Guidebook*.

His curse may have been fulfilled, but folks there don’t seem to mind.

As North Carolina’s oldest town, Bath has grown little since its creation in 1705 when it consisted of a few houses. The town — which had a 2000 census count of 286 residents — has a handful of shops; quiet, tree-shaded streets with old homes; and a marina on Bay Creek.

Also, many historic structures still adorn the streets, including St. Thomas Episcopal Church, the oldest North Carolina church still in existence.

This year, the town of Bath is celebrating its claim to fame with 300th birthday celebrations continuing through November.

Tours and open houses are scheduled. A replica of the *Elizabeth II* is set to sail over from Manteo to Bath in late September. An outdoor drama also is in the works.

“The people of Bath are happy to share their town’s history with everybody during this year of celebration,” says Patricia Sanford, the manager of the Historic Bath Site that provides tourist information. “The events being held throughout the year range from formal assemblies to street dances. There will be something for everyone to enjoy.”

Located near the Pamlico River and 50 miles across the sound from the Ocracoke Inlet, Bath was North Carolina’s first port and



produced the state’s first shipyard and gristmill. It also was the home of North Carolina’s first public library.

WALKING TOUR

The best way to see Bath is to take a guided walking tour. Start at the Bath State Historic Site’s Visitor Center just a block from the Ray S. Brooks Bridge over Bay Creek. The center shows a short film that includes a brief history of the town first settled by French Protestants from Virginia. One of the earliest settlers was John Lawson, author of the first history of Carolina.

“As plantations flourished, Indians were pushed further away,” according to the film. “An epidemic of yellow fever took many lives.”

After the epidemic and drought in the early 1700s, citizens began to rebuild the town. Trade in turpentine and other naval store products, as well as furs and tobacco, helped the town to become the first port of entry into North Carolina.

As deeper ports were built in Edenton and other towns in the 1700s, Bath’s trade diminished. Later in 1785, the town also lost its role as the seat of Beaufort County government to the new town of Washington.

The walking tour directs visitors to a cemetery behind the town’s oldest home, the Palmer-Marsh House.

As Leigh Swain of the Visitor’s Center points out the grave of Capt. Michael Coutanch, she explains that he was the first owner of the





that were used by the owners to look out for ships coming into the port.

“In the 1700s, there were no other homes across the street to obstruct view of the water,” she says. “The ships would come in and dock at the wharfs up and down the waterfront.”

The gable-roofed home has other characteristics that were exceptional for the Colonial period, including seven fireplaces and a double chimney — 17 feet wide and four feet thick at the base.

In the front room, which was used by Coutanch as an entrance to his store, are the original heart pine floors.

“Port records indicate that exotic fruit may have been sold here,” Swain says.

Later, the room was used by Palmer as a customs office.

On the second floor, there are several bedrooms furnished in the colonial period and decorated with a baby bonnet and spinning wheel.

The main bedroom is large and furnished with a poster bed, desk and large chest of drawers. The mantel is adorned with a sword.

“The western side of this bedroom had a beautiful view of the creek,” says Swain. “When

Continued

TOP TO BOTTOM, LEFT TO RIGHT:

- Bath's marina on Bay Creek draws many sailboats. •
- Bath is North Carolina's oldest town. •
- The Palmer-Marsh house is near the marina. •
- The living room at the Palmer-Marsh house is elegantly furnished. •
- The basement kitchen evokes images of the past. •
- The Bonner House is surrounded by towering elm, pecan and cedar trees. •
- St. Thomas Episcopal Church is well preserved.

Palmer-Marsh home and a sea captain from Massachusetts.

“The house was named for the second owner, Robert Palmer, and the Marsh family,” adds Swain.

Most of the graves are from the Marsh family, who lived in the house after the Palmers.

PALMER-MARSH HOUSE

Stepping inside the two-story, framed house, Swain points out the home's 13 front windows

PEOPLE & PLACES

someone purchased a home in the Colonial period, he owned both the house and the land across the street on the waterfront.”

During part of the 20th century, the home was used as a boardinghouse.

“Edna Ferber, who wrote “Show Boat,” stayed here when she was working on her novel of a floating theatre,” she adds. “The last person to live here was a school teacher.”

In 1959, the state of North Carolina purchased the home and restored it.

“The third floor was lost in a fire here in 1989,” says Swain.

The property also has a basement, including a kitchen with a huge fireplace and old kitchen utensils, as well as a cellar that was used to stock wine and root crops.

“Ballast stone is used throughout the foundation and can be seen from the basement,” says Swain. “Capt. Coutanch had a good system for his 100-ton ship the *New Bern*.”

It would take heavy cargo, including turpentine and pine derivatives, from naval stores to England. On its return, the captain would bring smaller items for him to sell in his merchant’s shop, she adds.

“On these return voyages, the ship would be weighted with ballast stones, which he apparently stockpiled until building his house,” says Swain.

WATERFRONT HOME

The next stop is the Bonner House several blocks away. It overlooks Bath Bay that runs into the Pamlico River.

The bay was a good location for the pirate, Blackbeard, says Swain.

While pretending to abandon his pirate career, Blackbeard established his home on Plum Point and Bath Bay so he could watch all ships coming to and from Bath, she adds.

Surrounded by towering elm, pecan and cedar trees, as well as dogwoods and figs, the Bonner home was first used as a summer home by plantation owner, Joseph Bonner.

Inside the home, Swain points out some of its original features — from delicate hand-carved mantels to small blown-glass windowpanes.

Throughout the house, there are many interesting decorative painting treatments, including layers of paint to imitate wood grain,



Services are still held in St. Thomas Church in Bath.

as well as marbelizing or special finishes on baseboards of the upstairs bedroom.

The next stop is St. Thomas Episcopal Church, built around 1734. The church features two-foot-thick solid brick walls laid in Flemish bond, a decorative brick

pattern. The building’s rectangular floor plan is several feet from being square. The floor is covered with eight-inch square red tile, beneath which lie the graves of settlers — buried in the church following English custom, according to Swain.

The church owns some interesting artifacts, including a silver candelabra that was reputed to have been a gift from King George II around 1740 and a large silver chalice that arrived in Bath in 1747, according to the *Bath Town Guidebook*.

MUSEUM EXHIBITS

The last stop is a self-guided tour of the Van Der Veer House — which has a gambrel or curb roof with a lower, steeper slope and an upper, flatter edge on each of its two sides. It now serves as a museum.

One museum exhibit features black and white photographs of the thriving naval store industry in the 19th century that included pine products such as turpentine.

Photos of modern-day Bath — from boats to street scenes — are also on display.

The Blackbeard room — which has a painting and story of the magical myth of the pirate’s last night in Ocracoke — draws a lot of attention.

Lt. Robert Maynard of the Royal Navy used two sloops to corner the villainous Blackbeard, according to the legend. After capturing him, Maynard sailed to Bath with the pirate’s head hanging from the bowsprit of the ship.

Though Blackbeard, who is believed to be Edward Teach, has ceased to haunt the streets of Bath, questions about him still fascinate visitors.

During the late ‘70s and early ‘80s, the outdoor drama, “Blackbeard: Knight of the Black Flag,” enlivened the town during the summer months, according to Lynn Lewis, Bath’s media relations coordinator.

“The drama is being resurrected for this celebratory year and is creating a lot of excitement.” □

TRICENTENNIAL EXHIBITS, EVENTS

Throughout the year, exhibits and lectures will be held to celebrate Bath’s Tricentennial.

Four exhibits will be on display at East Carolina University’s Joyner Library in Greenville, including digital, historical, musical and artifact exhibits.

- **Digital Exhibit**, runs indefinitely, and features resources connected with Bath’s founding and its 250th celebration in 1955.

- **North Carolina Collection Exhibit**, runs through July 31, and features artifacts excavated in 2003 by ECU archaeology teams.

- **Special Collection Exhibit**, runs through Aug. 31, and reflects on Bath’s history through maps, documents, photographs, posters and a variety of printed materials.

- **Music Library Exhibit**, runs through Aug. 13, and presents the history of the outdoor musical drama, “Blackbeard: Knight of the Black Flag.”

The following events will be held in Bath:

- June 30-Aug. 13, **Outdoor Drama**, “Blackbeard: Knight of the Black Flag.”

- Sept. 22-25, **Maritime Heritage Days**, tours of *Elizabeth II*, Buccaneer Bash, Blessing of the Fleet, picnic and concert.

- Nov. 12-13, **Military Re-enactments**, with re-enactors from the Revolutionary War through the Vietnam War.

For more information about the Bath events, call 252/923-3971 or visit the Web: www.historicbathnc.com. For more on the ECU exhibits, go online to: www.lib.ecu.edu/exhibits/.

Intense coastal development presents new challenges for coastal and ocean policy decisionmakers.



Center Focuses Legal Lens on Coastal Resources

By Pam Smith

It's a three-hour drive to Morehead City from Raleigh. But travel time seems to shrink thanks to a lively exchange between Walter Clark and Joseph Kalo. Their topics flow easily from current events to current best sellers:

A CNN science report on the possible "drowning" of the Gulf Stream by polar cap melt. *Collapse*, a Jared Diamond book that attributes the fall of some great civilizations to common factors — environmental damage,

climate change, rapid population growth and unwise political choices. And *Prodigal Summer*, a Barbara Kingslover novel whose characters realize their connectedness to each

Continued

other and to nature — and that humans are only one part of life on earth.

Clark and Kalo see a common denominator between fact and fiction — remedies to environmental problems can be found in individual choices, as well as broader policy decisions.

They are no strangers to the environmental policy decisionmaking process. Clark is North Carolina Sea Grant's coastal and ocean policy specialist. Kalo is UNC Law School's Graham Kenan Professor of Law, who concentrates on environmental, coastal and ocean law. For more than two decades, they have collaborated on a variety of coastal issues — from offshore energy exploration to ocean beach nourishment.

Now, the new North Carolina Coastal Resources Law, Planning and Policy Center will formalize and broaden their alliance. A collaboration of North Carolina Sea Grant, UNC School of Law and UNC Coastal Studies Institute (CSI), the center will focus a legal lens on coastal and ocean resource issues.

Clark and Kalo are sharing the center's helm: Kalo as co-director for research and legal education, and Clark as co-director for outreach and education. They see the center as a conduit for identifying and researching issues and delivering information to local and state governments, businesses, nongovernmental agencies and citizens.

Nancy White, CSI director, serves as liaison to identify research needs of coastal communities and, in turn, link them to the center's research resources.

"The center is a natural marriage of expertise," says Clark. "We combine the research capabilities of the law school and the university with Sea Grant's well-established outreach network."

"With the intensity of coastal development, a number of issues — both legal and scientific in nature — are coming to the forefront," Kalo observes.

And as more people crowd onto the coast, more legal and policy information will be needed, Clark adds. "Issues will become more profound — and new issues will arise."

A PILOT PROJECT

It's one such emerging issue — the proliferation of multislip boat-docking facilities — that has Clark and Kalo heading for Morehead City. They'll meet with an advisory committee they have assembled to examine North Carolina's marina policy and its long-term implications for water quality.

Funded by the N.C. Division of Water Quality, the new center's first project provides an opportunity for third-year law student Lauren Pogue to use her legal skills to investigate coastal and ocean issues.

Pogue is conducting the background research to lay the foundation for a "white paper" that will outline a set of recommendations to improve marina management and protect water quality.

"It's interesting to be researching a topic with real-world applications," says Pogue. "We have just begun to scratch the surface, and I look forward to continuing on the project... You can see how its outcome can make a difference."

Student involvement with the center has many benefits. For one, the experience is sparking Pogue's interest in coastal policy and public service as a career path. The Mount Tabor native is contemplating pursuing the National Sea Grant-sponsored Dean John A. Knauss Fellowship. Selected students spend a year in the nation's capital learning about federal policy-making processes.

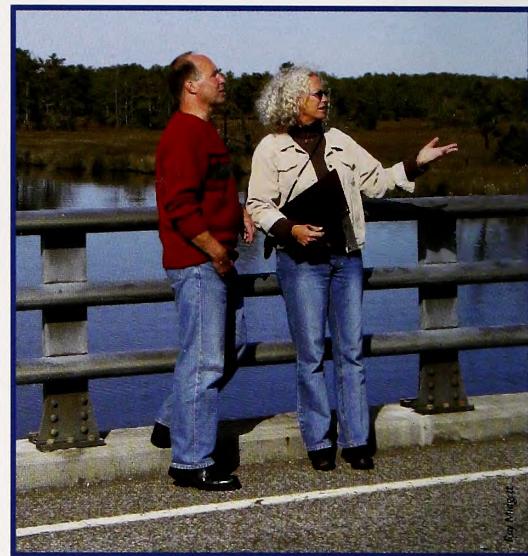
Also, working as part of a committee of professionals from a number of state and federal agencies, Pogue is learning first-hand that it's impossible to do research on legal issues in isolation — and that sound science is the foundation of law and policy.

For any environmental law or policy, the test is simple: Is it reasonable, is it defensible?

CONVERGING CURRENTS

The launch of the North Carolina Coastal Resources Law, Planning and Policy Center comes at a critical time for the state and the nation, Clark says.

Financial support from the North Carolina Sea Grant program coincides with the National



CLOCKWISE FROM TOP LEFT: Nancy White, director of the UNC Coastal Studies Institute based in Manteo, points out local water quality issues to Sea Grant's Walter Clark. • UNC Law School's Joseph Kalo and research assistant Lauren Pogue pinpoint coastal areas under pressure of development. • Traditional beach cottages are being crowded out by so-called "McMansions" along the Outer Banks. • Clark and Gloria Putnam, of the N.C. Division of Water Quality, compare notes on the state's marina policy.

Sea Grant's demonstrated interest in social science and law with the establishment of the National Sea Grant Law Center, headquartered at Mississippi-Alabama Sea Grant.

In addition, the Sea Grant Network has launched two new initiatives focusing on



And, many of the state's coastal communities are facing complex legal, policy and planning issues that accompany development pressure.

"For North Carolina, the Coastal Area Management Act has been a management tool since 1974. Now there are new issues. It's time to address

these new problems with innovative solutions," says Clark.

The center is all about public service, Clark and Kalo say. They envision the center as a catalyst:

- In developing a Southeastern Ocean Policy Report. This entails conducting a comprehensive analysis of North Carolina's — and other southeastern states' — existing ocean policy structure and identifying needs and priorities in ocean management from an ecosystem approach;
- In collaborating with the Coastal States Organization, NOAA's Coastal Services Center and the Rhode Island Sea Grant Program to conduct a state-by-state analysis of law and regulations related to the ownership, sale and leasing options of state-owned submerged lands; and

• In researching and assessing the potential for water-use planning for North Carolina's estuarine waters, linking water-use planning with adjacent land-use planning to encourage appropriate resource conservation and economic development. In other words: to

protect traditional uses of coastal waters while accommodating new uses.

Clark and Kalo won't be alone in setting an agenda and direction for the center. They will name a board of advisors drawn from coastal and ocean law, planning and policy professionals in coastal communities, state government, the academic community and public interest organizations.

VEHICLES FOR INFORMATION

Doing good research is not enough, say the center's co-directors. Getting the information into the public domain is essential — and they plan to utilize several avenues for delivering the research:

- The publication of scholarly articles on coastal and ocean law, planning and policy in professional journals;
- The publication of *Legal Tides*, a quarterly newsletter for lawyers, public officials and interested citizens to address contemporary coastal issues;
- The continuation of *Legal Tides* as an occasional feature in Sea Grant's *Coastwatch* magazine to reach a broader audience;
- Sponsorship of continuing legal education programs for lawyers and other professionals whose practices involve coastal and ocean issues;
- Sponsorship of conferences;
- Outreach to coastal communities and organizations with research assistance; and
- The development of course materials to enhance the educational experiences of students.

"We see the center as doing what universities should be doing: listening to the people we serve, searching for solutions, and providing public service," Kalo says.

"There is an opportunity to build the center into a nationally recognized research and outreach program in coastal and ocean law, planning and policy," Clark concludes. "We have a great coalition of organizations to make it happen." □

To request a copy of the *Legal Tides* newsletter, send an e-mail to walter_clark@ncsu.edu, or call 919/515-9101.



coastal communities and the urban coast.

The center's birth also coincides with the U.S. Commission on Ocean Policy challenge to states — and the nation — to develop science-based solutions for sustainable coastal and ocean resources.

Summer Time and the Reading is Easy

By Pam Smith

Ahhh. Summer is here at last. Time to head to the coast for that well-deserved escape from the work-a-day world.

Don't forget the sun block, a comfortable beach chair — and a sack full of good books. Forget spreadsheets and technical reports. Now is the time to read just for the fun of it.

And, there are plenty of books — fictional or factual — to match that coastal state of mind.

• **Saltwater Cowboys.** 2004, by Bill Morris, John F. Blair, Publisher (Formerly distributed by Coastal Carolina Press); Paperback, \$13. ISBN 1-928556-45-0.

Jump into Down East culture with *Saltwater Cowboys* by Bill Morris. Fact and fiction run parallel in this well-told story set in Croaker Neck, an imaginary fishing village somewhere east of Beaufort. Folks there eek out their living from seasonal harvests of shrimp, crab, clam and assorted finfish.

Navigating in challenging weather and regulatory conditions should generate enough drama for Morris' cast of colorful characters. But now, villagers are caught up in a genuine mystery: Sea turtles are "stranding" in curious places — from a hotel hot tub to a country club fountain.

Nearly everyone is suspect. A federal agent is determined to nab the person or persons responsible for violating the Endangered Species Act.

Dodge Lawson, whose job is to return stranded or rehabilitated sea turtles to offshore waters, has his hands full sorting out facts from rumors. Solving the mystery could help Lawson win the heart of the beautiful Ilse, who heads the save-the-turtle effort.

To make matters worse, finger pointing is pushing animosities between commercial and recreational anglers to a boiling point.

Trouble travels to Raleigh, where commercial fishers arrive by bus and boat-pulling pick-ups to rally state legislators' support for their endangered way of life. Coincidentally, a group of recreational anglers is holding a fund-raiser at a nearby, swank country club — with a fountain fit for a sea turtle.

Morris has done his homework to set the stage for *Saltwater Cowboys*. He portrays the culture, the people, the fisheries, the gear, as well as the issues.

His characters — some comical, some tragic — endear themselves to readers: Johnny Bollard, a respected shrimper and spokesperson for the commercial fishing community; Digger Davis, a charterboat skipper who has his own legal troubles; Pogy, the sometime fisher and would-be mystic; Gus Ridge, a sportfishing enthusiast; and the Yankee filmmaker and his anthropologist girlfriend, who say they are searching for traces of the legendary Lost Colony, albeit a bit off-course.

The action-filled saga makes for an entertaining day at the beach.

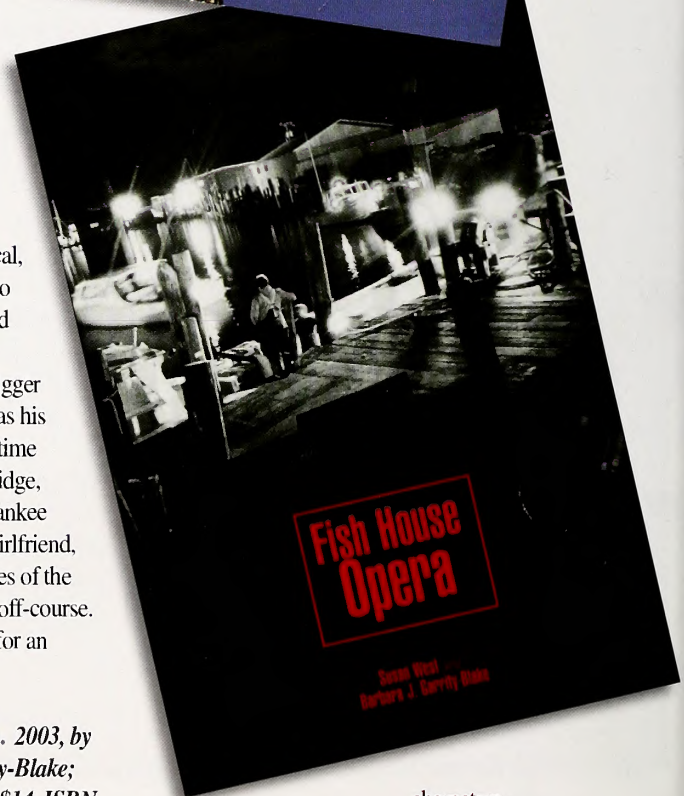
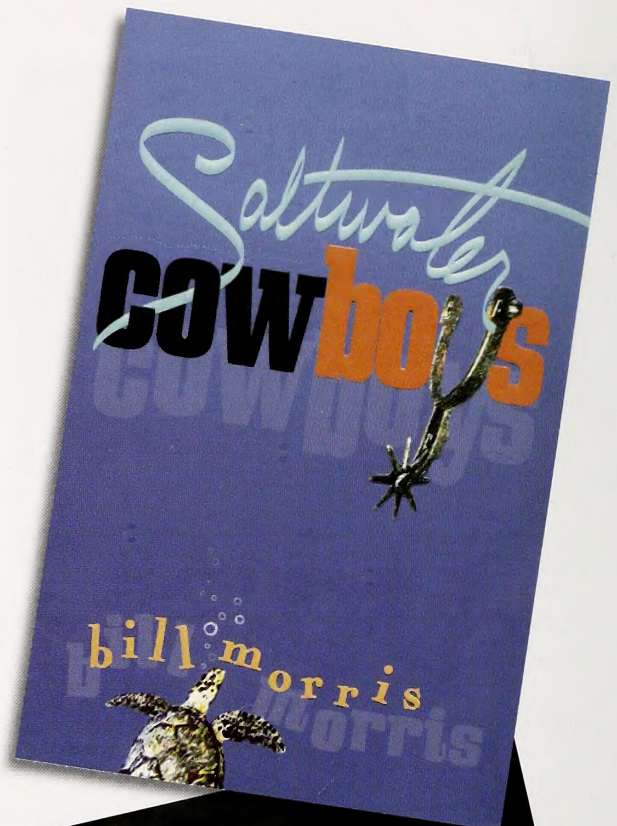
• **Fish House Opera.** 2003, by Susan West and Barbara J. Garrity-Blake; Mystic Seaport Press; Paperback, \$14. ISBN 0-913372-99-4.

Fish House Opera by Susan West and Barbara Garrity-Blake is a "must read" for anyone seeking an understanding of the issues that beset fishing families along North Carolina's coast.

It's a book that has plenty of real-life

characters, dramas, conflicts, politics and issues — including the protection of endangered or threatened sea turtles.

West, an Outer Banks writer, married into the politics of commercial fishing. Her husband, Rob West, fishes commercially out of Hatteras Village. She cut her teeth on fisheries issues as



a member of the North Carolina Moratorium Steering Committee that convened from 1994 to 1997 to tackle difficult fisheries management issues. Their deliberations led to the N.C. Fisheries Reform Act of 1997.

Garrity-Blake, on the other hand, took an academic route into saltwater fishing matters. Her doctoral research focused on myriad pressures on the menhaden fisheries. She was hooked.

Like West, Garrity-Blake was on the moratorium committee and continues to serve on the N.C. Fisheries Management Commission. She is married to a boat-builder/musician and lives in Gloucester.

In the book's prologue, Garrity-Blake reminds readers that in spite of hardships, the commercial fishing industry provides "the only wild food product on the U.S. market."

The book offers insight into a disappearing way of life, including a glimpse of the now defunct Carteret County Boom Truck Festival. The event was staged to lift sagging winter spirits when weather limits fishing time — and incomes.

Readers also meet Clammer Bob, who rode a bus to Raleigh in 1996 with other fishing colleagues to let lawmakers know their feelings about reform. They feared that reform might mean a ban on commercial net fishing. It was rumored that recreational fishing groups were behind a net-ban push.

"I don't think those politicians realized what it took for some of us just to get there," Clammer Bob tells the authors. For his part, he waded in icy waters from his boat to a waiting bike. He pedaled on the snowy February morning "over the Gallant's bridge, through Beaufort all the way to that grocery store parking lot where the buses were waiting."

In the book's epilogue, readers learn that Clammer Bob has traded his clam rake for construction tools to make ends meet. "...his concerns about the far-reaching effects of governmental control are shared more than ever throughout the fishing industry."

While the elders in traditional fishing families may have a pessimistic view of their future, the younger generation has a different perspective and seems determined to adapt to change.

Take teen-aged Zack of Marshallberg who has been shrimping Core Sound since he was in kindergarten and soloing his skiff since he was 12 years old. He tells the authors: "The old-timers say there's no future in commercial fishing...I'm used to all the rules and regulations. I don't get discouraged about it like the older crowd."

Still, Zack is realistic. He says he plans to go to North Carolina State University and major in agriculture. "It's good to have a backup in case they do close it down," he says.

Fish House Opera is a factual book that reads like a novel.

• **The Natural Traveler Along North Carolina's Coast.** 2003, by John Manuel; John E. Blair, Publisher; Paperback, \$16.95. ISBN 0-89587-272-2.

Put away your compass and turn off your onboard GPS. All you need to explore North Carolina's coastal plain is *The Natural Traveler Along North Carolina's Coast*, by John Manuel. Manuel takes the fear out of leaving the well-worn beach access paths to discover the wonders of nature.

In his preface, Manuel notes that he has seen the coast undergo change through the years — hurricanes, development and time have rearranged many familiar sites. "So much is changing that even veterans of the coast could use a guide to keep up." And so he sets out to share with readers the natural gems of the coastal region, as well as the culture, outdoor dramas, museums, historic sites, restaurants and lodgings to enjoy along the way.

Manuel introduces readers to the natural history that shaped North Carolina's coast — including ancient seas that stretched across the coastal plain 60 million years ago to the last ice age that ended 17,000 years ago. What remains are endless possibilities for exploration — open water, barrier islands, inlets, tidal rivers, saltwater marshes, maritime forests, sounds and swamp forests.

The author divides the book according to geographic regions — the Outer Banks, the Sound Country and the Southern Coast. For each of the geographic regions, sites are listed

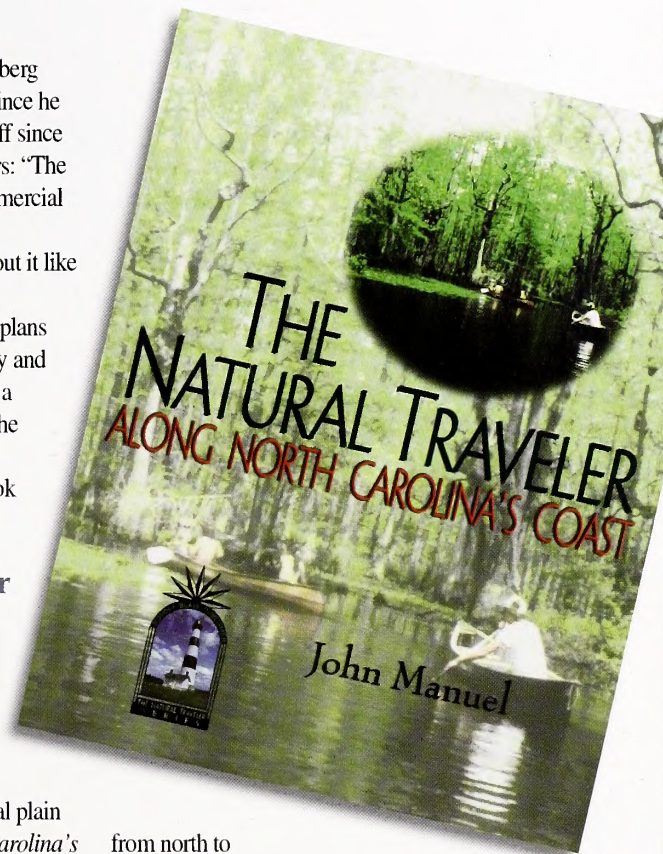
from north to south. Maps and driving directions are easy to navigate. And, for each town, readers will find listings of important natural features, historic sites or districts, as well as the selection and costs for local restaurants and lodgings.

His descriptive narratives help tourists know what to look for at each place and how best to access certain natural attractions. For example, the entry for Currituck National Wildlife Refuge/Currituck Banks National Estuarine Research Reserve notes that the combined tracts "encompass all the natural habitats of the Outer Banks, including beaches, dunes, tidal flats, shrub thickets, maritime forests, and freshwater and brackish marshes."

He also notes that views of both the Atlantic Ocean and Currituck Sound are spectacular. Facilities include a handicapped-accessible boardwalk. Hiking and bird watching are available free all year long.

Manuel writes: "For every place I have been, there is another to explore. And that will keep me visiting the coast for years to come."

Until his next installment, *The Natural Traveler* offers plenty of places to explore. □





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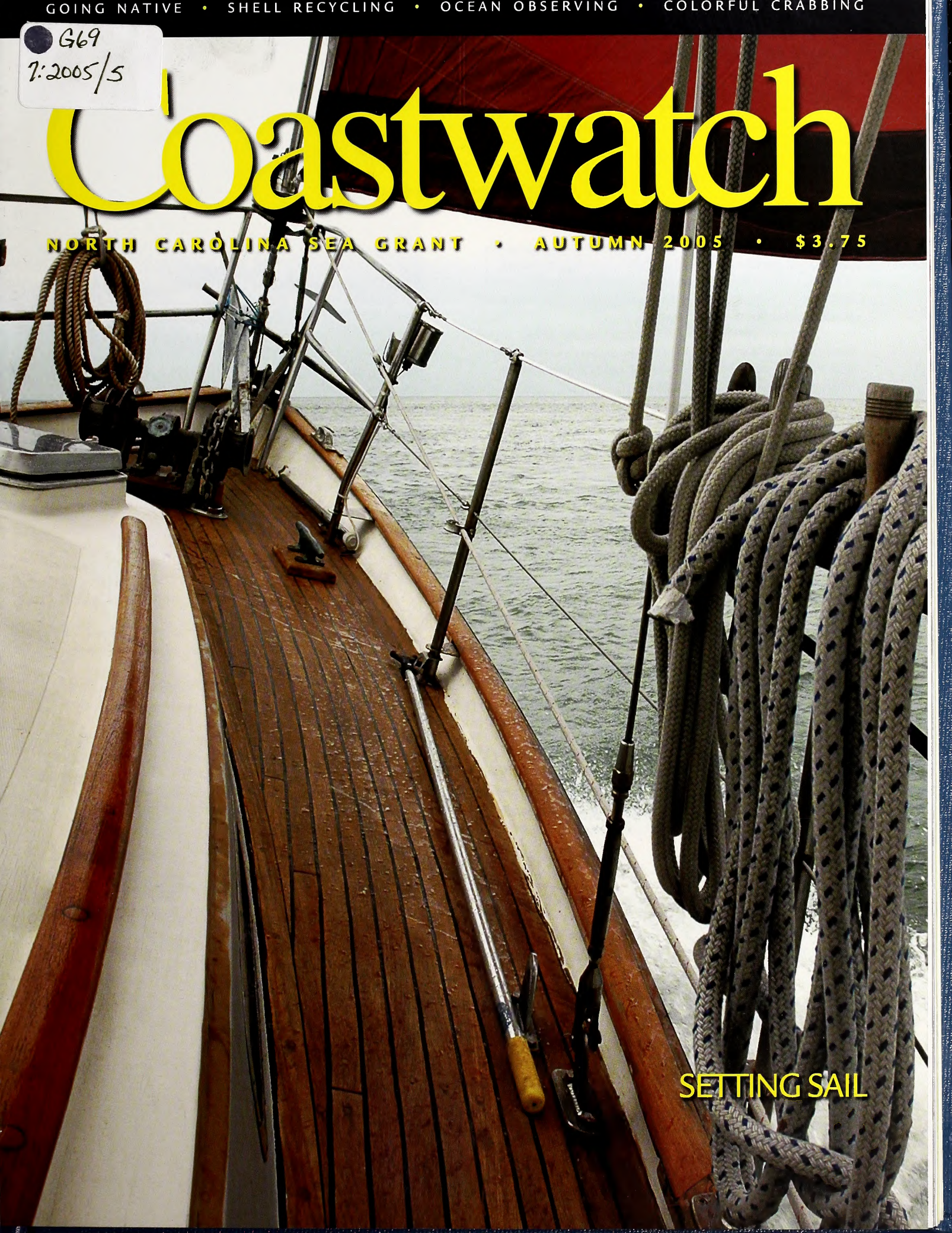
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Coastwatch

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SETTING SAIL

Humbled by Honors

In recent months, our North Carolina Sea Grant outreach programs have received several national honors. We truly appreciate the national recognition. Yet, we realize that our efforts — and these honors — would not be possible without strong support from colleagues on our staff, as well as additional partners on specific projects.

Coastwatch earned a Grand Award from the national APEX Communications Awards, organized by Communications Concepts. We submitted our Spring 2005 issue — you may recall the cover story on birding along the North Carolina coast.

“This is a magazine that exudes quality ... compellingly written, interesting articles, gorgeous photo spreads, clean legible typography, effective sidebars and a nicely designed contents page. Not a lot more you could ask for,” the judges wrote.

A total of 100 APEX Grand Awards were presented in 11 major categories. Overall, 4,942 entries from businesses, nonprofits, government agencies and educational programs were evaluated.

Also, our first DVD project, *The Amazing Oyster: A Keystone Species for the Health of Our Coast* received one of the 1,523 Awards of Excellence presented across 109 individual categories. Jason Talley produced the project while he was a Sea Grant intern. He now has his own company, Blue Bear Productions.

At Sea Grant Week 2005, our efforts also received honors among outreach projects submitted by the 32 Sea Grant programs in our national network.

Our dune plants education campaign anchored by *The Dune Book*, received the judges’ third place for individual projects. Spencer Rogers, our coastal erosion specialist, and David Nash of NC Cooperative Extension wrote the book and led follow-up workshops on dune management. Ann Green edited the book and coordinated media efforts.

Our role in the national *Break the Grip of the Rip* beach safety partnership also received several honors. Along with Michigan Sea Grant, we received two first place awards for “Collaborative Communications.”

One award came from the judges and the other was a “People’s Choice” honor from meeting attendees.

As a member of the national rip current safety task force organized by the National Oceanic and Atmospheric Administration and the U.S. Lifesaving Association, I coordinated logistics for the May 2004 news conference to launch the campaign. Michigan colleagues designed the *Break the Grip of the Rip* sign and brochure.

Spencer and I, along with Wendy Carey, coastal processes specialist at Delaware Sea Grant, also received three of the inaugural outreach awards presented by the National Sea Grant College Program (NSGCP).

During the announcement at the Sea Grant Week awards dinner, Ronald Baird, director of the national office, drew laughs at mention of Spencer’s potential alternative careers.

“Since his appearance in the *Break the Grip of the Rip* video Public Service Announcement — which continues to air — along with quotes in the *New York Times*, we heard Hollywood had offered Spencer a lucrative movie deal. Thankfully, he continues to focus on coastal processes for Sea Grant.”

He also noted how Spencer and Wendy collaborated to develop a technical workshop — and cited Wendy’s efforts “from ongoing research on rip currents, to collaborating with coastal processes scientists throughout the nation ... to helping develop the task force’s public message and educational materials.”

And, he had some very kind words for me. “Katie organized the event with her trademark grace — juggling camera crews, hotel managers, speakers, VIPs and numerous logistical challenges — to make the press conference, and the outreach campaign unparalleled successes. We thank her for her Herculean efforts, for her wealth of talents, and for her steadfast professionalism.”

But my efforts for the news conference were only a piece of a large puzzle that included NOAA Public Affairs, the NSGCP, UNC-TV and our hosts, the Holiday Inn SunSpree Resort and Wrightsville Beach community leaders. They — and anyone I have forgotten — share in the honor.

Katie Mosher, Managing Editor

I N T H I S I S S U E

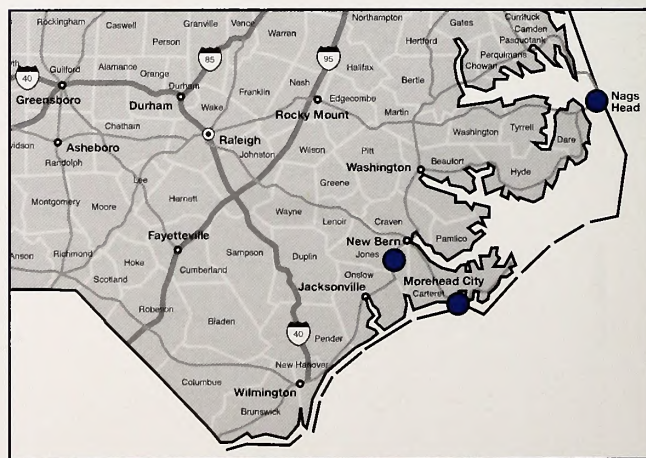
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North Carolina’s diverse coast offers countless interesting subjects. The large dots on the map indicate story settings in this issue — including Carteret, Jones and Dare counties.



Coastwatch

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NCCAT WORKSHOP REINVIGORATES TEACHERS

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A Small River Sets a Big Precedent

Paddlers are enjoying stretches of the White Oak River again, thanks to an innovative debris-clearing project. Julie Powers explains the motivations and strategies. 26

Coastwatch

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The North Carolina Sea Grant College Program is a federal/state program that promotes stewardship of our coastal and marine resources through research, extension and education. It joined the National Sea Grant College Network in 1970 as an institutional program. Six years later, it was designated a Sea Grant College. Today, North Carolina Sea Grant supports research projects, a 15-member extension program and a communications staff. Ron Hodson is director. The program is funded by the U.S. Department of Commerce's National Oceanic and Atmospheric Administration and the state through the University of North Carolina. *Coastwatch* (ISSN 1068-784X) is published six times a year by the North Carolina Sea Grant College Program, North Carolina State University, Box 8605, Raleigh, North Carolina 27695-8605. Telephone: 919/515-2454. Fax: 919/515-7095. Subscriptions are \$15. E-mail: katie_mosher@ncsu.edu World Wide Web address: <http://www.ncseaagrant.org> Periodical Postage paid at Raleigh, N.C.

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by Scott Taylor.
Table of Contents photo of
White Oak River by Scott Taylor.
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COASTAL TIDINGS

Angione Joins Sea Grant Staff

Kathleen E. Angione of Holly Springs has come on board North Carolina Sea Grant as an information and communications specialist.

Angione, the first North Carolina Sea Grant Science Communications Fellow in 2004-2005, replaces Pam Smith who retired in March from full-time duties at Sea Grant.

In her new position, Angione will serve as the webmaster, and will write and edit for *Coastwatch* and other Sea Grant publications.



Kathleen Angione

A Queens, N.Y., native, Angione holds a bachelor's degree in environmental policy from Eckerd College and a master's degree in technical communication from North Carolina State University. In 2004, she received an NC State University Outstanding Teaching Assistant Award.

Angione is a member of the National Association of Science Writers. In 2004, she received a New Horizons Traveling Fellowship from the Council for the Advancement of Science Writers. —A.G.

New Coastal Studies Institute Lab Opens

The University of North Carolina Coastal Studies Institute (CSI) expanded its reach this summer with the addition of an environmental research and educational laboratory in Nags Head.

The new lab, housed in the old Outer Banks Medical Center, will provide decision-makers, residents and visitors with science focused on the area's rich natural resources.

The lab is a cooperative partnership among the town of Nags Head, the N.C. Department of Environment and Natural Resources and CSI.

Research results from the facility will take some of the guesswork out of planning for the future health of both the natural resources and economy of the Outer Banks, according to Nags Head Mayor Bob Muller.

The new building will make it easier for scientists

to conduct research on the islands. It also provides a convenient local base and facilities for interinstitutional collaborations.

Scientists currently provide real-time buoy data on weather conditions for boaters, and study pathogens on land and in water. In addition, the institute has programs on estuarine ecology and human health, coastal processes and ocean observing, sustainable coastal communities and maritime heritage.

Overall, the institute provides a venue for distributing useful research results to the public to help citizens make wise decisions and enjoy the environment and community.

To learn more about the Coastal Studies Institute, visit the Web at <http://csi.northcarolina.edu>.

—E.S.



In the Next Issue of *Coastwatch*

Ann Green reveals how the Carteret County fishing community is promoting local seafood through a rural community college initiative. Pam Smith introduces the state's effort to preserve a million acres, including critical coastal parcels. And Kathleen Angione explores the history of the Freedmen's colony, Roanoke Island's other "lost" colony.

Some N.C. Fish Stocks Improving

The N.C. Division of Marine Fisheries' (DMF) annual stock status report has good news about North Carolina fisheries — two populations have been upgraded to “recovering.”

Each year, DMF evaluates the health of the state's important coastal fisheries. This year's report card highlighted several successes, as well as areas needing improvement.

Striped mullet, important to both commercial and recreational fishers, was upgraded to “recovering” based on a recent state assessment indicating the stock has not been overfished since 1998.

Sharks, a popular recreational target, were upgraded from “overfished” to “recovering.” A recent National Marine Fisheries Service assessment determined the overall large coastal shark stock has improved since 1998.

Summer flounder was downgraded from the “viable” category to the “concern” category. This change resulted from the most recent assessment by Atlantic States Marine Fisheries

Commission (ASMFC), indicating the stock is being overfished. The impacts of this assessment could result in additional harvest restrictions on summer flounder.

Southern flounder, a major commercial species, remains in the “overfished” category.

Weakfish was downgraded from “viable” to “overfished” based on the latest ASMFC assessment.

The long-term goal of DMF is to have all 40 of the state's major species move to the “viable” or “recovering” categories.

Fish and shellfish stocks considered viable include: Atlantic croaker, black sea bass north of Cape Hatteras, striped bass in the Albemarle Sound and the ocean, dolphin/wahoo, gag, king and Spanish mackerel, Atlantic menhaden, spot, spotted seatrout (speckled trout) and shrimp. Another six species are recovering.

For a full report, visit the DMF online at www.ncfisheries.net. —E.S.



“Flamenco” is from Kim Ellen Kauffman’s “Florilegium” collection. “Flamenco” is an example of the unique artwork on display in the Nature Gallery.

Natural Sciences Museum Events

The N.C. Shell Club will bring its shell show to the North Carolina Museum of Natural Sciences, Sept. 30 through Oct. 2. The show will include shells found in the state and around the world. Some shells will be for sale.

While at the museum, check out the Nature Gallery housed in the Museum Store. The Nature Gallery features artwork by regional artists depicting nature scenes of North America.

New exhibits are featured in the gallery every two months. Past exhibits have included abstract photographs of beachscapes and palmettos. Botanical artwork is featured in the gallery through Oct. 2. Upcoming artists will include photographer Mark Bashista, whose collection of prints includes North Carolina landscapes.

All artwork in the gallery is for sale. Prices vary depending on the medium and size of the piece. The gallery is open Monday to Saturday, 9 a.m. to 4:45 p.m., and Sunday, noon until 4:45 p.m.

Check the museum Web site for details on upcoming events: www.naturalsciences.org. —E.S.

Piping Plovers Fledge on Hatteras

Six piping plover chicks that closed part of Hatteras Island this past summer have finally fledged.

Listed as a “threatened species” under the Endangered Species Act

(ESA), the small, sand-colored shorebirds caused a big stir when the National Parks Service temporarily closed areas of Hatteras Spit and Cape Point to pedestrians, boat landings and off-road vehicles during peak tourist season.

Piping plover nests, breeding pairs and fledglings on Hatteras have declined since 1998, when 20 chicks were hatched and 12 fledged.

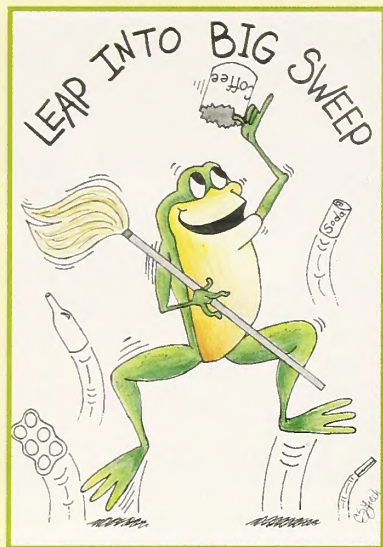


In 2004, four piping plover chicks hatched, but none fledged. Chicks typically fledge at 25 to 35 days of age.

The tiny birds forage for invertebrates during all hours of the day and in all tidal zones. When faced with a threat, the chicks adopt a defensive, motionless crouch, making them difficult to see — and susceptible to death by wayward car tires or footsteps.

Hatteras Spit reopened to the public in late July, and Cape Point reopened in August.

—K.A.



October Brings 2005 Big Sweep

Want to help clean up North Carolina's rivers, lakes or ocean?

North Carolina Big Sweep needs volunteers from across the state to retrieve litter from the state's waterways on Oct. 1.

N.C. Big Sweep is a component of the International Coastal Cleanup, held annually on the first Saturday in October. Volunteers participate in cleaning waterways in more than 90 countries around the world.

Carteret County's Big Sweep is scheduled for Oct. 8 to avoid conflict with the N.C. Seafood Festival.

The North Carolina cleanup was founded as Beach Sweep in 1987 by Lundie Spence, then North Carolina Sea Grant's marine education specialist. The 1,000 volunteers swept the coastal counties and collected more than 14 tons of debris. In 1989, the sweep expanded inland and became Big Sweep.

In 2004, N.C. Big Sweep reported that 12,700 volunteers collected 206.5 tons of debris. The volunteers found five animal entanglements in 2004 — significantly less than the 20 reported in 2003.

For volunteer registration and additional Big Sweep information, go to www.ncbigssweep.org or call 800/27-SWEEP.

—J.H.

COASTAL TIDINGS



Wings Over Water

Get your sunscreen and binoculars ready for the 9th Annual Wings Over Water Festival Nov. 1 to 6 on the Outer Banks. Wings Over Water is a celebration of wildlife and wild lands in eastern North Carolina for everyone who enjoys the outdoors.

Participants can go birding on the Alligator River, Oregon Inlet marshes, around the Bodie Island Lighthouse and on the Mackay Island National Wildlife Refuge's impoundment dike. On paddling trips, participants might glimpse river otters, owls, woodpeckers and Atlantic White Cedars.

The festival includes a "Shorebirds for Dummies" workshop on distinguishing

characteristics between sandpipers, dowitchers and yellowlegs, as well as a chance to learn about hummingbird banding. In addition, participants may join a natural history trip to "Pelican Island" guided by a ninth-generation captain or use radio telemetry equipment to listen for red wolves on the Alligator River.

Stop by the Pea Island National Wildlife Refuge Visitor Center that will feature the 2005 Federal Duck Stamp exhibit and Wings Over Water bird lists.

For more information on the Wings Over Water Festival, visit www.northeast-nc.com/wings. Or, call the Outer Banks Chamber of Commerce, 252/441-8144.

—J.H.

Core Sound Waterfowl Weekend

The Core Sound Waterfowl Weekend will have sights of carvers meticulously creating decoys, scents of Down East cooking and sounds of carolers on the porch.

The annual event will be Dec. 2 to 4 at the Core Sound Waterfowl Museum on Harkers Island. The event spotlights artists helping to preserve North Carolina's cultural and natural heritage.

The weekend will feature traditional music, net hanging, photography, boat building and storytelling for young and old. Visitors also may enjoy the hiking trails and duck blind building.

Harkers Island starts the weekend's events on Friday with an outdoor decorating contest. This is the "official opening" of decoy season on the island. The celebration ends with a Sunday morning community fellowship. For more information, visit www.coresound.com, or call 252/728-1500.

—J.H.



Researchers Monitor Sewage Spill Impact

Early results from the monitoring of a July sewage spill in New Hanover County's Hewletts Creek show that the water column concentration of bacteria declined rapidly after the spill, according to North Carolina Sea Grant researcher Larry Cahoon.

However, Cahoon says that sediment concentrations of bacteria in the tidal creek near Wilmington remained high, indicating that bacteria settled from the water column into the sediments.

"As a result of the spill, researchers will now be able to estimate how rapidly fecal contaminants are moved from both water and sediments under natural conditions," says Cahoon. "Sediment-associated fecal microbes are widely recognized as a source of contamination to shellfishing and recreational waters."

When fecal coliform concentrations in sediments are mixed upward by wind and waves, the levels can be sufficient to close overlying waters to shellfishing or other uses, he adds.

Cahoon and Mike Mallin, both of the University of North Carolina at Wilmington, are monitoring the effects of the Hewletts Creek Pump Station leak that caused as much as 3 million

gallons of raw sewage to flow into the creek's upper reaches. City of Wilmington crews spent 17 hours repairing the equipment problem.

"Two weeks after the original spill, a rainstorm apparently washed additional contaminated sediments from the high marsh into the creek, driving another increase of bacteria in the water column," says Cahoon. "However, the sediment levels of indicator bacteria declined again after several days. Hewletts Creek was much more dangerously contaminated than water column sampling alone would have indicated."

Mallin and Cahoon are continuing to sample the spill as part of an ongoing North Carolina Sea Grant study on the importance of sediment-associated fecal indicator bacteria in Hewletts Creek and other tidal creek ecosystems. The researchers used data from earlier Sea Grant work when comparing results of the spill.

Mallin cites system-wide effects on the ecosystem from the spill.

"During the day after the spill, a fish kill occurred that included adult flounder, mullet, eels and thousands of larval and juvenile fish," he adds. "Some waterfowl also died after feeding within the spill area." — A.G.

N.C. Seafood Festival

Mark your calendars for the 19th Annual North Carolina Seafood Festival, Sept. 30 to Oct. 2 on the Morehead City waterfront.

The festival is filled with activities that illustrate the positive impact of seafood industries and commercial fishing on North Carolina's economy and citizens.

The festival features continuous live entertainment on three stages, street clowns, a boat show and a variety of seafood and arts, and craft vendors.

Sporting events for the whole family will be held throughout the festival at the Sportsman's and Oceanana piers in Atlantic Beach.

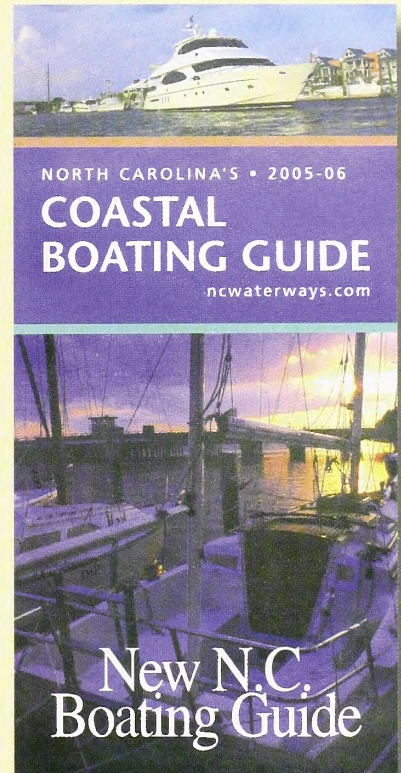
The festival opens to the public at 5 p.m. Friday with a Habitat for Humanity fish fry, rides, exhibits and

entertainment on all three stages. At 10 a.m. Saturday, the educational exhibits will open. North Carolina Sea Grant will share a booth with other National Oceanic and Atmospheric Administration partners.

The Blessing of the Fleet will take place at the N.C. State Port at 10 a.m. Sunday. This ceremony will remember those who died working in the fishing industry and thank those who work in these occupations today.

The festival's proceeds will help establish scholarships for young people pursuing educations in seafood-related industries, and also support local nonprofit and civic groups.

For more information and a complete schedule of activities, go online to www.ncseafoodfestival.org. — J.H.



Would you like to have an updated boating guide to North Carolina's coastal waterways?

The N.C. Department of Transportation and the N.C. Wildlife Resources Commission have released "North Carolina's 2005-2006 Coastal Boating Guide."

From Calabash to Currituck, the guide lists North Carolina attractions and places of interest such as lighthouses, recreation areas and aquariums. It also lists fishing tournaments from May to November, and provides information about N.C. ferries, the U.S. Coast Guard and other boating contacts.

A portion of the guide is devoted to educating boaters about protecting submerged aquatic vegetation (SAV).

The guide is not for navigational purposes, yet it does illustrate 145 of North Carolina's coastal marinas and boatyards. Amenities such as ramps, supplies, fuel, repair, restaurants and more are listed in a chart on the guide.

For a free copy of "North Carolina's 2005-2006 Coastal Boating Guide," visit www.ncwaterways.com, or call 877/DOT-4YOU (877/368-4968).

— J.H.





SETTING SAIL: NCCAT Workshop Reinvigorates Teachers

BY ANN GREEN • PHOTOS BY SCOTT TAYLOR

While sailing out of Beaufort Inlet with a group of teachers, Capt. Ron White yells, “Prepare to jibe. The sail will go in the opposite direction. The boat will tilt.”

With these instructions, Newport Middle School teacher Ed Lindberg pulls up a winch handle attached to a sail. Then the *Good Fortune* slowly heads toward a buoy.

“We’re smoking now,” says White, a veteran sailor and marine biologist. “We are going almost nine knots. If we sailed due east, we could be going to Africa. Baghdad is due east about 5,700 miles. Los Angeles is due west.”

For more than an hour, White gives a lesson in sailing dynamics — from terminology to choice spots for sailing around the world.

As the 41-foot sailboat nears Shackleford Banks, White points out a northern gannet diving into the water.

“The gannet makes the pelican look like an amateur,” adds White. “The gannet can hit the water and go 50 feet into it, or hit the water from as far away as 50 feet in the air.”

NAUTICAL SEMINAR

The cruise is part of “The Age of Sail” seminar sponsored by the N.C. Center for the Advancement of Teaching (NCCAT), which provides opportunities for teachers to participate in experiential learning and professional networking.

For elementary teacher Robin Darden of Sanford, who has battled two bouts of cancer, the sailing trip was like a dream come true.

“Being on a boat is a lot different than being on shore,” says Darden. “I find a lot of peace at the ocean. The whole week was a spiritual experience for me and so many other people.”

NCCAT seminars — often referred to as “Outward Bound for teachers” — are open to any North Carolina public school teacher employed for at least three years.

“This seminar is perfect for NCCAT’s vision of giving teachers a deep personal and professional renewal outside of the classroom,” says Donna Glee Williams, the seminar co-leader along with Pat Queen. “Sailing allows them to get out onto the water and learn history, science and music — and build self-esteem skills.”

The seminar also is a beautiful blend of all that the center cares about, adds Williams, who is on the NCCAT program faculty. “It lends itself to an integrated curriculum and connects North Carolina history with world history, literature and physics.”

Twenty-three teachers from across the state participated in the sailing seminar that included all aspects of sailing — from the history of sailing to sea songs and chanteys.

“I live at the coast and know a lot about boating,” says Wendy Milligan, a counselor at Shallotte Middle School in Brunswick County. “The coast is rejuvenating. The ship and captain are like a school. The captain is the leader and keeps the ship from going down.”

The sailing seminar was held at the Trinity Center at Salter Path so teachers could experience the sea life of both the Atlantic Ocean and Bogue Sound.

To help the teachers learn the parts of a ship, the instructors used a model of the *USS Constitution*, the Navy’s only remaining sailing vessel in commission. Borrowed from the Macon County library in the N.C. mountains, the model — which is 38 inches long and 29 inches tall — is an invaluable learning tool.

“Having a ship model in the room helped bring the seminar alive,” says presenter John Slater, who is retired from the U.S. Naval Reserve and an avid sailor. “The teachers got a feel for the complexity of a sailing ship’s masts and rigging.”

To get a glimpse into North Carolina’s sailing heritage, the group toured the N.C. Maritime Museum in Beaufort. The museum has a variety of sailing exhibits and relics, including a spritsail rig used by commercial anglers and navigational instruments.

“I am not a native of North Carolina and had no idea how much shipping and fishing heritage was in North Carolina,” says Julia Hooks of Weddington High School in Union County.

NCCAT INCEPTION

The idea for NCCAT was born in 1983 when Jean Powell spoke to the N.C. Commission of Education for Economic Growth.

As the N.C. Teacher of the Year in 1983,

Continued

Powell thought that providing a time and place for teachers to become students again would give them a renewed perspective of the student's role.

Then-Gov. Jim Hunt and the N.C. General Assembly shared Powell's vision and set up NCCAT in 1985. One year later, full-time operations began on the campus of Western Carolina University in Cullowhee.

Residential seminars are the heart of the NCCAT experience. Each year, the center sponsors more than 70 seminars. This year, the themes ranged from the history and culture of the Cherokees, to the struggle of black women in America.

Besides seminars, the NCCAT Teacher Scholar Program provides opportunities for professional research and independent study, including preparation for national teacher certification.

Since its inception, more than 70,000 teachers have participated in NCCAT seminars. During the 2004 school year, more than 5,000 teachers spent up to five days at various NCCAT programs.

"Whether you have taught five years or 25 years, you need to get away from the classroom," says Hooks. "When you step away from what you are doing, you come back more inspired."

When Hooks got back to her classroom, her students told her she seemed happy and energetic — like during the first week of school.

"The seminar reminded me of how much I loved to learn," she says. "It helped me to be more creative in my lesson plans and put me in the kids' shoes."

For many participants, the seminars are so invigorating that they return again as alumni.

"I have been teaching 36 years," says Lindberg. "This was my second NCCAT seminar. It was an interesting and relaxing week. You got to meet a lot of cool people. You also got pampered."

IMPROVING TEACHER RETENTION

Across the country, teacher retention is a major problem for public schools.

During the 2003-2004 school year, North Carolina's local school systems reported an average teacher turnover rate of more than 12 percent, according to the N.C. Department of Public Instruction. Of the 11,399 teachers reported leaving, 31.5 percent had tenure.

"When a teacher quits, it is a huge expense for the state," says Williams. "One of NCCAT's visions is to make it possible for teachers to stay in

teaching and save the state money."

Over the years, the center has become a national model. In 1995, U.S. leaders of education, business and government gathered in Cullowhee for a meeting of the National Commission on Teaching and America's future. In recent years, delegations of educators, community leaders and politicians from across the United States have traveled to the center to study its model.

Georgia has a center north of Atlanta that is modeled after NCCAT. There, teachers learn to become advocates for reform in their schools. There also are similar programs in San Francisco, Minnesota and Florida.

"Teachers tend to get boxed in and bogged down with day-to-day details of teaching," says Teri Kirby Hathaway, North Carolina Sea Grant marine education specialist, who has participated in NCCAT workshops. "NCCAT offers these teachers a way to break out of that box and refresh their learning skills."

COASTAL ENVIRONMENT

As teachers gather at the Trinity Center's Beach House overlooking the Atlantic, Slater takes them back to an era when seamen set their own time by bells and hourglasses.

"They were out there in the wet weather and spray," says Slater. "Nobody carried a watch. But they did use a bell to announce the passage of time."

He says that each watch lasted four hours. At the end of each half hour, a sailor would ring the bell.

"Each time the sailor struck the bell, he would turn the hourglass," says Slater.

To set the starboard or early morning watch, Bumsville elementary teacher Brenda Phetteplace goes up to the bell and strikes it twice. She then turns over the hourglass.

"The ship was a universe unto itself," says

TOP TO BOTTOM: Wendy Milligan rings a ship's bell for the noon watch during a seminar at the Trinity Center. • Brenda Phetteplace admires a model of the USS Constitution. • Capt. Ron White gives teachers a quick lesson on sailing.





Slater. “You had to carry out duties and be honest and fair. The only real opportunity for the sailors to jump ship was at port.”

While the hourglass is filling up, Slater goes over ship vocabulary and sailing history.

“Until the 1930s, there was commercial sailing,” says Slater. “Sailing now is essentially recreational.”

When the hourglass becomes half full at 9:30 a.m., Phetteplace rings the bell three times.

“I read sea novels,” she says. “I just love sailing. I have a small sailboat, but don’t get to use it much because I live in the mountains. Here I can experience beautiful sailboats at the mannas.”

Later in the day, the teachers divide into two groups. One group goes to

the beach and builds a sand model of the *Cutty Sark*, an English ship built in Scotland in 1870.

“We brought the plans for the tea clipper,” says Slater.

The others stay inside and learn to make a monkey knot used as a weight for a heaving line on a boat.

Using a piece of rope and some marbles, Williams shows the teachers how to tie a massive knot around a marble.

“This is fun,” says Mike Turner, a physical education teacher in Davidson County. “I have never made a monkey knot before.”

When Darden returned to her kindergarten class, she taught her preschoolers how to tie knots.

“My students were mesmerized by the experience,” she says. “They got to make a monkey knot.”

Darden also brought back seashells for each

student. “A lot of my students haven’t ever seen the ocean. They were so excited to get the seashells and hear the ocean. We also did a measurement in the hall to show how big a ship is and made drawings of a sailboat.”

NEW OCRACOKE CENTER

With the opening of the old U.S. Coast Guard station in Ocracoke in 2006, NCCAT will be offering more coastal courses. The renovated education center will have sleeping quarters for teachers as well as seminar rooms.

The station, a prominent white structure on the mouth of Silver Lake harbor, has been vacant for several years. The federal government transferred the building to the state of North Carolina in 2001. Since then, the state has been renovating the facility.

At the Ocracoke center, teachers will follow a schedule similar to those that NCCAT provides on its main campus in the mountains. The center will offer a range of subjects, including topics related to the coastal environment.

“However, we won’t just focus on coastal ecology,” says Williams.

During construction, the crews discovered relics of the past — from an old newspaper tucked behind a wall to charred timbers burnt in a fire.

Some interesting island history has been uncovered that will enliven teacher discussions, says NCCAT executive director Mary McDuffie.

As construction moves forward, NCCAT staff members also are gathering stories from former Coast Guard personnel who served on Ocracoke.

“We are trying to locate these personnel and compile an oral history,” says Alton Ballance, project facilitator on the Ocracoke campus. “We recognize that interviews and actual documentation from the crews and their stories are an important part of the history of the station.”

McDuffie says the eastern campus will become a special place for North Carolina teachers.

“It will make NCCAT programs more accessible for those who live and work in the eastern part of the state, and will be instrumental in helping NCCAT to retain the quality teachers so essential to the success of North Carolina’s school children,” adds McDuffie.

Teachers, media specialists and school counselors can apply for NCCAT seminars. Call 800/922-0482, send e-mail to information@nccat.org or visit the Web: www.nccat.org. To learn about the Ocracoke project, contact Alton Ballance, ballancea@nccat.org. □

TOP TO BOTTOM: John Slater shows teachers how to tie a knot. • Teachers board the Good Fortune for a trip along Beaufort Inlet. • As the wind changes, Capt. Peggy Burris trims the sheet.

NATIVE PLANTS: *Mother Nature's*



The pawpaw tree produces a banana-flavored fruit and has few pest problems.

Handiwork

Text & Photos by Pam Smith

When the earliest English settlers stepped onto North Carolina shores more than 400 years ago, they declared it to be “the goodliest land under the cope of heaven.”

They discovered grasses that anchored dry, sandy beaches and swayed beneath pristine tidal marshes. They delighted at maritime forests with freshwater pools. They marveled at thick forests and dense scrub vegetation with an abundance of wildlife. They praised rich soils that yielded plentiful fruits, berries, grains, herbs and fragrant wildflowers.

Now, modern-day “settlers” are rediscovering the beauty — and benefits — of native plants that are integral to North Carolina’s rich natural heritage. This back-to-nature trend is catching on — not only for major reforestation, stream restoration and stormwater management projects, but also for small-scale residential landscaping.

An annual “Go Native Plant Sale” hosted by the North Carolina Coastal Federation (NCCF) testifies to the burgeoning interest among coastal gardeners. Nearly 2,000 participants flock to federation headquarters in Carteret County’s Ocean community. Informational workshops augment the main attraction — the sale of some 3,000 native flowers, trees and shrubs.

“Landscaping with native plants celebrates our natural heritage,” says NCCF’s Cape Lookout Coastkeeper Frank Tursi, event coordinator. “It helps restore regional character and put us a little closer to nature. The natural processes from which coastal native plants evolved over thousands of years represent the cog and wheel of a healthy ecosystem sustained by a complex web of biological diversity.”

Native plants are those said to have been present before the first non-native explorers landed in the New World. In fact, fossil evidence links many modern-day plants to their prehistoric predecessors.



ABOVE: Jackie Foster and JoAnn Dalton consider the merits of the black cherry tree at the N.C. Coastal Federation’s ‘Go Native Plant Sale.’

WHY NATIVE PLANTS?

Coastal native plants have adapted to the geography, hydrology and climate of the region, explains Randy Mason, an NCCF board member and avid natural gardener.

That, he says, is why native plants provide a hardy, drought-resistant, low-maintenance and beautiful landscape while benefiting the environment. Once established, native plants save time and money by eliminating or reducing the need for fertilizers, pesticides, irrigation and even lawn maintenance equipment.

Mason’s planting philosophy is simple: “Take two steps. If nothing is growing there, dig a hole and plant something,” he says. That pretty much eliminates a need to own a lawn mower.

Mason offers surprising facts he has gleaned from researching the benefits of landscaping with native plants versus non-native turf grasses:

- Native plants require less water than lawns. In urban areas, lawn irrigation accounts for 30 percent of the water consumption on the East Coast. The deep root systems of many native plants increase the soil’s capacity to store water and reduce runoff.

- Native plants help reduce air pollution. Natural landscapes do not require mowing.

Lawns, however, must be mowed regularly. Gas-powered garden tools emit 5 percent of the nation’s air pollution. Forty million lawn mowers consume 200 million gallons of gasoline a year. One gas-powered lawn mower emits 11 times the air pollution of a new car for each hour of operation. On the other hand, native plants remove carbon from the air.

- Native plants save money over time compared to the cumulative cost of maintaining grass lawns.

HOMEWORK HELPS

A successful start in gardening with native plants requires a bit of homework, explains Katie Loewen, an environmental educator at Trinity Center’s “Sound to Sea Program” and a Go Native workshop presenter and volunteer.

Coastal gardening presents extreme challenges — from the arid, nutrition-deprived sand of barrier islands to the soggy, nutrient-rich soils of inland marshes. Wind and the salt spray it transports are ever-present issues.

As a first step, take a soil sample to a N.C. Cooperative Extension office or a local nursery professional, Loewen suggests.

Next, design a planting plan with a

Continued

specific purpose — to anchor a stream bank, provide shade, soak up a wet spot, provide fresh vegetables, herbs or cut flowers, or to improve landscape aesthetics.

Then, visit the gardening section of a local library to do some research. It's critical to choose native plants that are well adapted to specific garden site considerations, including soil type, wind, sun, shade, hydrology and salt spray.

Although just a year out of college, Loewen is a veteran gardener. She planted her first flower and vegetable garden while still in elementary school. As a high school and college student, she worked at a nursery that specialized in organic gardening in her home state of Oregon, applying new skills in her family garden.

Students at the Trinity Center benefit from Loewen's lifelong experience as they learn the fine art of composting as part of the environmental curriculum. "I get a lot of 'Oh, gross!' from the kids. But if you do it right, it shouldn't smell too bad."

Organic compost, she says, is a gardener's best friend — especially for those trying to grow tomatoes and herbs on a barrier island. Her own micro garden sits close to her oceanside cinderblock dorm. A couple of yucca plants atop a small berm protect the plot from a constant wind. "The summer sun is intense, and I have to water twice a day," she says.

Wherever she has moved to since leaving her Portland home for college, Loewen has kept a small garden. "The first thing I do when I move is to go buy plants. It's a tradition. Besides, I can't have a pet to nurture, but I can always have a garden no matter how small."

LEARN FROM NATURE

Small is not an issue for Ellen Colodney, owner of the Coastal Plain Conservation Nursery in Edenton, one of the few North Carolina nurseries specializing in native plant propagation. Along with the N.C. Forest Service, she provides native plants for the Go Native events.

Her first job after launching her business in 1999 was to come up with 15,000 loblolly bay trees for a Global Transpark mitigation project.

"It turned out there were no published research reports on how to propagate loblolly bay," she recalls. So, she collected cuttings at the



Dare County Bombing Range and then experimented with a number of ways to prepare and root cuttings for the project. In the end, she delivered the required 15,000 broad leaf evergreen plants — and published the first paper on propagation protocol for *Gordonia lasianthus* (*Native Plants Journal*, Idaho Press, 1999).

The nursery is more than a business. It's a vocation. Colodney, a medical doctor, gave up a successful career in rehabilitation medicine to devote 100 percent of her time to growing native plants, especially for water quality improvement projects.

"When you think about it, healing and restoration are connected," says Colodney, who approaches restoration with the same holistic strategy as rehabilitation medicine. The idea is to use plants to improve the function of an ecosystem beyond the physical stabilization of a stream or wetland.

"The aesthetics, the wildlife and the benthic invertebrates all function on what native plants provide. Stormwater management is not just a matter of using plants to improve nutrient uptake," she says.

Colodney cautions against using non-native plants in restoration projects. "As in medicine, the guiding principle should be



CLOCKWISE FROM TOP LEFT: A variety of native plants follow the meandering stream on the Chowan County Golf Course. • Randy Mason lets Mother Nature help protect his home from coastal storms. • Rainwater collected in barrels will irrigate Mason's home-grown plants. • Katie Loewen advises new coastal gardeners to do their homework.

'First, do no harm.' With non-natives, you don't know if you are going to cause more problems. Aquatic environments transmit plant material too efficiently, and you can end up with an invasion of harmful plants."

Nature knows best, she says. She has become a hunter and gatherer, plying the streams and creeks around Edenton by kayak with co-workers.

She studies how native plant communities grow in the wild and gets permission from landowners to collect seeds or cuttings from plants within particular ecosystems.

"It's important to know what grows together. In ecosystem restoration, the more you can replicate nature, the better," she explains. The diversity ensures a balanced food supply for fish, birds, beneficial insects and myriad wildlife.

Besides, native plants have built up defenses against attacking insects. For example, Japanese beetles have no taste for native swamp rose.

Colodney teamed with Dwane Hinson of



CLOCKWISE FROM TOP LEFT: Ellen Colodney nurtures nearly 200 native plant species at her Edenton nursery. • Greg May says native plants play a role in protecting water quality. • Bald cypress seedlings thrive at the Coastal Conservation Nursery. • Plant communities provide habitat for myriad wildlife.

Chowan County's Soil and Water Conservation District for an extensive project on the Chowan County Golf Course. They targeted a series of eyesore ditches that once dumped stormwater runoff directly into the Albemarle Sound.

The stunning transformation now boasts meandering streams and wetland sites featuring native plant communities that provide texture and tone to the landscape.

"Most golfers see a beautiful landscape, not hardworking ecosystems that are taking up nutrients that exceed the input from the golfing greens," Colodney points out.

OUTDOOR CLASSROOMS

When Barbara Doll, North Carolina Sea Grant water quality specialist, designs a remediation project, you can be sure native plants are in the plans. She often turns to Colodney for advice as well as plants.

Phase I of Doll's Farmville Country Club restoration project is on the ground and

functioning as designed: to restore a stream on a tributary of the Little Contentnea Creek, a 58-square-mile watershed that drains to Contentnea Creek and the Neuse River.

"The visibility, and the unprecedented cooperation of the golf course manager and members,

provided an ideal opportunity to develop a project to demonstrate water quality enhancement techniques on a localized scale," Doll explains.

The goal was to eliminate straight ditches, build habitat and improve aesthetics. A \$100,000 grant from the U.S. Environmental Protection Agency, combined with in-kind efforts from golf course members, accomplished those goals. In addition, attractive engraved granite signs at each of the three restoration sites along the 18-hole golf course provide information about the contribution of wetlands to water quality.

At one time, straight ditching was a common technique for handling drainage, says Greg May, club president and acting manager. The problem is that ditching speeds water flow, causing erosion, carries harmful sediments and contributes to downstream flooding.

"The restoration project is all about water quality," May says. "I'm glad we can help

people understand the importance of water quality. Our members are excited about the next phase that will improve another 1,000 feet along the Little Contentnea, which flows through Farmville."

Doll's outdoor classroom also has attracted visitors from a Greenville area golf course, where members are considering a similar remediation project.

The Farmville Country Club's modern conservation efforts are a fitting tribute to its own history. The original nine holes of the course were constructed in 1932 by the Federal Civilian Conservation Corps (CCC), which was authorized by President Franklin D. Roosevelt to put folks to work during the Great Depression, says Judy Groet, who manages the pro shop.

The primary work of the CCC was erosion control, but the agency also made outstanding contributions to the development of recreational facilities across the nation.

SWAT TEAM

Typically, the stormwater Best Management Practice (BMP) equation goes something like this: structural changes + native plants = reduced flooding, improved water quality, reduced mosquito populations and increased biodiversity.

But recent scares of mosquito-borne diseases have caused restoration engineers to take a closer look at constructed wetlands and wet pond BMPs.

A recent study by North Carolina State University's William Hunt and Charles Apperson concluded that stormwater BMP designers can incorporate design features and management strategies that will limit mosquito growth.

- Use deep pools to encourage water flow and mosquito predation.
- Site the BMP where mosquitoes already exist. Don't create a new mosquito habitat.
- Employ simple management strategies, such as removal of unwanted plant species on an annual basis, to maintain existing facilities.
- Choose vegetation that will help control mosquitoes, including duck potato, arrowhead, spatterdock, pickerel weed and salt marsh bulrush. These species attract predators of mosquito larvae, such as frogs, reptiles, birds, fish and dragonflies.
- Avoid cattail and common reed, species that can block predatory fish from reaching larvae.

Continued

PLANT FOLKLORE

Mason, who inspired NCCF to begin hosting the Go Native events, doesn't just talk gardening. He lives it. When he and his wife, Georgia, moved into their home on Archers Creek, about 50 yards off Bogue Sound, there were few plants on the property.

Now, when he gives directions to their home, he gives a street address and adds, "It's the house with the flowers."

That's an understatement.

From their streetside mailbox to their creekside fishing dock, their home is completely enveloped in green and spikes of color from thousands of plants he has propagated in a small lean-to greenhouse. Mason collects seeds, with permission, from farm ditches and beneath power lines. He tries to stay ahead of bulldozers in fast-growing Carteret County.

"I'm running out of places to plant things, but continue to propagate," Mason says. "No one leaves here empty-handed."

A stroll through his yard is akin to turning pages of a book on gardening with native plants. Mason loves plants and flowers for their beauty and environmental function — and for their stories.

"Each has a different history. Some are medicine cabinets. Sassafras, with its three different shaped leaves, was once used as a spring tonic — the cure for what ails you. The yaupon holly berry leaf was boiled for tea," he says.

"The wax myrtle is a magnificent plant with a rich history. Settlers boiled its blue berries to make candles," he notes. "Its leaves, when rubbed on the skin, are a natural insect repellent. Then there's winged sumac with its orange berries that sailors used to make tea as a source of vitamin C to prevent scurvy."

He adds, "Many native plants are 'smart plants' that defend themselves naturally against predators."

Mason's natural landscaping has other defensive qualities. His grey-shingled home is barely visible from the creek. Green spartina and black needlerush line the marsh. Live oaks hug the shoreline. A thick stand of wax myrtles and understory trees and shrubs provide a secondary buffer line. In short, the native plants work together to stabilize the shoreline and help protect his home from coastal storms.

Oh yes. With not a blade of turf grass in sight, Mason does not own a lawn mower. He is free to sit on the back porch and enjoy Mother Nature's handiwork. □

LEARN MORE ABOUT NATIVE PLANT OPTIONS

A wealth of information is available to match the growing popularity of gardening with native plants in North Carolina and the Southeast. Here are a few publications and other resources to help germinate seeds of interest:

- **The Soundfront Series: Protecting Estuarine Water Quality Through Design**, by Nancy White, North Carolina Sea Grant, UNC-SG-01-13. \$7. Series focuses on sustainable growth in the estuarine region. Others in series: **Shoreline Erosion in North Carolina Estuaries**, by Stanley R. Riggs, UNC-SG-01-11, \$7. **Protecting Estuarine Region Through Policy and Management**, by Walter Clark, UNC-SG-01-14, \$4. **Managing Erosion on Estuarine Shorelines**, by Spencer M. Rogers Jr. and Tracy Skrabal, UNC-SG-01-12, \$4. Complete set: \$20. For more information, call 919/515-9101 or e-mail harriss@unity.ncsu.edu.
- **Wild Flowers of North Carolina**, by William S. Justice, C. Ritchie Bell and Anne H. Lindsey; 2005 (second edition); UNC Press; ISBN 0-8078-5597-9; soft cover \$19.95.
- **Native Perennials for the Southeast**, by Peter Loewer; 2004; Cool Springs Press, Nashville, Tenn.; ISBN 1-59186-121-7; soft cover, \$22.99.
- **The Carolinas Gardener's Guide**, by Toby Bost and Jim Wilson; 2004; Cool Springs Press, Nashville, Tenn.; ISBN 1-591186-113-6; soft cover, \$24.99.
- **American Horticultural Society's Southeast SmartGarden Regional Guide**, by Rita Pelczar and William E. Barrick; 2004; DK Press, New York, N.Y.; ISBN 0-7894-9494-9; soft cover \$30.
- **The Dune Book**, by Spencer Rogers and David Nash; North Carolina Sea Grant; UNC-SG-03-03. \$5. www.ncseagrant.org.
- **The Carolina Gardener Magazine**, edited by L.A. Jackson, Carolina Gardener, Inc., Greensboro, N.C.; ISSN 1063-7451; Subscription: \$24.25 yearly. www.carolinagardener.com.
- **Coastal Plain Conservation Nursery**, Edenton, N.C. Dr. Ellen Colodney provides strategic plants for environmental professionals. 252/482-5707, liv2plant@yahoo.com.
- **North Carolina Cooperative Extension Service**, www.ces.ncsu.edu/counties. Specialists in each county can help would-be gardeners take the first step toward success by providing soil tests, as well as lists of regional native plants. The Master Gardener Program also offers workshops and other outreach services.

HOW DOES YOUR GARDEN GROW?

Wondering what native plants will fit your landscape needs? Here are a few suggestions from Ellen Colodney of the Coastal Plain Conservation Nursery in Edenton:

- **Grasslike Plants for Shallow Water:** creeping spikerush; softstem bulrush; or maidencane.
- **Broadleaf Plants for Shallow Water:** sweet flag; blue flag iris; pickerel weed; duck potato; lizard tail; bulltongue; or arrow arum.
- **Grasslike Plants for Soggy Soil:** fringed sedge; spikerush; soft rush; wool grass; fox sedge; or leathery rush.
- **Flowers for Soggy Soil:** swamp milkweed; wild ageratum; scarlet rose mallow; cardinal flower; white turtlehead, rose mallow; or joe pye weed.
- **Large Trees for Shallow Slopes and Buffers:** green ash; blackgum; poplar tree (tulip tree); sycamore; swamp chestnut oak; or white oak.
- **Small Trees for Shallow Slopes and Buffers:** pawpaw; parsley hawthorne; persimmon; swamp blackgum; black cherry; or eastern cottonwood.
- **Upland Shrubs:** beautyberry; wax myrtle; elderberry; or dwarf sumac.
- **Lowland Shrubs:** hazel alder; summersweet; swamp rose; buttonbush; wax myrtle; elderberry; silky dogwood; stiff dogwood; or Virginia willow.
- **Anywhere Shrubs:** red chokeberry; wax myrtle; Virginia willow; or elderberry.
- **Special Stream Ecosystems:** Atlantic white cedar; water tupelo; pond pine; loblolly bay; swamp redbay; or bald cypress.

— P.S.

By Kathleen Angione

FROM TRASH TO TREASURE: OYSTER SHELL RECYCLING

A typical summer evening at a Carteret County seafood restaurant is filled with the voices of servers and customers, the clinks and clanks of silverware and the distinctive smell of freshly cooked seafood.

But for Brian Woodard, the latter aroma is fleeting — the next morning, he will likely be outside these restaurants, hoisting garbage cans full of foul smelling, leftover oyster shells into the back of a pickup truck.

"It's probably one of the worst smells I've ever dealt with," admits Woodard, a Carteret County Community College (CCC) student.

But it is all for a good cause.

Woodard is part of an N.C. Fishery Resource Grant (FRG) project designed to collect discarded oyster shells from the county's restaurants and "recycle" them for use in the state's nine oyster sanctuaries. The old shells are prime substrate for growing young Eastern oysters (*Crassostrea virginica*), an ecologically important species that has been in decline in North Carolina for more than a century.

The project is designed to bolster the state's existing oyster shell recycling program, run by the N.C. Division of Marine Fisheries (DMF), which relies on people voluntarily bringing their old oyster shells to designated drop-off sites. Collectively, restaurants are a major source of discarded shells, but organizing individual pick-ups is too costly and time consuming for DMF.

"We can handle large amounts of shells," says Craig Hardy, a DMF section chief who heads the N.C. Oyster Shell Recycling Program, explaining the drop-off sites. "But it's difficult for us to be spread around the state collecting five bushels here or 10 bushels there."

Response to CCC's recycling project is positive. Six restaurants participate, and throughout the year Woodard collects their discarded shells each week, or three to four times per week during the summer.

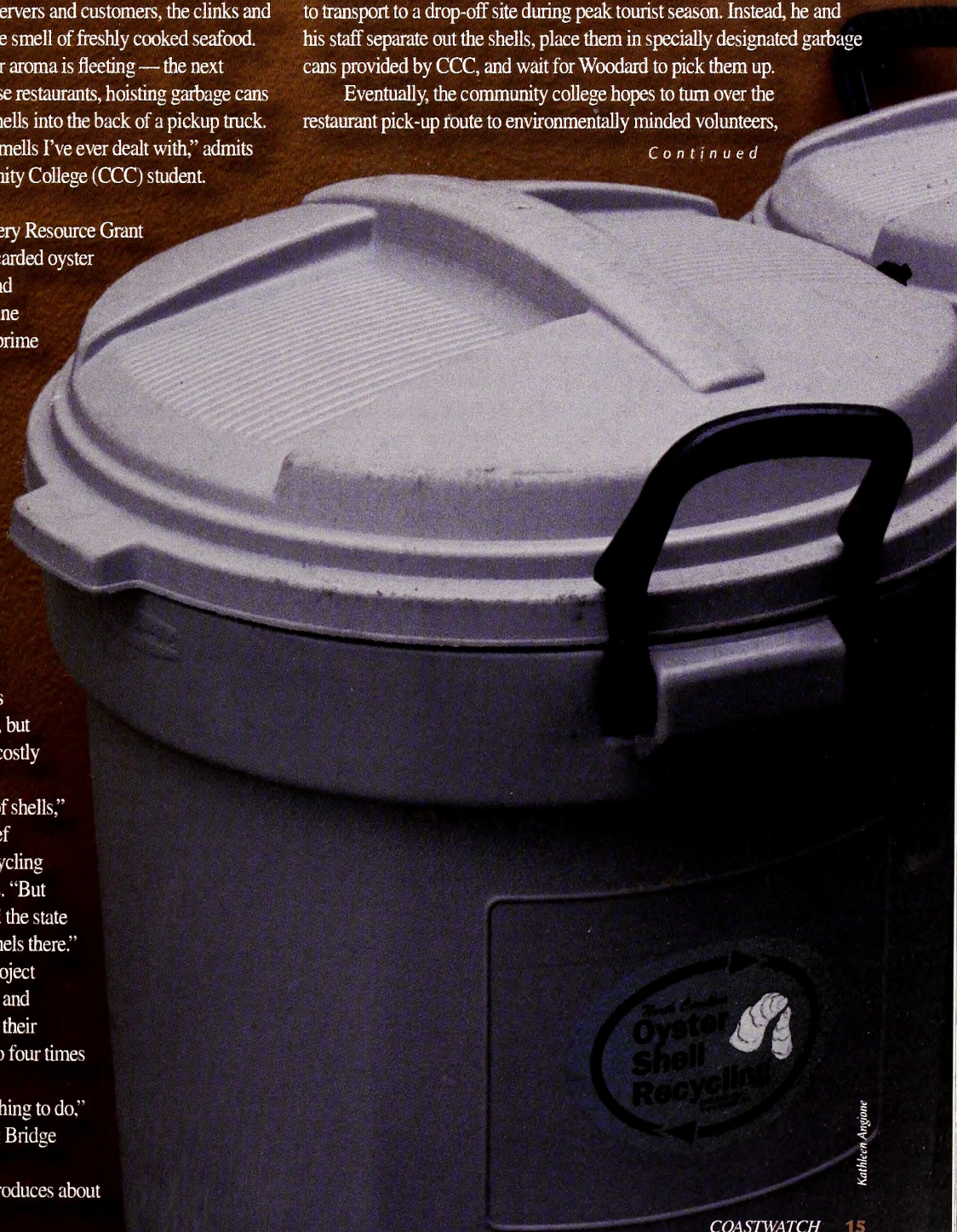
"Environmentally, it's the right thing to do," says Gene Heath, owner of the Flying Bridge restaurant in Swansboro.

Heath estimates his restaurant produces about

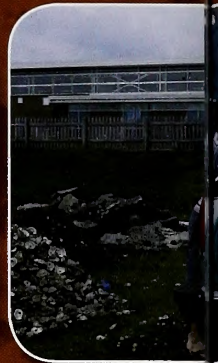
30 bushels of oyster shells per week in the summer — too many for him to transport to a drop-off site during peak tourist season. Instead, he and his staff separate out the shells, place them in specially designated garbage cans provided by CCC, and wait for Woodard to pick them up.

Eventually, the community college hopes to turn over the restaurant pick-up route to environmentally minded volunteers,

Continued



Kathleen Angione



LEFT TO RIGHT: A DMF-sponsored drop-off site for oyster shells in Brunswick County. • CCC's shell-recycling truck uses a special winch to lift heavy cans off the ground. • Brian Woodard's

such as student or senior citizen groups.

"That's how the project has to evolve to maintain itself," says Philip "Skip" Kemp, project organizer and aquaculture program coordinator at CCC. "Part of what this project does is educate people about the importance of putting the shells back into the environment rather than into the driveway or the dump."

RAISING A ROBUST RESOURCE

Oysters are vital to maintaining healthy marine ecosystems. A single oyster can filter up to 50 gallons of water a day, cleansing the water column of excess plankton and detritus. Oyster reefs also provide habitat for a multitude of organisms, including algae, worms, barnacles, crabs and fish.

A prosperous fishery in North Carolina during the late 19th and early 20th centuries, Eastern oyster populations have since been pummeled by overharvest, habitat loss, water pollution and disease. Today, oysters are listed as a "species of concern" by the DMF, and commercial landings in 2004 totaled about 69,500 bushels, a fraction of the record 1.8 million bushels landed in 1902.

"Most of the oysters being served in North Carolina are from out of state," Heath points out.

In 2001, the N.C. Marine Fisheries Commission adopted a fishery management plan designed to help restore the state's Eastern oyster populations. DMF began establishing no-take oyster sanctuaries throughout the Pamlico Sound, and in 2003 the N.C. Oyster Shell Recycling Program was born.

Besides helping DMF better acquire shell material for sanctuaries, aquaculture researchers at CCC saw another opportunity to help with oyster restoration efforts: provide state sanctuaries with "seeded" oyster shells, or shells with juvenile oysters already attached.

CCC researchers plan to select large oysters from the wild and breed them in aquaculture facilities, hoping the offspring will have better disease resistance.

"If you find large oysters [in nature], you assume they've been challenged by disease," Kemp says. CCC's hatchery already has several six-inch oysters from Stump Sound they plan to breed.

"Hopefully, those oysters will incorporate those robust genes back

into the gene pool," explains Hardy.

But there are no guarantees, says Don Meritt, a Maryland Sea Grant aquaculture specialist who runs the oyster hatchery program at the University of Maryland's Center for Environmental Sciences.

"'Resistance' does not mean immunity to disease," he explains. "As a population, they will live longer, but even those oysters will eventually succumb to disease."

Breeding oysters for disease resistance originally was developed in aquaculture circles to help oysters in hatcheries reach market size and be sold, he explains. Such efforts usually involved gathering wild oysters and exposing them to disease. Those that survived had greater resistance, and were bred again.

Researchers at the CCC hatchery will not conduct such a selection program among its wild oysters. Instead, they hope nature already has taken care of that. Regardless of how the disease-resistant oysters are selected, their offspring are hardly a panacea for the ailing species.

"The question of whether you can take these superior genetic features and infuse them into wild populations remains to be seen," says Meritt.

Some small-scale experiments in Virginia have shown that disease-resistant oysters placed in the wild have propagated, but it is extremely difficult to determine their effects on surrounding populations, says Stan Allen, director of the Aquaculture Genetics and Breeding Technology Center at the Virginia Institute of Marine Science (VIMS).

Allen describes using disease-resistant oysters in restoration as "almost like an act of desperation." He fears that losses from overharvesting and habitat degradation already may be too great for the species to overcome.

Kemp concurs. "Disease isn't nearly as big of a problem as the overharvesting of oysters. Overharvest and mismanagement caused the

oysters to go away — when you take away oysters, you take away shell for future crops."

A more sustainable option, he suggests, involves using aquaculture to produce oysters for seafood markets. Shell recycling and restoration efforts should be focused on no-take sanctuaries rather than areas for commercial harvest, he adds.

"Disease isn't nearly as big of a problem as the overharvesting of oysters.

Overharvest and mismanagement caused the oysters to go away — when you take away oysters, you take away shell for future crops."

— Philip "Skip" Kemp

Kathleen Angione



Kathleen Angione



Chuck Liddy, News & Observer



pick-up route takes about two hours. • Shells are emptied into a pile on the CCC campus. • Skip Kemp and CCC student Andrew Bunting extract eggs and sperm from oysters for breeding.

FIRST STEPS

In North Carolina, Kemp's vision for such restoration efforts seems to be materializing, thanks to project participants like Heath and Woodard.

Woodard's regular route takes about two hours. He starts in Morehead City and works his way toward Swansboro.

The pay and the schedule aren't bad, he says. And he's used to the smell. But as with any job, Woodard has a couple of pet peeves: restaurants that put shells in non-designated cans or mix shells with trash in the recycling cans.

"We just want the oyster shells and the oyster shells only," he says.

Besides the obvious stench, trash becomes a nuisance when it comes time for Woodard to empty the truck.

Back on campus, Woodard dumps the new recyclables at the far end of an enormous pile of shells behind the aquaculture building. He picks out any visible trash and reloads the empty cans onto the truck.

The shell pile serves an important purpose in the recycling process, explains Kemp. Before they can be seeded in the lab, shells must sit for a year so any leftover meat or muscle can decompose.

"If there is too much organic material, it makes the water foul, so the oyster larvae don't do well," he says, referring to the setting tanks used to seed the shells.

At the back of the pile are the oldest oysters, which are about ready for seeding. Soon, Kemp and his students will load these shells into crates and stack them in setting tanks.

"After the shells are put into the setting tanks, then we will put the eyed-larvae oysters — which we will be growing in the hatchery — into the water," says Kemp. "Then they swim around and attach to the shells, and they are ready to go back into the environment."

The newly seeded shells will be planted in two new DMF sanctuaries: one along the south shore of the Neuse River, near its mouth, and the other southeast of Swan Quarter Bay, says Hardy. The seeded oyster shells will be placed on top of large, individual mounds of limestone, known as "rip-rap."

These mounds help jump start the physical formation of the constructed reef. Under natural conditions, reefs form when oysters settle on top of each other and old shell. But oyster shells are a limited resource, says Hardy, and the rip-rap maximizes that resource by providing the constructed reef much needed elevation. Studies have shown that oysters

"These sanctuaries and enhancement efforts provide great opportunities for oyster research in North Carolina that hopefully researchers will take advantage of."

— Craig Hardy

higher in the water column survive and grow better because they are above the low-oxygen water mass.

FUTURE EFFORTS

Funding for CCC's shell collection project will last through March 2006. Afterward, Kemp and Hardy hope to turn the effort over to volunteer groups.

"Carteret County has shown that a few people can adopt a restaurant, collect oyster shells and make them available for recycling," says Hardy.

He hopes the DMF will add an oyster shell recycling position to help coordinate future volunteers. Funding is scarce, but a bill proposed in the N.C. General Assembly this year would provide state support for such a position.

Hardy and Kemp believe the restaurant project and the state's shell recycling program are helping people view oyster shells as a resource for habitat restoration.

"The oyster needs oyster shell to start its life," says Kemp. "Even the legislature has picked up on the idea and introduced a bill to ban oyster shells from landfills," he adds.

But even if shells are kept out of landfills, set with disease-resistant juvenile oysters and placed in sanctuaries, the Eastern oyster's plight is far from over. To truly restore habitat, the juveniles must not only survive but also reproduce and spread their offspring to adjacent reefs.

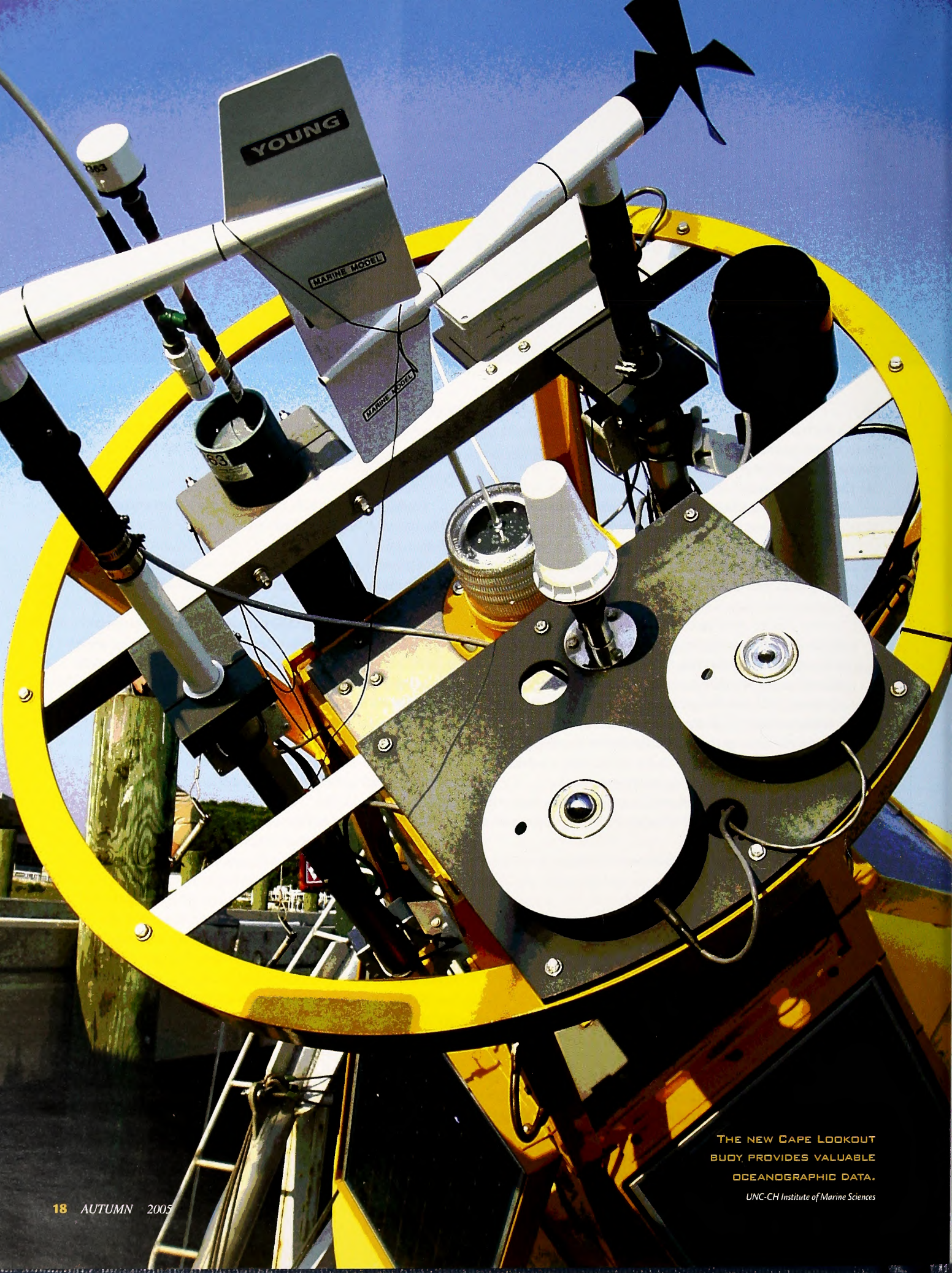
The DMF plans to monitor the sanctuaries planted with recycled, seeded shell by sampling for oyster growth, survival and structural stability, says Hardy. To monitor enhancement, DMF will sample and compare rip-rap mounds containing either seeded shells or regular shells. Hardy also hopes to engage other researchers from around the state.

"These sanctuaries and enhancement efforts provide great opportunities for oyster research in North Carolina that hopefully researchers will take advantage of," he says.

In the meantime, Hardy, Kemp and Woodard continue to promote citizen awareness about oyster shell recycling and the restaurant project.

Woodard cites himself as an example of how even the slightest shift in perspective — and thus practice — can make a difference: "I've never been much for recycling, but now I feel like I am doing my part." ■

For a complete list of DMF's oyster shell recycling drop-off sites, visit: www.ncfisheries.net/shellfish/recycle4.htm.



YOUNG

MARINE MODELS

MARINE MODELS

THE NEW CAPE LOOKOUT
BUOY PROVIDES VALUABLE
OCEANOGRAPHIC DATA.
UNC-CH Institute of Marine Sciences

OCEAN OBSERVING SYSTEMS GENERATE WAVES OF DATA

By Ann Green

When Cap'n Jim Willis flew over the Cape Lookout shoals in 1993, he noticed that the northeast ocean swells from Raleigh Bay spread out like spokes on a wagon wheel.

"As the waves come around from the northeast, they wrap around the tip of the shoals," says Willis, a longtime Bogue Banks resident and a self-described "banksologist."

However, the weather data from instruments in the area didn't give wave direction, height and length, or time of day and date, according to Willis.

But that changed in June when a new weather buoy was deployed off Cape Lookout shoals.

The buoy monitors a variety of ocean conditions, including waves, currents, water temperature and salinity. It also records wind speed and direction, and other weather data.

Willis says the buoy is in the center of the wagon wheel — where it provides useful oceanographic data. "It will provide valuable information for researchers, surfers, boaters and fishermen," he adds.

The new buoy relays data from its sensors to shore every hour. Once checked for quality control, the data eventually will be posted online at the Southeast Atlantic Coastal Ocean Observing System (SEACOOS) Web site, as well as through the National Oceanic & Atmospheric Administration's (NOAA) National Weather Service (NWS) and the National Data Buoy Center.

SOUTHEAST OBSERVING SYSTEM

The buoy is part of SEACOOS, a regional research group created to better understand what's happening in coastal ocean waters stretching from North Carolina to Florida. Researchers are using buoys and radar near or on the ocean to develop detailed maps and data sets.

SEACOOS, which knits together small

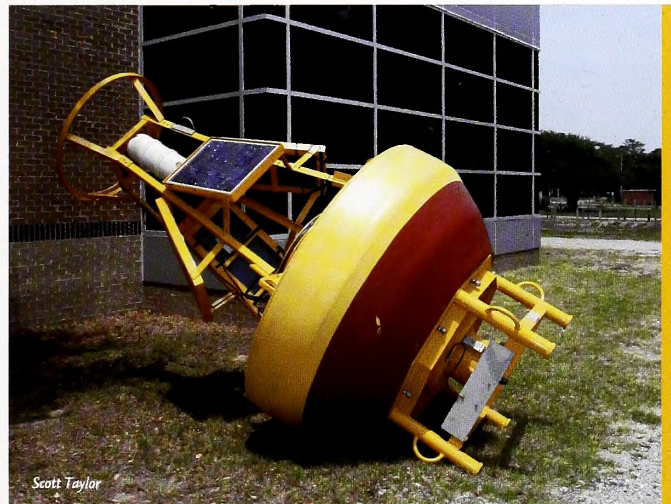
monitoring programs already operating along the coast, is a collaborative effort among the University of North Carolina at Chapel Hill (UNC-CH), North Carolina Sea Grant, the University of North Carolina system and numerous other partners in South Carolina, Georgia and Florida. The SEACOOS Web site provides an update on North Carolina observing systems, as well as other systems around the region.

"We are trying to integrate many different elements and form a merged information system that will address scientific and societal issues," says Harvey Seim, SEACOOS project coordinator and UNC-CH physical oceanographer. "We see a tremendous benefit in marrying satellite remote sensing and ship-based observation with offshore measures at Chapel Hill so that you can get all the information in one place in a consistent fashion."

Funded by the Office of Naval Research, SEACOOS also is a pilot component of the Integrated Ocean Observing System (IOSS) that will become a network of "eyes" on buoys, ships, satellites, underwater vehicles and other platforms that supply data and information for ocean predictions in U.S. waters. The national IOOS program is part of the federal Ocean.US program that was created by the National Oceanographic Partnership Program.

"The eventual goal for IOOS is to save the United States close to \$1 billion a year through enhanced weather forecasting resources and more efficient marine transportation," says Seim.

Because there is little data on weather conditions in the ocean between Cape Hatteras and Cape Fear, the new Cape Lookout buoy will



ABOVE: THE UNC-CH INSTITUTE OF MARINE SCIENCES IN MOREHEAD CITY PROVIDES TECHNICAL SUPPORT FOR THE NEW BUOY, NOW LOCATED OFF CAPE LOOKOUT.

provide much-needed data in this large section of North Carolina's coastal waters, according to Rick Luetlich, director of the UNC-CH Institute of Marine Sciences in Morehead City.

"This data should greatly improve the quality of the marine forecast provided by NWS, as well as provide information to the public on current conditions in this region," says Luetlich, the buoy coordinator.

"This information will be of great value to anyone who is fishing, boating or involved in recreation along the central North Carolina coast," he adds. The buoy also will provide important data that will help ocean scientists and NWS weather forecasters improve their ability to predict the behavior of the coastal ocean."

Thomas Kriehn of the NWS in Newport agrees.

"The buoy is in the boating superhighway between Beaufort Inlet and the Big Rock that is a popular spot for offshore fishermen," adds Kriehn, meteorologist in charge of the NWS Newport office.

Continued

JENNETTE'S PIER

Another SEACOOS observation system began operating this summer at Jennette's Pier in Nags Head, the Outer Banks' oldest fishing pier. Researchers installed a near-shore ocean observation system that gathers real-time data about weather and water conditions in the area.

Visitors can use a screen kiosk and learn about pier instruments: a weather station

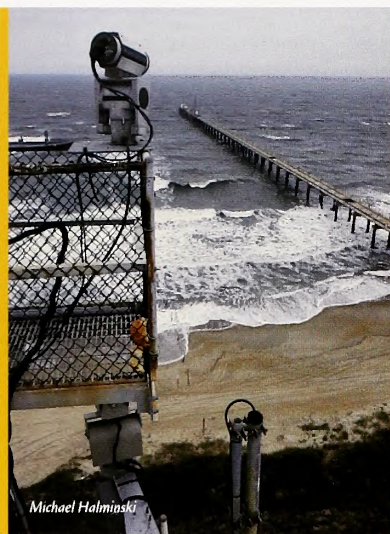
radar stations at the Duck research pier and the former U.S. Coast Guard station in Buxton. Researchers and anglers can use the CODAR data to unravel the complexities of currents in the Gulf Stream that flows around Florida and passes east of North Carolina.

These currents affect people and natural ecosystems both on land and at sea. The data could benefit shipping, improve preparedness

the water column above it — as well as the wave height, period and direction — will be installed.

NATIONAL NETWORK

Other ocean observing systems are found in North Carolina and across the country. For example, the University of North Carolina at Wilmington manages the Coastal Ocean Research and Monitoring Program (CORMP)



LEFT TO RIGHT: A NEW RADAR SYSTEM AT THE ARMY CORPS OF ENGINEERS FACILITY IN DUCK MEASURES OCEAN SURFACE SEACOOS RECENTLY LAUNCHED A BUOY OFF CAPE LOOKOUT. THE NEW BUOY IS SET UP IN THE "BOATING SUPERHIGHWAY"

measuring wind speed and direction, air temperature, humidity, barometric pressure and rainfall. A "surf cam" also serves up views of the ocean near the pier.

The project is a partnership of SEACOOS, North Carolina Sea Grant, the North Carolina Aquarium Society, the UNC Coastal Studies Institute, Surfchex and the Outer Banks Boarding Company. The U.S. Army Corps of Engineers Field Research Facility in Duck is providing technical support.

"The education kiosk will spread the word about weather and water conditions to new audiences, including pier and surf fishermen," says North Carolina Sea Grant fisheries specialist Sara Mirabilio, who is based in Manteo. "Displayed surface current information also will help make it easier for fishermen to find safe boating spots."

The kiosk also will provide Coastal Ocean Dynamics Applications Radar (CODAR) surface current observations from SEACOOS

for hurricanes and other storm effects, reduce public health risks, and protect and restore marine systems.

"CODAR shows both the convergent and divergent currents on the surface of the ocean," says Mike Muglia, UNC Coastal Studies Institute field research coordinator. "This information may be useful in helping to find good fishing areas."

The system also has huge benefits for search and rescue efforts.

"If an aircraft goes down in the water, CODAR could be used to track drifting crew members," says North Carolina Sea Grant Extension Director Jack Thigpen. "It also could be used to monitor the movement of an outbreak of harmful algae blooms that can contaminate shellfish beds."

In the near future, water temperature sensors will be mounted on pilings at Jennette's Pier. Also, an Acoustic Doppler Current Profiler that measures the current speed and direction of

that includes two real-time buoys in Onslow Bay and one offshore from New River Inlet. The system also includes a station at Johnny Mercer Pier at Wrightsville Beach that provides current and real-time wave data.

Jeff Marshall, CORMP outreach and education coordinator, says the data from the pier provides a valuable tool for the NWS in making rip current forecasts.

Another buoy will be deployed off the New River Inlet this year. The U.S. Marine staff at the Marine Corps Base at Camp LeJeune will use the real-time data when planning military training.

Other states also have ocean observing systems. In Florida's Tampa Bay, the Physical Oceanographic Real-Time System was installed in 1992. The system integrates real-time current, water level, temperature, wave, visibility and wind measurements collected every six minutes at multiple locations in the bay.

The technology, which provides information about the marine environment to

ships entering and leaving the bay, is helping to improve safety in the massive shipping industry.

After five years, the number of ship groundings dropped 60 percent. A single grounding can cost shipping operators hundreds of thousands of dollars in lost revenue, ship operations costs, tugboat fees, hull damage and environmental damage — even more if the hull is breached and hazardous cargo is spilled.

5,000 barrels of fuel oil at the entrance of Galveston Bay. Working together, the NOAA/ National Ocean Service's Hazardous Materials Response Division modeling team and the TGLO trajectory modeling team used TABS data and computer simulations to forecast the oil's movement with an unprecedented level of accuracy.

The modelers knew the current's

Researchers also documented bursts of powerful winds up to 100 mph.

The NWS regional office used the data in forecasting.

Now, the South Atlantic Bight Synoptic Offshore Observational Network operates eight large offshore platforms that provide a range of oceanographic and meteorological observations on a continual, real-time basis.



UNC-CH Institute of Marine Sciences



UNC-CH Institute of Marine Sciences

CURRENTS. A NEAR-SHORE OCEAN OBSERVATION SYSTEM WAS SET UP AT JENNETTE'S PIER IN NAGS HEAD, BETWEEN BEAUFORT INLET AND THE BIG ROCK, A POPULAR SPOT FOR OFFSHORE ANGLERS.

In the Northeast, one product of the developing Gulf of Maine Ocean Observing System is a Web site that provides real-time data for seafarers, including anglers, marine pilots, the U.S. Coast Guard and recreational boaters.

"Red sky at morning, sailors take warning doesn't cut it anymore," says Jeff Cockburn of the Penobscot Bay River Pilots Association. "We need quality, timely data to ensure the safety of our operations."

In Texas, emergency responders use measurements of surface currents to mitigate oil spills. The Texas General Land Office (TGLO) funds a network of surface current-measuring buoys known as the Texas Automated Buoy System (TABS). Since 1994 the network has reported the buoys' observations offshore in Texas and Louisiana in the Gulf of Mexico in real time to validate a computer model that estimates and forecasts surface currents over the Louisiana shelf.

Real-time data also played a crucial role in a spill response in 1996 when a barge spilled

direction within minutes of the spill, which was continuously tracked for the next 24 hours.

SEACOOS INCEPTION

Formed in 2003, SEACOOS is one of the newer regional ocean observation systems that bring together a number of independent efforts under one umbrella.

When Seim began overseeing the SEACOOS project, he drew upon his experience with a similar endeavor. While working at the Skidaway Institute of Oceanography, he helped launch a monitoring project in 1998 off the Georgia coast. That observational gear was attached to huge offshore towers installed by the U.S. Navy to track pilots learning to fly in squadrons.

As F-15s and F-18s sped overhead, Seim and other scientists collected information from the air and water below. Instruments tracked the shift in currents and temperature or picked up traces of pollution carried by rain and rivers.

Researchers are using underwater cameras to capture the movement and behavior of sea life off the Georgia coast — from Atlantic spadefish and black sea bass to sharks and stingrays.

Seim estimates the SEACOOS system will initially cost \$20 million to \$30 million to build over five years. The Office of Naval Research funded the initial project, which will be completed in 2007. Funding is expected for future projects.

Since the inception of SEACOOS, the amount of observational data from the coastal ocean has doubled, according to Seim. "All of that impacts the quality of weather forecasts," he adds.

Kriehn says that SEACOOS data is extremely important to NWS.

"The SEACOOS data is from the marine environment, and marine observations are relatively sparse compared to the amount of data the service has from over land," he adds. "Every little bit of data will help our forecasters, especially if it is data from the marine environment."

Continued

Besides tracking data through observation systems, SEACOOS provides computer modeling that simulates and predicts natural phenomena, such as temperature changes in the ocean.

For example, scientists can use the observed characteristics of a hurricane combined with models to predict how the storm might grow or shrink, and where it might travel.

“The modeling capabilities should improve

wave information, wave vocabulary and other resources. The online project is a partnership of COSEE SouthEast, COSEE Florida and COSEE Gulf of Mexico.

“We are pushing the envelope in bringing teachers and students up to date on oceanographic observation data,” says Spence.

Another educational component is an underwater video camera on the ocean bottom in the Gray’s Reef National Marine Sanctuary

and high school science teachers are extending Maury activity modules on shallow-water ocean waves and wind-driven ocean circulation by using data on the SEACOOS Web site.

“I find it valuable to access real-time data — the same data that scientists are using,” says East Carteret High School teacher Barbara Waters. “I think that students also find it so valuable to use this data and regard it as a valid exercise. To fuel an interest in science, you need real science.”



LEFT TO RIGHT: MIKE MUGLIA AND SARA MIRABILIO HELPED SET UP THE NEW OBSERVING SYSTEM AT JENNETTE’S PIER. SAM RAUSER OF OHIO CHECKS OCEAN CONDITIONS ON A NEW “SURF CAM” AT THE PIER. U.S. COAST GUARD CREW LOWERS A NEW CORMP AND U.S. MARINE CORPS BUOY OFF THE COAST OF CAMP LEJEUNE.

the quality of forecasts for areas where there is a potential for flooding and other problems,” says Seim.

EDUCATIONAL EFFORT

The network also offers a new frontier of knowledge for educators.

“Integrating real-time or near real-time data into lessons is a novel experience for students and teachers,” says Lundie Spence, director of the Center for Ocean Sciences Education Excellence (COSEE) SouthEast, one of seven regional educational centers across the country.

With the type of data and models on the SEACOOS Web site, precollege and undergraduate students can learn about geographically relevant information in earth science, marine science and other courses, adds Spence.

For example, the SEACOOS Web site contains the Virtual Waves Classroom, which includes a poster, classroom activities, real-time

about 17.5 nautical miles off Sapelo Island, Ga. The camera records creatures moving through the artificial reef structure.

In North Carolina, Sea Grant marine education specialist Terri Kirby Hathaway is using coastal ocean observing data to extend classroom lessons.

Through the American Meteorological Society’s Maury Project, a comprehensive national program of teacher enhancement based on the physical foundations of oceanography, Hathaway is bringing new lessons on a variety of oceans topics to educators for use in K-12 classrooms, as well as in aquariums and museums.

“The outreach and education group plays a major role in increasing public awareness of SEACOOS and in dealing with the needs and concerns of users,” says Hathaway.

Along with Hathaway and two college professors from the U.S. Naval Academy and Alvenia College in Pennsylvania, five middle

When the SEACOOS network is complete, marine scientists, anglers, boaters and others from North Carolina, South Carolina, Georgia and Florida will be able to tap into a database of regional meteorological and oceanographic information gathered 24 hours a day.

The regional observing system not only will greatly improve the decision-making process for coastal managers, weather response teams and others, but also will enhance the quality of life in the coastal zone.

“We want to provide the same predictions for the ocean here in the southeast as the National Weather Service does for the land,” says Thigpen. □

To find out more about SEACOOS, visit the Web: www.seacoos.org. Web surfers can find ocean data from Jennette’s Pier and the Cape Lookout buoy by going online to: <http://nccoos.unc.edu> and click on platform.

For more information about CORMP, visit www.cormp.org and follow the links.



Beyond Blue: Crabbing in Color

By Erin Seiling

Red, black, green, blue, orange, yellow, even lime — almost every color you can imagine. Crab pots come in lots of “designer” colors these days, and Mary Helen Cox makes them all.

Traditional crab pots were large square traps constructed out of galvanized chicken wire. Today, the colored pots are still square, but made of colored PVC-coated wire.

“Twenty-five years ago, we only had green and black. Then, people started trying new things. Different colors became popular, like

red and orange. Now we have multicolored pots and even lime green pots,” says Cox of Cox’s Crab pots in Fairfield.

Most crabbers prefer particular colors, she adds. Some like the red pots, some like the blue ones. Whatever their color of choice, they find something that “works,” and they keep using that color again and again.

There is a certain amount of mystery, folklore and superstition associated with colored pots. And plenty of debate. Almost any crabber will tell you his or her opinion on

what color to use and the “how,” “when” and “where” of using it. But there haven’t been any North Carolina studies examining whether certain colors actually attract more crabs.

Until now.

H.L. Bond of Edenton is testing the catching efficiency of various colored pots in the Albemarle Sound through a grant from the N.C. Blue Crab Research Program. The program is funded by the North Carolina General Assembly and administered through North Carolina Sea Grant. *Continued*

“The project should provide some answers as to whether or not color actually matters when catching crabs,” says Marc Turano, blue crab specialist for North Carolina Sea Grant. “If so, this could lead to increased efficiency for commercial crabbers, which would result in higher profits.”

Bond is testing red, black, green and yellow pots — more “traditional” pot colors for the Albemarle region. The four colors were randomly assigned to 100 pots for the study. The pots are clustered in the deeper waters of the Albemarle Sound to keep other boats from running over them — Bond doesn’t want the results skewed by pots that are tampered with or lost.

CATALOGING CRABS

“Number 24, red pot,” calls Sharon Bond, H.L.’s wife, over the drone of the boat motor.

H.L.’s son, Michael Byrum, pilots the boat towards the numbered buoy. Michael grabs the buoy line with a long, hooked pole. He wraps the line around the automatic reel and flips the switch to easily pull the pot alongside the boat.

Meanwhile, he pulls the pot from the water and gives it a vigorous shake, emptying the captured crabs onto a small wooden table. He tosses the pot back in the water, and the boat moves off towards the next buoy.

Between pots, H.L. sits at the table grading the crabs and sorting them into bushel baskets. The undersized crabs go overboard, the rest are sorted by grade.

Number 1s are big, hard jimmies — or male crabs that have the most meat. Number 2s are softer jimmies — they are not as fleshed out as the number 1s, and are worth a little less at market. The number 3s are sooks — or females.

“Most people prefer the males, even though the females can have as much meat on ’em,” remarks H.L.

“Two number 1s; four number 2s; and two number 3s.” Sharon records the catch in her notebook. The notebook pages are carefully laid out to track the pot number and color.

“That’s so we can keep up with the pots, in case something happens to one of them,” explains Sharon.

The remaining columns record the number of each grade of crab, the number of undersized crabs and the total number of crabs caught per pot. All of this counting and sorting is time-consuming work. It takes a lot longer than pulling H.L.’s personal pots.

Normally, H.L. pilots the boat and hooks the buoy line of each pot. Michael “shakes” the pots onto the table, and drops the pot back into the water.

Instead of sorting these crabs by hand, the wooden table the Bonds have built does the work. The table is slightly slanted and works as a ramp. The crabs fall out of the pots, onto the table and walk right down the ramp and into the waiting bushel box at the end. When the box is full, H.L. places a wet burlap bag over the crabs to keep them cool and sets up a new box.

Still, “The counting work goes faster than the old days when we had to pull the pots up by hand,” H.L. says with a smile.

Still, “The counting work goes faster than the old days when we had to pull the pots up by hand,” H.L. says with a smile.

ALBEMARLE APPROACH

In the Albemarle, crabbing starts around the end of April, when the pots are set.

“Usually by the beginning of May we’re pulling up our first pots,” explains H.L.

But you can’t just set the pots once and leave them all season. Blue crabs move up and down the sound according to the salinity of the water. The big males have just moved west of where many of H.L.’s pots are set.

A fellow crabber passes by, boat laden with empty crab pots, heading west. He waves at H.L. and motions ahead of him, signaling



Michael Halminski



Michael Halminski

- THIS PAGE, TOP: Michael Byrum shakes the crabs from the pot.
- THIS PAGE, BOTTOM: H.L. Bond grades the crabs as Michael empties the pots.
- NEXT PAGE, TOP RIGHT: H.L. Bond has been a commercial fisherman for 35 years.
- NEXT PAGE, BOTTOM RIGHT: Sharon Bond tracks and records the statistics for each pot.



Michael Halminski

fish. H.L. doesn't like to use shrimp heads, another bait popular in the area, because they are often rotten. The smell attracts the crabs, but it's not pleasant for the crabbers.

H.L. relates the story of a fellow crabber that *only* uses shrimp heads.

"You can smell him coming a mile away. I can't stand to

use them, but they catch good crabs, so sometimes you have to," H.L. says with a laugh.

Shrimp heads seem to catch better to the west, where H.L. is about to move his pots, so he is already preparing for the smelly weeks ahead. Switching bait is another example of how the crabbers adapt their technique to the local area.

Michael starts describing the strategy the Bonds use. "Around here, we catch more females in the east. And more males in the west. Seems like the males prefer the red and black pots, and the females like the yellow pots."

Many of their personal pots are red because they have been dipped in an anti-fouling solution to prevent algae from growing on them. And, "Sharon likes red," jokes Michael. Even still, some of their pots end up coated with the offending long, green strands.

The pots used for the study have to be kept clean so researchers can be sure crabs see the color. Every few weeks, H.L. pulls up empty study pots and leaves them sitting on his boat overnight. None of the pots have been fouled by algae, so far.

"It's a lot easier than dipping them, and it seems to be working," says H.L.

COLORFUL CONCLUSIONS

The study is designed to mimic the actual fishing practices of crabbers in the Albemarle Sound: H.L. uses pot colors typical for the area. He moves the pots as the crabs move. And he uses the same bait he puts in his regular pots.

Although the study isn't finished, the Bonds are starting to see some trends.

"So far, the red and black pots seem to be dominant. If you look back through this notebook, you can see the highest total catches go with the red [or] black pots," says Sharon.

That finding is interesting, according to Steve Rebach, blue crab researcher and associate director of North Carolina Sea Grant. "Studies have shown that blue crabs can't see red."

If the red pots are difficult for the crabs to see, those pots may be somewhat invisible, thereby catching more crabs attracted to the bait. If the pot is in deeper water, black might also be invisible, suggests Rebach.

It's hard to say how the results of this study will be received by the crabbing community according to Lynn Henry, marine biologist at the N.C. Division of Marine Fisheries. Henry has heard the lore for years, from all regions of the state. Every crabber he knows uses a different strategy.

Even if H.L.'s study finds a "better" pot color in the Albemarle, this one study will not likely "tell the entire tale," Henry says.

"Different areas have different bottom types, different salinities and water clarity," he explains.

These, and other parameters, affect how the crabs behave, with many variables at work in different areas. Henry explains that just because red pots, for example, work best in one place doesn't mean they will work well everywhere.

Although the results of H.L.'s study aren't expected to lay the color debate to rest, they will provide a starting point for additional research into blue crab behavior — with each new project adding a new "hue" to the spectrum of information. ■



Michael Halminski

to H.L. that it is time to pull up his own pots and move west as well.

"I was out that way yesterday, and the jimmies were huge; probably eight inches from point to point," H.L. says, adding that he'll start moving his pots this afternoon.

Blue crabs are attracted to the pots by the smell of the bait. The pots H.L. and his family have been fishing are baited with menhaden, or "fatback" as locals call the

A Small River Sets a Big Precedent

By Julie Powers • Photos by Scott Taylor

As a slender stream deep in the upland woods, the hushed environs of the White Oak River could belong to centuries past: Ancient, elegant cypress trees. Leaves whispering in a breeze. The scent of wildflowers and water lilies.

Such timeless tranquility has earned these reaches of the White Oak high esteem among kayak and canoe enthusiasts, says Michael Banks, who lives and works along its shores.

"It's pure nature," he says.

Well, not entirely. Yes, in the 50 miles between its headlands and the Atlantic Ocean, long stretches of the upper river flow through public forests free of human habitation.

But boat access to this natural beauty is courtesy of the N.C. Division of Water Resources (DWR), Jones County leaders and some tenacious White Oak devotees. Together, their minimalist approach to storm debris removal may become a standard for the state's waterways.

Until the spring of 2005, nature had locked paddlers out of some spectacular reaches of the coastal plain river for nearly a decade. A half-dozen hurricanes beginning in 1996 toppled hundreds of trees across the current. Branches and logs set afloat by the winds added to the obstacles.

Banks repeatedly cleared sections for local paddlers and customers of his White Oak River Campground and White Oak River Outfitters. Riverfront residents also did what they could.

The storms kept coming, however.

Hurricane Isabel in 2003 left an average of 20 new "blowdowns" per mile in the 20 miles of what became the 2005 cleanup project — from above Emmetts Lane Bridge on State Road 1333 to near Haywood Landing in the Croatan National Forest. Remnants of Hurricane Charlie added more than two dozen blowdowns in 2004, pushing the total past 500.

The section from Emmetts Lane Bridge downstream to Gibson Bridge had been impassable since 1996, says paddler Connie Asero of Atlantic Beach.

Now, clusters of wood debris frequently close in on the channel from both sides — but stop short of meeting. Mesmerized by the quiet splendor, a newcomer could easily overlook evidence the narrow passage was not sliced out by water.

"It's not a flume ride," says Asero. "It's not a canal. We just basically cut a path through each blowdown and pulled that section out."

This light touch was key to winning \$70,000 in DWR grants. The boom in recreational paddling represents much-needed economic opportunities for Jones County, which lacks major industry. But the fallen timber that confounds navigation is important to a stream's ecological agenda.

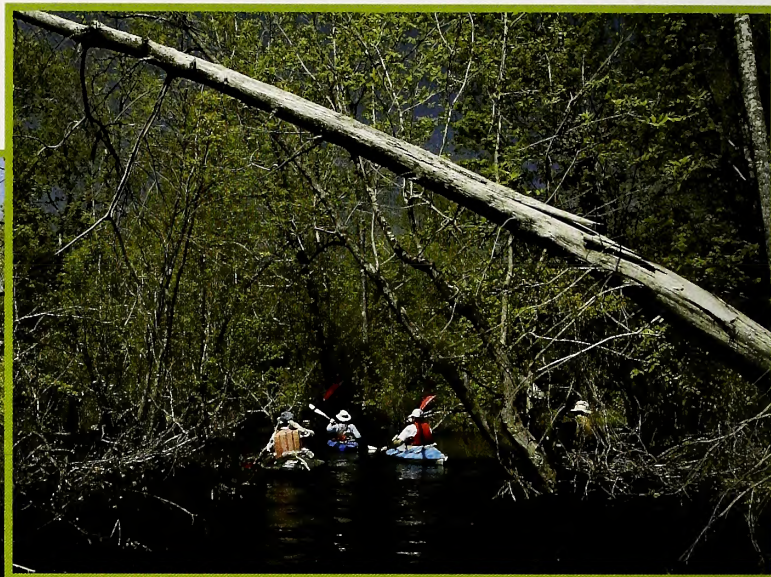
It slows water flow, allowing natural cleansing mechanisms time to work. It is an anchor in the food chain — small fish such as bluegills and redbreast sunfish feed on the invertebrates that attach to wood; bass and pickerel prey on the small fish, and so on up the scale. The still water downstream of a fallen log creates a rest stop for American shad toiling upstream to spawn in the spring.

"Woody debris is one of the primary drivers of aquatic productivity in coastal plain streams," says Bennett Wynne, an N.C. Wildlife Resources Commission (WRC) anadromous fish coordinator, formerly a WRC habitat conservation coordinator.

"It gives the stream habitat complexity," he says. "The more habitat complexity you have, the more diverse the assemblage of species you have."

Paddle trails can be compatible with habitat areas, if users don't strip the stream. "A good debris removal project, in my mind, is one you take a small boat down without any hardship, but it doesn't look like there's been a chain saw at work," Wynne says.

Continued



LEFT: Cut logs, trimmed branches and other evidence of the clearing project blend into the scenery. ABOVE: Kayakers paddle upstream from Gibson Bridge without stopping. Before the cleanup, more than 20 blockages per mile had obstructed passage.

As paddle sports gain popularity, more riverside communities are establishing trails on lesser-known waterways. The efforts can enhance appreciation and stewardship of resources, as well as the local economic picture.

"I see it as a good thing, overall," Wynne says, "as long as there's no harm done to the environment in the process."

BLAZING THE TRAIL

Banks used his knowledge of the White Oak to mark the channel under the blowdowns and beaver dams. The grants paid a tree service to cleave a six-foot section from the densest blockages. Volunteers did the same with the remainder.

Workers used only chain saws, small winches known as "come-alongs" and other hand-held equipment. They swung the cut wood well ashore, out of reach of floodwaters. They operated from small boats — no trucks, no loaders, and no roads to accommodate the big machines.

Banks and Asero searched for financial help for years before finding success with the DWR. Federal storm emergency money is often tied to widespread, direct human impact, and some policies dictate that waterways be totally scoured. Other funding sources, however, advocate no interference with natural processes.

A total hands-off stance has its drawbacks

when wood debris completely restricts the flow of water, says Barbara Doll, water quality specialist for North Carolina Sea Grant.

"The water becomes stagnant, oxygen levels drop, and the habitat is very poor," she says. "There is a fine balance between beneficial and detrimental wood in streams and rivers. I think careful removal by hand is definitely a smart way to remove the bare minimum of material to allow passage for small boats."

Heavy equipment and dragging debris up muddy banks also can injure the vital riparian buffer. Streamside vegetation filters pollutants, stabilizes the soil and provides habitat for a variety of wildlife, says Charles Peterson, a professor at the University of North Carolina at Chapel Hill's Institute of Marine Sciences. Peterson has worked on Sea Grant water quality projects, and chairs the N.C. Environmental Management Commission's water quality committee.

He characterizes the White Oak effort as "a superb example" of a responsible and environmentally friendly method — worthy of repetition.

"This approach should be widely followed in the future, and even mandated by the government agencies that fund clean-up," he says.

Subject to review under the N.C. Environmental Policy Act, the Jones County

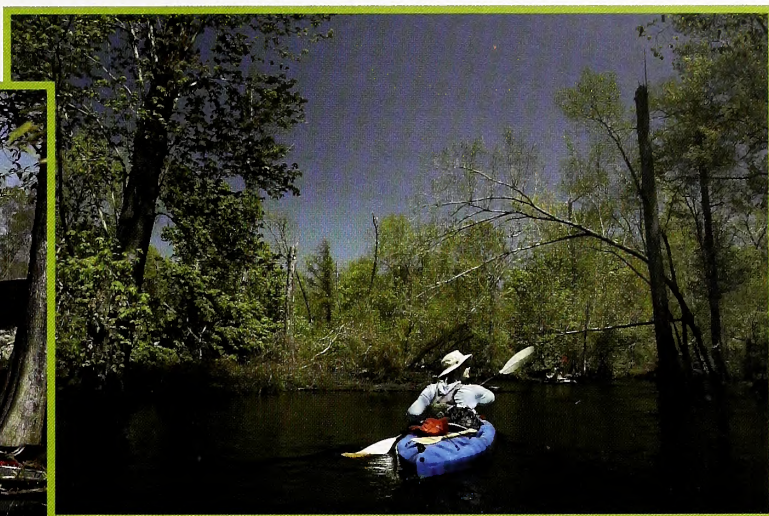
project followed guidelines recommended by the DWR. Accepted by the N.C. Dept. of Environment and Natural Resources for a class of activities, the guidelines minimize environmental impacts on riparian and aquatic habitats.

All requests for water resources development projects are thoroughly scrutinized, says Jeff Bruton, DWR environmental specialist. The WRC and other agencies concerned with protecting aquatic habitats review project proposals.

"Woody debris is a very important habitat component in streams and rivers, and we're careful to limit the amount that is removed," says Bruton, "so that there isn't a significant negative impact on stream ecosystems."

Motive, as well as method, helped the White Oak River project happen. The grant came through DWR's general navigation category, which funds up to 80 percent of commercial traffic improvement projects. Had the cleanup benefited recreation alone, the 25 percent funding level would have made the cost prohibitive to Jones County.

The proposal documented that campgrounds, outfitters, fishing and hunting enterprises and related businesses in Jones and surrounding counties rely on the White Oak's navigability for their livelihoods, Bruton says. The county satisfied the 20 percent local sponsor match with in-kind contributions — project



*LEFT: Michael Banks demonstrates a small winch powered by a chainsaw motor, used to swing cut wood out of the channel.
ABOVE: Connie Asero enjoys the sights along a section of the White Oak that was inaccessible before the project.*

supervision, management, administrative support and volunteer labor.

The White Oak River cleanup was the first small boat project funded under the general navigation category. The division has since backed a similar effort on the Newport River in Carteret County.

MINIMAL IMPACT, MAXIMUM RETURNS

The White Oak's own advocates also signed off on the plan. The White Oak River Watershed Advisory Board, formed in 1997, was the pilot watershed planning group for N.C. Cooperative Extension's Watershed Education for Communities and Local Officials (WECO). The program helps communities collaborate to address water quality issues. WECO project coordinator Patrick Beggs had previously worked for DWR and suggested the grant program.

Beggs and WECO's program manager Christy Perrin meet regularly with the White Oak board. Perrin assembled a panel of specialists from the state wildlife agency, North Carolina State University, Duke University Marine Laboratory, N.C. Division of Soil and Water Conservation and local experts on beaver dams and other issues. The panel assured the proposal satisfied water quality and conservation as well as recreational interests

represented by board members.

"It sounded like a good solution to the problem everyone could agree on," says Perrin.

Low impact also can mean lower costs. The White Oak averaged under \$3,000 per mile. The more disruptive "snag and drag" approach to remove all debris can cost twice as much.

Jones County has tried both approaches. County Manager Larry Meadows says 160 miles of county waterways were stripped of wood debris bank-to-bank in 1999.

"I like this program," he says of the DWR grant. "It shows there are other ways to keep a stream clean."

Jones County officials are hopeful the project will boost the number of paddlers seeking out the White Oak, and therefore the county's take in tourism dollars. In 2003, Jones ranked 99th out of 100 counties in tourism, according to state statistics.

"We've got the natural resources to do more," Meadows says.

Asero wants to put the newly navigable section on canoe and kayak trail maps so fellow paddlers can enjoy its uncommon sights, such as pitcher plants and diamond-back terrapins. She has counted at least 100 enormous cypresses — some reputed to be 1,000 years old.

"There's a reason to go," she says. "There's something to see."

Paddlers, though, are well aware that

nature could drop the curtain again on these wonders of the White Oak. The project spent \$53,000 of the \$70,000 in grants.

"We're not giving the rest back," Asero says, "until after the storm season this fall." □

For more information, go online to:

- The N.C. Division of Water Resources: www.ncwater.org
- Watershed Education for Communities and Local Officials: www.ces.ncsu.edu/depts/agecon/WECO
- N.C. Dept. of Environment and Natural Resources: www.enr.state.nc.us
- N.C. Wildlife Resources Commission: www.wildlife.state.nc.us
- N.C. Division of Water Quality, White Oak River Basinwide Water Quality Plan: <http://dem.ehm.state.nc.us/basinwide/>
- Stewards of the White Oak River Basin: www.whiteoakstewards.org
- Crystal Coast Canoe and Kayak Club: www.ccckc.org/
- N.C. Paddle Trails: www.ncsu.edu/paddletrails



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COASTAL CREATIVITY

PHOTO COURTESY OF J.L. SCOTT CENTER

Post-Storm Recovery

As we enter this holiday season, our thoughts are with folks still recovering from the devastating impacts of Hurricanes Katrina and Rita.

Though hundreds of miles away, residents of eastern North Carolina who coped with the effects of Hurricane Floyd feel a special “flood survivor” kinship with many along the Gulf Coast.

People along the Gulf continue to cope with the recovery — including Jeff Gearhart, formerly of the N.C. Division of Marine Fisheries and now working for the National Oceanic and Atmospheric Administration in Mississippi.

In an e-mail to colleagues after Katrina, he said he and his family were staying with friends. “My house was flooded with about 7 feet of water, and we lost everything.”

Sea Grant colleagues in Mississippi, Alabama, Louisiana and Texas are helping damaged communities recover — in many cases, like Jeff’s, they also are dealing with losses at their own homes and offices.

“Our aquarium in Biloxi, Miss., was directly in the path of Katrina’s fury and the results were catastrophic. Our facility, exhibits, and most of our contents are a total loss,” writes Sharon Walker, Mississippi-Alabama Sea Grant education director and administrator of the J.L. Scott Marine Education Center and Aquarium.

The loss also included the library for the National Marine Educators Association, but Sharon and her team see the storm as a teachable moment: “Even though our physical structures may now be a part of the ‘wind-wrecked and storm-surgéd’ landscape of coastal Mississippi, our marine education programs will continue as a part of this area’s marine rebirth.”

Spencer Rogers, North Carolina Sea Grant’s coastal erosion specialist, is helping analyze the storm’s impact. He spent several weeks evaluating damage from Mobile, Ala., to New Orleans as part of a team from the American



Photo courtesy J.L. Scott Center

ABOVE: Hurricane Katrina ravaged the J.L. Scott Marine Education Center and Aquarium in Biloxi, Miss.

Society of Civil Engineers — and he says the damage is unlike anything he has seen before.

While attending the University of North Carolina at Wilmington, Shonda Borden worked with Spencer in our Wilmington office. Now she is a Sea Grant extension specialist in Alabama.

“Seafood has been declared safe to eat.

Regular testing is done on fish, oysters, sediments and water, and will be done for some time,” she reports. “Those fishermen who still have boats and

can afford the gas will hopefully be able to recoup some of their losses.”

Sea Grant and the National Marine Fisheries Service have post-storm collaborations in the Gulf, including adding a Vietnamese-speaking extension agent to work with fishing communities. Sea Grant also will assist communities in planning how they will rebuild.

And Louisiana Sea Grant continues to work with Louisiana State University’s ongoing forum on coastal challenges. In January 2005 — months before Katrina hit — a panel of scientists gave a stark assessment of the current status of wetland loss, hurricane vulnerability, spatial data and coastal resource economics.

Sources for updates on recovery efforts include:

- National Sea Grant Coastal Hazards Theme Team: www.haznet.org/haz_hazards/hazard_katrina.htm
- Louisiana Sea Grant: www.laseagrant.org
- Mississippi-Alabama Sea Grant: www.masgc.org/
- J.L. Scott Marine Education Center: www.aquarium.usm.edu
- Texas Sea Grant: <http://texas-sea-grant.tamu.edu/>
- NOAA: www.noaa.gov

Recovery efforts will continue well into 2006. We want Gulf Coast residents to know that we have not forgotten them.

Katie Mosher, Managing Editor

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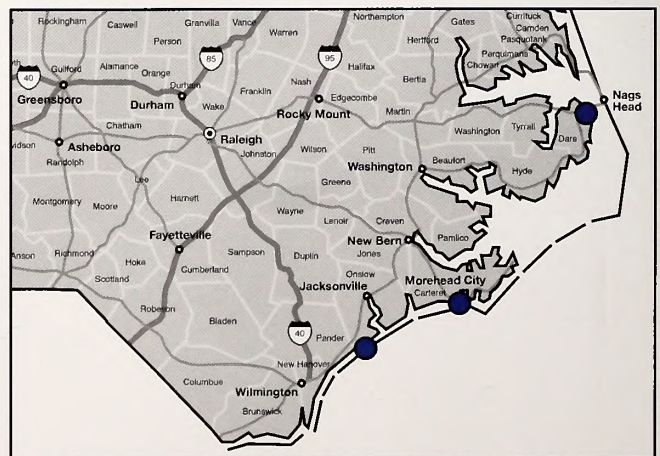
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North Carolina’s diverse coast offers countless interesting subjects. The large dots on the map indicate story settings in this issue — including Carteret and Dare counties, and Topsail Island.



Coastwatch

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Coastwatch

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The North Carolina Sea Grant College Program is a federal/state program that promotes stewardship of our coastal and marine resources through research, extension and education. It joined the National Sea Grant College Network in 1970 as an institutional program. Six years later, it was designated a Sea Grant College. Today, North Carolina Sea Grant supports research projects, a 15-member extension program and a communications staff. Ron Hodson is director. The program is funded by the U.S. Department of Commerce's National Oceanic and Atmospheric Administration and the state through the University of North Carolina.

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Cover photo of
Core Sound decorations by Scott Taylor.
Table of Contents photo of
storm damage by Erin Seiling.
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COASTAL TIDINGS

SEARCH BEGINS FOR NEW DIRECTOR Hodson to Retire in 2006

North Carolina Sea Grant Director Ronald G. Hodson will retire June 30, 2006. A search committee for a new director has been organized by University of North Carolina's Office of the President.

"We have strong research, outreach and education programs addressing important coastal issues," says

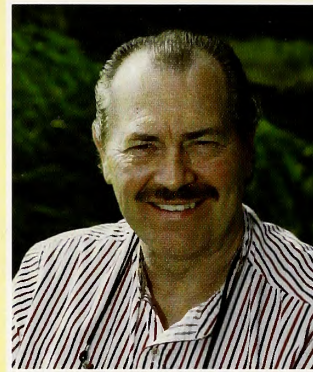
Hodson, who has served as Sea Grant director since 1997.

Hodson, who joined the North Carolina program in 1980 as associate director, is an international expert on pond aquaculture, and developed pond systems and breeding protocol for hybrid striped bass. Although he will retire from his university position, he expects to keep abreast of aquaculture topics and other coastal issues.

"By stepping down as director, I can focus my interest on a few specific topics in aquaculture, as well as marine science and policy," he says. "I also expect to spend quality time with my family — especially my grandchildren."

Sea Grant is a bridge between the university system's research abilities and the needs identified in coastal communities. Research and outreach topics include fisheries, water quality and habitat, coastal communities, coastal hazards, coastal business, marine education and seafood science.

A university-based, federal/state partnership, Sea Grant receives funding from the National Oceanic and Atmospheric Administration



Scott Taylor

Ron Hodson

through the National Sea Grant College Program, as well as an appropriation from the N.C. General Assembly. It is one of 32 programs in the national Sea Grant network.

In addition to core Sea Grant projects, North Carolina Sea Grant also administers the state-funded N.C. Fishery Resource Grant Program and the N.C. Blue Crab Research Program.

Russ Lea, UNC vice president for research, organized the search committee that includes representatives from various campuses, as well as Sea Grant's outreach partners.

Lea cites the North Carolina program as a leader in coastal and marine research and outreach. "North Carolina Sea Grant consistently receives high marks in national reviews, reflecting its strong roots in the universities and equally strong connections with stakeholders," he adds.

North Carolina Sea Grant's administrative headquarters is located at North Carolina State University in Raleigh. Coastal extension offices are located in Manteo, Morehead City and Wilmington.

The posting for the Sea Grant director's position is available online at www.ncseagrant.org (follow the news links), or www.northcarolina.edu (follow "Quick Links" to the Office of the President/Human Resources page). Applications should be addressed to Lea and sent electronically to kim_fogg@ncsu.edu. Application review began Nov. 1.

—K.M.

In the Next Issue of *Coastwatch*

As the North Carolina Aquaculture Development Conference approaches, Kathleen Angione examines aquaculture in eastern North Carolina. Also, readers will travel to Russia as Ann Green chronicles a visit by Sea Grant's Barry Nash to a seafood facility in the rural Voronezh region. And Erin Seiling introduces a new shrimp trap design being tested through the North Carolina Fishery Resource Grant program.

Gulf Fisheries Declared Disaster

After Hurricane Rita, the U.S. Department of Commerce issued a disaster declaration for the Gulf of Mexico fisheries in both Texas and Louisiana.

The storm caused major flooding and damage to fishing infrastructure.

A similar declaration was issued in the wake of Hurricane Katrina for waters from Pensacola, Fla., west to the Louisiana/Texas border.

There were significant economic effects of Hurricane Katrina on the fishing communities in the Gulf of Mexico, according to U.S.

Commerce Secretary Carlos Gutierrez. "Major commercial fisheries in the Gulf of Mexico include finfish, shrimp, and oysters,

with an estimated value of almost \$700 million per year," adds Gutierrez.

The National Oceanic & Atmospheric Administration (NOAA) will help states assess damage to the 15 major fishing ports and the 177 seafood processing facilities in Alabama, Mississippi and Louisiana. NOAA estimates there are 432 federally permitted fishing vessels in Alabama, 3,738 in Florida, 1,033 in Louisiana and 351 in Mississippi. Additional fishers hold state permits.

Federal relief funds are available to assess the impacts and restore the fisheries, prevent future damage and assist fishing communities' recovery efforts.

Working the Gulf states, NOAA also will continue to assess long-term impacts to the marine environment, says Bill Hogarth, director of NOAA's National Marine Fisheries Service.

For updates, go online to: www.noaa.gov.

Den Stern, UNC-Chapel Hill



David Moreau

WRRRI Names New Director

The N.C. Water Resources Research Institute (WRRRI) has named a new director with a familiar face — David Moreau, professor in the Department of City and Regional Planning at University of North Carolina at Chapel Hill.

Moreau served as director of WRRRI from 1983 to 1995. With his reappointment, Moreau replaces Kenneth Reckhow of Duke University's Nicholas School of the Environment.

WRRRI was established in 1965 as a unit of the University of North Carolina system. The program is authorized by the federal Water Resources Research Act of 1964 to administer and promote federal/state partnerships on water-related issues. WRRRI identifies and supports research to help solve water quality and water resources problems in North Carolina and the region.

At UNC-Chapel Hill, Moreau has taught courses in environmental quality assessment and water resources. His research interests are in the analysis, planning, financing and evaluation of water and related environmental programs.

Moreau also serves as chairman of the N.C. Environmental Management Commission. He is in his third six-year term on the panel.

Moreau received a doctorate in water resources from Harvard. He served as chair of the Department of City and Regional Planning from 1997 to 2002 and as senior associate dean of the College of Arts and Sciences at UNC-Chapel Hill from 1977 to 1983.

— E.S.

— E.S.

State Budget Affects Habitat Efforts

The new state budget includes funding — and challenges — for coastal habitat programs.

North Carolina's FerryMon — which places specialized equipment on state-operated ferries to collect water quality data on the Albemarle/Pamlico Estuarine (APE) system — received funding from the N.C. General Assembly.

Hans Paerl, of the University of North Carolina at Chapel Hill Institute of Marine Sciences in Morehead City, and Joseph Ramus, of the Duke Marine Lab in Beaufort, coordinate the FerryMon project.

FerryMon researchers gather data on estuarine responses to water quality changes in the APE system. Researchers hope to incorporate this data into North Carolina's Coastal Habitat Protection Plan (CHPP).

However, no new state money was designated for environmental agencies to inventory docks and piers in coastal North Carolina. Nor will there be targeted funding to develop a beach and inlet management plan.

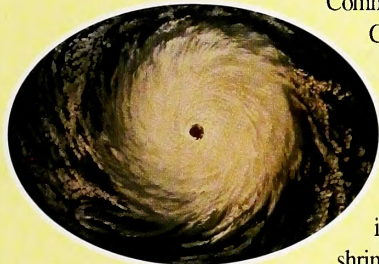
Gov. Mike Easley had requested money to establish a CHPP reserve fund, a portion of which would hire two new people to work on the docks and inlets projects. But, the final budget approved by the General Assembly did not include such monies.

Despite funding limitations, CHPP efforts continue. A committee is working through the Albemarle-Pamlico National Estuary Program to begin mapping seagrass beds and to determine ways to identify the health of estuary systems.

Another committee is meeting to discuss and identify Strategic Habitat Areas in coastal regions, a CHPP goal that was not included in the governor's budget request.

The CHPP implementation plan includes convening a stakeholder group to identify data gaps and funding needs for the beach and inlet plan and to begin a docks and piers inventory.

Visit the FerryMon Project on the Web at www.ferrymon.org. Learn more about North Carolina's CHPP at www.ncfisheries.net/habitat.



Rare Leatherbacks Hatch

After much anticipation, a nest of rare leatherback sea turtles hatched in late August on Bogue Banks. The nest was one of two leatherback nests laid in North Carolina this summer. Overwash prevented eggs in the second nest in Pine Knoll Shores from hatching.

Judy Wilgus, volunteer with the Emerald Isle Sea Turtle Protection Program, was walking the beach on an early August morning when she saw the first leatherback hatchlings emerging from the nest. Sea turtles normally emerge at night, when the sand is cooler, but these turtles waited until just after sunrise. With the sun in the east, some turtles headed away from the water rather than toward it.

Volunteers dug shallow trenches from the nest to

the water to help guide the turtles in the right direction. Volunteers also shaded the trench with beach umbrellas to keep the hatchlings cool.

In all, 36 hatchlings were recorded from the 97 eggs.

Leatherbacks are the world's largest sea turtle, and the hatchlings were noticeably different than loggerhead hatchlings commonly seen in North Carolina. Pam Minnick, coordinator of the Emerald Isle Sea Turtle Protection Program, estimates that the body of a leatherback hatchling is about a quarter-inch longer and wider than a loggerhead. And its flippers are about 50 percent longer. — E.S.

ABOVE: Leatherback turtle hatchlings head toward the sea.



Emilie Zuehr

Fisheries Fellow Studies Red Drum

Summer M. Burdick has come onboard as the 2005-2006 Marine Fisheries Fellow for North Carolina Sea Grant and the N.C. Division of Marine Fisheries (DMF).

As the new fellow, Burdick will assist DMF in the red drum tagging and monitoring program. Red drum is the state's designated saltwater fish.

Results and recommendations from this research will help DMF better understand the movements, survival and abundance of adult red



Scott Taylor

Summer Burdick

drum in North Carolina, and to assess the effectiveness of recent management measures.

Burdick received her bachelor's degree from Evergreen State College in Olympia, Wash., and a master's from North Carolina State University in Fisheries and Wildlife Science.

For more information about the 2006-07 Marine Fisheries Fellowship, visit the Sea Grant Web site: www.ncseagrant.org or contact Jeff Buckel at 252/222-6341. —A.G.

NOAA Offers New 'Encyclopedia of the Sanctuaries'

Have you ever wanted to learn more about sharks, anemones, spiny lobsters or killer whales but couldn't find one place with all the information? NOAA recently unveiled a free online resource that includes information about marine life from the nation's oceans and Great Lakes.

The new Web site includes video clips of species in their habitats, along with photos and important facts about each marine species that inhabits National Marine Sanctuaries. Facts about diet, habitat, distribution and status are

listed with each species. Users may search the site for a species or look at all the wildlife from a particular sanctuary.

The online encyclopedia was developed by NOAA, in partnership with the National Marine Sanctuary Foundation and The Ocean Channel, Inc. The National Marine Sanctuary Foundation supports 13 national marine sanctuaries and one coral reef ecosystem.

The Web site also offers schedules for upcoming events in all of the national marine sanctuaries, as well as information about management, educational programs and conservation efforts for each sanctuary.

To check out this site, visit the Web: www.sanctuaries.nos.noaa.gov.

—J.H.

Site Tracks Sea Turtles

Sea turtle nesting season may be over, but you can continue to follow turtles that visited North Carolina this summer.

To learn more about the biology and movements of sea turtles, North Carolina Aquariums researchers attached satellite transmitters to 14 cold-stunned juvenile loggerhead sea turtles to follow their movements after rehabilitation and release from the aquarium facilities.

Loggerhead sea turtles are the most common sea turtle seen in North Carolina. Sea turtles are reptiles and must stay in warm water to maintain their body temperature. Turtles who do not move into warm water often suffer from cold-stunning, which can cause the turtle to become sick or die.

The aquarium Web site provides information on loggerheads, a description of the aquarium project, photo gallery, maps tracking the turtles' movements and classroom activities for teachers.

Track the turtles at www.ncaquariums.com/turtletrails.

—E.S.

Summer Strandings Noted

Several whale and dolphin strandings were reported along the North Carolina coast during the summer of 2005.

Two whales — a pygmy whale and a dwarf sperm whale — stranded in Brunswick County in early August. In late August, 15 striped dolphins, an offshore species, beached themselves on North Topsail Beach, the second dolphin stranding in the state last summer.

When marine animals beach themselves, “usually there’s a reason and rescue is unlikely,” according to William McLellan, research associate with the marine mammal stranding program at the University of North Carolina at Wilmington.

Necropsies performed on the dolphins suggested degenerative tooth loss, an indication of old age. It did not appear that the dolphins had interacted with fishing gear or had been exposed to Navy SONAR in the days prior to the stranding, McLellan says. Because dolphins

swim in pods, mass strandings are common as older pod members swim ashore to die and are followed by other members of the pod.

Necropsies performed on stranded whales have contributed nearly half of what is currently known about the animals, McLellan adds.

Scientists examine the brain, heart, stomach and skeletons of the animals in labs around the country. This research provides answers to questions of anatomy and behavior of the species, as well as broader clues to the health of the marine environment.

Pygmy sperm whales are an important measure of environmental conditions because they consume squid, a food that humans also eat. Like humans, whales are at the top of the food chain, concentrating pollutants from the environment. By examining contaminants in the tissue of whales, researchers can track pollutants that could enter our food chain via seafood consumption, McLellan explains. — E.S.

USS Monitor Legend Debunked

USS Monitor researchers have debunked a 142-year-old legend about a “cat in the cannon.”

After spending most of August documenting the bore of two 11-inch cannons from the Civil War ironclad USS Monitor’s iconic gun turret, National Oceanic and Atmospheric Administration (NOAA) scientists and conservators from the Mariners’ Museum in Newport News, Va., did not find a trace of a cat in the barrels.

By extracting sediment from two cannons, conservators hoped to verify the legend that crew member Francis B. Butts shoved his coat and boot in one cannon and a cat in the other in 1885.

The ship sunk during a battle with the CSS Virginia in Hampton Roads. Discovered in 1973 off Cape Hatteras, the Monitor wreck is part of a National Marine Sanctuary managed by NOAA.

The cannon was removed from the Monitor’s gun turret in 2004 as part of the ongoing conservation process.

Artifacts from the Monitor, including the steam engine, propeller and revolving gun turret, are kept at the Mariners’ Museum. Currently, a new USS Monitor Center is under construction.

To find out more about the center, visit: www.monitorcenter.org.

—A.G.

RIGHT: Sediment was extracted from a cannon recovered from the USS Monitor.



Oyster Hatcheries Planned for Aquariums

The North Carolina Aquariums soon may help restock oysters in the state’s waters.

Through funding from the N.C. General Assembly, the three aquariums will begin planning oyster hatcheries.

With the new program, the aquarium’s mission will extend beyond education and coastal research to restoration.

During the last century, Eastern oyster populations have declined due to

overharvest, habitat loss, water pollution and disease.

Today, the N.C. Division of Marine Fisheries (DMF) lists oysters as a “species of concern.” Commercial landings in 2004 totaled about 69,500 bushels — a fraction of the record 1.8 million bushels landed in 1902.

Several efforts are underway to restore Eastern oysters, including an N.C. Fishery Resource Grant (FRG) project that collects discarded oyster shells from Carteret County restaurants and “recycles” them for use in the state’s nine oyster sanctuaries. The FRG project is designed to aid DMF’s existing oyster shell recycling efforts.

The oyster hatchery legislation directs the aquariums to consult with North Carolina Sea Grant, DMF, the University of North Carolina at Chapel Hill Institute of Marine Sciences and the University of North Carolina at Wilmington. —A.G.

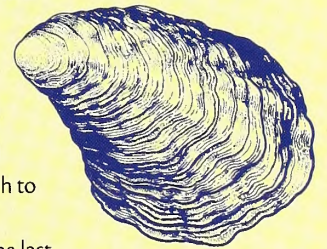


Illustration by John Norton



Strolling through Beaufort's Seafaring Past:
Holiday Walk
Features Historic Sites

By Ann Green • Photos by Scott Taylor

ABOVE: The historic Josiah Bell house is adorned with Victorian-style decorations for Beaufort's holiday walk.

It is the mid-1800s again in the historic Josiah Bell house in downtown Beaufort.

In a large yellow parlor with mauve woodwork, three women in Victorian-style dresses play the rich sound of "Oh Holy Night" on their harps.

In the adjoining parlor, three young girls, who look prim and proper in their long dresses, knit and embroider items near a tree trimmed with lace and German ornaments.

All of them are celebrating a Victorian-style Christmas, part of the Coastal Carolina Christmas walk held each year in Beaufort.



The walk showcases the Beaufort Historic site buildings, including a complex with a jail, courthouse and apothecary shop, as well as bed-and-breakfast establishments and other properties.

"Beaufort is the third oldest town in North Carolina," says Patricia Suggs, director of the Beaufort Historical Association. "The walk is a fun and easy way for people to experience Beaufort and its historic sites."

Tourists also can take a bus tour of the town during the holiday celebration.

Town's Seafaring Past

Beaufort-by-the-Sea, as the town is romantically called, has a captivating history that spans almost 300 years — from tales about the pirate Blackbeard to its use as a port in the 18th century for Spanish and French sailing ships.

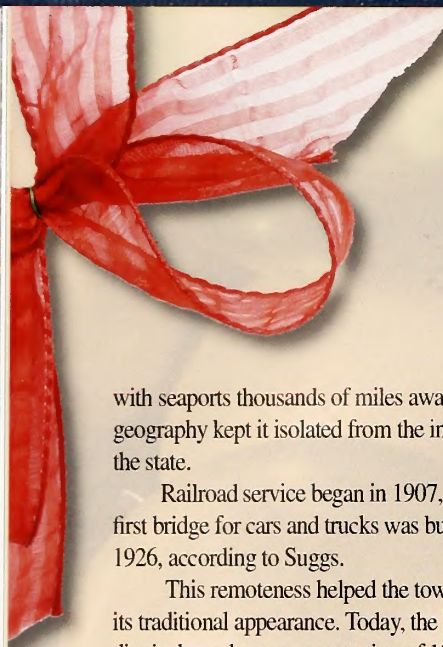
During the 1600s, Beaufort was called "Fish Town" because American Indians used the waters for their fishing grounds.

Named in honor of Henry Somerset, Duke of Beaufort, the town was incorporated in 1723 and has been the seat of Carteret County ever since.

Street names reflect the early development of the town: Ann Street for Queen Anne; Craven Street for the Earl of Craven; Turner Street for Robert Turner, owner of the land that was surveyed for the town; Pollock Street for Gov. Thomas Pollock; and Orange Street for William, Prince of Orange, who became William III of England.

By the late 18th century, Beaufort was an active seaport inhabited by sailors, pirates, privateers, fishers, soldiers and planters. While the town's busy sea trade connected Beaufort

Continued



with seaports thousands of miles away, its geography kept it isolated from the interior of the state.

Railroad service began in 1907, and the first bridge for cars and trucks was built in 1926, according to Suggs.

This remoteness helped the town retain its traditional appearance. Today, the historic district has a large concentration of 18th- and 19th-century homes.

Porches are a dominant feature — from traditional cottages to elaborate Queen Anne and Greek revival residences. For example, the Langdon House, which was built in 1733 by a shipbuilder and is now used as a bed and breakfast, has front porches on the first and second level.

Many homes also have a second story “widow’s walk” used by sea captains’ wives to watch their husbands sail in and out of the port.

“There has been a surge in preservation and renovation efforts not only at the historic site but in the whole town,” says Suggs.

Bus Tour

The holiday tour begins with a ride around the historic district in a red 1948 English double-decker bus.

“It is really blowing today,” says the tour guide Carol Willis, dressed in a white cap, long maroon dress and gray cape. “Since there is no power steering on the bus, the driver has to use a lot of muscle.”

As the bus turns from Turner Street onto Front Street, she points out the N.C. Maritime Museum and the Watercraft Center across from it on Beaufort Sound.

Next to the museum is Cedars-by-the-Sea, now used as an inn. The home was built around 1768 by William Borden, the son of a Rhode Island shipwright and gracious host to visiting sea captains.

Although Borden was an important figure in the town, he never held public office because he was a Quaker and could not take an oath, Willis adds with a chuckle.

Next to the inn is the Easton home that was built in 1771 and still has its original ballast stone foundation.

“The eastern North Carolina-style home was used as a prison and hospital during the Civil War,” says Willis. “Researchers dug up a cannonball from the home.”



CLOCKWISE FROM TOP LEFT: Visitors can tour downtown Beaufort in a 1948 English double-decker bus. ♦ Young girls sit at a table in the simple kitchen at the Leffers House. ♦ Apothecary guide Jackie Hubbard shows how tonics were made in past centuries. ♦ The front porches on the Langdon House feature festive greenery. ♦ Furniture in the living room of the Leffers House reflects the late 1700s.

Sea Captain's Home

One of the street's famous residences is the Sloo house, where a ship captain lived with his young daughter who later died at sea after she contracted yellow fever. To preserve the girl's body and bring it home, she was placed in a rum keg and later buried in the Old Burying Ground. To continue honoring the 13-year-old, people today put toys on her grave.

Near the end of Front Street is the Duncan home that was built in a Bahamian-style, with double porches, turned columns

and three chimneys.

“It is on the lowest ground on Front Street,” says Willis. “For many years, the owners opened the front door when a storm came and let water run through the house,” she says.

As the bus turns onto the corner of Ann and Orange streets, the guide points out the Hatsell House with its two bright red doors.

Emeline Pigott, a Confederate spy and nurse for wounded troops during the Civil War, lived in the home, according to Willis. When collecting intelligence information for the



Confederates, Pigott stored the items in big pockets under her hoop skirts, Willis says.

“When she was arrested, the Union soldiers found 30 pounds of contraband under her skirts,” she adds.



people move furniture,” she adds. “Capt. John Hill first built the home on Portsmouth Island where it stood for 100 years. Then the home was loaded on a barge and moved to Beaufort for another 100 years before it was moved to its present location.”

As the bus heads back toward Ann Street, Willis points out a home surrounded by a quaint white picket fence that may have a connection to an early livestock law.

“Pigs found outside the fence could be slaughtered,” Willis says, adding that half of the money had to be given to the church to feed the hungry.

The bus slows down as it nears St. Paul’s Episcopal Church. “This is considered one of the 10 architecturally perfect buildings in the state,” says Willis. “It was constructed by shipbuilders, and the inside is like the hull of a ship.”

Haunted Cemetery

Not far from St. Paul’s is the Pirus Chapel, the oldest church in Beaufort. The AME Zion congregation now owns the chapel.

In front of the chapel is the Old Burying Ground — one of the oldest and most historic cemeteries in the

state, now shaded with majestic oaks. Legends abound about those who are buried here.

“During the twilight hours, some say they have seen a cat jump out from a grave,” says Willis. “Some say it is Otway Burns, a hero who fought against the British during the War of 1812.”

After leaving the cemetery, the bus continues down Ann Street.

“When Beaufort was laid out, Queen Anne was on the throne,” she adds. “They planted apple trees on both sides of the street. After many hurricanes, only one or two apple trees are left.”

At the end of Ann Street, the bus turns onto a lane where the Hammock House stands on the



“They took her to New Bern to prison.”

The tour continues down Ann to Sunset Street and the John Hill house. Willis says that many homes on this and other streets were moved from other locations.

“People here moved houses like other

Continued

highest point of land in Beaufort. Built in 1709 for a group of sea captains, it also is the town's oldest home and one of the most intriguing because of its association with the famed pirate Blackbeard.

"Blackbeard lived here and brought one of his 14 brides," says Willis. "The bride was a teenager. When Blackbeard left to go on a trip, she was isolated and lonely and had a party where she found a boyfriend."

Later, Blackbeard came back and challenged the boyfriend to a duel, she adds. "That is why there are still blood stains on the stairs."

One legend has it that the home's residents often are awakened by the sound of women crying. "It is supposed to be a haunted house," Willis adds.

One of the last stops on the trip is the Blare House, a gothic-style home on Marsh Street. "The home has an octagonal-shaped back room," she says. It reportedly sold for a cow and half-a-calf in the 18th century.

Walking Tour

After the bus returns to Turner Street, the walking tour begins at the Beaufort Historic Site — which includes the Carteret County Courthouse of 1796, the oldest wood-framed courthouse in North Carolina.

The Church of England originally used the small-framed building as a meeting place, according to Daniel W. Barefoot's *Touring the Backroads of North Carolina's Lower Coast*. "During the War of 1812, the courthouse quartered American troops from Beaufort, Lenior and Craven counties," the author says.

Today, the courthouse's interior is painted Spanish brown to match the outside of the building. Trials were held at the courthouse until the mid-1800s, when it became a home, says the guide. In 1977, the building was moved from the square to its current site.

Next to the courthouse is a two-story jail that was constructed in 1836. The building has several cells and a jailkeeper's quarters, as well as some unique artifacts. An upstairs holding room contains only one object: a rope last used for hanging a prisoner in 1875.



Another interesting stop is the apothecary. Authentic medical instruments, bottles and prescriptions are on display — from Lydia Pinkham's vegetable tonic to an oil of youth "that won't make you young but make you feel young."

"The oil of youth was one of the favorites," the tour guide says. "It sold for 50 cents a bottle. What a deal!"

In the back of the apothecary is a doctor's office constructed in 1825 and filled with a variety of artifacts from 1936 or earlier — including an old stethoscope and a Red Cross flag from World War I.

"Dr. George Davis practiced here in the late 1800s to early 1900s," the guide says.

Across Turner Street, the Mattie King Davis Art Gallery is decorated with colorful wreaths. The building, which was constructed in 1732, was originally called the Rustell home and moved to its present location in the early 1970s.

Nearby is the Leffers Cottage, a good example of "story and a jump" or a one-and-a-half story house.

Built by schoolmaster and clerk Samuel Leffers, the house is decorated with simple early American furnishings — from a spinning wheel to handmade rope bed. The



CLOCKWISE FROM TOP LEFT: Women play the harp in the parlor at the Josiah Bell house. ♦ The Old Burying Ground is a popular stop for visitors. ♦ The sanctuary of St. Paul's Episcopal Church is shaped like the inverted hull of a ship.



living room mantel is adorned with a wreath made of turkey feathers.

Leffers migrated from Long Island to Beaufort to teach school in the 18th century. "In those days, school teachers were required to be sober and discreet, and be a quality man," says the tour guide.

After the Revolutionary War, the militia was disbanded in Beaufort. However, British warships did not know the war was over and came into the harbor. The British used Leffers' schoolhouse for a meeting place, but burned it before leaving town.

It's a short walk down Turner Street to Ann Street, where the white-framed Ann Street Methodist Church is open for tours.

Inside, there is a large Christmas tree and a number of stained glass windows that reflect Beaufort's maritime history, including anchors and nautical directional signs.

By the end of the tour, visitors realize that downtown Beaufort streets, waterfront and surroundings have changed little since the early days.

"No matter how many times you've been to Beaufort, there is always something different to see," says Suggs. □

The 2005 Carolina Walking Tour will be held from 2 to 4:30 p.m. Dec. 10 in Beaufort. For a complete list of tour stops, call 800/575-7483, 252/728-522; e-mail: beauforthistoricsite@earthlink.net or visit the Web: www.beauforthistoricsite.org.



Core Sound Trees Offer Coastal Flair

What goes better with a Christmas tree than old St. Nick?

Perhaps a different, younger "Nick" with his own special Christmas creation.

Neal "Nick" Harvey of Davis has designed a truly unique holiday decoration — the Core Sound Christmas tree.

A former commercial fisherman, Harvey left the unpredictable seafood market in the early 1980s in search of more dependable income. He started up Harvey and Sons Net and Twine, selling nets and trawls to locals still in the fishing business.

When the market for nets and trawls declined, Harvey started marketing crab pots.

Within a few short years, the demand for crab pots declined as well, and Harvey again was searching for new ways to generate income.

The crab pots the Harveys made, and still make today, came in the fashionable colors that crabbers like to use — from bright orange to the "old standard" green. The scraps of green wire were the inspiration for Harvey's next business venture — the Core Sound Tree.

Cutting the green mesh wire into triangles, Harvey fashioned a tree-shaped decoration suitable for outdoor use. Stringing the tree with brilliantly colored lights, a new holiday decoration was born that the locals lovingly refer to as the "crab pot" Christmas tree.

The pre-lit trees have taken off in popularity and now decorate homes, yards and docks from Long Island to Florida.

Storing the trees is easy. Simply fold the tree flat without removing the lights.

The crab pot is mesh, designed to withstand submersion in salt water for up to five years, so the trees hold up well to typical outdoor use.

Although most people choose to display their trees outside, the trees may also be decorated and enjoyed indoors. Down East, people have decorated their trees with shells, colorful floats and pieces of net. Garland and ornaments adorn many others. The folding design of the tree makes it a versatile display piece — it can be opened inside a corner, laid flat against a wall, or wrapped around corners and doors.

The trees are available in heights from 2 to 6 feet. Custom colors also are available to suit every holiday need. Orange trees brighten fall displays; red, white and blue trees shine patriotically; and pink and blue trees announce the birth of a child.

Prices and ordering information can be found online at www.harveyandsons.com or order by phone at 800/428-7549. □

— E.S.



Carteret Catch

New Marketing
Project Promotes
Local Seafood

by Ann Green

It is a bone-chilling morning in the historic fishing port of Gloucester, Mass. As North Carolina seafood dealer Bradley Styron gets out of a truck, he steps through fresh piles of snow.

Styron heads up the steps into Whole Foods' Pigeon Cove seafood processing facility on the Gloucester waterfront.

"We are here to try to sharpen our marketing skills," says Styron, owner of Quality Seafood in Cedar Island. Domestic commercial fishers and seafood dealers are being affected by international markets, he adds. "Fuel prices are killing us."

Inside, Steve Parkes of Whole Foods gives Styron and others from the Carteret County fishing community an overview of how the company markets high quality seafood.

"We don't waiver on quality here," says Parkes, Pigeon Cove facility team leader. "We deal with 30 fishermen from this area. They unload here at Pigeon Cove. We buy by sight and smell and knowledge of how long the boat has been out."

The seafood goes directly to Whole Foods stores across the East Coast, including North Carolina.

Continued



Scott Taylor

The visit to the state-of-the-art seafood facility is one stop on an East Coast trip sponsored by a Rural Community College Initiative (RCCI) grant awarded to Carteret Community College. The project promotes local seafood through community and business partnerships.

In October, RCCI community volunteers unveiled the seafood branding campaign — “Carteret Catch: Select N.C. Seafood from the Fishermen of Carteret County” — at the 2005 N.C. Seafood Festival in Morehead City. The campaign focuses on seafood caught by commercial fishers, processed by seafood dealers and served by select restaurants, all from Carteret County.

“We are trying to find ways to build traceable chains from catch to plates, so customers are sure of what they are getting,” says John O’Sullivan, the RCCI team coach.

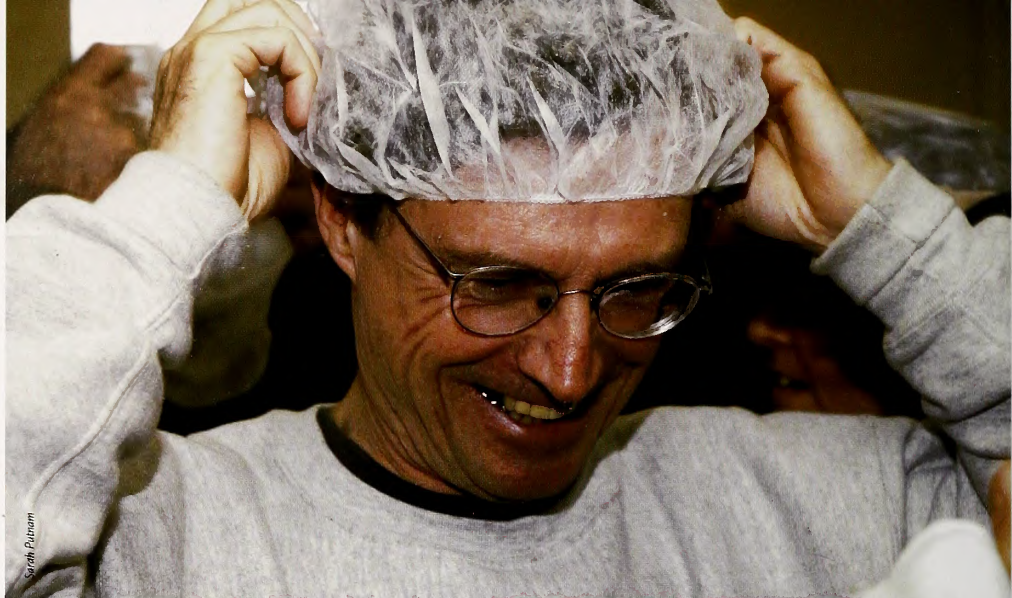
The group also wants to increase demand for local seafood and boost revenues to local fishers, seafood dealers and restaurants, according to North Carolina Sea Grant seafood technology specialist Barry Nash, who is helping to develop the marketing program.

Funded by the Ford Foundation and implemented through the Southern Rural Development Center, RCCI is a collaborative effort between Carteret Community College, North Carolina Sea Grant, North Carolina A&T State University, North Carolina State University, N.C. Cooperative Extension, and the National Oceanic & Atmospheric Administration.

EAST COAST TRIP

Last winter, the RCCI group took the week-long trip to Whole Foods and other East Coast markets and facilities to learn how to market products in different ways, according to O’Sullivan, an NC A&T farm management and marketing specialist. “Whole Foods is the most successful retail grocery of the natural foods approach,” he adds.

The company participates in the “fish for future” program that promotes sustainable seafood caught by fishers who follow practices that allow the fish population to grow and thrive rather than be depleted, adds O’Sullivan.



TOP: John O’Sullivan puts on a net before touring the Whole Foods’ Pigeon Cove facility in Massachusetts. BOTTOM: Bradley Styron and other volunteers from Carteret County watch as a worker prepares fish fillets.

“I was impressed how much customers value local seafood,” says Sandra Gaskill of Harkers Island, who works the water along with her husband, Elbert Gaskill. “You just need the right equipment, transportation and marketing of the seafood.”

To learn more about the processing plant and its marketing practices, the group toured the Pigeon Cove facility.

After putting nets on their hair, they crowded into a large processing room where a man was filleting fresh pieces of flounder. Then they moved to another area where a worker places flounder fillets on a conveyor belt that flows through a skinning machine.

Nearby, a woman checked fish for

parasites and bruises under a special light.

“Fish has to look good and have eye appeal for customers to buy it,” says Parkes.

While in Gloucester, the group also visited the “Lady of the Sea” memorial — “dedicated to the wives, mothers, daughters and sisters of Gloucester Fishermen,” according to the inscription.

“This is touching,” says Sandra Gaskill. “Fishing is a hard way of life, and the women deserve a memorial.”

During the trip, the group also went by bus to markets and fishing cooperatives along the East Coast — from the famed Fulton Fish Market in New York to the waterfront at Stonington, Conn.



TOP: The Pigeon Cove facility sits on the waterfront in Gloucester, Mass., where fishing captains bring in the daily catch. BOTTOM: Flounder fillets are sorted into trays prior to packaging.

“We got a lot out of talking with fishermen in Stonington,” says Pam Morris, a RCCI representative and wife of commercial fisherman Herbert Morris. “The town supports the fishing industry by leasing the harbor to the commercial fishing industry and seafood packing houses.”

In exchange for using the harbor, Morris says the fishing captains and seafood dealers helped pay for the dock, while the town is responsible for repairs. The town also uses the commercial fleet for heritage tourism. At the dock, workers answer questions from tourists while mending nets or doing other chores.

“Everybody in the community is benefiting in a positive way,” she adds.

AGRICULTURAL MODEL

To brand Carteret County seafood, O’Sullivan says the marketing group is following the model used by the N.C. Department of Agriculture & Consumer Services for niche marketing.

To boost sales of top-quality agricultural and seafood products grown, processed or manufactured in the state, the department has a number of branding programs. The “Freshness from North Carolina Waters” (FFNCW) program requires that participants use North Carolina seafood when it is available and in-season.

“Our program is generic and focuses on all North Carolina seafood,” says William

Small, seafood marketing specialist for the N.C. Dept. of Agriculture & Consumer Services. “It helps fishermen and processors market their products by letting consumers know the products they are buying are top quality and locally harvested.”

To compete with foreign markets, the department also has begun radio and magazine ads encouraging consumers to buy shrimp caught in North Carolina.

“We are trying to emphasize that the state’s shrimp are fresh and have a firmer flesh that tastes better than imported shrimp,” says Small. “We also are working closely with retail buyers, such as Lowes Foods, to purchase North Carolina shrimp in season.”

In addition, some North Carolina chefs are developing native shrimp recipes that will be sent to food editors and home economists.

The goal is to create a positive public image about all North Carolina seafood and aquaculture products through the campaign, adds Small.

Recent market research conducted by North Carolina Sea Grant and N.C. Cooperative Extension indicates that the public is more inclined to purchase local seafood over foreign imports, when given a choice.

And a survey taken at the recent Seafood Festival agrees. Of the 175 respondents, 84 percent expected seafood purchased at the coast to be locally caught; 94 percent expected seafood in local restaurants to be locally caught; and 92 percent said they were more likely to purchase seafood that is certified as locally caught.

“Consumers are willing to pay a premium price for seafood that comes from a specific locale and is obtained from fishermen who use sustainable practices,” Nash says.

In addition to the public’s increased awareness of the health benefits of seafood, the threat of bioterrorism to the national food supply also has contributed to rising interest in local seafood.

“Most seafood sold in the United States is imported — and people are starting to review federally mandated package labels to learn the origin of their seafood,” Nash adds.

Continued

DOWN EAST FISHING HERITAGE

For generations, many families in Carteret County have made a living from working the local waters — from clamming, shrimping and fishing in Core and Pamlico sounds to beach seining for mullet off Bogue Banks.

But in recent years, Carteret County commercial fishers have struggled to remain viable in a fiercely competitive world market.

The local fishing communities, including Harkers Island, Atlantic, Davis and Cedar Island, are so tiny that most natives know each other on a first-name basis.

Many fish alone or in small groups. A few work for large commercial fleets that run out of Beaufort and Morehead City.

In the last decade, the number of trips by commercial fishers in Carteret County has declined from more than 54,000 in 1994 to around 30,000 in 2004, according to the N.C. Division of Marine Fisheries.

The value of catch also has dropped from more than 96.5 million pounds worth more than \$20.6 million in 2004 — to less than 61 million pounds valued at about \$19 million last year.

“We have been shrimping and clamming for 35 years, and it has changed drastically in recent years,” says Leroy Goodwin of Cedar Island. “There is not as much to catch, and prices are not as good as they used to be.”

Gaskill says she and her husband, Elbert, are the fourth generation of watermen to fish in waters around Carteret County. “We have to make a living and do it all

— shrimping, scalloping, clamming, oystering and fishing,” she adds. “During the year, we jump from one fishery to the next.”

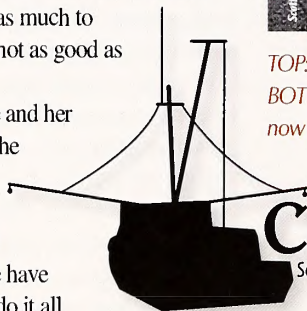
More and more commercial fishers in Carteret County are leaving the industry.

Five years ago, George Goodwin of Cedar Island gave up fishing to work for the N.C. Ferry Division.

“In 2000, my husband sold his shrimp trawler,” explains his wife, Claudia Goodwin,



TOP: Large pieces of fish from all over the world are cleaned and processed at the Whole Foods facility. BOTTOM: Harkers Island in Carteret County, N.C., maintains its fishing traditions. BELOW: Restaurants are now featuring the Carteret Catch logo. RIGHT: Surveys show consumers prefer domestic seafood.



CarteretCatch[™]
Select NC Seafood from the Fishermen of Carteret County

an Atlantic middle school teacher. “He couldn’t keep up because of rising costs.”

PROJECT INITIATION

The seafood project began when Carteret Community College received a RCCI grant that helps rural communities become competitive in the economy by forging partnerships.

After several brainstorming sessions with a variety of community representatives,

the group decided to focus on creating a brand image for Carteret County seafood.

“In Carteret County, the heritage and value of the seafood industry is important,” says Joseph Barwick, president of Carteret Community College. “RCCI will help strengthen the community, and what is good for the community benefits the college.”

The initial two-year RCCI grant ended in the spring of 2005. The project is now funded by a second RCCI grant, and is partially supported by North Carolina Sea Grant.

“We are excited about the project because it will do something positive for the fishing

Commercial Fishing Past, Present and Future

by Travis Adams

community,” says Morris, educator at the Core Sound Waterfowl Museum in Harkers Island.

As part of the initiative, RCCI volunteers met with county restaurant owners to discuss quality standards for seafood.

“My customers see boats outside the restaurant and want local catch,” says Dan Hatch, chef of Key West Seafood Co. restaurant in Morehead City. “There is so much local seafood — from tuna and sea bass to red snapper and mahi mahi.”

In addition to promoting local seafood, the group is trying to educate consumers about environmental rules and food safety regulations affecting the seafood industry.

In developing niche markets for Carteret County seafood, O’Sullivan says that seafood processors might have to adopt new small-scale technology and develop sound business plans.

“Our long-term goal is for the fishing communities to develop a plan that is market-driven and focuses on high quality, local-branded seafood,” he says. “We want to deliver products that emphasize the region’s core values to customers in the county and in commercial outlets in the state’s metropolitan areas.” ■

To find out more about the Carteret Catch project, visit the Web: www.carteretcatch.com.

Commercial fishing has always been the life blood of the Down East communities of Sea Level, Atlantic, Stacy and Cedar Island. It has been the communities’ singular industry since the beginning. This tradition runs deep in the blood of us all.

Sadly though, this industry is dying. For one reason or another it is becoming harder and harder to harvest these essential products. Basically, even though commercial fishing is second nature to most people, it is becoming nearly impossible to live as a commercial fisherman.

My Great-Grandfather was a fisherman and boatbuilder for some time. Pictures I have seen of him show him with great catches. This was no more than fifty years ago. I have heard stories from my dad of nets so full of shrimp that the wench strained to haul them in. Personally, I have seen skiffs with so many fish in them, it was impossible to walk without finding yourself crushing one. This couldn’t have been more than ten years ago.

Now, though, people struggle to make a living. Shrimp tickets from 2002 show my Dad rarely caught over 100 pounds of shrimp a night. With prices dropping sometimes as low as 75 cents a pound, it was difficult to survive. Fifteen years ago an average night would have blown that out of the water.

Most people have had to move into new lines of work. My Dad was hired by the National Park Service shortly after Hurricane Isabel to help with clean up and reconstruction. This is lucky for us, because unlike so many others, my Dad found a job in an area in which he was qualified. For many, though, fishing is all they know how to do. Though intelligent, they never attended any sort of college, and many skipped high school, so it would be difficult for them to find new lines of work.

Another problem facing the fishermen is competition. Tourism is probably our second biggest industry, and when tourists arrive, they come with expectations of local and fresh seafood. However, most restaurants and stores sell seafood from other countries or from other parts of this country.

Tourists know no better, so they eat it, and go home happy and content in the fact that they ate some fresh seafood from the coast of North Carolina. While this is good for the tourism industry, it hurts the commercial fishing industry tremendously. Hopefully in the future, it will become more evident as to what seafood is harvested in Carteret County and what is not.

Throughout the entire paper, I’ve said how the fishing industry is becoming unsuitable for making a living, but many people still do it, and do it passionately. These people will probably be fishermen til the end of their days. To me, there is little better than spending time on the water. One day perhaps the industry will become revitalized, perhaps the waters of Core Sound have just been overfished, and one day sea life will again flourish at it once did 50 years ago. ■

Written by Travis Adams while he was in the eighth grade at Atlantic School. He is now a freshman at East Carteret High School.



TRACKING HURRICANE OPHELIA THROUGH NORTH CAROLINA

Compiled by Erin Seiling

Hurricane Ophelia lingered for nearly a week off the North Carolina coast — dumping more than a foot of rain and causing severe erosion and property damage in some areas. Ophelia clearly illustrates that even weak tropical systems are a force to be taken seriously.

CLOCKWISE FROM BELOW: Flooding in Beaufort made Front Street look more like a Venetian canal. • Progress Energy employees cleared fallen trees to restore power. • Once the flood waters receded, this boat was left high and dry along N.C. 24 in Swansboro. • A sand fence in the Wrightsville Beach area was damaged by erosion during the storm. The fence originally sat on top of the dune line.

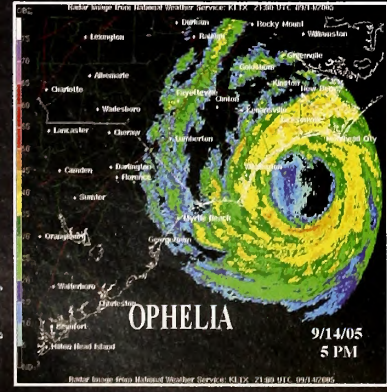
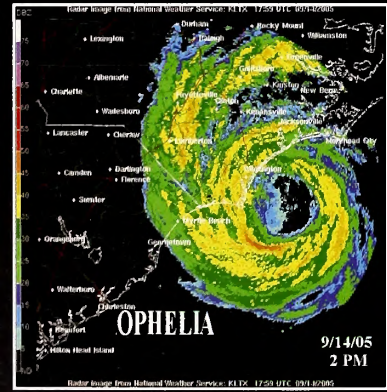
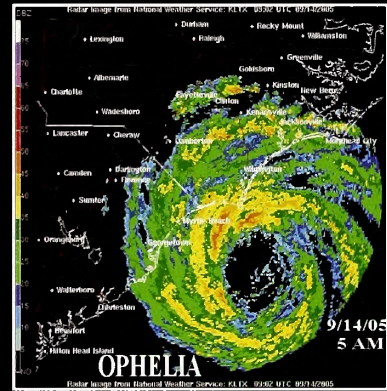
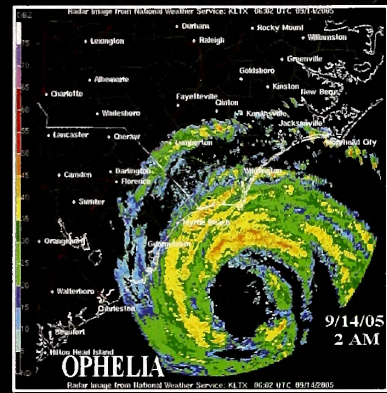
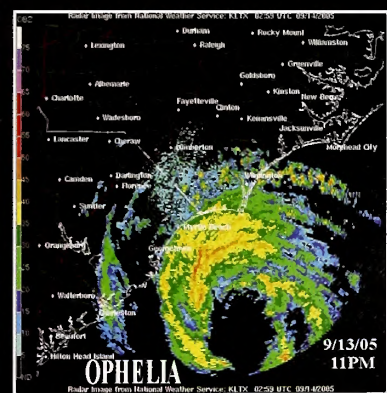


The slow-moving nature of Hurricane Ophelia caused more damage than a typical Category 1 storm. Portions of the North Carolina oceanfront coastline got pounded for a week with weather typical of winter storms.

The long-term annual erosion rate along most of the N.C. coast is quite low — approximately 2 feet per year — however, this leads to a false sense of security because it is the short-term events that can cause major loss of sand resulting in tens of feet of erosion in a matter of days or even hours. The Division of Coastal Management currently is assembling the data needed to analyze the short-term annual erosion rate and will present its findings to the Coastal Resources Commission for policy consideration.

Remember, hurricane season in the Atlantic Basin is not over until November 30th and two more storms have been predicted.

— Jeff Warren, coastal hazards analyst,
N.C. Division of Coastal Management



T

he Town of Topsail Beach suffered a tremendous amount of dune escarpment and loss of sand on our beaches. We had nine separate breaches in the dunes. Fortunately, the breaches occurred in the latter phases of the storm, which minimized flooding behind the dunes. Most of the dune walkovers, both private and public, were either destroyed or experienced heavy damage.

— Jim Carter, Topsail Beach town manager



Paul Stephey/Wilmington Star-News



Erin Saling

T

he legacy of Ophelia is going to be what appears to be record-setting soundside flooding. For a week prior to the storm making landfall, winds pushed water out of the Pamlico Sound towards the Banks. The full moon was the Saturday after Ophelia and we knew the worst-case scenario would be if the storm moved slowly, then hit at high tide — and that's what happened.

Considering that it was a slow storm that hit us at the worst possible time, the beaches took a very small hit. We had some spotty dune erosion. But the day after the storm you couldn't tell a hurricane had been there from looking at the beaches. We did lose some acreage on the sound side, which is hard to recover once it is lost because there is no sediment supply coming in to build it back up. Given the duration of the storm, overall we fared very well.

— Gregory Rudolph,

Carteret County shoreline protection specialist

Continued



Scott Taylor



Mark Capriano/Wilmington Star-News

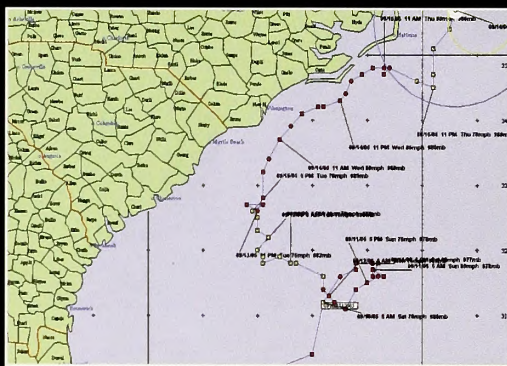


H

urricane Ophelia was nothing like Isabel. It was more on the scale of Alex. We had sand on N.C. 12 in several areas — Ocracoke, Hatteras Village, north of Buxton, north of Rodanthe and south of the Oregon Inlet bridge. In areas north of Buxton, we had three to four inches of sand on the roadway. Most of the sand was wind-blown. Very few areas experienced overwash from the ocean back over the dunes. The main issue we dealt with was the high winds that lasted so long and blew the sand off the beaches and onto the roads.

— **Allen Russell, county maintenance engineer for Dare and Currituck counties, N.C. Department of Transportation**

LEFT: The Salter Path community on Bogue Banks took a hard hit. Many homes and businesses along the sound suffered severe damage.



HURRICANE OPHELIA TIMELINE

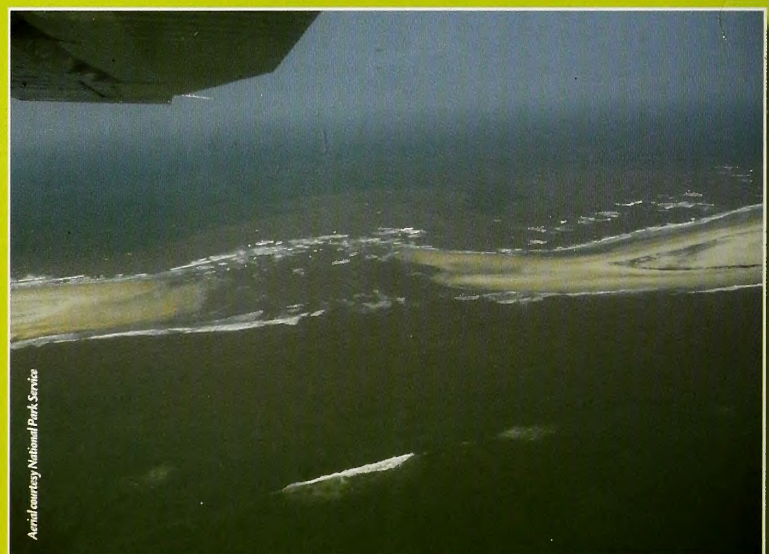
- Sept. 7, 2005 – Tropical Storm Ophelia named when located 115 miles east-southeast of Cape Canaveral, Fla.
- Sept. 8, 2005 – Briefly upgraded to hurricane strength before losing power.
- Sept. 9, 2005 – Storm begins northeastward motion.
- Sept. 11, 2005 – Ophelia stalls about 235 miles south of Cape Hatteras, N.C.
- Sept. 12-13, 2005 – Storm makes slow loop.
- Sept. 13, 2005 – Storm becomes hurricane again.
- Sept. 14, 2005 – Ophelia's eyewall brushes the North Carolina coast near the Cape Fear River.
- Sept. 15, 2005 – The storm's center passes south of Cape Lookout and Cape Hatteras before leaving the coast of North Carolina behind.

Although Cape Lookout National Seashore did not experience the level of damage that it did from Hurricane Isabel in 2003, Ophelia's slow passage over the length of the seashore exerted tremendous force on the barrier islands.

A damage assessment overflight conducted by the park on Friday, Sept. 16 revealed that Ophelia's fury cut a channel across Cape Lookout Point, created a new inlet 1.5 miles south of New Drum Inlet, and significantly widened Old Drum Inlet which had been almost closed. Employees of Cape Lookout National Seashore have nicknamed the new inlet "Puppy Drum Inlet." The new inlet will be allowed to close, or remain open naturally. Coastal managers are watching to see how the Old Drum Inlet and Puppy Drum Inlet interact with each other.

— **Wouter Ketel, National Park Service, Cape Lookout National Seashore**

RIGHT: A new inlet, nicknamed "Puppy Drum," was cut south of Old Drum Inlet on Cape Lookout National Seashore.



Seahorse Round-Up

By Jamie Harris

Seahorses were once magical creatures of myths and folklore, pulling the conch chariots of Neptune, Poseidon and Triton.

Today, seahorses are so elusive that even experts have many questions.

Associated more with tropical waters, seahorses also are found in the temperate waters of North Carolina, often transported north on sargassum during storms from the Gulf of Mexico and the Caribbean.

Total worldwide seahorse population is unknown, but experts estimate about 40 million of the world's seahorses are taken from the wild each year — sold as souvenir trinkets or for Traditional Chinese Medicine (TCM).

“That’s a huge problem in the Caribbean,” says Jeff Smith, curator of aquatics and living collections at the North Carolina Museum of Natural Sciences. The unregulated harvest of seahorses makes it difficult for researchers to assess seahorse populations, he explains.

But in Smith’s exhibit at the Raleigh museum, seahorses float through the water effortlessly with their hummingbird-like fluttering fins. Several move up and down the water column with as many as 35 flutters per second.

Camouflaged in the seagrass replicas, seahorses wrap their prehensile tails tightly around the blades to resist the current. Scientists refer to a seahorse tail as “prehensile” because it is used like a hand, helping them to hold onto eelgrass when searching for food or onto each other when mating.

Continued

LEFT: A male seahorse has a pouch, like a marsupial, for protecting its young.

NATURALIST'S NOTEBOOK

When museum visitors approach the glass, a female flutters close — as if curious about the onlooker. The seahorse turns to the side. One eye robotically turns toward the glass while the other eye stays focused on the opposite side of the aquarium.

“Whenever I am on the second floor, the female will come up to the front of the tank and look at me — they have very good vision and emotional personalities,” says Smith.

THE HIPPOCAMPUS HERD

Seahorses are unlike any other fish in the ocean. They swim upright and have necks. Their bodies seem like compilations of different creatures — a horse head, lizard eyes and armadillo snout. They even have body armor — bony rings and plates — much like an armadillo.

Their abilities — including changing colors rapidly like a chameleon and using tassel-like appendages and coronets — help seahorses adapt to their environment. Seahorses also allow smaller creatures and plants to encrust on their bodies, creating further camouflage from predators.

Seahorses employ a sit-and-wait strategy to eat, which they often do. A seahorse only digests 30 to 40 percent of its food because it has no stomach.

When Smith drops shrimp into the tank, each of the seahorses' eyes move, focusing on the incoming food. In what appears to be a split second, the seahorses' vacuum-like snouts suck in shrimp.

“Seahorses are ambushers and do not chase food,” Smith explains.

Seahorses are found in the world's temperate and tropical coastal waters from England to Brazil.

Their natural habitat includes eelgrass beds, marshes, mangroves and coral reefs, all of which are destroyed by trawling, dredging, pollution, and severe storms, according to Sarah Foster and Amanda Vincent, Project Seahorse researchers and authors of a life history of the genus and recommendations for conservation.

Seahorses prefer locations along cable lines or coral structures within estuaries where there are calm waters, no beaches and no people, according to Smith.

North Carolina is an open range for the lined seahorse, *Hippocampus erectus*, and the longsnout seahorse, *Hippocampus reidi*.

Seahorses often are found in southeastern North Carolina waters, he adds. But they can be found all the way up the state's coastline, where the water temperature varies from about 54 to 85 degrees Fahrenheit during the year.



Photo courtesy Shedd Aquarium

CLOCKWISE FROM ABOVE: A longsnout curls its prehensile tail. • The heavily armored lined seahorse hides in sea grass. • Longsnout seahorses are more common in tropical waters. The seahorses have lizard-like eyes that move independently. • When mating, the lined seahorse rapidly changes color to white in seconds.

Unlike their tropical relatives, temperate-range seahorses are incredibly adaptable to changes in temperature and salinity, according to David LaPlante, aquarist at the North Carolina Aquarium at Fort Fisher.

CAROUSEL DANCERS

Only 2 percent of seahorses born survive to adulthood, making breeding success critical.

Seahorses live in small clusters and generally keep the same area throughout their lives, except when transported by storms to different locations.

The genus is unusual in that the male — rather than the female — carries the young, known as fry. The young are protected in a pouch, much like a marsupial.

Due to his role as carrier of the young, a male's intestines are 50 percent longer than a female's, according to Smith.

Seahorses often are monogamous for several breeding seasons, making it difficult to find a replacement when a partner dies or disappears. Smaller seahorse species attain sexual maturity at about three

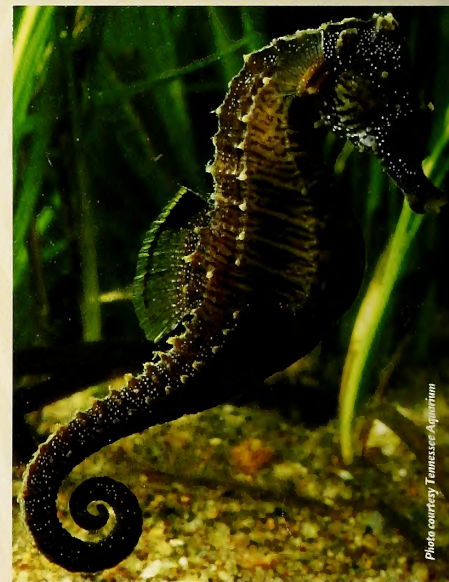


Photo courtesy Tennessee Aquarium



Photo courtesy Shedd Aquarium



Photo courtesy Shedd Aquarium

months, while larger seahorses mature six months to a year after birth.

When mating, seahorses do a “carousel dance,” according to LaPlante. The male and the female interlock their tails and swirl up the water column and then back down.

It seems that with every swirl, their appearance changes. “They change colors fairly fast, from white to black, black to red, and red to orange in seconds,” says Smith.

“During the spiral dance they intertwine — the higher partner turns white while the lower is black,” Smith explains. “Every fourth or fifth time the male and female go up and down the water column, the male stops to scratch his pouch on a rock or shell, thus preventing the eggs from forming clumps.”

If the eggs clump, the fry will be deformed. Some fry leave the pouch with their tails connected because each egg did not have an individual place on the male’s liner, according to Smith.

When the seahorses are born, they must swim to the surface and gulp air to fill their swim bladders, according to Smith. Some die because they gulp too much air and become too buoyant.

SEAHORSE SURVIVAL

Each year, 20 million seahorses are dried and sold by the kilo in TCM markets to treat anything from asthma to infertility and impotence. The World Health Organization recognizes TCM as an acceptable health-care option.

Experts also note that human activities, such as coastal construction and boating, threaten seahorses because these activities may disturb or destroy important habitats, such as eelgrass beds.

Water runoff in developed areas also may kill fragile shrimp, the seahorse’s primary diet. Without adequate shrimp and eelgrass cover, seahorses may starve or wash up on beaches.

Seahorse predators include crabs, urchins, other fish, humans, skates and rays, tuna and birds.

Storms are also a threat because they create rough currents that seahorses are not strong enough to withstand. After storms, seahorses often are found washed onto beaches.

The entire genus of seahorses, *Hippocampus*, is listed as a threatened species under the Convention on International Trade in Endangered Species of Wild Fauna and Flora — better known as CITES.

In order for seahorses to receive this listing, the 166 nations agree to manage trade to protect wild populations.

The international convention generally protects commercially important species. Seahorses are one of the first non-commercial species to be listed.

But, many of the people in these signatory nations depend on the export of seahorses to provide a means of survival in their small villages.

For example, Caribbean fishers and harvesters rake out the seahorses from eelgrass beds and put them on platforms to dry, in preparation for sale to foreign markets, Smith explains.

The Philippines has a law that prevents the harvest and trade of any listed CITES species, yet the seahorse trade is vital to some of the nation’s small villages.

The Project Seahorse Foundation for Marine Conservation is working with partners — the John G. Shedd Aquarium, the University of British Columbia, and the Zoological Society of London — to find a balance between economics and ecology.

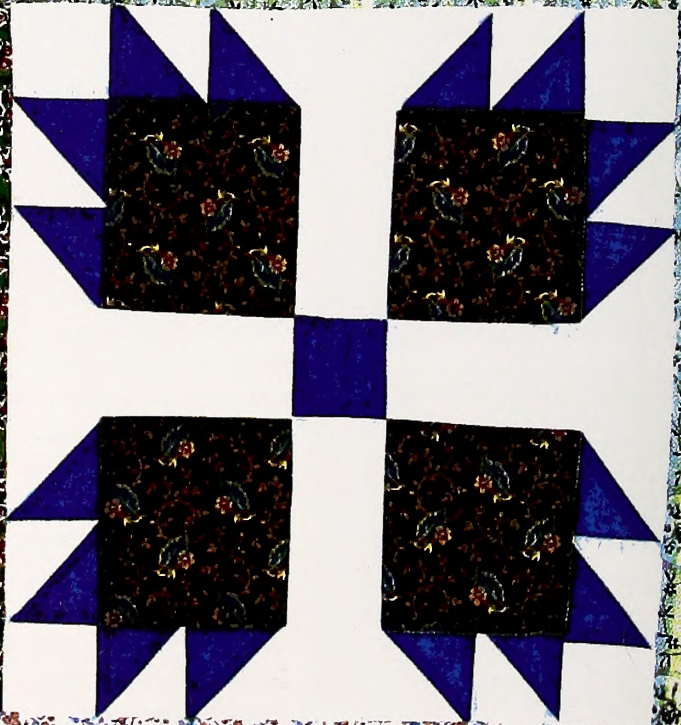
In order to ensure the persistence of seahorse populations worldwide, researchers ideally need to analyze the past, assess the present and plan for the future, according to Foster and Vincent.

An assessment of each seahorse species is necessary to learn how they are affected by exploitation and habitat damage, the researchers say. Such information will improve genus management, thus protecting wild populations worldwide.

In North Carolina, conservation efforts include breeding programs at the North Carolina Aquarium at Fort Fisher and the Museum of Natural Sciences in Raleigh.

“The seahorse breeding program has been very successful this year,” says LaPlante. “We’ve had fifteen seahorses live this year.” □

The N.C. Museum of Natural Sciences, as well as the North Carolina Aquariums at Roanoke Island and Fort Fisher, currently have seahorse displays. The aquarium at Pine Knoll Shores will have a display when it re-opens in 2006. For more information about North Carolina’s seahorses and conservation, check out www.naturalsciences.org, or www.ncaquariums.com. For an international view, go to Project Seahorse’s Web site www.seahorse.fisheries.ubc.ca.



Ray Aldgett



The Freedmen of Roanoke Island: The Other Lost Colony

By Kathleen Angione

Crossing the bridge onto the northern tip of Roanoke Island, visitors can hardly help but stare at an 11-foot-wide sign announcing the birthplace of Virginia Dare, the first English child born in the new world.

Across the road, a simple street sign marks another of our nation's historic firsts. The thin strip of metal reads: "Freedmen's Colony Road." There is no room to explain that the Freedmen's Colony was a camp of ex-slaves that became a thriving colony — one that built schools, churches and homes during the Civil War.

Until recently, that explanation was left to a dilapidated monument at the far end of a motorist pull-off area. The monument's faded plastic pictures and overgrown planter were plaintive reminders of Freedmen's voices absent from America's stories of bravery, perseverance and freedom.

Most people have not heard about this other "lost" colony that is rarely mentioned in history books. But a handful of people, mainly from Manteo, are steadily raising awareness about the Freedmen and their remarkable colony.

"My goal is to make sure that this type of information is incorporated into North Carolina history," says Virginia Tillett, a Dare County commissioner and one of the leaders in the effort.

"None of the areas in and around North Carolina would have been as beautiful as they are if it wasn't for slave labor," Tillett says. The Freedmen's Colony was an opportunity for ex-slaves to contribute to United States history as free citizens.

"I think that type of history needs to be told," says Tillett, who is also assistant dean of continuing education at the College of the Albemarle. She often speaks to school and community groups in the area about the Freedmen's Colony.

Each fall, Tillett joins neighbors Arvilla Bowser and Dellerva Collins — along with 20 volunteers — to organize a festival in Cartwright Park to remember the Freedmen. Bowser, who retired from the National Park Service, co-wrote a book about the colony.

The women also collaborate with the Dare County Heritage Trail, a citizen committee, to commemorate the colony. In 2001, the committee erected a marble monument at the Fort Raleigh visitor center. In 2004 the monument was added to the National Underground Railroad Network to Freedom.

This and other Freedmen's Colony markers are now incorporated into Roanoke Island's Civil War Trail, adds committee chairperson Mel Covey.

"We've just been trying to spread the word and share it with everybody," says Collins. "We've just been trying to keep the story alive."

Continued

LEFT: Each square on this pictorial quilt illustrates an aspect of the Freedmen's legacy.



PEOPLE & PLACES

From Contraband to Colony

During her childhood, Collins was well aware of the famous lost colony — the 110 English colonists who disappeared from Roanoke Island in the late 1580s.

Each year, she and Bowser would usher at a special performance of “The Lost Colony,” the longest-running outdoor drama in the country.

“They used to have what they called ‘Negro Day,’ and that’s when all the black people from surrounding counties could go see ‘The Lost Colony,’” remembers Collins, who, in 1995, became the first black citizen to serve on Manteo’s board of commissioners.

The four women heard their elders talk about the Freedmen’s Colony, but only began researching it after meeting Patricia Click, Manteo’s historian-in-residence during the summer of 1981. Then-mayor John F. Wilson had assigned Click a seemingly monumental task — research a colony of former slaves that almost no one had ever heard of or written about.

“My stomach kind of sank,” admits Click.

As she completed a short paper about the colony that summer, Click realized there was enough historical material — albeit fragmented — to piece together a more detailed picture of the Freedmen.

Two decades later she published a book about the Freedmen’s Colony titled: *Time Full of Trial: The Roanoke Island Freedmen’s Colony 1862-1867*. Tillett and friends credit Click — now a professor at the University of Virginia — for sparking their interest in researching possible family connections to the Freedmen.

“It’s very difficult for blacks to trace their families because of slavery times,” explains Tillett. After six years of research, she traced her father’s ancestry to the Freedmen, but still is working on her mother’s side.

With no physical evidence of the colony left, her task is daunting.

After the Civil War began, nearly half a million former slaves fled to the outskirts of Union camps scattered across the South, writes Click. Union troops captured Roanoke Island on Feb. 8, 1862, under the direction of Gen. Ambrose E. Burnside, and former slaves began pouring onto the island.

As the number of refugees swelled, an official “contraband” camp was established on the island. As contraband, ex-slaves became property of the Union and were protected from their former owners. The camp grew rapidly, and within the first month the new settlers built two churches and a school.

In April 1863, the Rev. Horace James was appointed the “Superintendent of all Blacks” in North Carolina, and he

redesignated the camp as a “colony.” James organized the former camp into three straight avenues and 26 cross streets, assigning plots of land to black settlers, according to Click. The colonists quickly built homes and planted gardens.

Based on the little documentation that remains, scholars believe the colony was located on the northwest portion of the island, possibly from Weir’s Point to Pork Point, notes Click.

By January 1864, more than 2,700 black residents lived on the island, and the colony had 300 families living in homes, writes Click.

Despite such progress, daily life was difficult. Many men enlisted with the Union,

leaving women, children and the elderly to maintain the new colony. Although families of black soldiers were entitled to compensation and rations, lapses were common. The soldiers’ frustration is palpable in an 1865 letter to the general from Sgt. Richard Etheridge



Roy McGeist



Janella Vardanis



Kathleen Angerson



Drew Wilson/Carolina Country Magazine

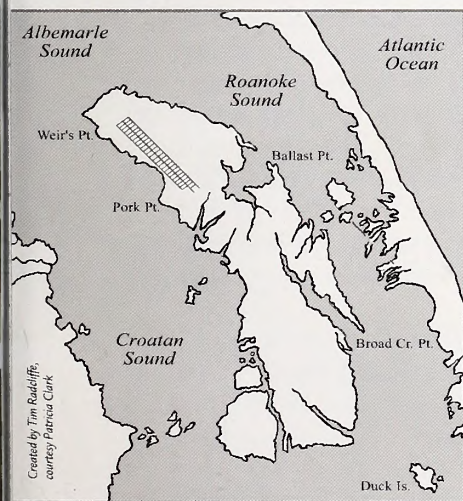
TOP TO BOTTOM: Patricia Click spoke at the 2005 Freedmen’s celebration. • Left to right: Lindsey and Arvilla Bowser wrote Roanoke Island: The Forgotten Colony. • Freedmen’s Colony Road is located at the northern tip of Roanoke Island. • Dellerva Collins, left, and Virginia Tillett participated in the dedication of the First Light of Freedom monument to the Freedmen erected at Fort Raleigh in 2001.



Ray Midgert



Ray Midgert



Created by Tim Roadcliffe, Carney Patricia Clark

the Pea Island Lifesaving station — also purchased land and sold it to black families, according to Bowser.

By 1900, only 300 black residents lived on the island, in a neighborhood called “California.” That year, the government divided the property into 11 lots, based on the original buyers and their heirs, writes Click.

Today, Bowser lives on what was Tract 9. Tillett lives only a block from the two tracts her ancestors inherited.

Whether their children or grandchildren will remain on the land is uncertain. Younger generations often leave the island to attend college or to find better-paying jobs, says Collins. Many never move back. For those who stay, the daily demands of jobs and families leave little time

and a man identified as “Wm” Benson:

“We the soldiers of the 36 U.S. Col. Reg Humbly petition to you to alter the Affairs at Roanoke Island... The rations for our wives and family’s have been (and are now cut down) to one half the regular ration. Consequently three or four days out of every ten days, they have nothing to eat...”

A Fragmented Legacy

Spotty rations were soon the least of their worries. When the Confederacy collapsed in April 1865, the Union returned all land to owners who held title. The Freedmen now faced eviction.

But just as they labored to build their colony, the Freedmen labored to keep it — or at least some of it.

A small group petitioned the government, requesting to rent the land where their homes stood. In 1868, 11 petitioners scraped together \$500 and bought 200 acres of land from the heirs of Thomas Dough, according to Click.

Richard Etheridge — the famed leader of the first all-black crew at

for history, adds Bowser.

Still, the women believe educating people about the Freedmen is the best way to keep the story alive.

They have hung posters about the colony at Manteo’s community center, where Collins volunteers. They’ve also helped make the annual remembrance event for the colony family friendly, featuring music, games and storytelling.

When talking with school and community groups, Tillett brings a special pictorial quilt made by the Tea Cup Quilters, Manteo’s local quilting club. Each square depicts either a scene or symbol related to slavery and the Freedmen, such as the North Star. Children ask the most candid questions, she says. Their parents often hang back — at first.

“Adults sometimes don’t know what to ask because they don’t know whether they are going to offend,” observes Tillett. “I start out by saying — ‘What happened 200 years ago, neither one of us had any control over. We accept what happened and move on. But it’s a part of history, so we’re going to talk about it in a positive light.’”

Tillett’s accepting and open demeanor have prompted listeners to send her scraps of information, such as old family letters or documents, that might give her or other black families from Manteo clues about their ancestries.

And the women never leave their education efforts at their doorsteps.

When Collins’ grandson was assigned a poster project on the Civil War for school, she offered to help him highlight the Freedmen’s Colony.

“His history teacher didn’t even know some of the information he had!” Collins proudly exclaims. “He received an A.” □

For more information about the Freedmen’s Colony, visit <http://www.roanokefreedmenscolony.com>.

TOP TO BOTTOM: Echoes of Heritage, a local singing group, sang for the crowd at the 2005 Freedmen’s celebration. Left to right: Naomi Hester, Doris Creesy, Annie Drake, Dellerva Collins, Essie Brown, Mary Conway and Elmer Pierce. Not pictured: Lovey Moore. • The 2005 Freedmen’s celebration was held in Cartwright Park, which includes the ruins of the A.M.E Zion Church. • Although the precise location of the Freedmen’s Colony is unknown, locals and historians believe the village stretched from Weir’s Point to Pork Point as shown in the plot marks on the northwest end of Roanoke Island.

Shellfish Expo Features Clam, Oyster Dishes

By Ann Green • Photos by Scott Taylor

When Tom Mattison cooks up big pots of clam chowder for community groups around Camp LeJeune, he must remain very patient.

"If the chowder is not the right temperature, it will burn," says Mattison. "Chowder is a big tradition in eastern North Carolina. I have been making chowder for more than 30 years. I always use North Carolina clams in my chowder, even though I make it New England style."

Mattison, who is on the board of directors of the North Carolina Shellfish Growers Association, was giving out samples of his tasty chowder at the 2005 Shellfish Expo. Held at the Carteret County Community College Culinary Center in Morehead City, the event was sponsored by the Shellfish Growers Association, along with North Carolina Sea Grant, Carteret Community College, Progress Energy and the N.C. Department of Agriculture & Consumer Services.

"We are trying to promote North Carolina farm-raised shellfish and to build relationships between shellfish buyers and local shellfish harvesters," says Jim Swartzenberg, president of the state's growers association.

In North Carolina, 267 shellfish growers produce clams and oysters on more than 1,894 acres of state-leased lands within the state's sounds and tributaries, according to the N.C. Division of Marine Fisheries (DMF).

In 2004, DMF reported that 7,125 bushels of clams priced at about \$400,000 and almost 10,000 bushels of oysters valued at around \$222,000 were harvested from private leases in North Carolina.

The shellfish expo also included a cooking competition between several local chefs who made a variety of recipes with clams and oysters.

"The dishes were very tasty and showed how many different ways you can prepare clams and oysters," says Ronald G. Hodson, director of North Carolina Sea Grant and a contest judge. "North Carolina is a great source of fresh clams and oysters harvested from waters washed by the Atlantic Ocean."

Below are a few winning recipes from the chefs, as well as Mattison's clam chowder recipes.



CLOCKWISE FROM TOP: Ron Hodson, David Inscoc, Patricia Smith, Jimmy Johnson and Skip Kemp judged dishes presented at the Shellfish Expo. Oyster and Clam Sushi was prepared by Anthony Garnett. Chef Eddie King of The Dunes Club was one of several participating chefs.

Hors d'Oeuvre Winner OYSTER AND CLAM SUSHI by Anthony Garnett, Coral Bay Club Atlantic Beach

- 6 oysters in juice
- 12 clams in juice
- Sushi rice, as needed
- 1 sheet nori
- 2 spears of asparagus (blanched and cooked)
- Cream cheese, as needed
- Fish roe, as needed
- 1 cucumber
- 1 red pepper

Cook rice according to the instructions. Peel and seed cucumber, julienne-cut red pepper. Wrap flat sushi mat in plastic wrap. Form rice in shape of mat. Place nori on top of rice.

Spread bottom of nori with cream cheese 1-inch wide. Place oysters and clams next to cream cheese. Spread with fish roe into triangular shape and put between cheese and seafood. Place cucumber, asparagus and red pepper on top of roll.

Slice into 8 servings. Garnish with wasabi and ginger. Yields: 1 roll.

Salad/Appetizer Winner
OYSTER ORGY SALAD

By Eddie King, Dunes Club, Atlantic Beach

- 1 quart peanut oil
- Fish Fry (recipe follows)
- 4 eggs
- 2 cups milk
- 1 dozen freshly shucked oysters
- 1 pound bag fresh spinach, stemmed and cleaned
- 4 ounces brie
- 2 ounces Balsamic Vinaigrette (recipe follows)
- 2 ounces pimentos
- 2 ounces hickory smoked bacon, crumbled
- 3 ounces croutons

Mix eggs and milk and dip oysters in mixture. Cover oysters with fish fry. Fry oysters in peanut oil at 325 degrees or medium high heat for three minutes or until golden brown. Place spinach onto salad plates. Slice brie into 1-ounce portions. Place pats of brie on top of spinach. Arrange oysters evenly on salad. Drizzle dressing to taste and garnish with pimentos, bacon and croutons. Yields: 4 to 6 servings.

Fish Fry

- 1 cup corn flour
- 1 cup all-purpose flour
- Salt and pepper

Blend ingredients until texture is even. Season with salt and pepper, to taste.

Balsamic Vinaigrette

- 1/2 cup olive oil
- 1/2 cup balsamic vinegar
- 1/4 tablespoon Italian seasoning
- 1/4 tablespoon salt
- 1 teaspoon crushed red pepper
- 1/4 cup sugar
- 1/4 cup diced onions

Mix all ingredients together.

Entrée Winner
Sea Captain's Platter

GRILLED TUNA, SEAFOOD SAUSAGE AND FRIED OYSTERS WITH POTATO-RUTABAGA MASH, ASPARAGUS AND SAUCE CHARONE

By Charles Parks, Beaufort Grocery, Beaufort and Shepard's Point, Morehead City

- Tuna steaks, seasoned and grilled to your liking
- Shucked oysters
- Seafood breader (your favorite)
- Seafood Sausage (recipe follows)
- 4 Idaho potatoes
- 48 spears of asparagus
- One rutabaga
- Sauce Charone (recipe follows)

Make or obtain the seafood sausage recipe below.

Cook diced rutabaga, mash with cooked potatoes, butter and cream and keep warm.

Grill tuna and sausage to your liking, while at the same time cooking the asparagus. Fry the oysters. Assemble the plate. Add Sauce Charone and enjoy. Yields: 8 servings.

Seafood Sausage

- 1/2 pound grouper, cut into 1/2-inch cubes
- 2 egg whites
- 1 large shallot, chopped
- 3 ounces brandy
- 1 tablespoon chopped garlic
- 1/4 cup chopped parsley
- 6 feet of medium hog casing
- 1 pound peeled baby shrimp (70-90 count)
- 1 cup heavy cream
- Pinch salt and pepper

Mix all ingredients in food processor, putting in the cream last, and then purée. Keep mixture as cold as possible until cooking. Add 1/4 cup chopped parsley and peeled baby shrimp.

Stuff into casings, tie and poach in fish or chicken stock at 180 degrees for 45 minutes. Let cool, wrap and then refrigerate or freeze (up to a year) until needed. Reheat by gently sautéing, roasting or poaching.

Sauce Charone

- 3 egg yolks
- 2 teaspoons dry tarragon infused into 1/2 cup white wine with chopped shallots
- 1 teaspoon tomato purée

- Dash hot sauce (your favorite)
- 3 sticks melted butter (12 oz.)

Prepare the sauce by melting butter. Cook the egg yolks with the tarragon reduction over a water bath until custard forms. Carefully incorporate melted butter by whisking in a little at a time. Finish with hot sauce and tomato purée. Keep warm until needed.

NEW ENGLAND CLAM CHOWDER

By Tom Mattison, N.C. Shellfish Growers Assn.

- 1/4 cup cut-up bacon or lean salt pork
- 1 medium onion, chopped (1/2 cup)
- 16 ounces minced or whole clams
- 1 medium potato, diced (1 cup)
- 1/2 teaspoon salt
- Dash of pepper
- 2 cups skim milk

Chop onions, clams, and potatoes into bite-size pieces and set aside.

Cook bacon. Mix all chopped ingredients with crumbled bacon, seasonings and skim milk in a large pot.

Cook slowly on low temperature on top of stove for several hours. If possible, make the night before, store in the refrigerator and then reheat and serve. Yields: 4 servings.

MANHATTAN CLAM CHOWDER

By Tom Mattison, N.C. Shellfish Growers Assn.

- 1/4 cup finely chopped bacon or salt pork
- 1 small onion, finely chopped (1/4 cup)
- 16 ounces minced or whole clams
- 2 medium potatoes, diced (2 cups)
- 1/3 cup chopped celery
- 1 cup water
- 2 teaspoons chopped fresh parsley
- 1 teaspoon chopped fresh thyme leaves
- 1/2 teaspoon salt
- 1/8 teaspoon pepper
- 1 can (14 1/2 ounces) whole tomatoes, undrained

Chop celery, parsley, thyme leaves, potatoes, clams and onion into bite-size pieces.

Fry bacon and crumble. Mix chopped ingredients with bacon or salt pork; add to pot with 1 cup water. Then add tomatoes, pepper and salt. Stir ingredients and cook on low heat for several hours. If possible, make the night before, store in the refrigerator and then reheat and serve. Yields: 4 servings. □



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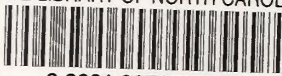
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