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South Carolina Wildlife

July-August 1980



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P.O. Box 167

Columbia, South Carolina 29202

South Carolina Wildlife

July-August 1980

 This issue of SOUTH CAROLINA WILDLIFE is dedicated to our coast in honor of the Year of the Coast—1980.

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One Ernest Peabody and a few regulations could rid our beach of vulgarity forever—but what's a summer vacation without a little vulgarity?

BAN THE BUM!

by NANCY COLEMAN

Ernest Peabody was upset.

Every summer for the twenty years of their marriage, he had loaded Miss Grace and Ernestine and Little Oscar up in his Cadillac and headed toward Greenville to drive the Blue Ridge Parkway. One week up near heaven and he had paid his family debt for the year.

But this spring a pubescent 13-year-old Ernestine had somehow convinced Miss Grace it was time to switch to the coast. And Miss Grace had bargained with Ernest: "We can miss my brother's July Fourth barbecue if we go."

She packed some sandwich meat, tomatoes, a loaf of bread and several jars of tap water. They hit the art exhibits, the flower gardens, Ripley's Believe-It-or-Not, jungle golf and the water slides. They splurged on the buffet at Granny's Smokehouse. Little Oscar and Ernestine rode the Break-A-Back and the Whirley-Skirt. Trouble didn't start until mid-week, when Ernest crossed Ocean Boulevard to see the beach for the first time in over 20 years.

Shadowed cleavage—bare thighs—beaded braids—wandering eyes—men

illustration by Joseph Byrne



in bikinis—frisbees—radioes—cruising cars—slick lifeguards selling suntan oil —**Men in Bikinis?!!**

“My word!” Ernest gasped. “This is obscene! It’s like a giant bathtub here! Things are really out of hand! If people dress this way in broad daylight, what do they wear and do in the dark of night!”

Ernest stopped his tirade for then, but when Miss Grace left to get a hot dog, he took some snapshots. And when he got back to the Upcountry, he made a few phone calls, called a few meetings.

He started with the Skin Cancer Institute. “South Carolina’s incidence of skin cancer is so high because we have more exposed flesh per capita than any state. This won’t be a popular movement, but we can change things. Let’s be leaders.

“This isn’t California; this is America! We’ve got to protect our citizens from themselves!” They composed a resolution and sent it straight to the General Assembly.

Then as a co-founder of the Society Against Mind Pollution (SAMP), Ernest was able to enlist this group’s support by showing them his pictures. The society was horrified and had duplicates made to show their wives, husbands and neighbors.

Ernest also talked to the secretary of agriculture (“How you gonna keep ‘em down on the farm after they’ve seen the Sun Fun Parade?”) As only Ernest Peabody could, he appealed to high-class women’s circles and societies and men’s civic and golf clubs: (“Our beaches are littered with these half-dressed half-baked youngsters with no morals and only hedonistic goals.”)

Outsiders didn’t give the movement a chance, but then it wasn’t an outsider’s issue. Ernest got a strong lobbying effort behind a bill. And he found a sponsor in Senator Cotton Calhoun, a powerful man with no political enemies and few friends. A hush fell over the chambers the day Senator Calhoun plowed forward to the podium to present the bill. Pages tripped over the brass rails on their way to the back benches. The press picked up their pens.

“My fellow South Carolinians,” he

began, peering over reading glasses, “It is with grave concern that I bring before you a bill proposing to enforce some sort of respectability upon our beaches in this, the great state of South Carolina. We are national leaders in the cause of conservatism and I want to appeal to you today—let’s take this cause a step further by acting on the very basic element of our social system—that is, the clothes that we wear. Getting to the point, when I was just a lil’ country boy growing up in this state, my mama and papa used to carry me to see the ocean. . .”

Well, anyway, Senator Calhoun’s bill proposed to enforce a dress code on our beaches, a stricter curfew, no sunbathing, no parades, no loud music and no lifeguards selling suntan oil (on the premise that whatever good they do during the day is offset by their wanton behavior at night). All fishing except commercial fishing was forbidden in order to keep the piers clean. There were still a few kinks, of course; for example, the definition of “bikini” as opposed to “bubble-top bathing suit with cullotte legs.”

The House and the Senate held joint sessions in which they inspected various bathing attire but insisted upon seeing the articles on a live body before they could deem it improper. The lobbyists provided an example of acute sunburn in the person of Miss Strawberry Queen and the legislators pinched her pinkness to check the severity of her burn.

The bill gained ground. Without the sunbathers, industrialists figured, we can take the whole beach. Without the sunbathers, preservationists figured, man won’t vacation there and disturb the ecology.

And then the bill passed. All the vacationers passed by on I-95, heading for Georgia and Florida. Open-air T-shirt and souvenir shops pulled their shutters and followed the tourists. Half the restaurants and motels closed and the other half clamored to host conventions. Big golf and tennis tournaments moved elsewhere. The fight began over whether the entire coast would become an industrial park or a wildlife sanctuary. The coastal health department dwindled to a three-nurse staff. Students used their spring breaks for job hunting. The tourism industry began a vigorous campaign to promote the other three hot spots in the state. The birth rate dropped. Parents kept closer watch over

children and vice versa. All in all, it was a pretty unhappy state of affairs.

Two years passed and one day another hush fell over the senate chambers, this time not out of awe but out of surprise. Senator Leland Askew asked for the floor. Askew was a five-term senator who hadn’t spoken a word in the state capitol for 12 years. The only committee he chaired was the Tuesday night sing-along. He weaved his way to the front and stood there in what could have been his first campaign suit.

“Boys and girls . . .,” he paused to burp, “before we became so gravely concerned, the beach of South Carolina was the closest thing to freedom we had left. Ours is the difficult task of deciding how much of our neighbor’s land can be used for what purpose. It makes it easier if we eliminate commercial tourism. Beachcombers, sunbathers, daydreamers, builders of sand castles are a sinful lot; they are sometimes filthy, often obscene, always selfish. They enjoy shallow pastimes, they waste money on pointless junk, they encroach upon the other species as if only the Homo sapien had rights to our coastal environment.

“The beach belongs to all God’s creatures, not just one. But the human is one. And better to let us roll in the sand with the turtles and crabs than sit back and scheme some way to harness the ocean’s power. This time let’s remember that we belong to the ocean and not it to us.

“I maintain that we must move over and make room for our fellow residents of the coast—the fish, the bird and the others.

“But I further maintain that the joy behind the waves and the beauty behind the creatures are lessened if not enjoyed by man. And I maintain that we cannot shrug off the bikini, we cannot smother the radio, we cannot halt the parades. In addition, my fellow Senators, I maintain that my kids are driving me mad.”

Understanding moans were heard from the floor and, in a rare move, the legislature backed up. A committee was sent to study the coasts of France, Italy and Sweden. And then a pilot project was set up to bring back the beach bum.

Biosphere



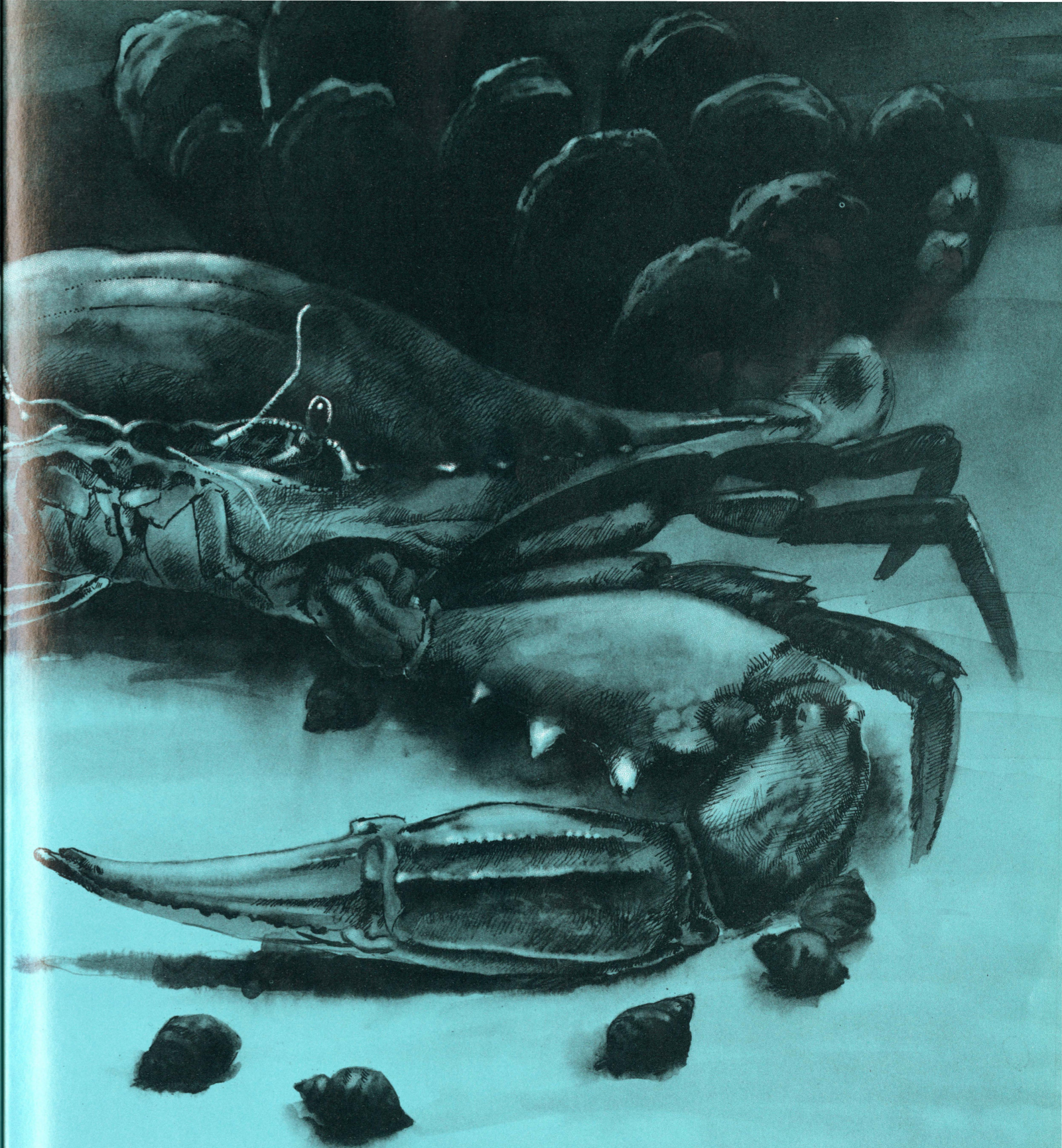
Soldier of the Salt Marsh

by David Whitaker

Though one of nature's most aggressive creatures, the blue crab is among the most sought-after shellfish. Crabbers are wary of its powerful claws, but its succulent flesh encourages its capture along the East and Gulf coasts.

From above, all appears serene in the coastal creek. Rich green spartina grass trembles in the summer breeze. Schools of finger-size mullet drift lazily, feeding over the bottom, while basking fiddler crabs lift their claws in mock salutes and scurry before the incoming tide.

Below this placid surface lurks one of nature's most aggressive creatures—the blue crab. Eyestalks and waving antenna protrude from his sharp-spined shell while hinged mouth parts filter the water for hints of

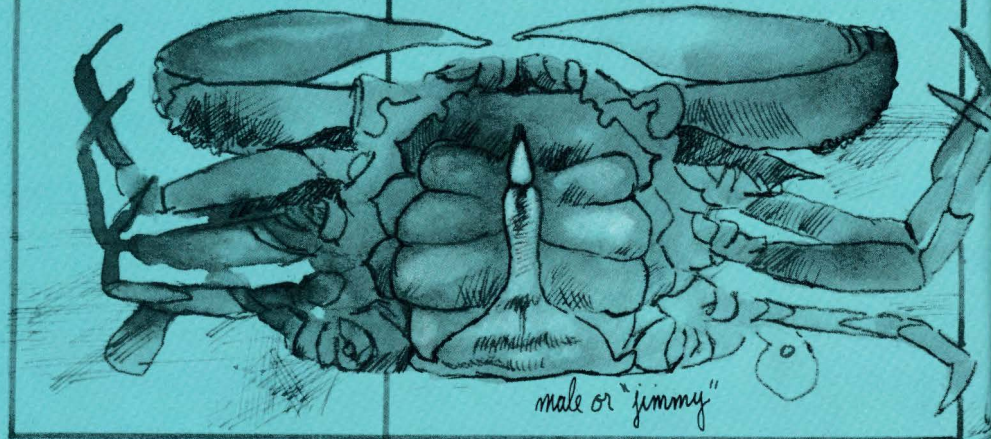


Illustrations by Joseph Byrne



mature female or "sook"

A "jimmy" or male blue crab has an abdominal apron shaped like an inverted T, while the apron of the "sook", or mature female, has a semi-circular bell shape with an inverted V on top.



male or "jimmy"

food. Armored legs, the front two bearing powerful claws, complete an appearance no less awesome than the sinister creations of science fiction.

Paddling slowly, the crab stabs at a small fish, then a shrimp, before settling down on the mud to probe with his claws for bottom dwellers such as clams and worms. Moving further up the creek, he joins other blue crabs picking at the carcass of a large fish.

Among marine invertebrates in the Carolina salt marsh, the adult blue crab is most aggressive. Few salt marsh animals will confront a large blue and fewer yet will prey upon him. The painful pinch of his sharp claws causes even man to respect the blue crab's protective abilities.

Despite this fearsome appearance and aggressive nature, the blue crab is a cherished seafood in the South Carolina Lowcountry. Many gourmets prefer the crab's sweet flesh over all other local seafood. This fascinating animal supports a considerable commercial fishery second only to the shrimp industry.

In 1979, over 7.4 million pounds of hard blue crabs valued at over \$1.9 million were landed on our coast. The most common method of commercial fishing is the crab pot, a cubical wire trap with two funnel-shaped entrances. Bait, usually menhaden or herring, is placed in a central bait well. Recreational crabbers are allowed to fish two crab pots without purchasing a license.

Most recreational crabbers use drop nets, collapsible traps or the time-honored method of "dipping." A chicken neck, or other morsel is tied to a weighted string, tossed out and pulled in slowly until the crab can be netted with a dip net. Dipping crabs is the least expensive means of crabbing and can be an excellent family activity.

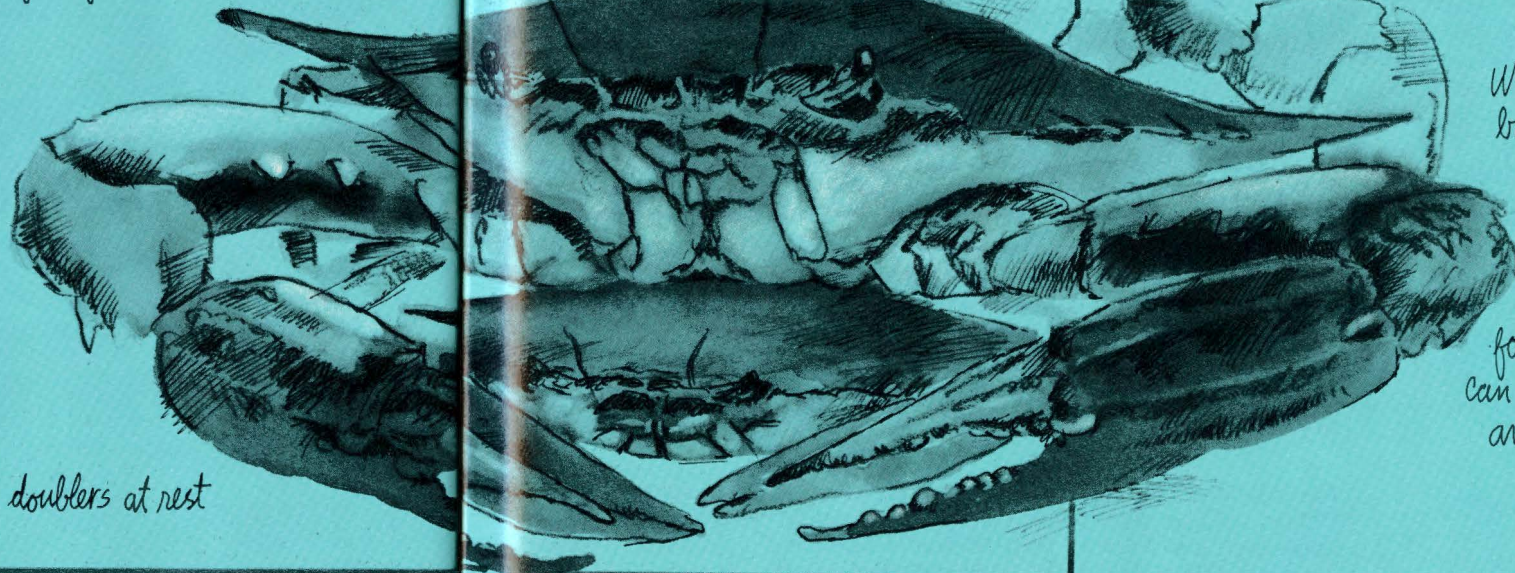
The blue crab requires both inshore brackish waters and high salinity ocean waters to complete its life cycle. The species is common from Massachusetts to Texas and has been reported as far north as Nova Scotia and as far south as Uruguay. The Chesapeake Bay area supports the largest blue crab fishery, which annually averages about 55 million pounds.

The blue crab's scientific name, *Callinectes sapidus*, translates to "savory beautiful swimmer". Swimming ability is a trait common to most crabs in the family *Portunidae*. Although smaller species in the same family



males courting

When ready to mate, the male raises himself high on his walking legs, assuming the position he will later use to guard her. He then extends his claws and waves his swimming legs at her.



doubtless at rest

occur locally, only the blue crab is of any commercial or recreational importance in South Carolina. It swims by skulling the oar-like fifth pair of legs, the swimming legs. These paddles can usually be seen rotating at 20 to 40 revolutions per minute but disappear into a blur as the animal quickly darts away. Three pairs of thin walking legs, directly in front of the swimming legs, are used for stalking along the marsh or ocean bottom. The crab almost always walks to the side, clearing its path with the sharp lateral spines along its shell. With its large, powerful claws, the blue crab digs, gathers food, defends itself and displays its sexuality.

Males can be distinguished from females by the shape of the abdomen. The male has a T-shaped abdomen held tight against the body until maturity when it becomes somewhat loose. The immature female has a triangular abdomen tightly held to the body. After the final molt, the mature female's abdomen is rounded and easily pulled from the body. Large males, called "Jimmies," often have brilliant blue claws and legs. The mature females, called "sooks," can be easily distinguished by their bright orange- or red-tipped claws. Males typically grow larger, sometimes reaching seven or eight inches in point-to-point width across the shell.

Factors controlling the blue crab's abundance are not completely understood, but much of its life cycle has been determined. Mating generally occurs in brackish water from February to November and peaks from March to July and again in October and November. Females mate only during the final molt when they are in the soft shell condition. Males, which mate in the hard shell condition, are believed to mate with several females.

The blue crab performs a rather elaborate courting ritual. Standing on tiptoe on its walking legs, the male crab holds out its arms and waves its swimming legs. When finished, he snaps his body backward, kicking with his swimming and walking legs.

Meanwhile, the female rocks and waves her claws. Some try to back under the male. He grabs and cradle-carries the female for two to three days while he searches for cover. Then she moults for the last time, a process that takes several hours. With her tucked under him, right side up, the cradle carry offers her protection for her most difficult moult and assures that the male will be there during the short time she is ready to receive him.

After the moult, the male lets her rest and then turns her over gently until she is on her back beneath him. The male then inserts his pleopods, two small appendages, into her two genital pores. The female extends her

When the she-crab rocks and waves back at him, the male grabs and carries her under him for two to three days. During this time he swims hard with his swimming legs and looks for a hiding place where she can undergo her final moult and the two can mate.

abdomen around his back and the two remain thus locked for five to 12 hours. And then he cradle-carries her for at least two more days while her shell hardens. Crabs in a cradle carry are known as "doubblers."

After mating, females migrate from brackish water leaving the males behind. They spawn in near-shore ocean water about one or two months later, in spring or summer. Females that mate in fall or winter usually spawn in the following spring.

Females carry up to two million eggs on their rounded abdomen, but only about two of these will survive to become an adult. The bright orange eggs darken as the embryos mature. Females in this condition are called "sponge" crabs. State law requires that sponge crabs be immediately returned to the water if captured. Sponge crabs usually first appear around early April. Eggs hatch after about two weeks into zoea larvae. Zoea are an early, free-swimming larval stage about .01-inch wide. During the next month there are six more larval stages and a megalopic (advanced larval) stage.

The zoeal stage, which occurs in most of the blue crab's close relatives, looks nothing like a crab. The zoea larva has a small shrimp-like tail and a relatively large head with prominent eyes and a long dorsal spine. The megalopic stage, unique to crabs, is the first larval stage that bears any resemblance to a crab. The eyes are still prominent, but the dorsal spine is absent. Tiny claws appear for the first time as well as the other four pairs of legs.

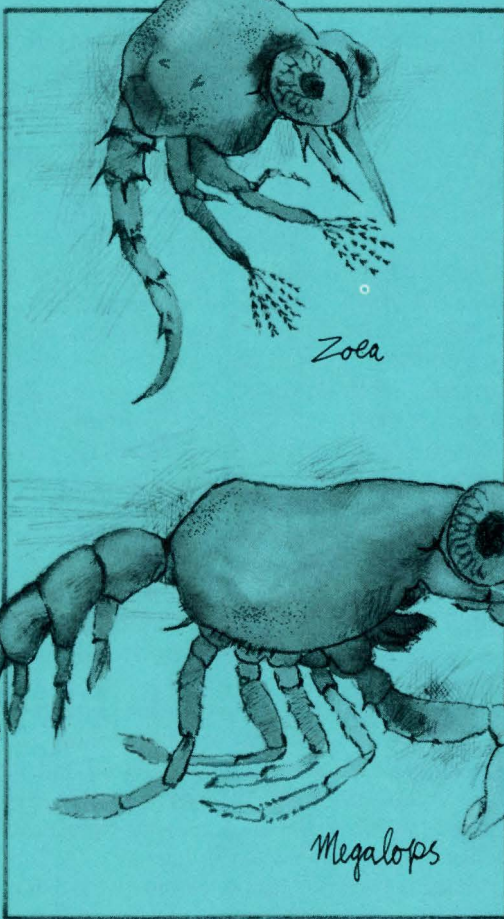
After several days, the megalops molts into the "first crab" stage, which is about 1/10-inch wide. It migrates into nutrient-rich estuarine waters. Crabs hatched in April or May become two to three inches wide by November and five inches or larger by August of the following year. Those hatched in early fall will be only one-half inch in width by winter. After one year these crabs will be only three or four inches wide and will not mature until the following spring. A few crabs may live for three years but most live for less than one year. In South Carolina, law requires that captured crabs less than five inches in width be returned to the water.

Blue crabs, like all other arthropods, must periodically shed their hard-shelled exoskeleton to grow. The smallest crabs shed every three to five days, while juvenile crabs shed every 10 to 15 days, and those 3.5 inches and larger, every 20 to 50 days. Experienced crabbers can quickly spot "peelers," crabs about to molt. Five to 10 days before molting, a narrow white line appears just within the thin margin of the last two joints on the swimming legs. A few days before shedding the peeler's narrow white line turns red. Fine white wrinkles appear on the blue skin between the wrist and upper arm. Molting lasts only a few minutes as the crab pushes out the rear of the old shell. The resulting soft crab, which is limp and wrinkled, will swell to normal shape and usually increase in size by 25 to 35 percent. If forced, soft shell crabs can swim or walk but prefer seclusion. After about 12 hours, the crab's shell is like parchment and will fully harden within two or three days. Soft shell crabs are considered a delicacy and may bring a dollar or more each at the market.

Stomach content studies have shown that blue crabs eat fish, oysters, snails, clams, crustaceans, worms, plants and other organisms. Blue crabs also scavenge as evidenced by their capture in crab pots baited with dead fish. At high tide, crabs swim into the salt marsh and pluck snails from the tall grass. They burrow into the bottom until only eyestalks are visible to lie in wait for an unsuspecting fish. Regardless of size, area and season, crabs usually eat what is most available.

The blue crab is a prominent link in the estuarine food chain, processing less than desirable foods into a succulent end-product. Besides its importance to the salt marsh ecology, the blue crab makes for delightful and profitable fishing. 🦀

David Whitaker is a marine biologist at the South Carolina Marine Resources Center in Charleston, South Carolina. Information on the courting ritual is condensed and adapted from "Beautiful Swimmer" by William W. Warner, copyright 1976 by William W. Warner. By permission of Atlantic-Little, Brown.



In its first larval stage, the zoeal stage, the blue crab has huge eyes, a large head, a shrimp-like tail and a single dorsal spine. Never measuring more than .01 inch, the zoeal crab goes through about seven molts and then metamorphoses into the megalopic stage. A megalops has two rudimentary claws, three pairs of legs, stalked eyes and, again, a shrimp-like tail. This stage usually lasts about 12 days.

Coastal Development and Planning for the Future

Dr. John M. Armstrong

Dr. John M. Armstrong is executive director of the newly formed South Carolina Consortium located on James Island in Charleston. The Consortium has assumed management of the state's Sea Grant Program involving various research, education and marine advisory activities and is under contract with South Carolina's Coastal Council to coordinate state and federal research on issues such as coastal erosion management and oyster resource development.

South Carolina has some of the most unique and valuable coastal areas in the nation. Our barrier islands and salt marshes are among the most beautiful in the world.

Historically, the development of large portions of the state's coastal area has been held back by two factors: the large expanses of coastal salt marshes and irregular bays, which made travel along the coast difficult, and the vast amounts of coastal land held in plantation ownership over the decades.

In recent years, there has been a rapid increase in the use and development of the state's coastal lands and waters. This increase in use and development has also brought about an increased awareness on the part of the state's citizens as to the limited nature of our coastal resources. We have increasingly noticed that there are only so many miles of beach and so many acres of salt marsh. As we continue to increase our use of these fixed amounts of beaches and wetland areas, we start to notice the crowding that is beginning to take place. We begin to face conflicts in use and to see that one use of coastal resources is inevitably tied to others. In turn, we have to think more about the problem of how to allocate these limited coastal resources. We have begun to worry about the way in which we cut the "coastal pie". This is not a simple matter. We must now think hard about the way in which we manage the coast.

Who will decide upon the rules for cutting up this coastal pie and how will we set these rules? The answer is in who the coast really belongs to. We are beginning to become aware that access is a key word in coastal use. We must have access to the many coastal resources of the state, the beaches, the fish, the water surface, and so on. All of this is what we now call coastal management.

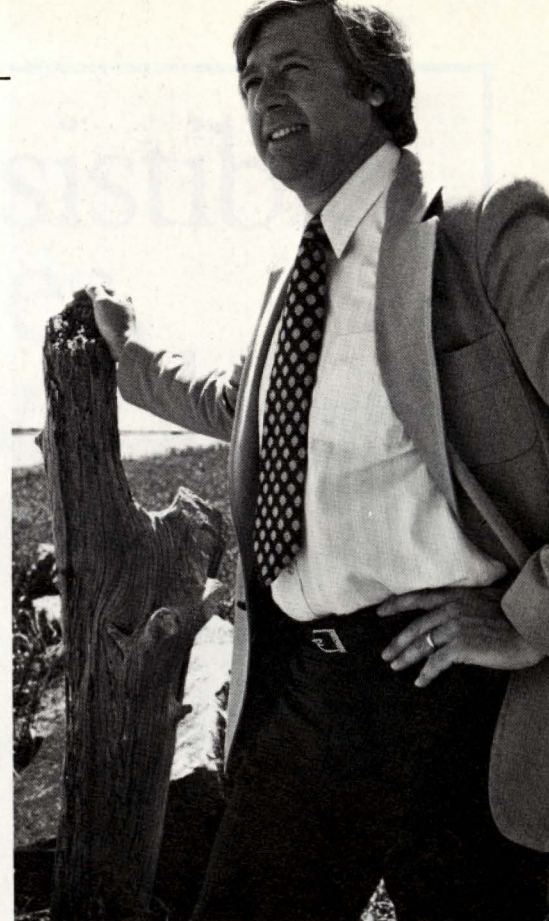
South Carolina has a relatively new Coastal

Council that has the enormously difficult job of balancing all the demands on the coast. In a way, it is a "no-win" situation because some developers, preservationists, environmentalists and others are always going to be unhappy with the way the coastal pie is cut. It is a job for the wise and brave!

A particularly knotty problem becoming debated more intensely in this "Year of the Coast" is the question of barrier island development and the effects that nature can produce on homes and buildings built on barrier islands, particularly the effects of hurricanes and hurricane flooding. As we have increased our use of these islands, we have vastly increased the potential economic damage and loss of life that would occur if a major hurricane should strike our coast.

To help coastal residents cope with these kinds of potential losses, a federal flood insurance program provides substantial protection benefits at low costs to property owners. As some people look at these insurance programs, they question the wisdom and feasibility of such federal assistance. Others call for federal takeover of the undeveloped areas of barrier islands. Where we end up on this issue is anyone's guess, probably a compromise with the requirement for meeting certain more stringent development and construction criteria in order to qualify for insurance.

I personally believe that before the federal government sets any criteria for managing our coastal islands, South Carolina should develop its own criteria for construction and development on barrier islands. In this way, we can use our own judgment about the future use of these irreplaceable resources. It is particularly fitting in this "Year of the Coast," to which this edition of *South Carolina Wildlife* is dedicated, that we ad-



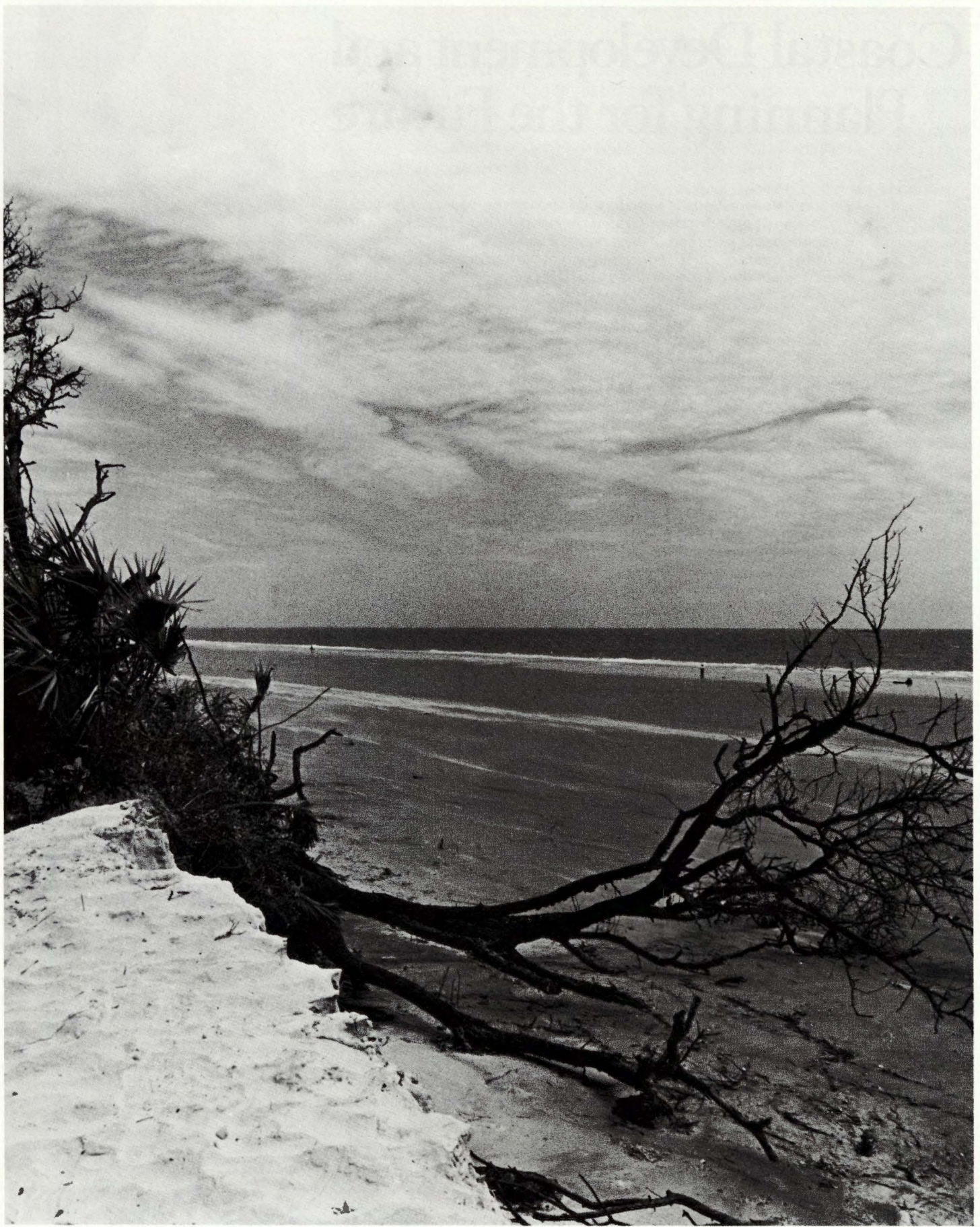
dress ourselves to the unique nature of South Carolina's barrier islands and to discuss the future alternatives for these islands in a realistic and pragmatic fashion. Such discussions might include:

1. Establishment of potential economic storm damages for realistic storm occurrence probabilities.
2. The concept of flood inundation limits for various hurricane intensity and duration (how far hurricane-driven ocean water would reach inland).
3. The concept of uniform state and local coastal and barrier island construction codes that reflect water level, wave velocity and wind forces associated with hurricanes.
4. Further development of coastal evacuation mapping and planning procedures to deal with major coastal storm occurrence.
5. Public education programs to better acquaint citizens with the consequences of hurricane occurrence in coastal areas.

The South Carolina Sea Grant Consortium and other involved state agencies are moving forward in providing research, service and information to accomplish these and other objectives related to the coastal and ocean resources of South Carolina. We welcome the opinions and assistance of the citizens of South Carolina. 🐾

A forum for readers interested in wildlife issues, Viewpoint does not necessarily reflect the opinion of the South Carolina Wildlife and Marine Resources Department.

Viewpoint



The survival of coastal life processes depends on our protecting the flexibility that enables them to adjust to natural changes and human activities.

irresistible forces, movable objects

by carol speight

Timelessness is the quality most of us associate with the edge of the continent—with the seeming imperturbability of the great ocean, the primitive beauty of our barrier islands, the incredible fertility of the marshlands. The creativity of ancient processes is nowhere more evident than here at the interface between land and water.

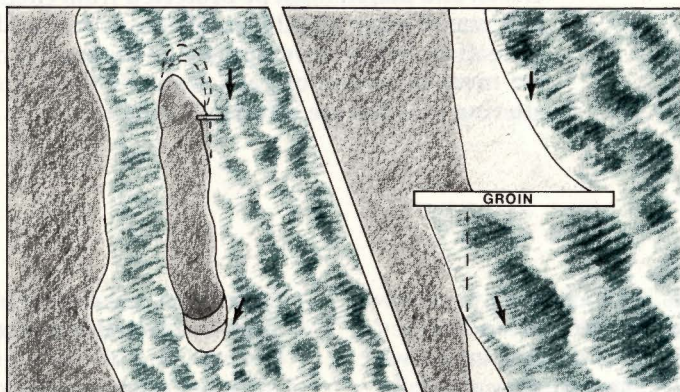
The rich soil, the abundance of fish and game and the magnificent forests of the coast nurtured the first Americans and later the European colonizers of our continent. And through centuries of settlement and development, we have relied on the functions of a coast that we have treated as if it were indestructible.

About 25 percent of all Americans live on the East Coast and population growth for this area continues to be significantly above the national average. The tremendous growth of recent years has brought increased population, industrialization, development and pollution. It has also brought increased awareness that there are limits to the pressures we can bring to bear on coastal systems.

We are beginning to comprehend that the ocean can be degraded, that beaches and even whole islands can disappear, that the marshes' productivity can be inhibited or destroyed by our activities. We are learning that in the complex interplay of forces at work on the coast, we cannot

alter one part without affecting all others. And belatedly we are recognizing the value of what we have already lost, the fragility of what we might yet save.

In South Carolina, we are in the sadly unusual position of *having* something to save. All along the East Coast, we have seen the destruction of the very qualities which make the coast so attractive to us in the first place. Great stretches of beach have been lost to erosive building on protective dunes.

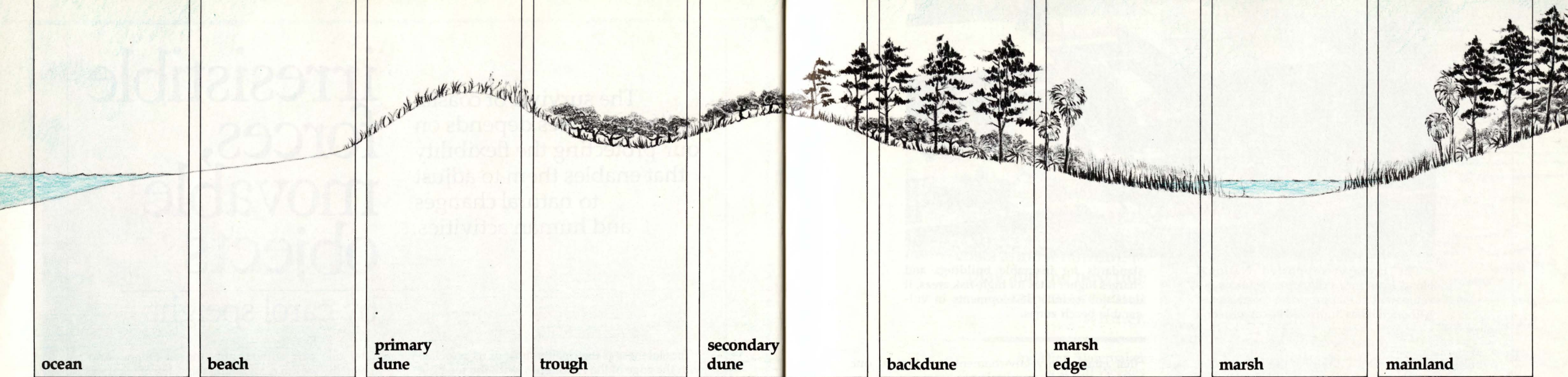


Under natural conditions, sand is transported from one part of an island, or island chain, to another in response to prevailing wind and water conditions (left). When we try to "stabilize" a particular section of the island with jetties or groins (right), we frequently destroy the very features we mean to preserve.

Millions of acres of marsh, now known to be the most productive areas on earth, have been filled for various kinds of development. Coastal waters, the greatest source of the world's protein, have been fatally polluted by dumping and drainage from mainland sources.

The question facing us now is whether or not we can adapt the demands of our rapidly growing, energy-consuming

society to the requirements of the coastal life system upon which we all depend. It is a particularly pressing question for two reasons. The first is that South Carolina is one of the fastest-growing states in the country. In the coming decade, the demand for recreational, residential and industrial development, particularly along the coast, will be tremendous. Secondly, a significant portion of our coast remains undamaged, and much that has been impaired is restorable to some degree.



coastal profile

Protecting our coastline is not a simple matter of preventing overt destruction of specific features. Just as important is maintaining the ability of those features to adjust to changing prevailing conditions. Ocean and marsh must be protected from chemical impairment. Dunes and marsh edge should be off-limits to building, filling and erosure recreation. While development on the coast is necessary and inevitable, we must be aware of each feature's need for flexibility and of how altering one feature affects all others.

Obviously, those areas are increasingly vulnerable to ultimately harmful exploitation and, if they are to survive as functioning natural units, we must shepherd their development very carefully. Protection is more than preventing overt destruction such as bulldozing of dunes or filling in acres of marsh. As our knowledge of coastal biological and geological systems grows, we are learning that a more insidious danger lies in activities which impair the flexibility of those systems.

Everyone knows that natural systems are dynamic; that the survival of an organism or an environment depends on its ability to adjust to changes in or around it. But this knowledge has a way of burying itself when we lay out a property line and a piece of earth becomes real estate.

At that point, we come to expect a permanence that is contrary to the way things work. Our barrier islands are an excellent case in point. "The jewels of the coast," we like to call them. But our attempts

to fix them in a setting of human design is almost always to their detriment and thus, sooner or later, to ours.

Barrier islands are of special interest not only in and of themselves, but also because of their formidable role in determining the nature of much of our coastline. As their name implies, they protect the mainland from the powerful energies of the ocean. They shape our marshes and bays and define our access to and use of coastal water.

Barrier islands have existed continuously for thousands of years, but not in the same shape or place. Since the time of their emergence in the last stages of the Ice Age, they have responded to rising sea level, storm waters and changing patterns of continental drainage with dynamic changes of their own—largely by redistribution of sand and retreat from rising waters.

Most of these responses are initiated on the beach; in fact, the very existence of the islands

depends on the ability of their beaches to respond dynamically to prevailing conditions. Sand moves from one part of an island chain to another; old inlets silt up and new ones are formed; storm waters pass through breaks in the dunes, or wash over islands entirely. And the islands survive.

It is only when we have a vested interest in the stability of our property that these natural strategies are conceived as undesirable. From the front porch of a house on the beach, moving sand becomes erosion, overwash flooding.

What we build on or near a beach often triggers or accelerates a net movement of sand. And our response—attempted stabilization—usually compounds the problem.

Up and down the coast, we have impaired the flexibility of our beaches to respond to changing conditions with breakwaters, seawalls, groins and jetties. And we are learning that these devices are, in the long run, destructive of the very features

we mean to preserve.

In spite of mounting evidence that our defensive concepts are dead wrong, we persist in the practice of putting rigid barriers in the way of natural forces. We cite natural barriers like dunes as precedents for our engineering techniques. But dunes are not walls. They blunt the force of storm waves not only by blocking them to some degree, but primarily by allowing for them. Wind and high waters pass through gaps in the dune system; dune sand is released to flatten the beach and force storm waves to break farther out and dissipate their force over a longer run.

As we now know, changing sea level—certainly a phenomenon beyond our influence—is the primary controlling factor in changes in the shape and place of barrier islands. Yet we insist on occupying land that needs to move to survive.

In principle, this is the problem with human endeavor throughout the coastal zone. When we



PHILLIP JONES

The taxpayer-supported National Flood Insurance Program subsidizes development in inappropriate coastal areas. Although it has improved its construction

standards for insurable buildings and charges higher rates for high-risk areas, it does not exclude developments in vulnerable beach zones.

build causeways which diminish the flow of tidal waters into the marsh, we cause chemical reactions which inhibit the marsh's normal tolerance to other changes. When too dense population on the mainland lowers the water table, saltwater intrudes and the environment is drastically altered.

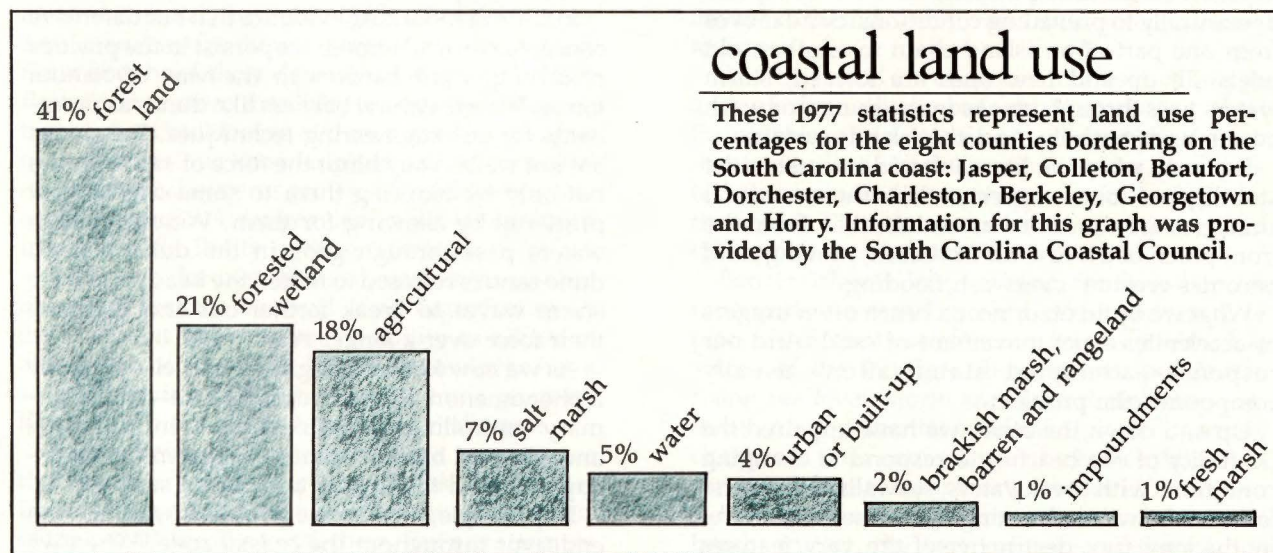
We must consider potential and long-range impacts on coastal life processes very carefully in the years ahead. Recognizing that development is necessary and inevitable, we must insure that existing and proposed activities do not interfere with the flexibility of coastal systems that is necessary to their survival.

The coastal zone becomes more important to us all the time. We are dependent on its plant and animal life, on its harbors, on its commercial potential, especially in the areas of energy and recreation. It is essential that we preserve the diversity

that enables any environment to adapt to our activities—and our mistakes.

Henry Beston reminded us of the rewards for our caretaking in his classic book about life on the shore of Cape Cod, "The Outermost House:" "Touch the earth, love the earth, honour the earth, her plains, her valleys, her hills, and her seas; rest your spirit in her solitary places. For the gifts of life are the earth's and they are given to all, and they are the songs of birds at daybreak, Orion and the Bear, and dawn seen over ocean from the beach."

Former associate editor of South Carolina Wildlife, Carol Speight is a writer living in the Cedar Creek community of Columbia.



Guess which wave
hides the shell and you
take home the prize. It
costs almost nothing to
play and the next tide
may make you a
winner.

by Allen Shoemaker
and Bill Weekes

the Shell Game

TED BORG



Each year millions turn out on South Carolina's beaches to play the shell game. Star players are those persistent, keen-eyed, early-risers willing to hike, stoop and bend with the daily regularity of army boot camp trainees.

It's a game of chance that tests one's knowledge in discerning treasure from trash. In the shell game, only a few can tell the score without a field guide.

The most serious collectors are called conchologists, "conch" being Greek for "shells." Conchologists play the game by gathering, identifying, labeling, storing and displaying the hard limy outer skeletons which housed soft-bodied creatures called mollusks.

There are about 100,000 species of the phylum Mollusca (Latin from "mollis" for "soft") and each creates a shell

unique in shape, size or markings from that of any other species.

Of these mollusk species, nearly 300 have been recorded in South Carolina's coastal estuaries and shallow marine waters. While most are less than one inch long, at least 30 common species are larger and suitable for collection. Most of these are gastropods (snail-like) and bivalves (clam-like), with some exceptions being the sand dollar, starfish and sea urchin. These three shells are not mollusks; they belong to the phylum Echinodermata (Greek "echinos" meaning "hedgehog" and "derma" meaning "skin").

A horn-like substance, concholin, connects thin layers of calcium to make up a shell. The mantle, an organ unique to mollusks, has minute glands which secrete liquid to the growing edge or lip

of the shell. This liquid hardens into the shell. With these secretions come patterned colors inherited through millions of years. Damage to the external surfaces is irreparable, but breaks or fractures at the lip can be mended as the shell is enlarged.

Shells are usually worn and broken from the grinding and pounding of waves. Bivalves usually separate into halves as the hinge material decays after the animal's death. When mollusks die, especially the soft-bodied clams and snails, their bodies decay rapidly, producing a chemical. This chemical and the sea water disintegrate the shell and its colors. The quahog clam's interior dark purple blotch fades to light blue and the bright red or orange of the living knobbed welk (often called a conch) changes to a milky pink or yellow.

Shells are not randomly distributed. Each of the living animals has specific requirements linked to a combination of salinity, bottom type, tidal flow, current and competition with other species. An ample supply of food is perhaps the most decisive factor.

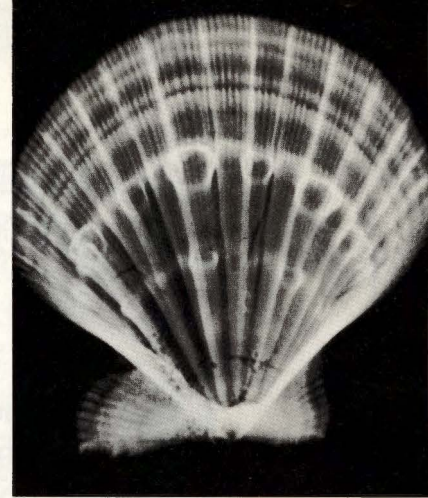
The estuaries, inlets and adjacent marshes in the southern end of our coast provide a much more abundant food supply than the more northern beaches of unbroken sand. The further from an inlet one wanders, the fewer shells one is likely to find and the worse their condition. Storm tides may wash many species ashore, but the inventive shell seeker must be willing to wade and boat along the shoreline and across the shallow sand and mud flats of bays and inlets to pick up the greatest number of native species.

All bivalves and some gastropods are plant-eaters (herbivores), filtering plankton from the water or, as in the marsh periwinkle, scraping algae from the stems of spartina grass. Large gastropods like the whelks, shark eyes and tulips are meat-eaters (carnivores), feeding on young and adult bivalves, smaller snails, dead flesh and each other. Plant-eaters are usually more common on particular bottom types and depths while the carnivores may range over a wider variety of areas ranging from the intertidal zone along the shore to depths of 75 feet.

Mollusk habitats can be divided into two main zones—estuarine and marine. Typified by reduced salinity, estuarine zones are areas of high stress. Shells are often numerous, but the number of different species may be limited. Each species must have an area that meets its needs.

Oysters, for example, cannot tolerate normal sea water or the slow currents of inside creek bends where sediment builds up. They are most abundant in estuarine creeks and inlets where salinity is less than the open ocean and fast currents prevent high sedimentation. Intertidal oyster populations, those living on the shore between high and low watermarks, are kept under control by a predator known as an oyster drill. The oyster drill makes a hole in the shell and sucks out its juicy occupant. Oysters in deep subtidal waters are controlled by another gastropod predator closely related to the intertidal oyster drill.

The depth, the salinity of the water and the geological structure of an area



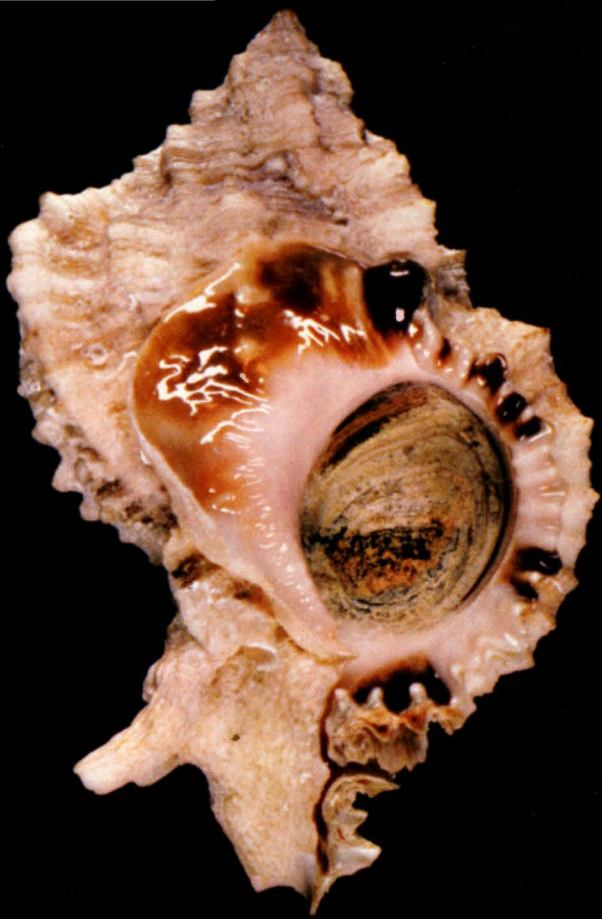
Common South Carolina Shells

Location	Univalves (clam-like)	Bivalves (snail-like)
Subtidal zone	common eastern nassa, variable nassa, New England nassa	blood ark, ponderous ark, giant Atlantic cockle, yellow cockle
Open beach	shark eye, American auger	rigid pen shell, half-naked pen shell, channeled duck clam, coquina
Salt marsh	periwinkle	common oyster, Carolina marsh clam, Atlantic ribbed mussel
Near inlets	channeled whelk, knobbed whelk	alternate tellin, disc dosinia, northern quahog
Intertidal		Atlantic jackknife clam, green jackknife clam, stout tagelus
Mud flats	Eastern mud nassa	macoma
Oyster bars	banded tulip	
Attached to other shells or coral	slipper shell	winged oyster

The above shells are members of the mollusk phylum. Also common to our waters are two members of the echinodermata phylum: the sea urchin, found near inlets, and the sand dollar, often seen on the open beach. Some rarer univalves are the lightning whelk, the lettered olive, the true tulip and the apple and giant Atlantic murexes. A guide to shell identification is available as part of a three-volume set, which also includes guides to birds and trees. Send \$15.41 (which includes postage and handling) to *South Carolina Wildlife*, P.O. Box 167, Columbia, South Carolina, 29202.



Lion's Paw Scallop



A. Apple Murex



B. Channeled Whelk



C. Lightning Whelk



D. Giant Atlantic Cockle

determine where a certain shell is likely to be found. A clam species, the northern quahog, can be found between high and low tide marks, while disk shells live below the low tide mark. In contrast to the northern quahog clam, the Carolina marsh clam may be found by the thousands at the edge of the marsh, where salinity is at a minimum.

Subtle variations in the bottom, food sources and currents will suit one species better than any other and for this reason a marsh or ocean habitat can be home for a single shell. Thus, the giant Atlantic cockle is abundant on the land side of inshore sandbars where it is protected from strong currents or breakers. The other side of the bar is better suited to the channeled duck clam.

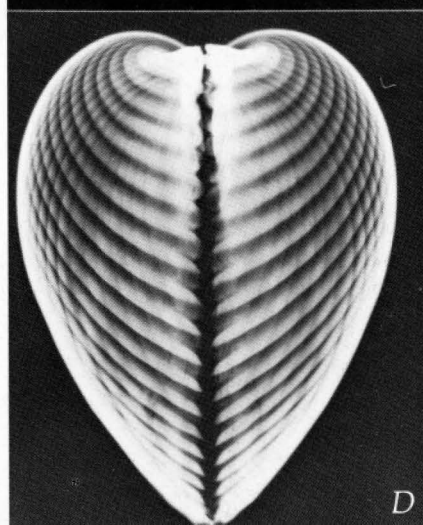
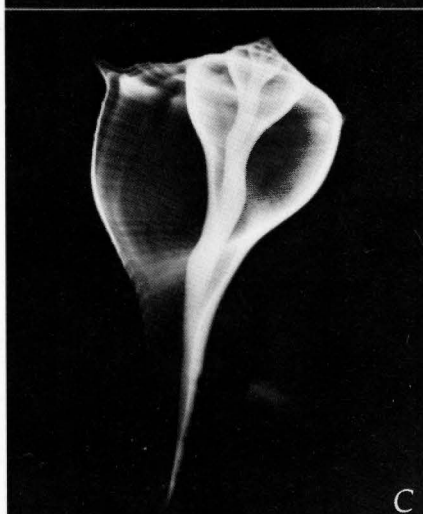
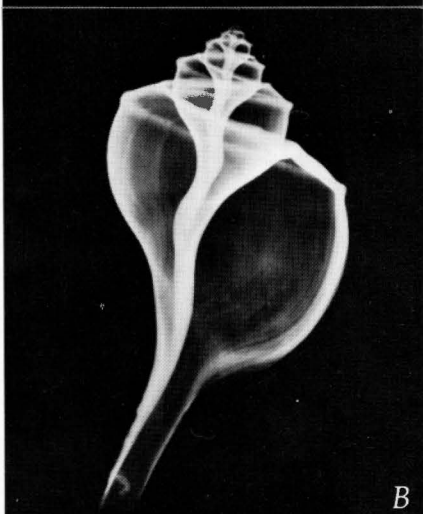
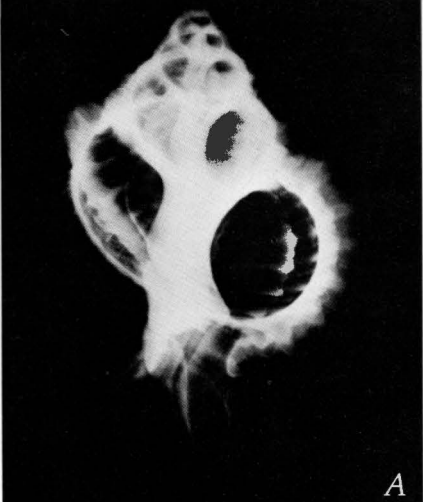
Carnivores, of course, can be found where their prey also are present. Therefore, the common Atlantic augur is abundant near shallow inlets where worms are available and whelks are most common near clam beds.

Inshore wrecks and the recently constructed artificial fishing reefs harbor large groups of marine invertebrates not normally found inshore on sandy bottoms. Carnivorous gastropods like apple murex and giant Atlantic murex favor these reefs. Their shells occasionally appear on beaches adjacent to these reef sites.

Weather conditions, time of day and season can also greatly influence the number and variety of shells available. Strong tides may bring normally subtidal species inshore. Fall and winter are good seasons as competition is minimal, but an early spring or summer morning, before many vacationers are about, are considered the best times for shelling.

The successful sheller must be innovative. Remote or island waters can be visited by boat; trained divers may investigate the offshore wrecks. Those in search of nocturnal species can use lights when inlet tides are low.

Many vacationers visiting South Carolina's northern beaches find few shells along the stretches of hard-packed sand. Competition there is stiff and the lack of a nearby estuarine food source greatly limits variety. Not far to the south, however, in Georgetown County, are several large inlets and estuaries plus Huntington Beach State Park. Beachcombing in



these areas or boating across the shallow flats is very likely to be productive. The nearby marsh is the main difference.

Further to the south in Charleston County are numerous bays, inlets and nearby marshes. Boat launching facilities are available and tidal schedules should be consulted to have access to shallow water for as long as possible. Areas in Bull's Bay and Edisto Inlet are good and chances of seeing many species are high. The same is true for Beaufort County, especially among the myriad of coastal islands.

Most shells picked up on the beach no longer have the animal inside. Cleaning such specimens requires little more than rinsing in warm water to remove sand and traces of salt, then leaving the shells to dry for a day or two. Some prefer to use acid or bleach for cleaning each shell to gem-like perfection.

If the animal is still in the shell when collected, the flesh must be removed and the shell deodorized before it can be displayed. Bivalves open quickly if placed in cool water and brought to a boil. The animal may then be scraped out. For gastropods, the shell may be boiled briefly and the animal removed with a fishhook or tweezers. Larger gastropods may need longer boiling periods before attempting to remove the animal. For small snails, soaking for a week or two in a 20 percent alcohol solution will dehydrate and preserve the tissue.

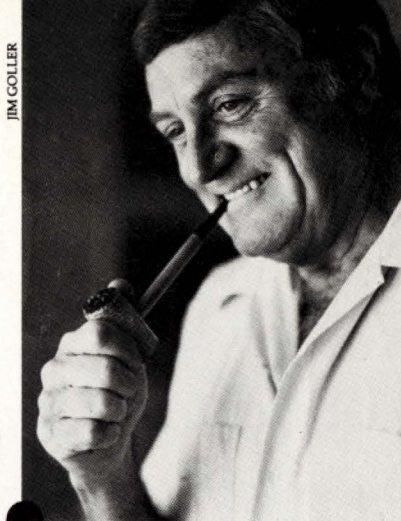
Gathering and preserving shells is easier in many ways than identifying them. The longer one plays the shell game, the more discriminating the collector at selecting individual shells. A good field manual is essential for identification.

Shell collecting as a hobby is kept alive by the allure of discovery and the uncomplicated rule of "finders, keepers." And what is found may be rare, if not to the world or another collector, then, perhaps to the individual collection.

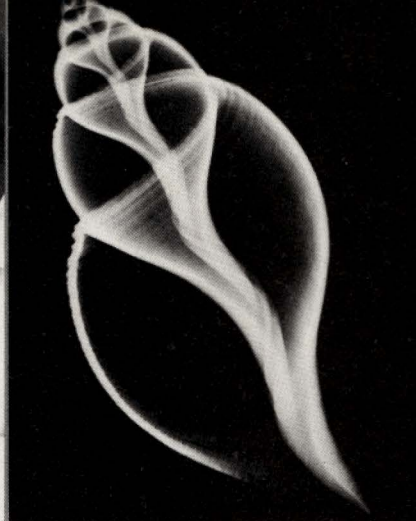
Man has searched for, collected, admired and valued shells probably since his beginnings. France's Cro-Magnon man traded exotic shells 30,000 years ago. Aristotle kept a large collection. They have been used as decoration, currency, a medium of exchange for human slaves, fertilizer, material for clothing and as a source of dye. 🐌

"And some of the plainest on the outside were the most fascinating on the inside."

Inner Dimensions



JIM COLLIER



Four years ago, Bill Conklin combined a career in radiology with his hobby of photography and a curiosity about the internal structure of seashells. The dramatic results brought national recognition to Conklin as an author, lecturer and exhibitor, and to a new art form he terms "God's art" to the world.

A 1947 graduate of Roper Hospital School of X-ray Technology in his native Charleston, Conklin accepted the position of chief radiologic technologist at Orangeburg Regional Hospital in 1952. Conklin's work with shells evolved almost by accident from a fishing trip to Florida's Sanibel Island.

"My family and I had been going to the coast each year for a little relaxation, shelling and fishing." Conklin's speech exemplifies his high-speed energy. "Well, when the fish didn't bite, I'd join my wife and children on their shelling trips, and, at the end of each day we'd sort, size and classify the shells. The shells were so beautiful that gradually they got me interested in shelling and conchology in general.

"I've always been fascinated with the structure of things," he grins, "and though I'd X-rayed the shells many times over an eight-year period, I wasn't impressed with the results, primarily because I hadn't taken the time to study the anatomy of the shells before making the radiographs. It wasn't until 1975, when a friend, on Sanibel, who is a conchologist and artist, showed me her painting of a cross-sectional study of the chambered nautilus, that I realized the potential of shells as an art form. Her nautilus, done

in white on a black background, was to me what I would see if the shell were X-rayed.

"I bought a nautilus, reproduced the artist's conception, using radiography and photography, and from this evolved my unique studies of the inner dimension of the shells.

"What I found was absolutely gorgeous—unbelievable! And some of the plainest shells on the outside were the most fascinating on the inside. They're a lot like people in that respect."

Since radiographing the nautilus, which is still his favorite, Conklin has been hooked on shells, perfecting along the way special processes for X-raying the shells. He also developed a self-designed illuminator for photographing the X-rays without "hot spots;" and, since most of his photos are accompanied by a color print of the shell's exterior, he designed mounting and lighting devices for photographing.

New shells are sized, grouped and studied by X-ray to determine which have the best inner structures and to eliminate those that have cracks and abrasions. A dozen of one species may be radiographed to find the one nearly perfect specimen for his artwork.

Most of the work is done in his home, often with the assistance of his wife Elizabeth and children, Liz, Patti and Chip. "I guess the thing just took over the entire house," Conklin says, "but the wife and kids don't mind. In fact, Chip has become so involved with the shells that he goes with me on most lectures. He knows more of the shell names than I do."

Don't let the twinkling eyes and mischievous smile fool you—Conklin

knows his work. He has photographed and X-rayed well over 100 species of shells from around the world. In July 1978, the National Museum of Natural History, Smithsonian Institution, held the first exhibition of 55 of Conklin's studies. Reaction was favorable and the exhibit was accepted for permanent display in the Halls of Mollusks at the National Museum.

In April 1979, through the Association of Science Technology Centers, Washington, D.C., 50 of Conklin's framed photographs began a two-year tour of science museums throughout the country. Again, public reaction was favorable and the exhibit has been booked through July 1981.

Conklin has also lectured on his artwork at the Smithsonian, and to scientific and civic groups throughout the country. This July, he will be the banquet speaker at the annual meeting of The American Malacological Union in Louisville.

Conklin is presently working on 50 new shell varieties as well as a collection of radiological photographs of other forms of sealife. "I get some pretty weird reactions when I go into a restaurant and order something like a small live lobster to go in a box," he chuckles. "And Elizabeth still doesn't know what to expect when she opens the refrigerator. But the shells offer almost unlimited variety. They're my main love. I intend to photograph every one of them, if it takes me until I'm 200 years old."

For a brochure on Conklin's photography, write Inner Dimension, 1571 Marshall Ave., Orangeburg, S.C., 29115, or call (803) 534-8980. 🐚

Bill Weekes is a free-lance writer in Spartanburg and Allen Shoemaker is a zoologist at the Riverbanks Zoo in Columbia.



True Tulip

Blue-winged teal and pintails are only a few of the ducks which winter on the Yawkey Center ponds. A large flock of Canadian geese also returns to the area each year. Right: Trees form a living tunnel over "Down Below," a 100-year-old dike road leading to the southern portion of the South Island refuge.



TED BORG



ART CARTER

Yawkey Center refuge for today; research for tomorrow

by Julie Lumpkin

The Goose Pasture area was busy with activity as we drove in the department truck on the causeway from Cat Island to South Island. Hundreds of ducks and geese were hobnobbing about, fussing with their neighbors over patches of green winter wheat and clover and tasty bits of corn.

Sim Grady, a Yawkey Wildlife Center technician, pointed to a group of birds which stood out among the rest. "Those big white ones are whistling swans. Had 52 here this winter—that's just five less than the total number sighted at the center in the last 20 years.

"Usually they stay over in the big impoundment on South Island. They really seem to enjoy it here—we hope they'll keep coming back."

We turned down a side road and stopped near the field to get a closer look. As the truck stopped, the swans rose up on deliberate wingbeats and sailed to another part of the 500-acre field. As if in orchestration, dozens of Canada geese followed, as did hundreds of mallards, black ducks, pintails and a sprinkling of widgeon. It was a beautiful sight, but one that is an everyday occurrence at the Tom Yawkey Wildlife Center.

"Where would these birds go if they couldn't come here?" I asked.

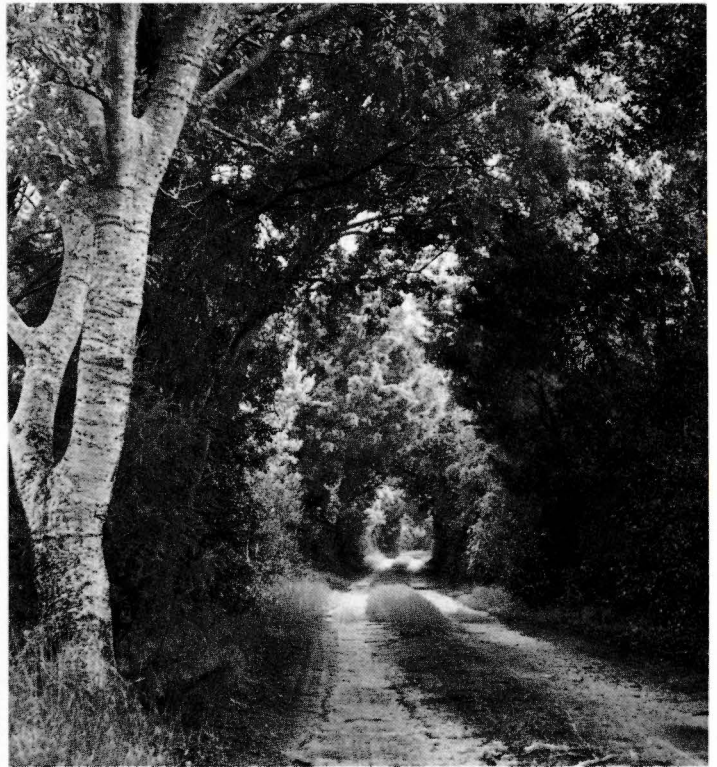
"Don't know. That's the value of the place. There's no hunting here, but more and more folks are realizing what this refuge means to the birds and the future of waterfowl."

With those words, Sim had stated the purpose of the Yawkey Center. Tom Yawkey, owner of the Boston Red Sox baseball team for 43 years, died July 9, 1976. His will made a bequest of the center to the wildlife department, that it be held in perpetual protection for the purpose of continued wildlife management, conservation, education and research. Although it is dedicated to the enhancement of all wildlife harbored within its boundaries, it is principally committed to managing habitat for large numbers and varieties of wintering waterfowl. To ensure these goals, Yawkey provided a \$10 million trust fund to the center trustees, who may grant up to one half the fund's annual income for the property's maintenance, operation and numerous research projects.

The center's project leader is Bob Joyner, a biologist with the state wildlife department for 14 years. Sim dropped me off at the center headquarters on South Island to see Joyner, whose enthusiasm for the center and his work is immediately evident in his every word.



Thomas A. Yawkey



TED BORG

"One important point about the center," Joyner remarks, "is that the staff and the technicians—Sim, Wyatt Cannon and Charles Jernigan—are very enthusiastic about the area. The level of accomplishment is the best I've seen in my years with the department.

"The center works well also because of the three trustees. Mrs. Yawkey is very much interested in wildlife and the center's purpose as outlined in her husband's will. Joe La Cour has the legal and financial training to make things work at that end. And as a wildlife biologist himself, Bill Baldwin sees the needs of the resource and ongoing management, so he can tell how the Yawkey Foundation can best assist the center's activities. As a project area within the Division of Wildlife and Freshwater Fisheries, we also get a lot of support through the department's many wildlife specialists."

A visitor to the Yawkey Center may not fully appreciate the wildlife refuge without first understanding its geography. The center is composed of three coastal islands in Georgetown County, South Island and parts of Cat and North Islands, all of which lie at the entrance to Winyah Bay. The bay is a classic estuary fed by the Sampit, Black, Pee Dee and Waccamaw Rivers and flushed by the Atlantic.

Currently including more than 13,000 acres, South and Cat are essentially parts of the same land form, now separated by Mosquito Creek and Miller and Rockfish Canals. Like locked puzzle pieces, South Island fronts the Atlantic while Cat Island takes up the rear, extending behind South to the Intracoastal Waterway. From South Island, the North Island property lies across the bay's entrance and runs the length of the beach to North Inlet. Its 4,500 acres of barrier beach, maritime forest and salt marsh join along Jones Creek the Belle W. Baruch Institute at Hobcaw Barony.

The center's three islands embrace nearly 20,000 acres of protected marsh, impoundments, forest and beachfront, where hunting is prohibited, but visitation for education and research is welcomed by prior arrangement with the project leader. Representing land in various stages of use, some of the property remains in its natural state, some has been historically manipulated for rice or waterfowl, while other land in recent years has been managed to enhance wildlife populations.

Whether the landscape is undisturbed or manipulated, the Yawkey Center has never lacked an extraordinary abundance of wildlife. The tens of thousands of ducks, wading birds and shorebirds; the high concentration of endangered species such as eagles, alligators and sea turtles; one of the few pure strains of southeastern wild turkey, and the ever-present white-tailed deer lend undeniable credence to the center's reputation as one of the finest wildlife refuges in the country. Rare seasonal visitors including white-fronted geese, black-necked stilts, avocets and a lone western white pelican underscore the excellence of the refuge.

On North Island, designated a wilderness area under the terms of the will, marine life, birds of all kinds, furbearers and game animals thrive within one of the few undisturbed barrier islands on the East Coast. On Cat Island's 5,000 acres, game is intensively managed within the pine-hardwood forest, planted wildlife openings and waterfowl impoundments. South Island's unspoiled beach and maritime forest provide habitat variety for game and non-game species including over 3,000 acres of marshland formed by about 50 miles of dikes.

Within Cat Island's pine ridges and alternating low-lying

hardwoods, 35 small fields make food supplies more available to deer, turkey and quail. Waterfowl management on Cat focuses on planted crops grown especially to attract Canada geese and mallards to the center's Goose Pasture and adjacent freshwater flats managed for smartweed.

Designated by Yawkey as "the inviolate waterfowl area," South Island's 13 widgeon and muskgrass impoundments gather thousands of ducks each year, including mallard, pintail, gadwall, widgeon, coot, blue- and green-winged teal, black, shoveler, canvasback and ruddy duck. Normally South Island's sustained winter population varies between 35,000 and 40,000, but past records show that duck and geese populations have peaked at over 100,000 in December.

Although the center occupies a prime spot on the Atlantic Flyway and is blessed with rich natural resources, the large numbers of waterfowl also are due to sound and innovative management practices started by Tom Yawkey and followed through by department biologists. A Yale graduate, avid outdoorsman and self-taught ornithologist, Yawkey learned many management techniques through experimentation. He was often known to say, "Folks don't need book learning. They got their common sense."

Yawkey learned from observation too. Sometimes rising before dawn, he would spend hours roaming the refuge every day, taking notes on all he observed, from changing weather to needed repairs to animal behavior.

Yawkey biologists use book learning combined with observation and common sense to discover new and better ways to improve the habitat quality of wildlife populations. Waterfowl management emphasizes improving food management techniques, since the main goal is to create more abundant and dependable food supplies to assure the annual migrations of ducks and geese to our coast.

The center's primary duck food has been widgeon grass, a plant generally liked by all species—especially widgeon, gadwall and coot. But recently discovered plants which have great merit as duck foods are also being grown to expand the numbers that are already there and specifically to increase populations of canvasback, redheads and other diving ducks that have dwindled on southeastern waterfowl refuges.

In some cases, the habitat setting is more important than the food. For instance, in the sixties Yawkey created a system to hold a large body of water with tidal flow and a shallow water level over a higher brackish marsh. The wildlife department's mottled duck introduction program is successfully using this system as one of its sites. (These ducks appear to be reproducing successfully far from their Florida and Gulf Coast origins and may provide South Carolina with another year-round species like the wood duck.)

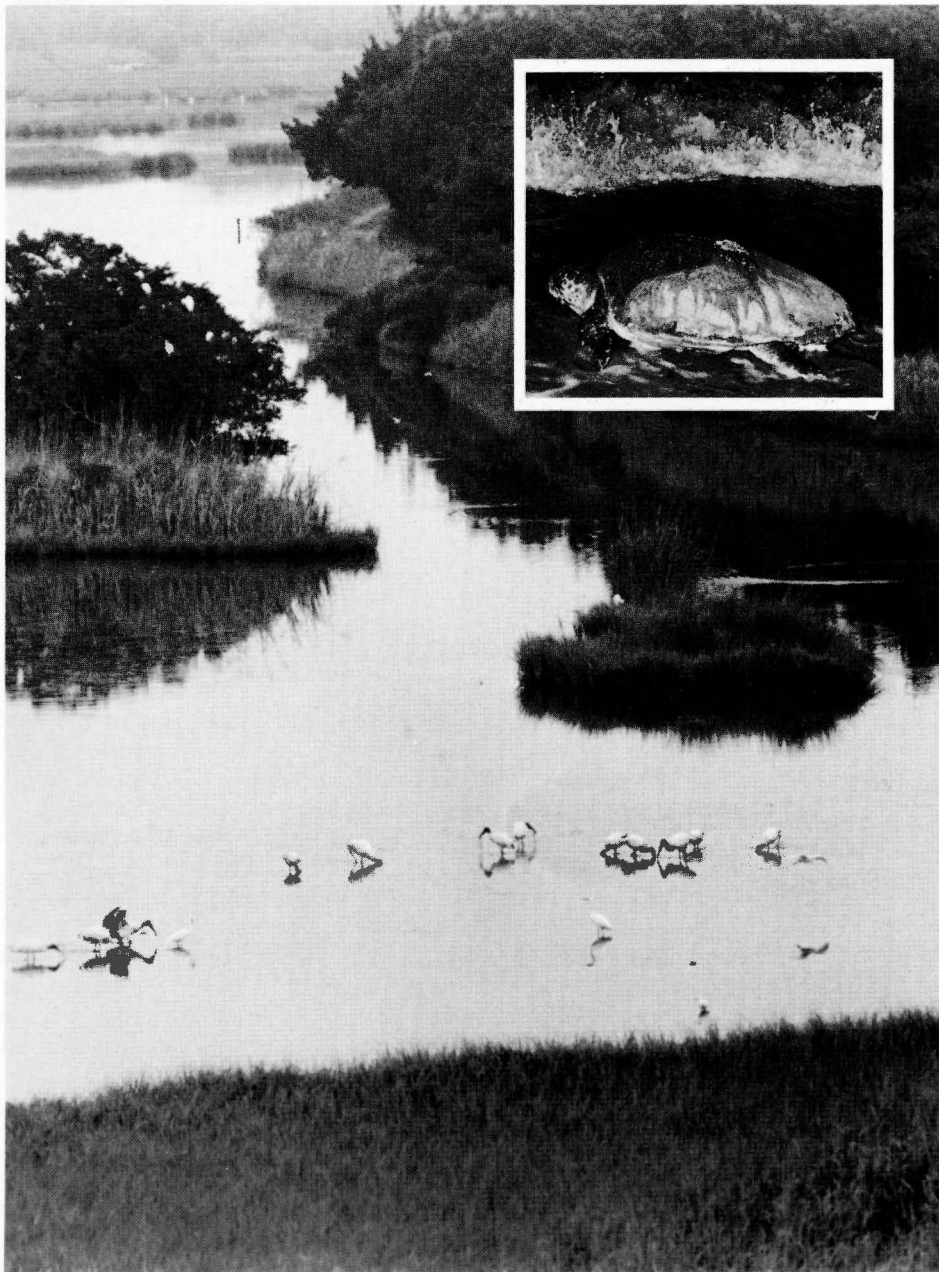
New research is being conducted, including a comparative study of widgeon grass, muskgrass and sea purslane and another scheduled study will compare three management techniques for growing widgeon grass with sea purslane and possible double crops of widgeon grass in the same growing season. Planned investigations into the establishment of Gulf Coast muskgrass and sea purslane into new areas may aid other waterfowl areas in taking advantage of these highly relished duck foods.

The potential for conducting applied research in wildlife management or natural systems at the Yawkey Center is nearly unlimited. For instance, in the current study of its deer populations, the center can take advantage of a unique situation by comparing the behavior and movement of Cat's

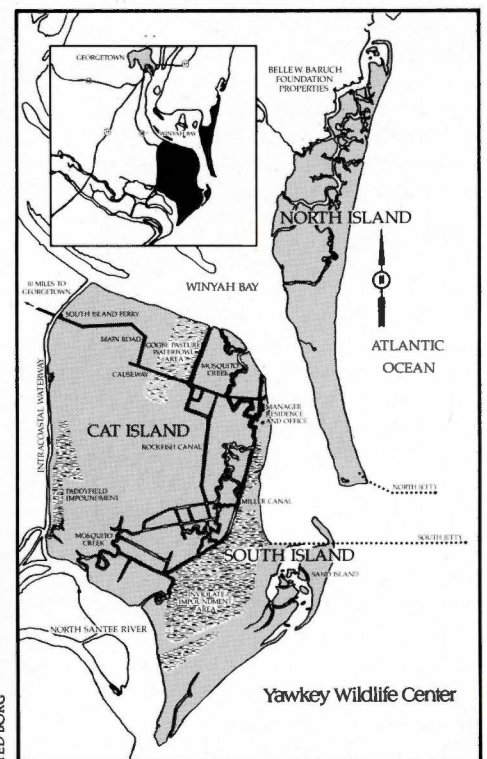
managed deer, South's food-supplemented deer, and North's unmanaged deer. Study results will bear directly on the sportsman who can better select his best chances for seeing deer. Wild turkey research and restocking sources also are assisted by the center.

Beyond game management, the Yawkey Center offers unparalleled opportunities for non-game and endangered species research. Although the center is probably best known for its waterfowl numbers, the food sources afforded by its protection policy and managed impoundments actually provide far more to shore and marsh birds. Center population levels for such endangered or threatened species as the bald eagle, the Eastern brown pelican, red-cockaded woodpecker, loggerhead sea turtle, osprey and alligator are also significantly high for the state.

As part of their overall coastal survey, the wildlife department's non-game and endangered species biologists observe activities of the above species as well as other birds of prey, reptiles and nesting colonial, sea and marsh birds. These



Wood ibis and other waterbirds find food and rest on the center's impoundments such as the "Upper Reserve," part of a 1,700-acre "Inviolable Waterfowl Area" assuring solitude in a protected setting. Loggerhead sea turtles are one of the many endangered and threatened species which seek nesting sites and shelter on the center's 20,000 acres. The map below shows how the center spans both sides of Winyah Bay, providing an important part of the Georgetown area's coastal wetlands.



TED BORG

include the Carolina diamondback terrapin, canebrake rattlesnake, eastern narrow-mouthed toad, golden eagle, peregrine falcon, great-horned owl, great blue heron, black skimmer, Wilson's plover, clapper rail and gallinule.

An example of endangered species research includes a three-year study of loggerhead sea turtle nesting activity on the South Carolina coast. The Yawkey Center has one of the highest nesting rates, including 100 nests per season at North Island, 150 nests each season at South Island and 250 nests a season at Sand Island (a sand spit off South Island's beach). Nesting behavior is being evaluated so biologists can determine why the loggerhead turtle is endangered and how we can help it recover. Part of the study will attempt to identify what portion of the state's total loggerhead nesting population comes to the Yawkey Center because it is undeveloped.

As an undisturbed population over several decades, the center's mature alligator population also offers a model group for studies in behavior and management. Biologists are collecting reproductive data on the adults which will enable them to census the center's population. By comparing

this population to others, biologists can make recommendations on how many can be safely taken from any state location, should such a harvest ever be warranted.

If the Yawkey Center is unsurpassed in its abundant wildlife, its quality is still only as good as the water systems which support it. Because the wildlife and marine life depend on water quality for their high population levels, water sources from the Santee River and Winyah Bay must be kept free of chemical pollutants and damaging changes in sediment deposition or salinity levels. In addition to the thousands of acres of managed wildlife area, about 10,000 acres of open salt marsh contribute to the area's excellent shrimping, oystering and saltwater fishing.

The Yawkey Center is the northernmost link in a chain of sanctuaries and management areas in a continuing 60-mile stretch of coastline in Georgetown and Charleston Counties held in public ownership by the state and federal government. Protected for their valuable natural resources, the Belle W. Baruch Marine Institute, Santee Coastal Reserve, Cape Romain National Wildlife Refuge, Capers Island and Francis Marion National Forest, combined with the Tom Yawkey Wildlife Center, comprise perhaps the most priceless wildlife system on the Atlantic Coast.

In 1977 South Island Plantation became the Tom Yawkey Wildlife Center. As Joyner takes me back to the South Island Ferry, I ask him to stop at a marker erected at the gate of the center's headquarters. Below the center's name and a bronze bust of Tom Yawkey are these words: "In dedication to the memory of Thomas A. Yawkey whose spirit of generosity and dedication to wildlife conservation is reflected in his invaluable gift of North and South Islands to the people of South Carolina. Through this gift a significant portion of South Carolina's wildlife and natural heritage will be preserved for posterity."

Upon inheriting South Island Plantation from his adopted father William Yawkey, 16-year-old Tom Yawkey said, "I hope I'll be able to do some good with it. I hope I'll be as good a man as my Dad." Tom Yawkey invested years of his life in his wildlife refuge.

As a businessman, he brought the best management techniques to improve the area for waterfowl and other wildlife. As an outdoorsman, he first used his retreat as a private hunting reserve, then as a wildlife observatory and research center. As a man who loved wild animals, he was more a benevolent guardian, creating a protection policy first for the benefit of wildlife—and then for the secondary benefit of man. At the time of his death when he was 73, South Island Plantation was a total sanctuary where man acted as observer and facilitator, but remained in the background in harmony with his surroundings.

Because Yawkey invested only in those things he considered worthwhile, he didn't view the future of his beloved retreat lightly. He wanted his wildlife management practices maintained and research fostered in new techniques. He wanted wildlife enhanced and enjoyed during his lifetime and in future generations. He wanted his refuge unaltered to continue as a sanctuary preserved for all time.

Yawkey provided South Carolinians with one of the nation's greatest wildlife legacies. The gift was a compliment and a challenge to honor his trust exactly as he intended. 🐾

A writer in the information division, Julie Lumpkin is responsible for the production of brochures, booklets and other printed matter for the Wildlife and Marine Resources Department.

To Visit the Center

Recognizing that the abundant wildlife can largely be attributed to man's infrequent disturbance, the center's research and visitation policy is primarily based on the management precedent set by Yawkey. Visits to the property should relate to one of the four purposes to which the center is dedicated. Individuals and groups are welcome for:

1. Approved research
2. Educational field trips
3. Wildlife observation
4. Conservation management study

Research

One of the basic objectives of the Yawkey Center is to conduct research designed to preserve, maintain and improve conservation and wildlife management techniques. Academic institutions, government agencies and natural resource-related organizations or individuals are encouraged to submit proposals for projects they wish to conduct at the center. Send to: Executive Director, South Carolina Wildlife and Marine Resources Department, P. O. Box 167, Columbia, South Carolina, 29202.

For further details on submission procedures, contact: Project Leader, Tom Yawkey Wildlife Center, Route 2, Georgetown, South Carolina, 29440.

Visitation

1. Since the tour van's capacity is 14 people, group size is limited to that number. Larger groups should consider requesting additional dates.
2. No more than one group per week may be scheduled.
3. Visits may not exceed one-half day—select either a weekday morning or afternoon outing for guided tour or observation blind assignment.
4. Visitation requests should be made to the project leader at the above address 30 days in advance if possible.

Remember that the center is not accessible by land. Visitors must make arrangements with the project leader to meet the South Island Ferry. Once on center property, a guide will accompany your group and provide transportation. Individuals may also visit the center for special purposes. Prior approval must be obtained from the Director, Wildlife and Freshwater Fisheries Division, South Carolina Wildlife and Marine Resources Department, P. O. Box 167, Columbia, South Carolina, 29202.

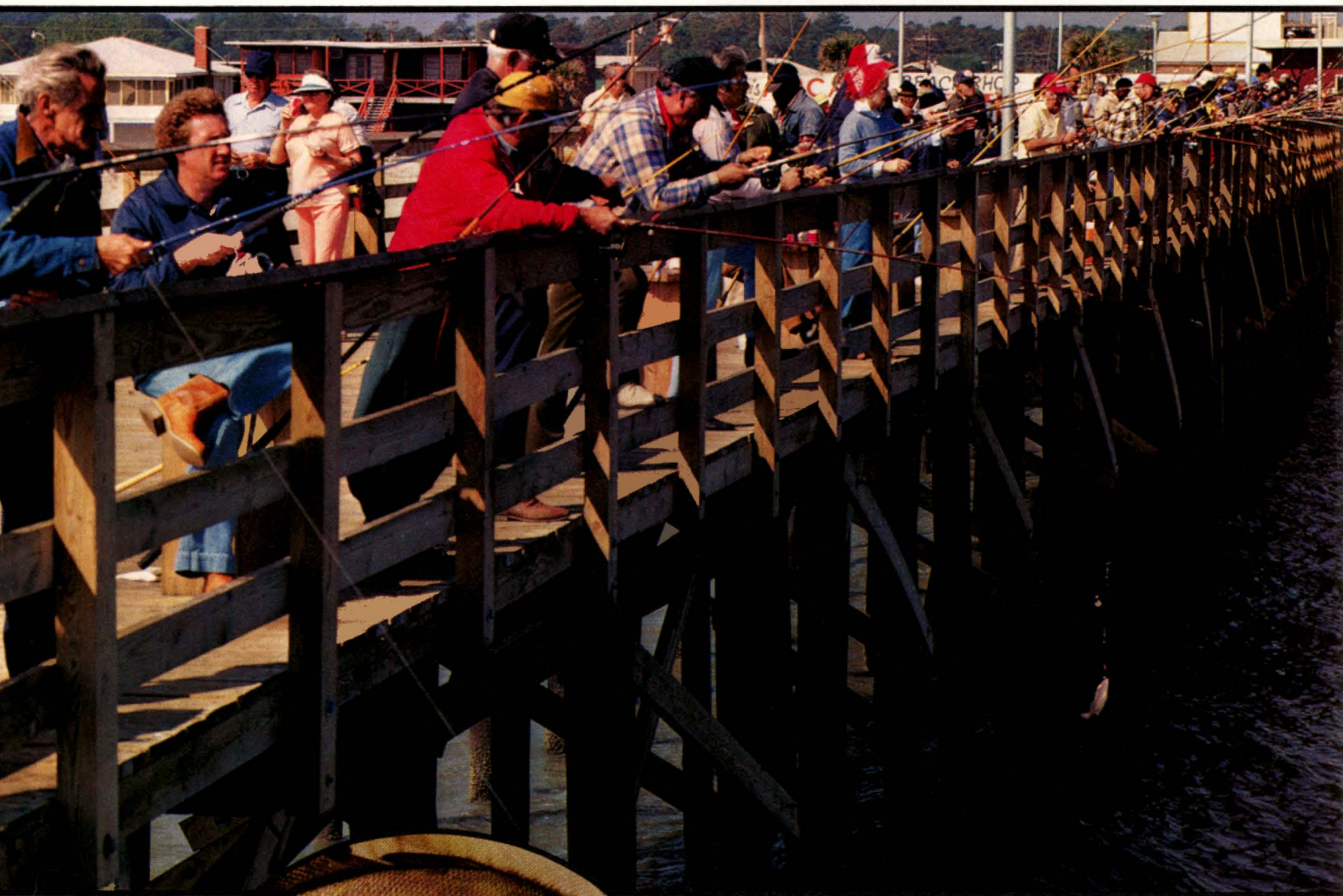


LARRY CAMERON

Visitors to the center are often surprised by the sight of elusive game species such as this whitetail or by the beauty of others like this purple gallinule striding over a lily-padded pond.



TED BORG



by Donald Millus

the spot



From Cherry Grove Inlet near our North Carolina border to the lagoon behind Hunting Island near Beaufort, a saltwater panfish averaging less than half a pound is probably fished for by more South Carolina anglers than any other marine fish.

No world records are kept for the spot. The South Carolina record for this fish is barely over a pound. Yet this silvery relative of the croaker, marked by a black spot just behind its gills, provides recreation and food to people who wouldn't dream of pursuing our plentiful flounder, sea trout and channel bass or such dramatic game fish as sails, swordfish and marlin. The spot is easy to catch, abundant and tasty.

Spots range along the Atlantic Coast, but prefer waters south of New Jersey. Faint yellow stripes and flashes of blue among the silver make it a pretty fish. Its mouth is small and always hungry.

Though spots range far out into deep water, they provide sport for anglers from our beachfront piers and through coastal inlets from spring until after Thanksgiving. Huge schools move along the South Carolina coast in fall, and to a lesser degree in spring. They feed in water from three to 15 feet deep. When spots are in, they are in hungry competition with each other, and anyone who tries will usually catch them.

Tackle is no great expense for spots since the same freshwater spinning, spincast or bait-casting outfit used for bass, catfish, or crappie may be used for spots. Even a handline will do, although everyone on the piers in North Myrtle Beach, Myrtle Beach and Surfside will be using some sort of rod and reel. Two or three small hooks, size 4, 6 or 8, depending upon the size of the fish in the

school, are tied to monofilament line on short loops a few inches up to a foot above a one- or two-ounce sinker. With six- to 10-pound test line, there is no need for a leader. Baits are as simple as the rigs.

Young spots feed on plankton, but as the fish develop, they move along the bottom into the marshes feeding on crustaceans, worms and even small fishes. Shrimp, because of their availability, are the most popular bait on the piers, followed by bloodworms and ordinary earthworms. Small pieces of a fileted fish also work at times. Hard-shelled clams seem to be the best bait, at least for the inlets.

When the fish move in, word spreads fast. Anglers of all ages fish elbow to elbow. Whole families may line a small stretch of pier railing, sending one member of the tribe out for hot or cold drinks, depending upon the weather, or for fresh bait, if the fish are hitting in great numbers.

The word "tribe" is particularly fitting for spot fishermen since there are whole family groups of American Indians who make annual autumn spot fishing expeditions to the pier at Cherry Grove. The fall run of spots brings representatives of every segment of society to the piers and inlets of South Carolina. Those who lack the patience to fish for other species cast out their lines when the spots come in.

Inlets are as crowded with boats as piers are with people. But the fish are

usually so abundant that anchor lines tangled with leaders and hooks are of little consequence. Areas such as Murrell's Inlet and the "Cabbage Patch" just north of Charleston are filled with small boats and happy anglers during the peak runs.

Those with access to neither pier nor boat still have a good deal of spot fishing available on the shores of the smaller inlets and tidal creeks. Backdrops of palmetto trees and myrtle bushes with the rippling golden green of spartina grass make for a perfect day on the water. The possible distraction of biting insects such as mosquitoes and no-see-um's can be lessened by a good application of insect repellent.

Spot runs last for eight months in South Carolina, but the best fishing occurs in October and November. These are also some of the best days to be on the coast: bright, brisk, with a feeling of fall in the sunny air. With the ease and economy of spot fishing, the sport it provides on light tackle and its taste in the pan, the spot is a fish for everyone. When there is a strong run, the angler has only to flip out his baited hooks, tighten up on the line and wait for the hard tap-tap that signals one of the hungry bottom feeders striking again. 🐟

Donald Millus is an English professor at Coastal Carolina College and recently authored "A Contemplative Fishing Guide to the Grand Strand."

Our Restless

Ever changing, they guard our southeastern shore from the rush of sea and hide their residents from mainland civilization. Barrier islands offer refuge for both man and beast, but the power of the ocean resists man's own attempts to control them.

by Bill Thomas

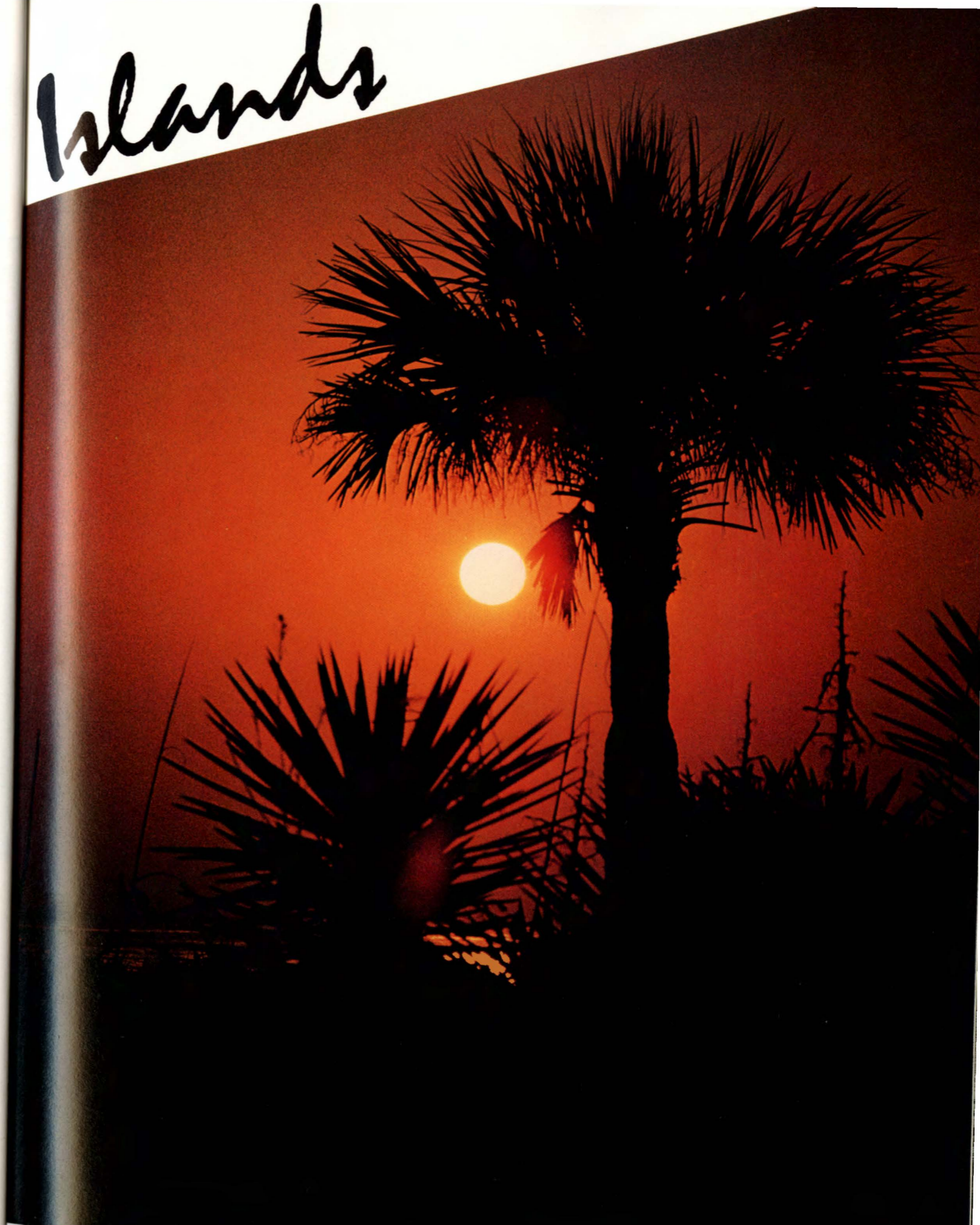
Along South Carolina's fragmented coast lie islands nestled close to the mainland like eaglets drawn to the mother nest. Because they extend along a line from southwest to northeast, they are diametrically opposed to the trade winds and the broad Atlantic's southern storm track and, as a result, are among the most geologically unusual barrier islands of the East Coast.

Peril is part of an island's ecology; the ocean consistently adds dimension to its shores. . . or tears it away. The continuous surge of moving water is the greatest power on the planet. Wherever the oceans touch an island, a massive battle is in progress—a conflict between mass and liquid. Sometimes it is subtle, sometimes violent. The degree is always fluctuating. And the water invariably wins. The drama produced by such adversaries as a molecule of water, a grain of sand, a particle of rock is, without question, one of the greatest performances in nature. And yet the transformation is so slow it goes unnoticed by all except those who study such things.

South Carolina's islands are shaped like whales with their mouths closed, whales with their mouths open, swordfish, uncarved turkeys or a piece of pie that someone has pinched. Their configuration is endlessly carved and molded by the relentless wind and waves. Some are built on the ocean floor, swept up by the currents and added to by the winds once they rise above the water's surface. Others are dissected from the mainland by sloughs and guts created by currents and storms from the ocean as well as drainage waters from the land. Some are newcomers, created only yesterday or last year or a decade ago by ocean storms or silt-laden river deltas. But all of them share one basic element: they exist under the domain of the sea.

It is difficult to establish a definition of an island—or to cast them in a single

Islands



Our barrier islands serve as buffers between mainland and sea. Massive dunes on Hunting Island's northern end form an almost surrealistic scene sculpted by wind and tide in the island's first defense against the reclaiming ocean.





mold—for each is different from the other, each having its own significant character. More than 25,000 islands encircle the United States.

To attempt to stabilize, restrict, buffer, move, build or demolish an island is to invite disaster. Everything in nature is interrelated. An intimate relationship exists—even if sometimes stormy—between the land and the sea.

Islands are intermediaries between the mainland and the ocean. The great ocean storms, hurricanes, those notable sculptors of islands, would wreak far greater destruction upon the mainland were it not for the islands barring their paths. That was well demonstrated

when Hurricane David moved up the coast and came ashore near Beaufort last year. With some of its energies spent upon the islands, a hurricane may not have time to recharge before striking the main continent.

Islands are eternally eroding, moving, building here, razing there. That fact was vividly demonstrated to me once while camping on Hunting Island. It was late autumn. The summer crowds had long disappeared. The island was settling down to winter. Leaves were turning color, preparing to fall. The nights were cool under a harvest moon. And the ocean was responding to that moon in a way few

residents of the island had seen before. "These are the highest tides—outside of stormy waters—I can remember," one old-timer told me.

At high tide, which then coincided with dawn, the ocean waves lapped at the dune line and trees which had stood for 75 years or more, now struggled to maintain their stability against the sea. The pre-dawn hours were marked by occasional crashes and cracklings as roots snapped and trees toppled into the sea. At one point, a hard-surface road leading through the park was perilously close to the sea's reach, and the sand substructure of the island was being crumbled away.

Shocking?

Not at all. Just a part of the normal scheme of things. The tides soon subsided, of course, and sand pumping and restoration operations began a short time after that on Hunting Island, an attempt at taxpayer's expense to restore the island. Thousands of dollars were spent. No one had listened to the sea's warning; no one perceived what really was happening. And less than a year later, Hurricane David brought the message again to Hunting Island, sweeping away all the built-up beaches, the restored sand and taking the hard-surface road itself.

It was not the first time a hard-surface road on Hunting Island had been claimed by the sea. Months before I had photographed broken pieces of asphalt leading into the sea where not so many years ago another road had been taken.

Late one evening on the south end of the island, I encountered a solitary figure also walking along the beach. He identified himself as an architect from a mainland city. He had owned a house here for several years, but had moved into it only recently.

"My house," he pointed, "is up there amid the trees. I love the island and walking on the beach, but my house should have been on wheels. I've had to move it three times to its present location."

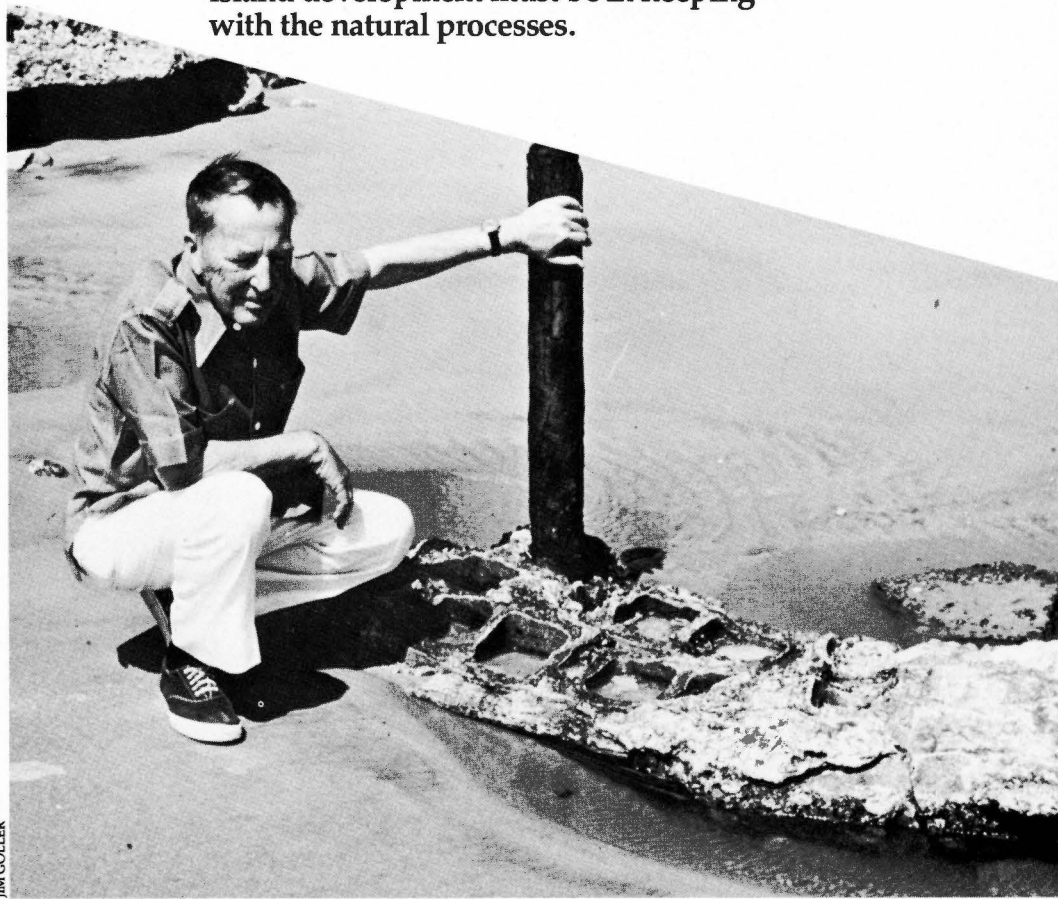
Two days later, I joined retired television star Gary Moore at his winter home on Hilton Head's capricious Sea Pines Plantation for an exploratory cruise around parts of that island.

"The island is changing," he said, "and not necessarily for the good." He soon pointed out expensive townhouses and condominiums being constructed virtually at the water's edge and, further along, expensive homes still under construction while the sea lapped at their foundations. "Later, they'll expect the Corps of Engineers and the American taxpayer to finance

Shore birds including the royal tern and Eastern brown pelican find nesting sites on many of our island beaches.

Visitors to areas such as this one on Bulls Island should avoid unnecessarily disturbing the birds as unattended eggs quickly become addled by the sun.

Gary Moore kneels beside a remnant of man's futile efforts to stop the sea. As this issue goes to press, once remote Daufuskie is scheduled for development. To avoid destruction of our coastal resources, island development must be in keeping with the natural processes.



JIM COLLIER

construction of a breakwall or seawall," Moore said.

The large island of Hilton Head has of course experienced more development than most South Carolina islands. There is a greater sense of stability on an island large enough to find a point at which the ocean can no longer be seen or even heard. But anyone familiar with Hilton Head over a period of 50 years can recall the sea's constant claim, real estate lots disappearing, shorelines changing, forests plummeting into the waters and other trees dying from saltwater intrusion.

Real estate developers, anxious to make their fortunes off island

environments, have sprung up during the past 20 years on other South Carolina islands—Fripp, Kiawah, Seabrook . . . the list goes on. Some development is more orderly and sensible than others, some more in keeping with the natural processes.

On the other hand, some of South Carolina's islands have experienced little or no unnatural development or change. Daufuskie Island south of Hilton Head is occupied by several hundred residents, but no large-scale development is planned for that island now, primarily because of its inaccessibility. No bridge or causeway leads to this island, although periodic ferry trips are

Last fall ocean tides aided by the force of Hurricane David devastated a large portion of Hunting Island's front beach, including this hard-surface road. Such change is part of the normal scheme of things as our restless islands and the marshes and mainlands they protect are constantly altered by whims of the sea.



TED BORG

made from Savannah. Bull Island, part of the Cape Romain National Wildlife Refuge and a designated wilderness area, and Capers Island, owned and set aside as an island wilderness by the state, are little changed from the days when the Europeans first discovered America. North Island, South Island and Cat Island are all now preserved by the South Carolina Wildlife and Marine Resources Department, after being deeded over a few years back by the late conservationist Thomas Yawkey, owner of the Boston Red Sox.

The wilderness islands, as well as some of the more developed ones, are nesting areas for the endangered loggerhead sea turtle which comes in

considerable numbers during the hot-weather months to lay eggs in the sand. Thousands of migratory birds use the islands, too, including waterfowl which sometimes winter in the area.

Also protected through the Heritage Trust division of the wildlife department are Cedar and Murphy islands, down the coast from South Island. Dewees Island, south of Cape Romain, has been set aside from any development through an environmental easement. Even portions of Hunting Island enjoy some protection from development, for extensive tracts are included in a state park.

An atmosphere akin to paradise prevails on several of South Carolina's

undeveloped islands. On Capers and Bull, for instance, are great stands of live oak, palmetto and magnolia trees providing such a thick summer canopy the sun seldom breaks through. Here osprey nest and eagles soar. Alligators bask in the swamps and ponds. Leaping and playing like ghosts from the shadows of the forest, white-tailed deer emerge in the evening to graze in the meadows.

On the landward side of the islands are salt marshes, usually on tidal flats which form a substantial portion of the island's mass. Marshes teem with estuarine life—shrimp, crabs and oysters. Fin fish circulate in the creeks, and shore birds feed with the changing tides upon the mudflats. Reptiles and insects find in the islands a haven where man seldom intrudes.

Only during the past decade has man realized the importance of barrier islands. And this year, through its designation as the Year of the Coast, national attention is being drawn to the islands for the first time. Efforts to save them from further abuse and development are underway. During 1979 Representative Phillip Burton of California introduced a bill to Congress to curtail future development of barrier islands and to set aside many of those still in a near-natural state—or even portions of them—to be preserved as places where no one lives, but where man is a sometimes visitor. Through this bill and other efforts being made by various environmental organizations such as the Sierra Club, The Nature Conservancy, Coastal Alliance and the Barrier Islands Coalition, our remaining undeveloped islands may stay unchanged except by nature. 🐾

Nature photojournalist Bill Thomas is the author of several books, among them "The Swamp" and "American Rivers." His next book, "The Island," an all-color study of America's offshore islands from Maine to the Aleutians, is being published by W. W. Norton Co. Inc. in September.



by Pete Laurie
Shipwreck!

Untimely ends to many a maritime venture, the ancient shipwrecks on our coast continue to yield the unexpected treasure of excellent fishing.

On August 29, 1893, carrying passengers and freight on its regular run from Boston to Savannah, the *City of Savannah* met a violent storm off Charleston.

Monstrous waves ripped away the cabin and the saloon and poured down the stack to flood the great steam engines. Hoping to regain some control of his foundering vessel, Captain Savage and his crew tried to hoist sails on the two-master, but the winds, later reported at 150 miles per hour, instantly whipped the canvas into the night, leaving the 272-foot boat to drift helplessly.

A newspaper account of the ordeal said many of the 20 passengers on board slept through the early stages of the storm, unaware of the danger. But by the time the steamer grounded off Hunting Island at five the next morning, the hold was flooded. Passengers and crew survived only by lashing themselves to the rigging. Later in the day, despite very heavy seas, the stronger men left with the nine women and children aboard in the ship's only two undamaged lifeboats and rowed them three miles to safety at Coffin Point.

illustrations by Joseph Byrne

The shipwrecked men endured another terrifying night by again lashing themselves to the rigging. Miraculously, all escaped the following day by another steamer, the *City of Birmingham*, which had survived the storm.

The *City of Savannah* did not survive. Debris from the vessel littered miles of beach on Kiawah Island, 20 miles to the north. The steamer's hull and engines settled into the shallow water, but the saga of the 2,250-ton vessel, built in 1877, was not over.

Shipwrecks often prove the adage that one man's loss is another man's gain. Local inhabitants of Hunting Island quickly salvaged the *City of Savannah's* stores and other usable goods as the wreck occurred in the wake of one of the state's worst hurricanes, a storm that devastated the totally unprepared Lowcountry, killing hundreds and leaving thousands homeless.

First to profit from a shipwreck would be coastal residents, who salvage stores and cargo before the vessel goes completely under. Later, divers with more sophisticated equipment sometimes are able to extract gold, silver or valuable artifacts from sunken vessels. But long after any cargo or other valuables are removed, many shipwrecks continue to provide a treasure that in the end is worth far more than golden doubloons or silver chalices: an endless harvest of

shimmering black sea bass, succulent sheepshead, darting trout and robust channel bass. In short, the mariner's disaster often becomes the angler's delight.

Wrecks provide a solid base of permanent attachment for barnacles, oyster, mussels and other sedentary sea animals that have difficulty gaining a foothold on the shifting, sandy bottoms so typical of our coast. Sheepshead, black sea bass and other fish come to graze on these attached organisms and to seek shelter in the cracks and crevices of wrecks. Larger fish then prey on those fish, resulting in a microcosm of the marine food web established around the wreck. Even highly mobile surface-feeding fish such as barracuda, amberjack and cobia sometimes congregate at wrecks and may use the high profile of the wreck as an orientation point.

Bill von Harten, a retired Beaufort machinist, remembers fishing the *Savannah* (local people usually use this shortened version of the ship's full name) with hand lines before rods and reels were universally available.

"We'd get up a party of 15 to 18 fishermen on a good-sized boat and come around and anchor pretty close to the wreck and then put the fishermen out in smaller boats to fish the area," he recalled.

Using only hand lines with twin hooks baited with shrimp or fiddler crabs, a fishing party might return to Port Royal after a day's sport with as much as 200 pounds of black bass and sheepshead.

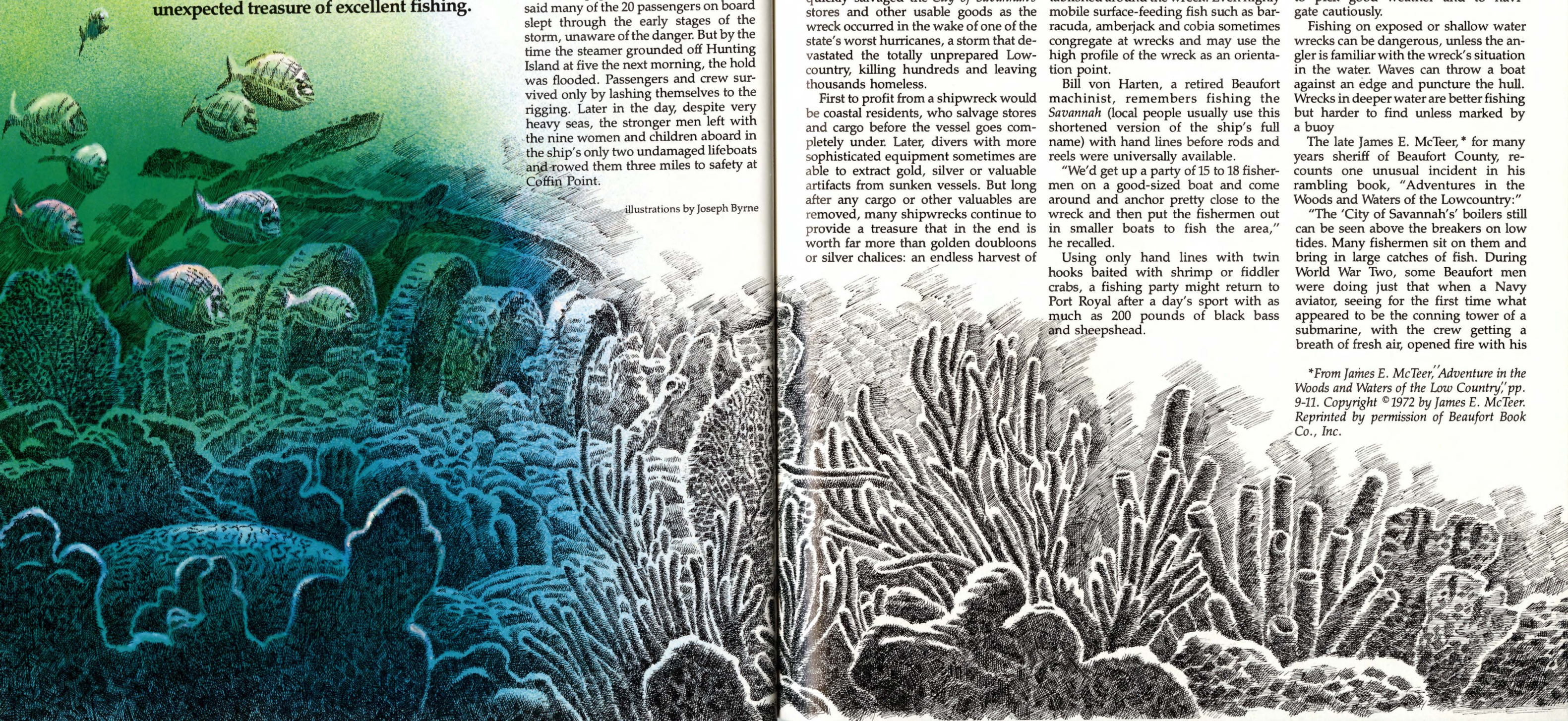
Protruding above the ocean surface are the so-called "boilers" of the *Savannah*, which von Harten thinks are more likely the ship's engine cylinders. Half a dozen fishermen can scramble to this somewhat precarious perch to fish. Only one other South Carolina wreck extends above the waterline: the *William Lawrence*, a 200-foot steam-driven brigantine that sank in an 1898 storm off Bay Point at the entrance to Port Royal Sound. Von Harten, whose father and uncle both were harbor pilots, and who grew up on the water, notes that both the *Savannah* and the *Lawrence* are in shallow shoal waters; he cautions would-be anglers to pick good weather and to navigate cautiously.

Fishing on exposed or shallow water wrecks can be dangerous, unless the angler is familiar with the wreck's situation in the water. Waves can throw a boat against an edge and puncture the hull. Wrecks in deeper water are better fishing but harder to find unless marked by a buoy.

The late James E. McTeer,* for many years sheriff of Beaufort County, recounts one unusual incident in his rambling book, "Adventures in the Woods and Waters of the Lowcountry:"

"The 'City of Savannah's' boilers still can be seen above the breakers on low tides. Many fishermen sit on them and bring in large catches of fish. During World War Two, some Beaufort men were doing just that when a Navy aviator, seeing for the first time what appeared to be the conning tower of a submarine, with the crew getting a breath of fresh air, opened fire with his

*From James E. McTeer, "Adventure in the Woods and Waters of the Low Country," pp. 9-11. Copyright © 1972 by James E. McTeer. Reprinted by permission of Beaufort Book Co., Inc.



50 calibre machine guns on them. The men dove over board and clung to the 'Savannah's' slippery sides, while 50 calibre slugs cut out chunks of metal all around them. Luckily their small boat was not sunk, or this story would have a much different ending, as it was, five miles off shore, and through the breakers. The pilot banked around the wreck, saw he had made a mistake, and went back to his base."

McTeer's adventures with another Beaufort area wreck illustrate the problems of locating and keeping track of submerged wrecks. In 1918 the *General Gordon*, a steel-hulled, 250-foot two-masted barkentine was hauling a load of shelled corn from Argentina to Charleston. Her troubles began just off Fripp Island. McTeer takes up the tale:

"The Captain noticed that she was sluggish and not answering the helm. Her 'Voice' had changed. Removing the hatch covers, he saw that salt water was flooding her holds. He knew that the corn would swell, and that his ship was in extremity. There were two things to do—call for help and try to beach her. Heading for the coast line off Fripp Island, he ran into the shelf of the reef approximately ten miles out.

"The large Coast Guard tug 'Relief' had heard his S.O.S. and was speeding through rough seas to his aid.

"Pilot W. H. VonHarten of Beaufort, who owned the small tug, 'Annie,' was notified. He and his son W. H., Jr. (Captain Geetchie), and two nephews, Carl and Clarence ('Zoo') VonHarten, made haste to the scene. The 'Relief,' in spite of high seas, had gotten pumps aboard the 'Gordon.' One look, and Captain VonHarten knew that the ship was beyond

help. Listing far over on her side, the corn in her holds swelling, her ruptured seam was letting the sea in much faster than the pumps could take it out. . . .

"The insurance company declared the 'Gordon' a complete loss, and the VonHartens, along with others, started salvage operations of her rigging, sails, food and so forth.

"In 1918, the 'General Gordon' began shifting around to the south, slipped off of the ledge, and disappeared from sight. No one knew, in the years ahead, exactly where her hull was. We found out the hard way."

Fifty years later McTeer and a partner had gone into the purse seine fishery hoping to catch mackerel, a profitable species in Florida. After a few semi-successful excursions they managed to set the huge net around an incredible school of fish that included "huge sea bass, enormous sheephead, black drum, besides the bluefish and mackerel we had been following." But as they attempted to winch the catch onboard, the seine refused to budge. They had unknowingly set their net directly over the wreck of the *General Gordon*, which explained the huge school of fish and the great variety of species. In the end most of the fish were lost and the shredded net all but irreparable. McTeer, perhaps wisely, converted his seine boats into shrimp trawlers, concluding, "Yes, ships that have died let you know they are there."

Although McTeer put a buoy on the wreck, "during the night large waves and the serrated hull cut the line" and the

General Gordon again was lost. Ten years later the wreck was rediscovered by another experimental purse seiner with the same unfortunate results that McTeer experienced. Finally, the South Carolina Wildlife and Marine Resources Department fixed a permanent buoy to the wreck, and for the moment at least the *General Gordon* can be found by recreational fishermen and avoided by commercial fishermen.

Thus, off the southern coast are three more easily found fishing wrecks in the state, but several wrecks along the northern coast also are buoyed.

A wreck thought to be the *Tourungen*, a Norwegian ore freighter torpedoed by a German submarine during World War I, has recently been relocated and buoyed off Georgetown. It was discovered by the U. S. Navy, but the marking buoy was lost and anglers had no luck trying to find it with conventional electronic gear. It took a U. S. Navy minesweeper several years later to pinpoint the wreck again. Unfortunately, buoys are easily lost, and while the recreational fisheries section of the Marine Resources Division does its best to maintain buoys on suitable wrecks, their upkeep is a never-ending and very expensive job.

The *City of Richmond*, a 225-foot ferry boat, sank off Georgetown while under tow in 1964. The plush, 212-room ferry was being towed to the Bahamas where it was destined to become a floating casino. A few miles west of the *Richmond* lies another buoyed wreck, the *Hector*, a

coastal coal boat that sank about 1919. Little is known about the *Hector* except that it was used as a strafing target by World War II fighter pilots.

During the Civil War, many blockade runners were wrecked off the South Carolina coast. Some were sunk by Union gunboats, others simply ran aground as the greatly inflated prices of even common goods goaded captains and crews to take navigational gambles that otherwise never would have been attempted. The locations of most of these wrecks are unknown and many have long since been broken up by waves and currents.

Even during peaceful times, shipwrecks were once more common, not because earlier ships were less seaworthy, but because electronics we now take for granted did not exist. Lacking radar, sonar, depth finders and other navigational aids, ships sometimes ran aground in unfamiliar waters or due to human error or carelessness.

And, of course, as in the case of the *City of Savannah*, ships often stumbled into severe storms with no warning. In fact the *City of Savannah* was only one of an estimated 70 ocean vessels wrecked in the hurricane of 1893. Another was the *Frieda Wyley*, perhaps the only wreck in South Carolina whose remains are still visible on the beach. The 507-ton barkentine was headed north along the North Carolina coast with a load of yellow pine when the storm hit. A lamp or

stove apparently overturned on the rocking boat, which was seen burning out of control near the mouth of the Cape Fear River. Burned to the waterline, her charred hull eventually drifted into Myrtle Beach where it lies partly buried in the sand near 43rd Avenue North. The fate of her crew is unknown.

The wreck known for years as the "Cherry Grove wreck" is thought possibly to be the wreck of the *General Sherman*, a former blockade runner. According to newspaper clippings, the ship was originally commissioned in 1861 for the Confederacy and christened the *Prince Royal*. When captured by the Union Navy, it was renamed the *Sherman*, and used as part of their blockade fleet. At the end of the war, the *Sherman* was sold to Frederic Baker and renamed the *General Sherman*. In 1874, destined for New Orleans from New York, the *General Sherman* sprang a leak in rough weather. The passengers and crew were picked up by fishing schooners from Little River.

Several years ago fishermen notified the wildlife department that salvage operators were dynamiting the Cherry Grove wreck. The dynamite enabled them to take artifacts and coral from the wreck, while it also killed fish and destroyed habitat. The wildlife department has included the wreck in its artificial reef system to protect it from further destruction.

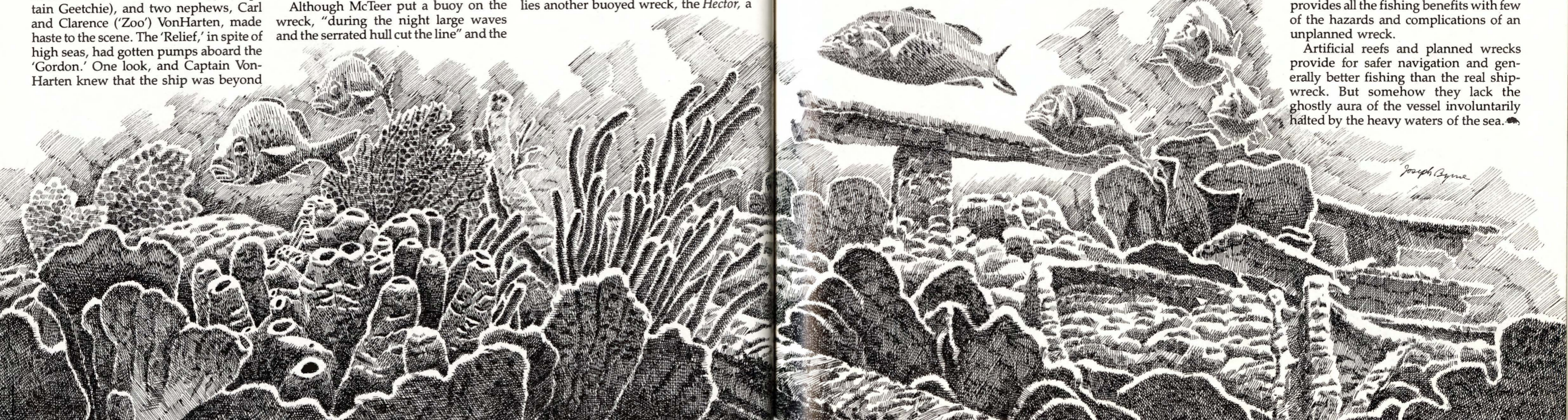
An angler fishing over a wreck on a calm summer day seldom thinks of the terror onboard a ship about to go down in a violent storm. To those who lost fortunes and sometimes loved ones in shipwrecks, it offers little consolation that their remains continue to benefit South Carolinians.

But a recent survey by the Marine Resources Division indicated that the state's wrecks and artificial reefs bring as much as \$10 million a year into the coastal economy. This is money spent by anglers who might not fish at all, or at least not as often, were their chances of catching fish not enhanced by the presence of these structures.

The effectiveness of shipwrecks partially prompted the establishment of the state's 10 artificial reefs. Constructed primarily of old ship hulls and discarded car tires, reefs attract fish the way wrecks do. There are four shipwrecks marked by permanent buoys for fishing off the South Carolina coast: the *Tourungen*, the *City of Richmond*, the *Hector* and the *General Gordon*. In addition, there is the state's most recent reef, actually a ship "wrecked" on purpose.

In December 1978, the *Betsy Ross*, a 400-foot Liberty Ship, was sunk at a carefully selected site off Hilton Head. Prior to sinking the vessel, the South Carolina Wildlife and Marine Resources Department had the superstructure cut away and the engines and all sources of oil and other pollution removed. The *Betsy Ross* provides all the fishing benefits with few of the hazards and complications of an unplanned wreck.

Artificial reefs and planned wrecks provide for safer navigation and generally better fishing than the real shipwreck. But somehow they lack the ghostly aura of the vessel involuntarily halted by the heavy waters of the sea. ♣





SEASIDE CELEBRATIONS

Bavarian, Scottish, Greek and Lowcountry foods; the South's plantation lifestyle; sun-tanned bodies smiling on parade; a feeling of Mardi Gras with the refinement of the fine arts—all are available in South Carolina's coastal festivals.

by Bob Janiske

You've probably seen the stickers pasted on car bumpers, trunks and rear windows—Spoleto! Sun Fun! Catfish Festival! Each promises and delivers its own unique mix of parades, contests, special foods, music, dancing, games and crafts. Each is a special celebration to which everyone is invited.

Local festivals are booming throughout the nation. The reason is just plain old family fun. South Carolina's coastal communities are particularly well represented in this festival potpourri. Water is a powerful magnet for recreation and these communities have set about purposely to create a tradition of excellence in the area of festival management.

Above all other things, a festival offers diversion. Virtually any setting and theme will do. If the people in a community want to get together, have a good time, foster community spirit and pride, generate some publicity and fund some worthwhile civic or charitable projects, a festival usually comes into being. A theme may be chosen because it makes good sense in terms of history, ethnic composition, local products or specialties, tourist attractions—or simply because it's catchy. Festival dates may be chosen to coincide with the fall harvest or a holiday, or the date may be selected simply because it doesn't compete with other, more popular events.

Settings are as varied as the dates and themes. Some of the best are staged in urban settings, where they tend to attract a large and often more sophisticated following. Festivals sponsored by rural and small town communities appeal to city dwellers looking for an occasional escape from urban life.

More than 3,000 festivals are staged in America on an annual basis, with South Carolina hosting well over a hundred. The tremendous popularity of this recreational format has spawned a flood of new offerings in recent years. The typical festival draws between 2,000 and 10,000 participants, but some attract as many as a third of a million.

Festivals abound along the state's 55-mile Grand Strand. The season gets underway in mid-March when 50 or 60 thousand vacationing Canadians invade the region to shed their winter weariness with fishing, golf and tennis, street parades, plantation tours and surf splashing. Canadian-American Days are not limited to Canadians, but an Ontario

winter can make our sometimes unpredictable March temperatures seem like a heat wave.

In early June, the gigantic Sun Fun Festival starts the summer season at Myrtle Beach. There are beauty contests, parades and competitions like sand sculpture and ice block sitting. The scents of suntan lotion and the sights of hot pink bodies dominate the scene.

At Huntington Beach State Park, three miles south of Murrell's Inlet, the Low Country Lifestyles festival in March centers around Atalaya, a Spanish-style castle built by the famed sculptress Anna Hyatt Huntington. The Georgetown Arts Council holds the Murrell's Inlet Arts and Crafts Festival at the park in April and the Atalaya Arts and Crafts Festival in September is held at the castle.

At the southern end of the Grand Strand, beachhouse-lined Pawley's Island lends its rich history as one of the oldest Atlantic resorts to the Strand's biggest and best Independence Day Parade. It's not your average July 4th parade; reversing its route, it meets itself coming and going. But anyone with a car, a bicycle or two stout flipflops may join the festivities en route.

Eight miles south of Pawley's, the Georgetown County Lowland Fling in late April or early May attempts to remain a "homey" community gathering, while still welcoming visitors.

Further south, below the Santee River's entrance to the Atlantic, McClellanville, a quaint village on the Intracoastal Waterway, holds its Low Country Shrimp Festival for 5,000 or so visitors in mid-April. The traditional blessing of the shrimp boat fleet is a real crowd-pleaser and nobody seems to mind that the festival takes place a month or more before the shrimping season.

Charleston's internationally known Spoleto Festival U.S.A. may well be the world's most comprehensive arts



festival. Patterned after its Italian namesake (and with the same guiding hand — Gian Carlo Menotti), this “explosion of the visual, dramatic and musical arts” is a regular late May through early June event.

Charles Towne Landing State Park, located on the site of the first permanent English-speaking settlement in South Carolina, hosts the Colonial Life and Crafts and Colonial Crops and Crafts festivals held respectively in May and October. Agricultural and crafts demonstrations based on early settler’s records, fireworks displays, music and games abound at the park’s Independence Day Celebration and the last-fling-of-the-summer Annual Labor Day Celebration. The Oktoberfest held there in September is an American version of the famed German harvest festival complete with appropriate foods and music in the oom-pa-pa Bavarian style.

The Lowcountry version of Oktoberfest also can be celebrated at beautiful Magnolia Gardens a few miles northwest of Charleston on Highway 61. Sponsored by the Federation of German Heritage Societies of Charleston, the event brings out the lederhosen and dirndls (German folk dress) with a yodeling contest, among other German customs.

At Middleton Place and Gardens, another plantation just up the river from Magnolia, Greek Spring Festival is held in May. This celebration is complete with Greek foods, bazoukia music and folk dancing! Colonial lawn games and a special music program dedicated to one of the signers of the Declaration of Independence are the highlights of Middleton’s Arthur Middleton’s Birthday Celebration on June 29. September at Middleton means the Scottish Games and Highland Gathering with tartans, kilts, pipers, meat pies, shortbreads and some undeniably weird medieval games. The month of October finds knights in colonial costume spearing a two-inch ring from horseback in the garden’s Lancing Tournament. Plantation Days round out Middleton’s festive season the weekend before Thanksgiving, with such activities as sugar cane milling, corn shucking, soap and cider making, mule wagon rides and a country auction.

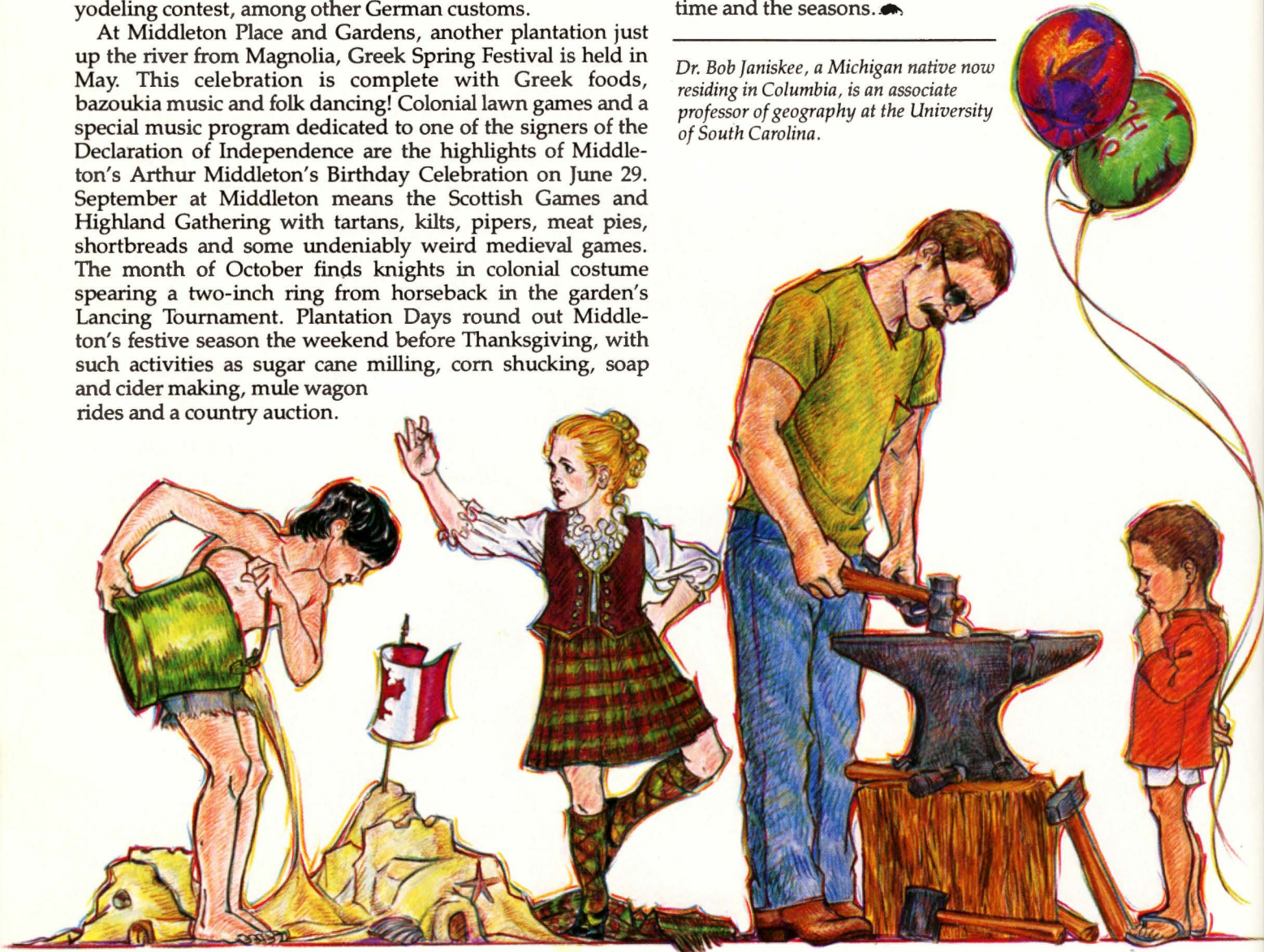
In mid-July, the gala week of the Beaufort Water Festival begins. Roughly 75 to 100 thousand people attend during the week to see the blessing of the shrimp boat fleet and the crowning of the Queen of the Sea Islands.

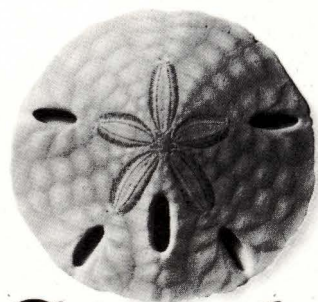
In Ridgeland, just inland of our coast’s southern extreme, the first Saturday in October is Gopher Hill Day. The town used to be named Gopher Hill because of its terrain—what passes for a gopher in the Lowcountry looks remarkably like a turtle.

Nearby Hardeeville’s Annual Catfish Festival is held during the third weekend in September (so as not to conflict with Gopher Hill Day). Anybody who has tasted a batch of Lowcountry catfish stew will appreciate why this event attracts 5,000 to 10,000 happy, hungry people.

Some enthusiasts “collect” festivals and their souvenirs like other folks collect stamps. There are even those who concentrate—as true collectors will—on specific themes, activities or contests. If the coast is their specialty, there are 24 to be experienced. A contented minority can be seen at the same festivals every year. For these “festival regulars,” each event in its proper turn is a ritual that marks the passage of time and the seasons. 🐢

Dr. Bob Janiskee, a Michigan native now residing in Columbia, is an associate professor of geography at the University of South Carolina.





South Carolina's Spectacular Shore

Man gathers in greatest numbers where land and water meet, especially in America, where we are dedicating this year to our coast. And the magnetism of the coast is strongest when temperatures are highest.

Millions are lured by South Carolina's rolling waves, its salt marshes and its tiny creeks. One visit can transform us into addicts, craving another moment to break away to the shore. For some people, it's the tranquility of Edisto Island and the chance to pluck crabs from the brackish water. For others, it's the hours basking in the sun along the wide beaches of the Grand Strand or standing thigh-deep in the surf, with fishing rod in hand, waiting

for the sharp jerk of a channel bass taking their bait.

We celebrate now the Year of the Coast, though this spectacular shore needs no celebration to keep our attention. Nothing can improve what the ocean has sculptured: a haven for the nation's waterfowl, a nursery for marine animals and a filter for the flow of our rivers and streams. It's a creation that literally took thousands of years in its shaping but can be tainted in a relative moment at the touch of a careless hand.

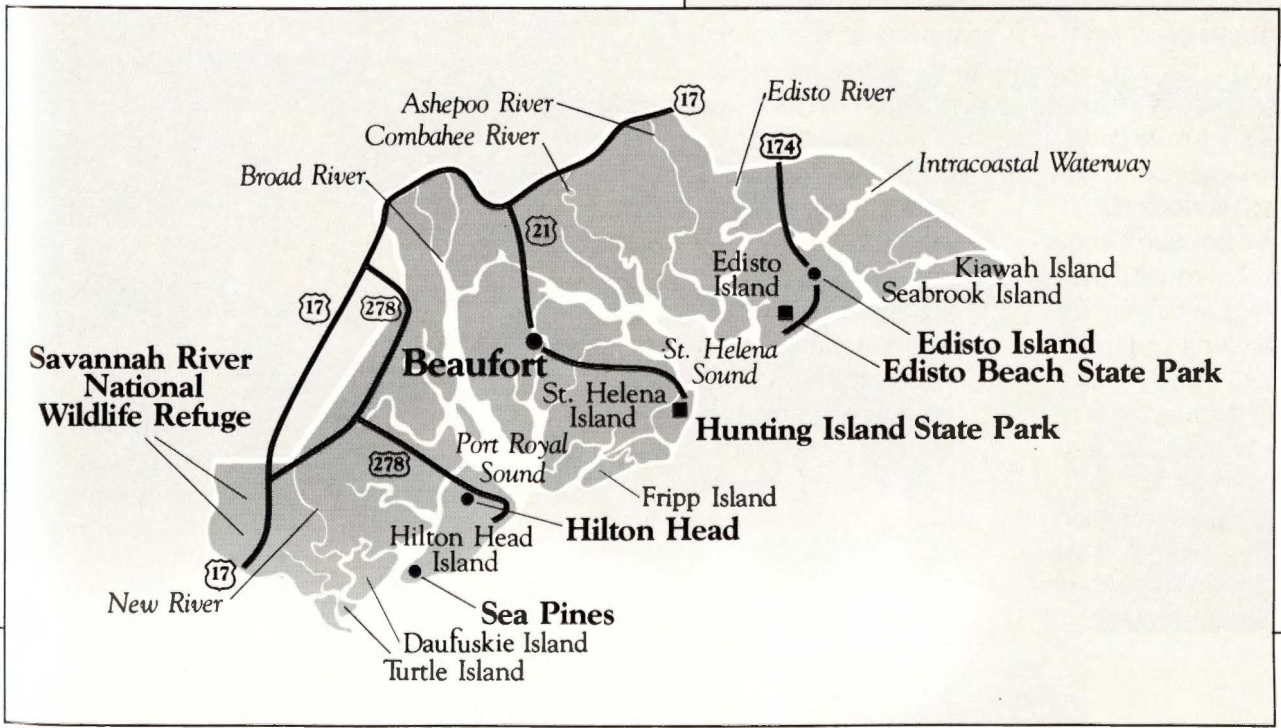
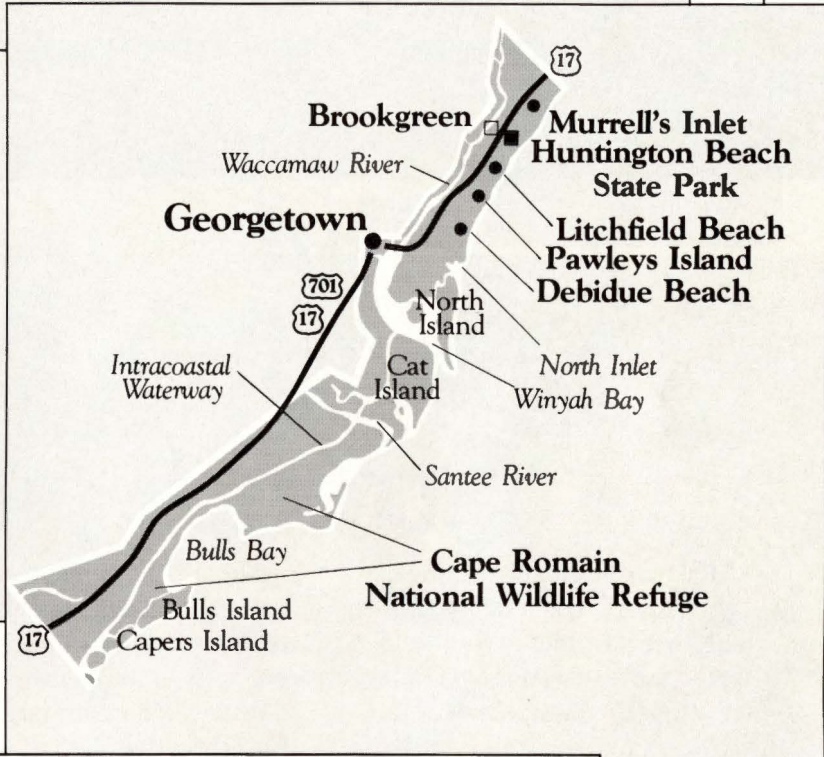
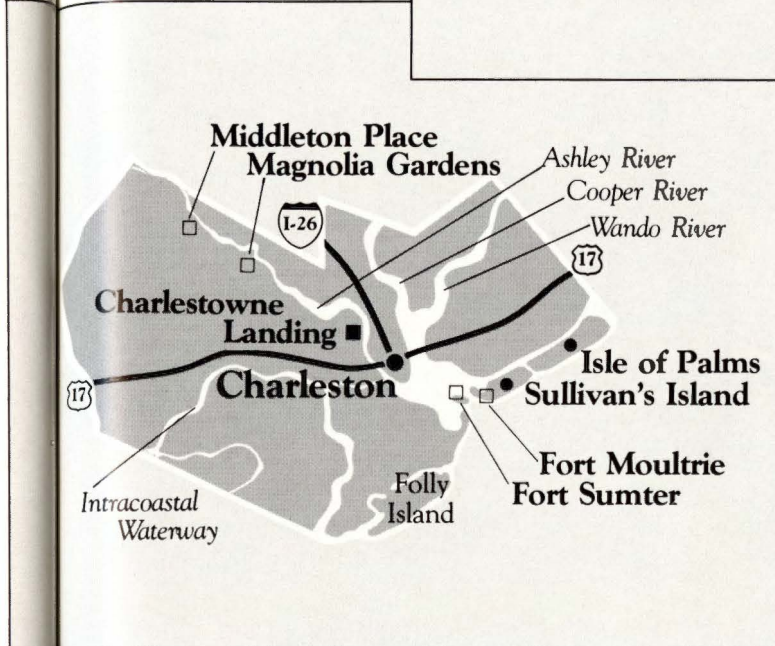
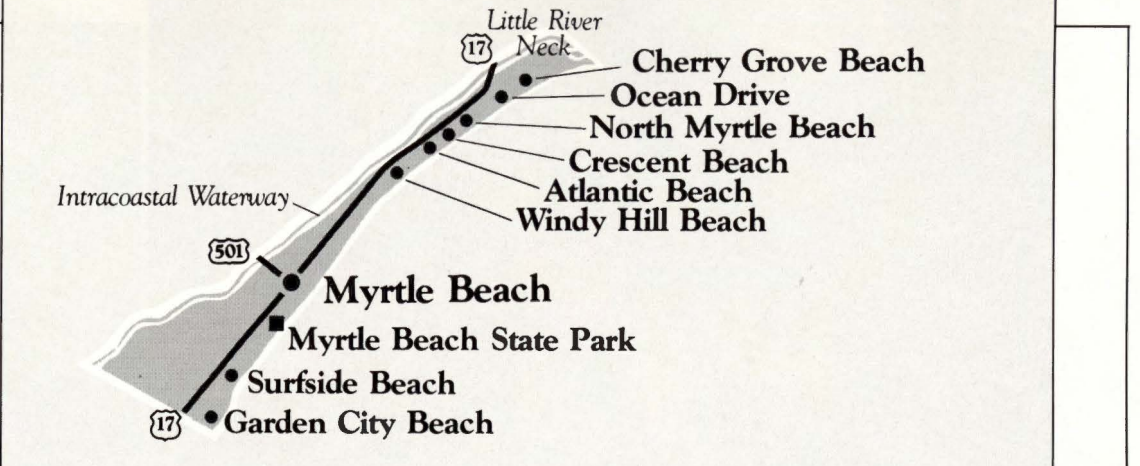
It is in honor of the beauty, joy and security provided by our coast that we dedicate this issue of *South Carolina Wildlife*.

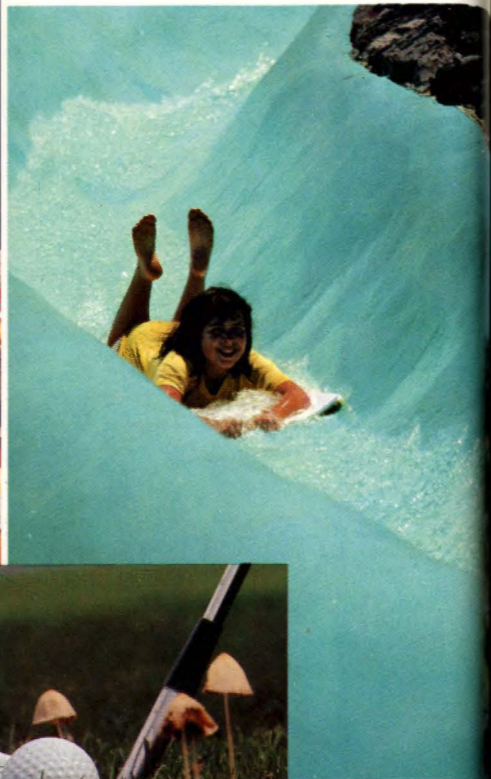


Our Spectacular Shore

Rather than one solid strip that defines the South Carolina coast, there are four distinctly different sections that come to mind when we say "the beach." To some, "the beach" means days of basking in the sun and nights danced away on the neonlit floor of a disco. To others, "the beach" is solitude—an island maybe—peaceful pier

fishing and a seafood supper with the family. Our beach is where Tracy Austin hits tennis and Tom Watson plays golf; it's also where loggerheads lumber ashore and waterfowl winter. It's where Charleston has been for 300 years. With such diversity offered by our coast, there's a favorite place in the South Carolina sun for everyone.

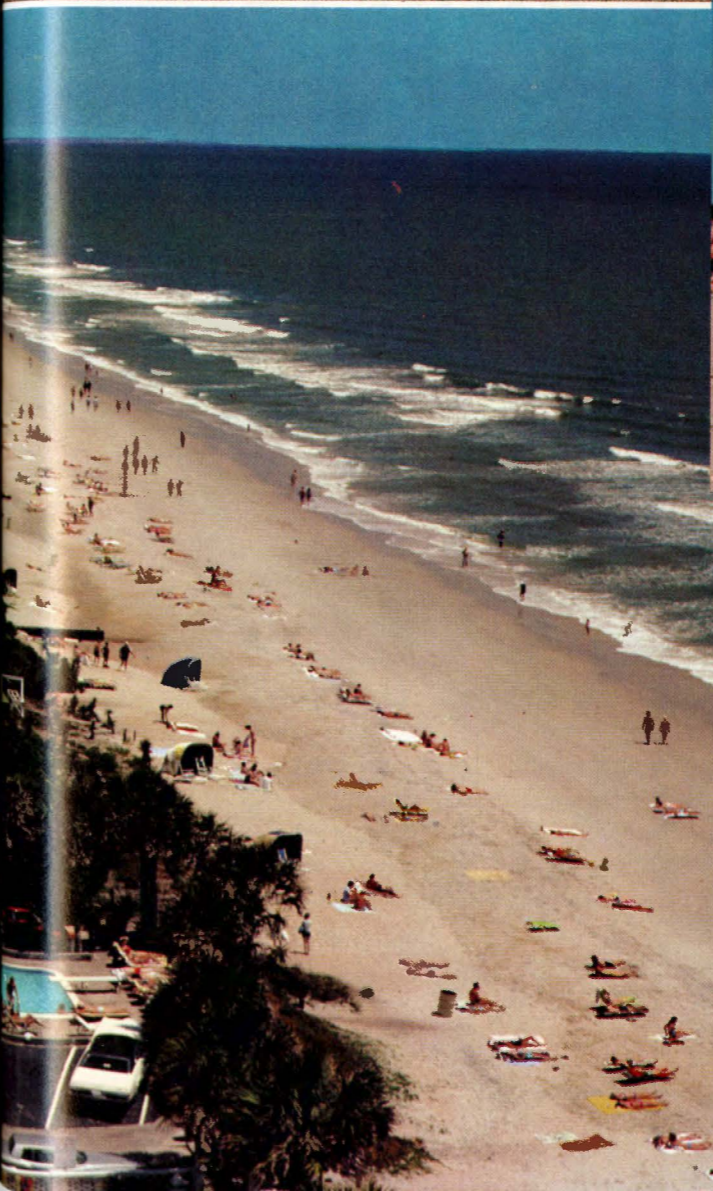
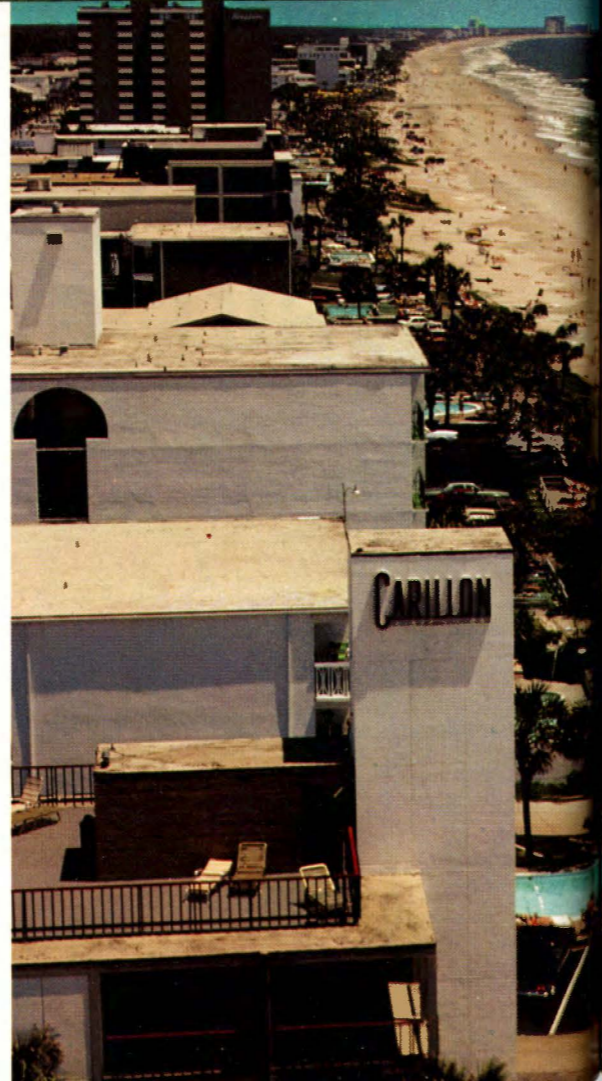


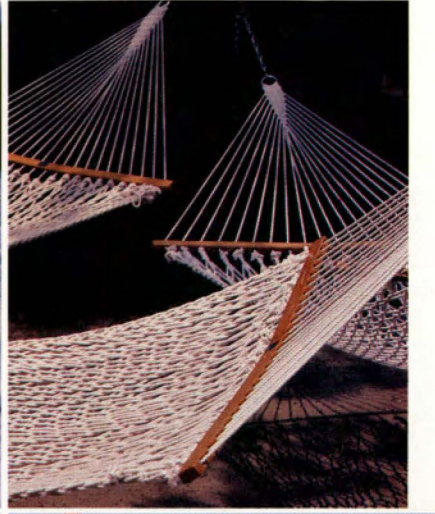


The Sparkling Strand

Along this famous stretch of white shore, the lodging, the food, the pastimes—they're as varied as the throngs of people who stop by to visit. Step out of the finest resort hotel or from a woodframe beach house and listen for the crunch of wet sand under your toes. Search for sand dollars along the 40-mile beach. Accept the challenge of 34 golf courses that overlook the Atlantic or twist through clumps of palm trees. Learn why the 12,000 campsites have made this region the "Camping Capital of the World." From Little River to Garden City, the longer you're here, the more fun you can find. From the surf, the pier or your own dock, you'll discover that pulling in the big ones ain't just another fish story on the Grand Strand. Ask a native the secret of

crabbing with chicken necks. Sign up for a deep sea charter boat excursion at Little River and bring home a red snapper whose taste you'll never forget. And then there's man-made adventure at the waterslides. Or in the amusement parks filled with Putt-Putt monsters, funny face mirrors or terrifying rides. Or just take it easy. Throw a towel onto the white sand and stretch out. There's always room for one more sunlover who enjoys watching the waves roll. Down the shore, sand castles are under construction. A waterfront volleyball game is being discussed. And plans for the evening are well underway, from dining on she-crab soup to dancing the night away. Something for every taste and pocketbook.





The Planter's' Retréat

Revel in the same natural luxury that attracted the fabulously rich plantation owners of another century. Enjoy the seafood tradition that is unsurpassed: perfect hush puppies, freshly fried shrimp, oysters or the sweet taste of flounder just pulled from its watery home. See a porpoise roll beyond the breakers attended by a formation of brown pelicans.

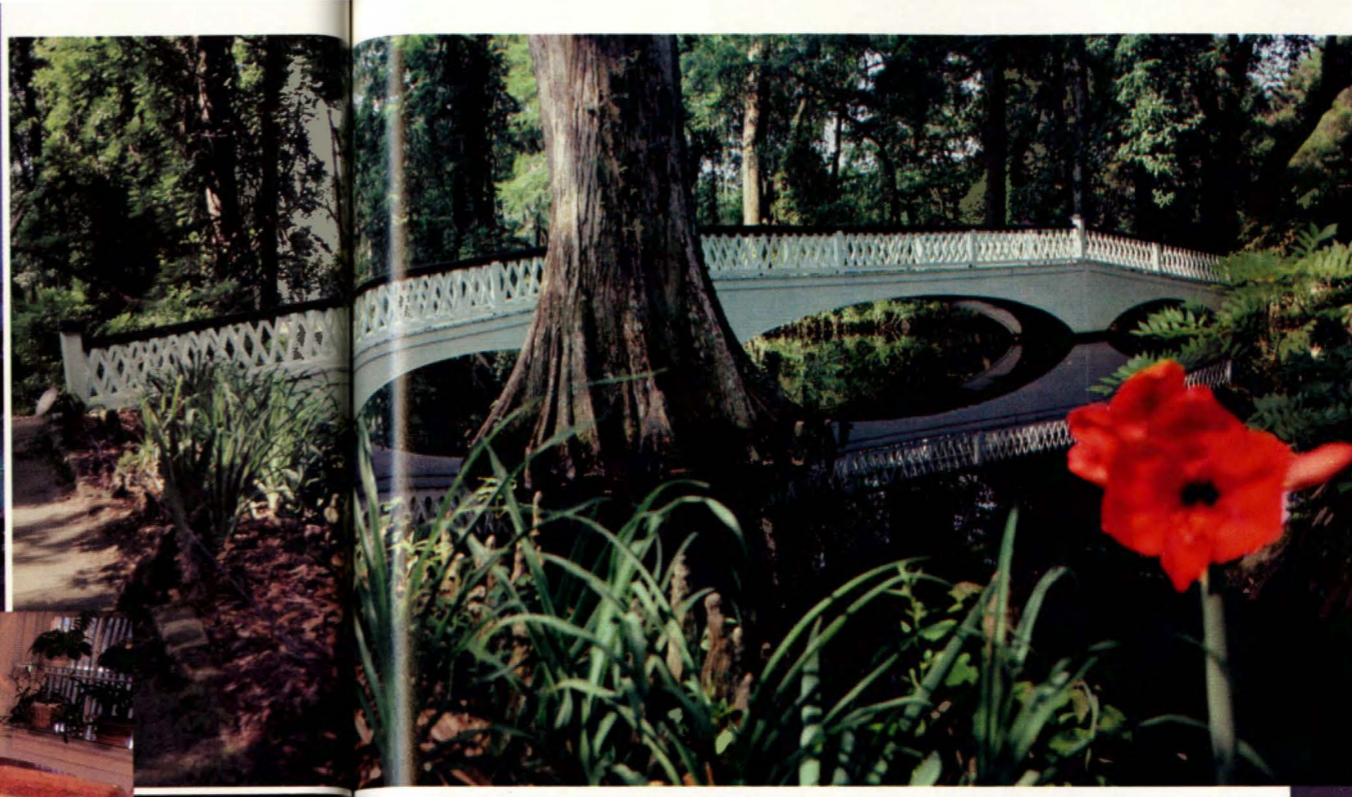
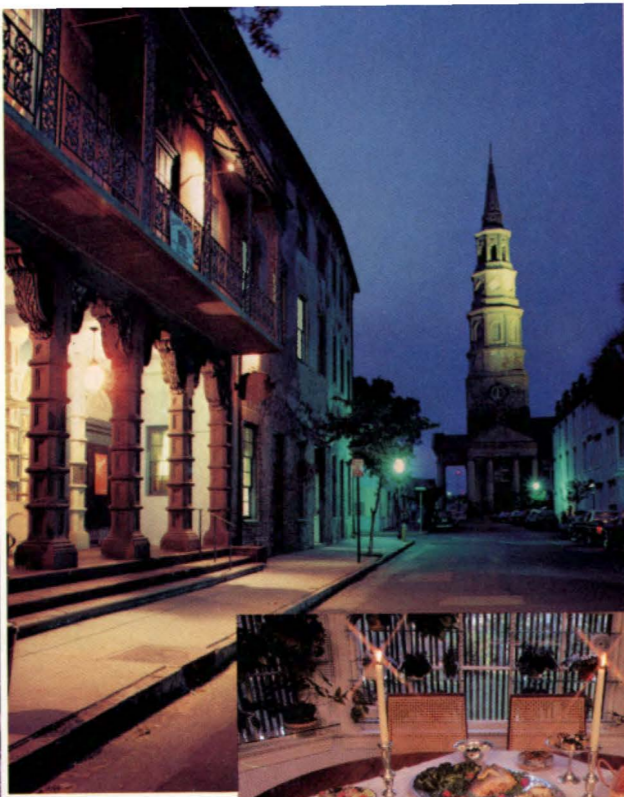
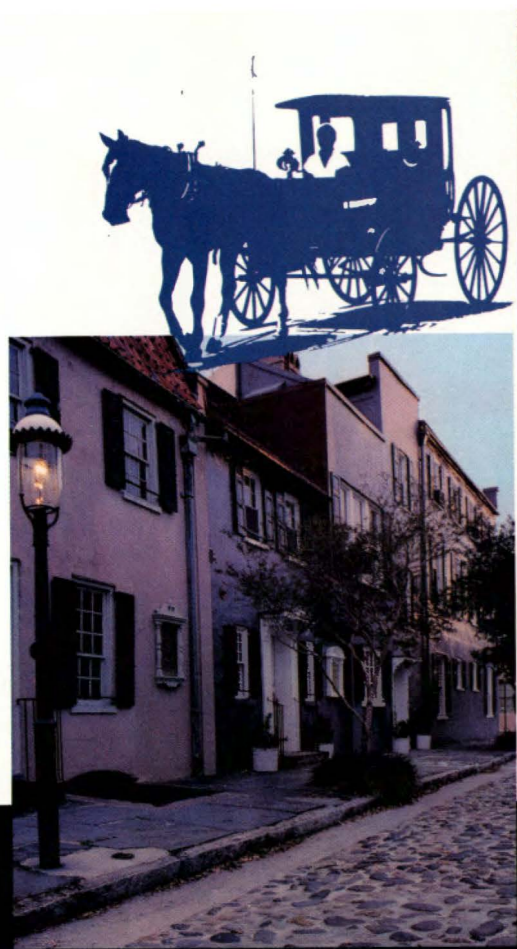
Practice the South Carolina stoop, as you pick up shell after shell, first a whelk, then an olive, now an agur.

Or just lean back and discover the serenity of historic Pawley's Island with its strong though weatherbeaten houses and resident ghost, or on Murrell's Inlet, with its enchanting marshes. When you muster the strength and inclination, take in the ancient hammock crafts of Pawley's Island, golf at Deerfield and Litchfield beaches, deep sea

cruises out of Murrell's Inlet or a peaceful tour of fabulous Brookgreen Gardens, America's finest display of outdoor sculpture. Plan a picnic and nature walk at Huntington Beach State Park. And come in time to watch the alligators feeding. Relive the grandeur of the rice culture at the Georgetown Rice Museum or tour homes born before your grandfather.

And don't ignore the fishing. Arrange a boatripe to Bulls Island in the Cape Romain Wildlife Refuge. Feel your arms grow tense as a spottail bass weighing 30 pounds hits your line off nearby Capers Island. Hide behind a blind and snap a picture of one of the more than 200 species of birds. Or just sit back and enjoy 60,000 acres of coastal marshland and islands in a wilderness unmolested by man.





Historic Charleston

Here you can peek through lacy iron gates at the birthplace of the Palmetto State: some 73 buildings are pre-Revolutionary. Another 136 are late 18th century and more than 600 were built by the 1840s. Private tours are available. In the 789-acre historic district, horse-drawn carriages filled with visitors regularly clump through the "Holy City," home of 181 churches. Cassettes can be purchased for a leisurely self-guided tour of the famous Battery, Rainbow Row or Cabbage Row, which inspired the opera "Porgy and Bess." View the delicately wood-carved mantles at the Joseph Manigault House (1802) or marvel at the circular staircase in the Nathaniel Russell House. Don't miss Dock Street Theater, or Fort Sumter, where the War Between the States

began. And even then you've just begun. There's still Charles Towne Landing to see, the site of the first permanent settlement in South Carolina. Outside of Charleston, there are the plantations: Boone Hall, Drayton Hall, Magnolia Gardens and Middleton Place. To the east stand the resort islands which generations of vacationers have enjoyed. A 20-minute drive away is the public Folly Beach, whose marshes are guarded by shore birds. Find privacy in the subtropics of the Isle of Palms, while the children fly kites and churn ice cream with a supervised kid's program. Teach them state history on Sullivan's Island, whose Fort Moultrie has been restored to represent five war eras.





Lowcountry Resort Islands

Watch carefully as you follow the trail first blazed by the Spaniards, who visited South Carolina's mystery-shrouded barrier islands 100 years before the Pilgrims discovered Plymouth Rock. Rent a sailboat, fish for trout, ride horses through the woods and marsh of Seabrook Island. Miss a night's sleep to see the giant loggerhead turtles lumber ashore to lay her cache of eggs or take a jeep to Vanderhorst Plantation on Kiawah Island. Watch the pros play tennis. Loosen yourself up on the jogging trail at Fripp Island. Or challenge some of the nation's finest golf courses, including the Harbour Town Links, home of the Heritage Golf Tournament, at Hilton Head. Then cruise past Daufuskie Island, scenic wilderness. Spend your late afternoon hauling oysters from the tidal

creeks and your evening sticking a thick-bladed knife between the shells to extract the delicious meat. On less developed Edisto Island, which was originally bought from the Indians for a piece of cloth, hatchets and some beads, search warily for the ghosts who haunt the gnarled live oaks surrounding the plantation homes. On these islands the highly prized sea island cotton was grown, with its long fibers and silky feel, in the years before the Confederate War. Stop by the Beaufort Arsenal Museum for a lesson in nature, Indians and war relics. Or travel to Hunting Island State Park, 5,000 acres of beaches, forest and marshes protecting South Carolina's enormous flocks of birds, many of them endangered everywhere else but here. 🐾



Oceanbound?

For more information on where
to eat, sleep and loosen up on the coast,
call or write the following centers:

North Myrtle Beach Chamber of Commerce
P. O. Box 754

North Myrtle Beach, S.C. 29582
(803) 249-3519

Myrtle Beach Area Chamber of Commerce

P. O. Box 2115
Myrtle Beach, S.C. 29577
(803) 448-5135

Georgetown Chamber of Commerce

600 Front Street, P. O. Box 1443
Georgetown, S.C.
(803) 546-8436

Charleston County Parks,
Recreation & Tourism Commission

P. O. Box 834-TD
Charleston, S.C. 29402
In S.C.—(803) 723-7641;
outside S.C.—800-845-7108

Charleston Trident Chamber of Commerce

P. O. Box 975-TD
Charleston, S.C. 29402
(803) 722-8338

Beaufort County Chamber of Commerce

P. O. Box 910-TD
Beaufort, S.C. 29902
(803) 524-3163

Hilton Head Island Chamber of Commerce

P. O. Box 5647
Hilton Head Island, S.C. 29928
(803) 785-3613

Division of State Parks
S.C. Department of Parks,
Recreation & Tourism
Edgar A. Brown Building, Suite 113

205 Pendleton Street
Columbia, S.C. 29201
(803) 758-7507

National Forest Service
U.S. Department of Agriculture

1835 Assembly Street
Columbia, S.C. 29202
(803) 765-5222

S.C. Division of Tourism
Edgar Brown Building, Suite 113

1205 Pendleton Street
Columbia, S.C. 29201
(803) 758-2536

Cape Romain National Wildlife Refuge

Route 1, Box 191
Awendaw, S.C. 29429
(803) 928-3368

Kiawah Island Resort
P. O. Box 12910

Kiawah Island, S.C. 29412
(803) 768-2121

Seabrook Island Company
P. O. Box 32099

Charleston, S.C. 29407
(803) 768-1000

Fripp Island Resort

Fripp Island, S.C. 29920
(803) 838-2411

or out of state but east of the Mississippi,
call toll free 1-800-845-4100

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THE SPARKLING STRAND: 48
(top left & center)—Ted Borg. (top
right)—Jim Goller. 48, 49

(bottom)—Jim Goller. 49 (top left &
center right)—Jim Goller. (top
middle)—Susan Dugan. (top
right)—Phillip Jones. (bottom
right)—Ted Borg. THE

PLANTERS' RETREAT: 50

(center)—Art Carter. (bottom)—Jim
Goller. 50, 51 (top)—Ted Borg. 51
(top left)—Art Carter. (top
middle)—Phillip Jones. (top right,
center & bottom left)—Jim Goller.
(bottom right)—Art Carter.

HISTORIC CHARLESTON: 52
(top left)—Art Carter. (top middle &
center)—Phillip Jones.

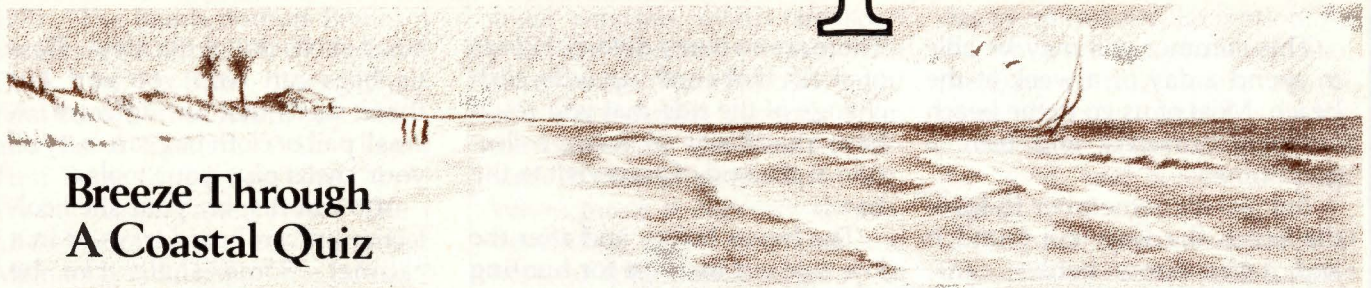
(bottom)—Jim Goller. 53 (top)
(top)—Phillip Jones. 53 (top)—Jim
Goller. (center)—Phillip Jones.
(bottom)—Ted Borg.

LOWCOUNTRY RESORT

ISLANDS: 54 (top left, center
left)—Jim Goller. (top right, bottom
middle & right)—Ted Borg. (bottom
left)—Phillip Jones. 54, 55

(center)—Jim Goller. 55 (top
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Goller. (bottom)—Phillip Jones.
OCEANBOUND?: 56—Ted Borg.

field trip



Breeze Through A Coastal Quiz

This summer you may see many state and national events and activities that are a part of the "Year of the Coast." Thousands of persons will participate in festivals, contests, tours and other activities bringing attention to the need for protecting, conserving and restoring our coastal resources.

The coastline of the United States, where land and sea meet, is approximately 88,000 miles long, enough to make three complete trips around the equator. The coast is more than a place to relax, sunbathe or swim. It contains enough food to feed the world's population, and yet it is one of the most misused and least understood natural resource areas on earth.

See how much you know about our coastal resources by taking this Coastal Quiz. The answers to the quiz may be found at the bottom of page 59.

1. How many of the fifty United States are considered by the U. S. Government to be coastal states? (a coastal state is one that borders the oceans or the Great Lakes)

_____ states

2. What percentage of the U. S. population lives within 50 miles of the coastline?
 - a. 10%
 - b. 25%
 - c. 33%
 - d. 50%
 - e. 65%
3. An estuary is:
 - a. an iceberg that floats near the coastline.
 - b. a place along the coast where fresh water and salt water mix.
 - c. the scientific name for a rock crab.
 - d. a machine on a whaling ship used to haul whales out of the water.
4. Which is capable of producing the most organic matter per acre?
 - a. desert
 - b. wheat field
 - c. salt marsh (coastal wetlands)
 - d. deep ocean
5. What percentage of the East Coast's saltwater marshes are found along South Carolina's miles of coastline?
 - a. 10%
 - b. 25%
 - c. 50%
 - d. 75%
 - e. 100%
6. What percentage of the U. S. shoreline is set aside by the government for public recreation?
 - a. 2%
 - b. 14%
 - c. 25%
 - d. 50%
 - e. 75%

7. Sharkburgers are likely to become the next most popular sandwich in seafood restaurants.

True False

8. List the following fish or shellfish in order of economic value in our country.

a. crab	f. oyster
b. tuna	g. flounder
c. lobster	h. clam
d. menhaden	i. salmon
e. shrimp	

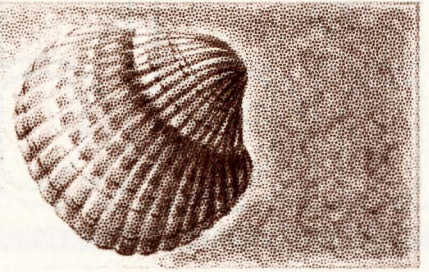
9. Complete this sentence correctly: Our coastal wetlands and barrier islands serve as

- a. nursery grounds for many marine animals.
- b. a buffer against ocean borne storms.
- c. a filtering system which lessens the effects of pollution and siltation.
- d. habitats for a wide variety of birds, mammals, shellfish, fish and other life forms.
- e. all of the above.

10. What percentage of the world's water is salt water?

- a. 5%
- b. 25%
- c. 50%
- d. 75%
- e. 97%

Waves, Tracks, Shells, Driftwood



This summer you may be able to spend a day or a week at the beach. Most of us go to the beach to enjoy ourselves and have a good time.

But always remember to leave the beach the way you found it and never throw bottles, cans, paper or other litter on the beach.

While relaxing at the ocean, take note of the way the parts of nature live together. Watch the birds gather food. Find an animal inside its shell.

Lots of different kinds of birds visit the shore for food. Look for their footprints in the sand and match them to the birds. What do these birds' calls sound like? Draw pictures of them.

A shell collection is easy to start when you visit the seashore.

There are so many different kinds of shells that wash up with each change of the tide that you could have practically an entire collection at the end of your visit to the beach.

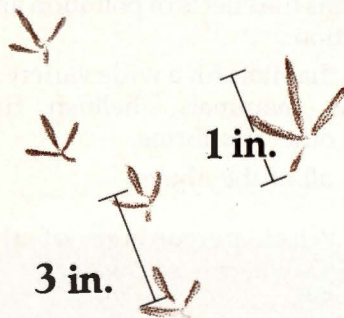
The hours before and after the low tide are the best for hunting shells. Find the tide chart for the area where you want to hunt shells (many coastal grocery stores and marinas have them) and determine when the low tide will be.

Bring a small rake or shovel to uncover the shells below the surface of the beach. A kitchen strainer can be useful for sifting

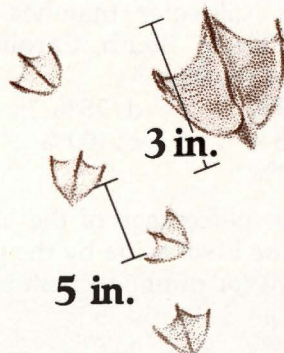
small shells out of the sand. Plastic bags can help you sort out those shells that are different. A small pail or cloth bag can carry all your shells plus your tools.

You can display your shell collection in cardboard trays or in a cabinet. Some shells can be cemented to glass. Keep tiny shells in small vials and display larger shells such as whelks on your bookcase. "The Shell Game" beginning on page 15 in this magazine has information on cleaning your shells and shell identification books. 🐚

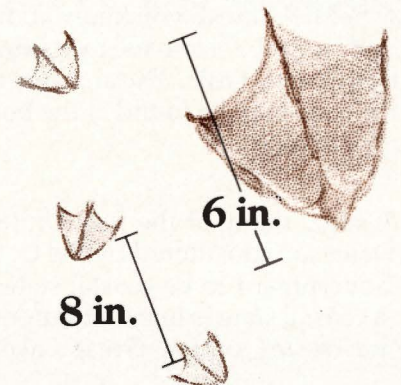
Sandpiper



Gull



Pelican



If you'd like to know more about the beach, ocean, sand dunes and marsh, here are some books you might wish to get from your school or local public library: "The Art and Industry of Sandcastles," by Jan Adkins, 1971. "The Beachcombers Book," by Bernice Kohn, 1970. "Captain Cook," by H. Bellis, 1968. "The First Book of the Ocean," by Sam and Beryl Epstein, 1961. "The First Book of the Seashore," by Wyatt Blassingame, 1964. "The Life of Sea Islands," by N. J. and Michael Berrill, 1969. "The Life of the Ocean," by N. J. Berrill, 1966. "The Life of the Seashore," by William Amos, 1966. "Meet the Men Who Sailed the Sea," by John Dymont, 1966.

Answers to the Coastal Quiz

1. 30 states
2. d. 50%
3. b. a place along the coast where fresh water and salt water mix.
4. c. salt marsh
5. b. 25%
6. a. 2%
7. False (However, in 1975, 70,000 school children in New Orleans ate 12 tons of shark meat for lunch and loved it.)
8. Importance in descending order of economic value:
 - e. shrimp
 - i. salmon
 - a. crab
 - b. tuna
 - h. clam
 - d. menhaden (used mainly for industrial purposes)
 - c. lobster
 - g. flounder
 - f. oyster
9. e. all of the above.
10. e. 97%

Dear Field Trip:

What causes the waves on the ocean?

Wind is the most important cause of waves on the ocean surface. By blowing across the surface of the water, wind creates small wavelets which are soon piled up into wave crests with sharp peaks. The eventual height of a wave mainly depends upon the force of the wind and the distance it moves across open sea. Waves move at different speeds, depending upon their size and how far they travel. A group of swells similar in size are known as "wave trains." Swells hitting our beaches may have formed a thousand miles or more offshore. Sharp "young" waves formed by winds at the shore often mix with the long rolling swells.

Although a wave may travel across thousands of miles of ocean, the water itself does not move forward. With each passing wave, the ocean moves up and down and only the wave shape moves forward. You can see this yourself by placing an object that floats in the water out from the

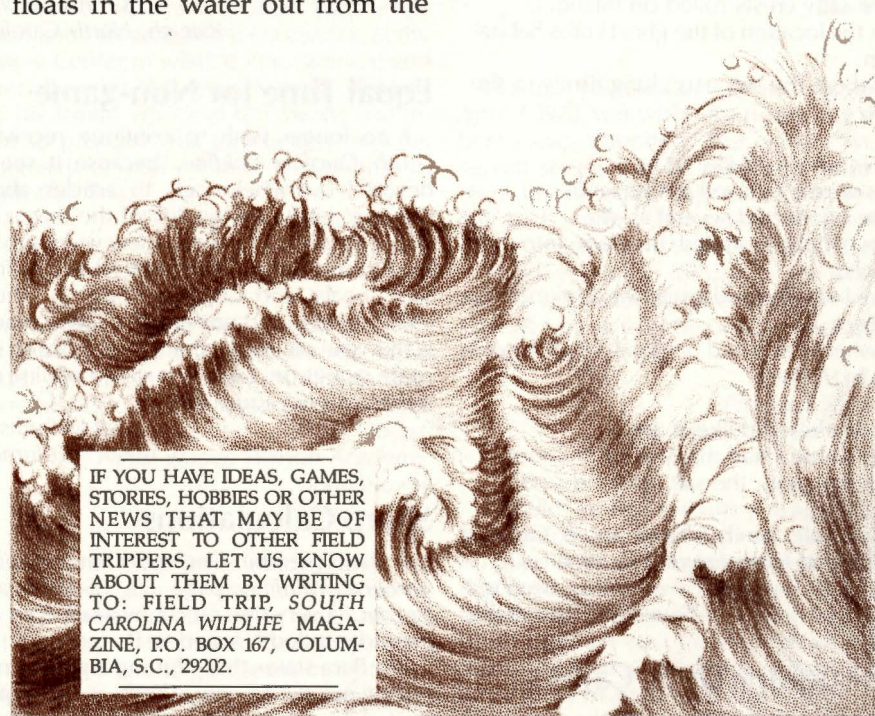
beach. The object merely moves up and down as the wave passes by.

Within the wave, water particles move in a circular motion. As the wave reaches shallow water, the base of this circular movement comes in contact with the underwater bottom. This slows the wave and forces its peak higher.

The peak continues to travel at the same speed and soon topples over. The falling of the wave peak causes the foaming white breaker that rolls onto the beach.

As this forward motion stops, the water runs back into the breakers, and deeper water as undertow. Steep shoreline usually have higher breakers and heavier undertow than shallow shorelines. 🌊

Send your questions to **Field Trip**, P. O. Box 167, Columbia, South Carolina, 29202.



IF YOU HAVE IDEAS, GAMES, STORIES, HOBBIES OR OTHER NEWS THAT MAY BE OF INTEREST TO OTHER FIELD TRIPPERS, LET US KNOW ABOUT THEM BY WRITING TO: FIELD TRIP, SOUTH CAROLINA WILDLIFE MAGAZINE, P.O. BOX 167, COLUMBIA, S.C., 29202.

turned sideways two of the ice formations resemble a duck and an alligator. We thought this was unusual but fitting for your magazine. Had you noticed? We Georgtonians did!

Also we are interested in learning more about the annual South Carolina Duck Calling Contest. What are the requirements for entering the youth division? Where and when will the 11th state contest be held? How does one register to enter? We will appreciate your help in getting this information.

We have recently started getting your magazine in our school library and are enjoying it.

Larry Plogman Jr.
Georgetown

Editor's Note: The 11th Annual South Carolina Duck Calling Championship will be held October 19, 1980, at 2 p.m. at Mill Creek Park, Pinewood, South Carolina.

There is an application fee. Youths must be 15 years of age or younger, and residents of South Carolina. The youth contest is limited to the first 20 contestants to submit applications.

To request an application and rules, contact Jerry Robertson, South Carolina Duck Calling Championship, Manning, South Carolina, 29012.

Back to Stay

I've been out of touch from your magazine for a little over a year. Now I'm back to stay. Too bad the rest of the country cannot follow your finest example of a superb wildlife magazine.

Chuck Ketchie
Raleigh, North Carolina

Equal Time for Non-game

I no longer wish to continue receiving *South Carolina Wildlife*, because it seems devoted overwhelmingly to articles about hunting. I miss the quality of the magazine which resulted in articles a few years ago on the Richard Russell Dam (then known as Trotters Shoals) and Congaree Swamp. Those stories concerned *non-game* wildlife, and it is this type of wildlife that I would like to see more stories on. I feel *non-game* wildlife deserves at least equal time.

Isabel Williamson
Columbia

Sharp Calculations

In the November-December issue of *South Carolina Wildlife*, page 55, "Sportsman's Corner," a very fine article by Mark Bara appeared entitled "Honed to Perfection."

Mr. Bara states that "Putting a good working or razor edge on a knife is often presented as a mysterious and complicated process." He states further, "If your blade is

1¼ inches wide, the back of the blade should be ¼ inch above the stone to achieve a 20-degree level."

In this situation, the *back of the blade* should be 7/16 inch above the stone, not ½ inch, to maintain the 20 degrees. Further, at 10 degrees, it would be 3/16 inch plus, and at 30 degrees, it would be ¾ inch above the stone. The ¼ inch Mr. Bara suggests equals 11½ degrees!

No mystery—just simple trigonometry.

T. T. Beck III
Tuscumbia, Alabama

Culture Goes to Ohio

I'm sorry but I'm nothing but a poor ol' student living in Ohio who loves to get her *South Carolina Wildlife* to keep in touch with home. For the most part, I do love the content except for the fishing and hunting articles. Many of your articles and stories, though, do hit on my old stampin' grounds from the coast to the mountains.

If you are anything like I am about my copies of *South Carolina Wildlife*, you keep them till the bookworms get tired of reading them and you keep looking through them over and over again. In fact, I've had to hide mine from my roommate (education major) who's been threatening to cut out some of the beautiful pictures for her class projects. . .

Horrors!

I like getting your magazine, because it can give some of these Mid-westerners up here some culture. Keep up the good work!

Arden Ball
Bowling Green, Ohio

An Outdoor Career

I am 18 years old and a regular reader of your fantastic magazine, and think it's a credit to wildlife, not only here in South Carolina, but everywhere in the United States.

Magazines like yours have influenced me greatly in wanting a career dealing with the outdoors.

Robbie Mullinax
Greenville

Delicious Jerky

We never throw our copies of *South Carolina Wildlife* away, and recently while thumbing through some, I found a recipe for kitchen jerky (September-October 1975). If some lemon-pepper salt and a touch of hickory-smoked salt are added to the seasoning, the jerky is absolutely wonderful!!

We love *South Carolina Wildlife!*

Peggy Blanton
Spartanburg

Editor's Note: For those readers who missed Wayne Fear's jerky recipe, here it is: Trim all fat off a cut of venison or beef and



Readers' Forum

S.C. Inspires Poetry

I am 13 years old and I go to Chippewa Middle School which is in Saint Paul, Minnesota. In the summer my family and I vacation on the Isle of Palms. I wrote this letter after a long Minnesota winter. Enclosed is a poem about South Carolina which I wrote during Minnesota's long winter:

S. C. is where I'd like to be . . .
It was where the sun shined all summer long,
Where salty crests rolled on inland.
It was the location of the ghost crabs habitation,
And where the sea oats clung firmly to the soil;

S. C. is where I'd like to be . . .
It was where I played in the sand,
Where I collected several shells.
It was where I waded barefoot into tidal pools,
Where I smelled and tasted the seasoned sea breeze,
And where I watched porpoise schools swim on by;

S. C. is where I'd like to be . . .
It was where I had many fond memories
About the sand, the salt, and the seas.

My whole family enjoys *South Carolina Wildlife* and looks forward to each issue.
Heather Greenslit
Saint Paul, Minnesota

Lowcountry Duck Callers

We noticed with interest the back cover of your January-February 1980 edition. When

cut the meat into six-inch strips about one-half inch thick along the grain. Season with salt, pepper and seasoning salt. Stick a round toothpick through one end of each strip. Suspend the strips from the oven rack. Leave the oven door slightly open. Heat at 120 degrees for approximately five hours or until the meat has turned black and there is no moisture in the center. The strips should be completely dry but flexible enough to bend without breaking.

A History Lesson

I enjoyed very much your article on the Carolina wren. Being in the third grade and studying South Carolina history, I am beginning to appreciate the state of South Carolina in which I live. I am interested in learning all I can about it. When my teacher, Mrs. Shelly, read this story to my class we thought it was a good chance to let you know how valuable this information was to our learning about our state bird, the Carolina wren.

*Brad Weathers
Greenwood*

Yawkey Center Mail

Following are selections from the many letters received by the Tom Yawkey Center in recent years:

I would like to thank you for your efforts on behalf of my students last Friday. I do believe they learned more about wildlife and photography in that one day than they could in six weeks in a classroom. I am such an amateur photographer—I too learned a lot. Their reactions have been good. They were very quiet on the tour; they were anything but quiet on the ride back to the academy! Their remarks were great. They loved their day and truly appreciated your help. They have daily asked me about their film. They are almost as anxious to see their work as I.

*Carolyn Rogerson
Winyah Academy
Georgetown*

Thanks again for hosting us at the Tom Yawkey Wildlife Center during our recent field trip to the Georgetown area. We all thoroughly enjoyed our visit, and the students learned a lot from it. As usual, they were overwhelmed by South Island. Students generally want a cookbook approach to wildlife management and the many impoundments on South Island always provide some good examples of the limitations of following the book and the need to be flexible and innovative.

*A. Sydney Johnson
Associate Director
Institute of Natural Resources
University of Georgia*

Returned from South Carolina just in time to hit two feet of snow, which I can do without. It is a far cry from the center.

My wife, Ronald Lyman and I thank you sincerely for the tour and courtesy you (Bob Joyner) and your wife showed us January 15. It was a high point on our whole stay in South Carolina and we appreciate the time both of you took to show us more waterfowl than we have seen in one place.

Under separate cover, I am sending along some lures you may want to try on the sea trout, channel and striped bass when the season rolls around. All of them have worked in the past for me and I hope they will do the same for you.

*Henry Lyman
Publisher
SaltWater Sportsman*

The landscape and the wildlife is really something to behold. We are all very fortunate to have such a place as South Island where all of us and future generations can observe the natural beauty of the state.

*Sam Applegate
Charleston*

Thank you for showing us around South Island. The beach was pretty, and the angel wings, and the moonshells, and sand dollars were pretty too.

*Kim
Georgetown*

We could not help but come away impressed with the natural beauty of South Island, the abundance of wildlife, the investigation and research being conducted at the Yawkey Center in wildlife management and especially with the man, Thomas Yawkey, and his family, who had the means and insight to preserve this rare beauty and the generosity to share it with the people of South Carolina.

*Dr. Marshall C. Sasser
Conway*

In this day of modernization and industry, it is good to know that there are still some places, such as the Yawkey Wildlife Center, where wildlife can be enjoyed and protected.

*Mike Oberst
Ninth grader, Winyah Academy
Georgetown*

GINNY and I are just surfacing after our recent trip to your fair state and, of course, the high point was our visit to South Island.

It was very instructive to be with you and Vernon Beville and to gain some insights into turkey lore and biology. I was also delighted to see the dikes that rim the wildlife center with its rich population of waterfowl; and

particularly to find that there is such a thriving population of avocets.

*Roger Tory Peterson
Old Lyme, Connecticut*

It makes one very proud to see the projects which the state is sponsoring and the commitment to using the area for the preservation of a number of habitats, both floral and faunal.

*John J. Winberry
USC professor, Geography Department
Columbia*

On behalf of the Columbia Audubon Society, Pat and I wish to thank you for the two interesting and informative trips that you granted us to the Tom Yawkey Wildlife Center. We appreciate the time and personal involvement that you (Bob Joyner) and your wife put into these trips to make them enjoyable for everyone.

I believe that almost everyone saw some species of bird, animal or reptile that they had never seen before or at least had never seen in the number or circumstances that they observed at the wildlife center.

Not until tonight had I had a chance to talk to one of the participants of the 19th and I gather that they saw more and different geese from the ones we saw and also some swans and at least one wood stork that we didn't see. However we saw species that they didn't, so I guess it came out equal.

Thanks again and please be sure to thank your wife for us in helping to make the trips pleasant and possible.

*Charles H. Eastman
Columbia*

The tour you conducted for our group on April 7, 1978, was without a doubt one of the best I ever attended. The wildlife we observed seemed to be putting on a private show just for our group. Everyone I've seen has had nothing but praise for the work going on at the Tom Yawkey Wildlife Center.

Thank you again for one of the most delightful educational experiences of my lifetime. If we can ever be of assistance, please contact us.

*Betty M. Bayne
Program Specialist
Land Resources Commission*

I would just like to thank you again for the tremendous tour of South and Cat Islands. All of us were very impressed with the work that is going on there; needless to say, the islands themselves were something to behold. Contrary to what many think, I think this state is truly blessed in having such large areas of protected real estate.

*Dr. Bright Williamson
Charleston*

Marine Literacy Needed in Schools

Teachers Study Coastal Environment

Public school teachers from Georgetown and Horry counties are dragging beach seines, catching plankton in a net made from a coathanger and a pair of pantyhose, and learning how to set up a saltwater aquarium in a new course offered by Coastal Carolina College, University of South Carolina.

The course was developed by Dr. Sally Z. Hare of USC's Graduate Regional Studies and William M. Stephens, naturalist and educator, who teaches the course.

"Would you believe that we have school children in coastal counties of South Carolina who have never seen the ocean?" Stephens says. "Their teachers don't take them on field trips to the shore because the teachers themselves lack the training to make the trip a meaningful experience for the youngsters. They grew up thinking the beach was just a place to get a tan. The textbooks used in our schools appear to be designed for children who live in Kansas."

Each teacher must develop a project to be used in his or her own classroom. Projects produced to date have been so varied and creative that a book of the ideas is being prepared by Stephens and Hare.

Demand for the beach course has been so great that Coastal Carolina College plans to develop similar programs for undergraduates and for the community at large. Stephens and Hare, with the help of Dean Roy Talbert of Coastal, plan to use a mobile sea lab to visit schools.

We hope the Sea Grant Consortium and other agencies will give us the support we need to develop a fully functioning Ocean Education Center," Stephens said. "This will be a place where school classes, civic groups and others can go to immerse themselves in the excitement and lore of the sea."

In another coastal education program, fifteen high school teachers in South Carolina coastal counties will be offering a course this fall on coastal problems and management.

Using federal funds, the South Carolina Coastal Council trained the teachers this spring. All school districts in the eight coastal counties were invited to

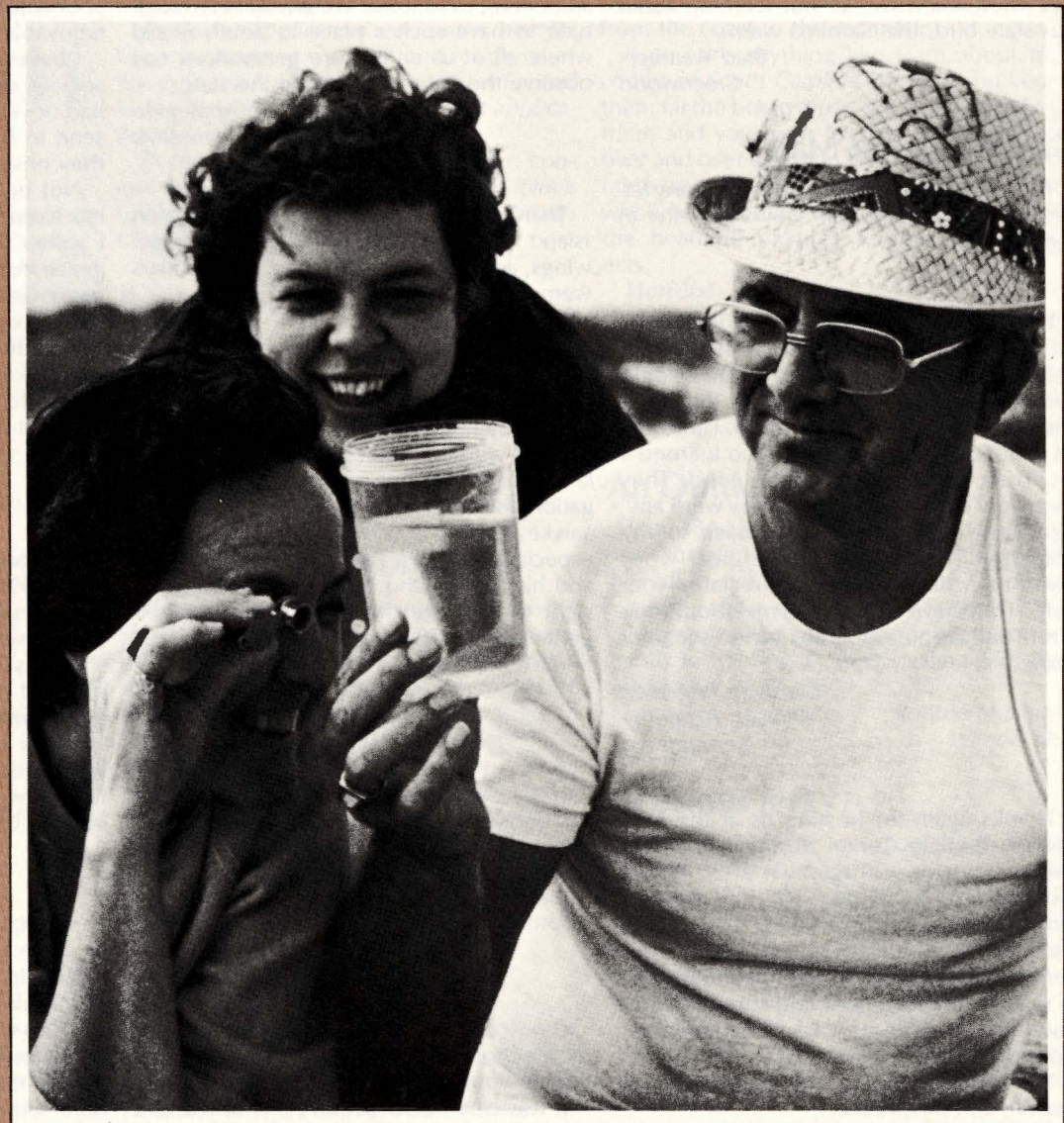
participate. Horry County sent five teachers, Beaufort three, Charleston three and Dorchester one.

"At present, this is an experimental program, but if it is successful, we hope that children in all high schools in the state will have the opportunity to develop marine literacy," said Alice Linder, environmental education

coordinator for the State Department of Education.

Francis Marion College in Florence also offers a marine education course for teachers of grades seven through 12. Dr. Tom Roop of the department of biology will teach the course, offered June 4 through 25.

Dr. David McCollum will be teaching a course for science



These teachers take a closer look at a marine specimen they have captured in a jar of seawater. Courses offered at various colleges take

high school teachers out of the classrooms and onto the beach to give them firsthand information for their science classes.

teachers of kindergarten through 12th grade at the University of South Carolina—Beaufort campus.

USC's Columbia campus, Clemson University and the Citadel offer environmental education institutes at the graduate or undergraduate level.

More information on these courses can be obtained by calling 758-2652. 🐾

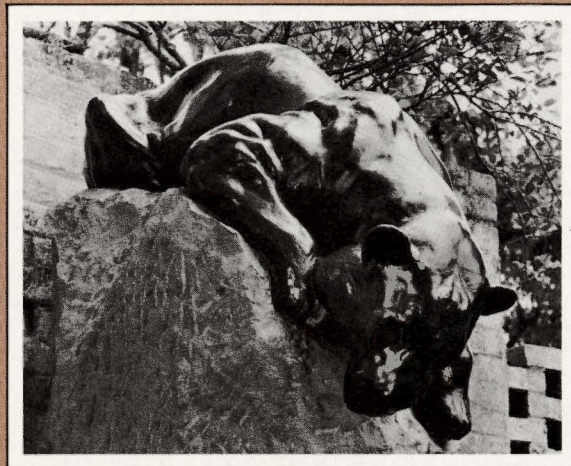
COASTAL PLACES RECEIVE GRANTS

Nearly one-fourth of the more than 170 historic preservation grants-in-aid projects in South Carolina since 1971 have been awarded to coastal properties, according to the State Department of Archives and History.

These properties include Hampton Plantation (1735, Charleston County); Middleton Place (1741, Dorchester County); Pompion Hill Chapel (1763-65, Berkeley County); the Exchange Building (1767-71, Charleston County); St. James, Santee Chapel (1768, Charleston County); Robert Mills' Fireproof Building (1822, Charleston County); Brookgreen Gardens (18-19th Century, Georgetown County); the Kaminski Building (1840, Georgetown County).

Major survey and planning grants have also gone to South Carolina's three oldest coastal cities—Charleston, Beaufort and Georgetown.

The Department of Archives and History administers the statewide historic preservation program, which makes available to owners of historic properties listed in the National Register of Historic Places the opportunity to apply for matching grants of up to 50 percent for the cost of acquisition, development or planning the preservation and use of those properties.—JANET T. LAMB 🐾



Brookgreen Gardens near Murrell's Inlet holds a collection of America's finest outdoor sculpture and a park with wildlife native to the Lowcountry. Brookgreen is one of 170 South Carolina properties listed in the National Register of Historic Places.



Roundtable

MARINA PERMIT STARTS LAND USE CONFLICT



Murrell's Inlet's new jetties were welcomed as aids to ocean access and sport fishing, but the jetties also made possible the development of a marina for commercial fishing boats, which is opposed by many inlet residents.

At the little summer resort town of Murrell's Inlet, a classic conflict on the use of coastal resources has local property-owners up in arms and government decision-makers in a quandary.

The legal battle is now brewing, and the eventual outcome of the case may well have a lasting impact on the way our entire coast is developed.

It all started in 1979 when an out-of-state developer, Ralph Triska, was granted a permit to construct a marina for commercial fishing vessels and recreational head boats. Triska had previously leased a site called Smith's Landing off a loop of Main Creek. On a very close vote by the 18-member South Carolina Coastal Council, Triska was granted a permit to construct the marina on this site.

A coalition of outraged local property-owners then appealed the decision to issue the permit. Most of the opposition has come from absentee property-owners with summer homes on the inlet.

In the Coastal Council's files, letter after letter from these people praise the tranquil beauty and natural setting of Murrell's Inlet. Some of the letter-writers have spent each of the last 50 or 60 summers at the inlet. The word "charm" appears again and again as these people attempt to describe the old homes along the inlet and the way of life they love.

Although the project will require some channel dredging and construction of piers and bulkheads, the South Carolina Wildlife and Marine Resources Department and other agencies

believe that any adverse impact of such activities will be minor and short-lived, and as a result have not objected to the issuance of the permit. Moreover, the permit granted by the Coastal Council and now under appeal carried detailed conditions on waste water treatment, control of runoff, establishment of vegetative screens and other qualifications designed to minimize any long-term impact of the facility on the area.

The proposed marina may have a positive economic impact on the area since few large-scale commercial fishing docks exist along that part of the coast. Opponents doubt that the offshore fishery resources in the area will support this type of facility, however.

Many also express concern over the degradation of the en-

vironment that they claim to have already witnessed. Most think the proposed marina would further increase traffic, noise and water pollution.

A growing number of restaurants, a thriving boat business and an increasing population have already altered the traditional character of the area. But now property-owners have seen enough change at Murrell's Inlet and are taking a final stand at the proposed marina. Since the project already has received the necessary zoning and other local approvals, the Coastal Council permit seems the last possible roadblock.

This sort of land use conflict puts government agencies and decision-making bodies in a difficult position. Intangible issues such as "the quality of life" are the type of issues about which people often are most adamant and emotional. Yet these very same issues are all but impossible to fit into any equation weighing the pros and cons of a proposed development.

To further complicate the picture, the U. S. Army Corps of Engineers has recently spent millions of dollars to construct jetties at the inlet mouth. These jetties are designed to reduce shoaling and to improve navigation. The presence of the jetties thus greatly enhances Murrell's Inlet's potential as a seafood port. So the very type of development made possible by the jetties is now under fire, though the jetties themselves received only minor opposition.

The Corps must also issue a permit to Ralph Triska before construction can begin, but the Corps is waiting to see the outcome of the fight over the Coastal Council's permit. Although both agencies generally agree on the issuance or denial of a permit, should the council ultimately uphold the appeal and deny Triska a permit, the Corps would be in an awkward spot. After authorizing the jetties, the Corps would be very reluctant to deny construction of the very type of facility the jetties make possible.

Another factor in the case against commercial development is the recent nomination of two pieces of property adjacent to the proposed marina, Sunnyside Plantation and the Hermit-

age, for inclusion on the Federal Register of Historic Places.

Regardless of how the Coastal Council rules, the loser will no doubt move the fight into the courts. The final resolution may be years away but could set a precedent that will have repercussions far beyond Murrell's Inlet, as the state continues to wrestle with the complex problem of how our coast should be developed and by whom. 🐌

NEW GROUP TO STUDY S.C. COAST

A South Carolina Consortium, made up of the state's major marine research institutions and the wildlife department, has begun to address the important coastal and oceanic resource problems of the state and region.

Created through assistance of state Senator James Waddell of Beaufort and U.S. Senator Ernest F. Hollings, the consortium is composed of the marine research institutions at the University of South Carolina, Clemson University, South Carolina State College, the College of Charleston, the Citadel and the Medical University of South Carolina. The Board of Trustees for the consortium is made up of the seven presidents of these universities and Dr. James Timmerman, director of the South Carolina Wildlife and Marine Resources Department.

Dr. John M. Armstrong, former director of the Coastal Zone Laboratory at the University of Michigan, became the director of the consortium in January.

The consortium will manage the state's sea grant program and contract with the state's Coastal Council to research erosion management and oyster resource development. 🐌



The marine center's seafood marketing program hopes to add dishes such as pink porgy, grouper, shark and gray tilefish to the fare available at South Carolina's local seafood restaurants.

State Agency Marketing Seafood to Restaurants

The wildlife department's new seafood marketing section intends to demonstrate to consumers the value of seafood products and the best methods of preparing them.

Funded through a grant from the Coastal Plains Regional Commission, the marketing section is now in its second year as part of the Wildlife and Marine Resources Department's Office of Conservation, Management and Marketing.

According to section head Paul Van Steenbergen, most consumers are unaware of how to buy and prepare whole fish. This unfamiliarity can be costly to the industry, he says. Consumers also are unfamiliar with new products like smoked

fish, whelks and rock shrimp.

To increase awareness the section is using cooking demonstrations, television and radio shows, and informational brochures.

"We also are working with restaurants, retail fish markets, and supermarkets," said Van Steenbergen. "More people consume seafood in restaurants than anywhere else, and South Carolina has a tremendous influx of tourists into its coastal areas during the warm weather months."

"Much can be done with these restaurants to encourage them to handle local species. Methods which we feel will be successful are in-house demonstrations on buying, storing and

preparing local seafood, developing point-of-sale material, and techniques which the restaurants can use to alleviate both lack of knowledge on the part of consumers, as well as dealing with their supply problems."

Some seafood species currently being produced in the state enjoy reasonably good markets elsewhere, but show up relatively infrequently in South Carolina markets. Included in this group are clams, pink porgy and grouper.

Other products are not currently produced to any great degree here and enjoy no strong markets anywhere. This last category would include gray tilefish, shark and, to some extent, rock shrimp. 🐌

Fishing Guides Now Available

A 90-page, photo-packed guide entitled "A Guide to Saltwater Recreational Fisheries in South Carolina" has been written by Charles J. Moore, Donald L. Hammond and DeWitt O. Myatt III of the South Carolina Wildlife and Marine Resources Department's recreational fisheries program.

The new guide contains information on pier fishing, coastal boat rentals, coastal boat landings, coastal marinas, scuba diving shops, artificial fishing reefs and wrecks, head boats and charter boats. A list of current South Carolina all-tackle state record saltwater gamefish and information and rules for registering a new state record have been included. There are photographs and information on the local distribution and seasonal occurrence of the 50 most common South Carolina saltwater fish taken by hook and line. Tide tables, marine fisheries laws which pertain to the taking of saltwater fish and shellfish for personal consumption and much more have been included.

Another booklet, the 60-page shellfish guide entitled "A Recreational Guide to Oystering, Clamming, Shrimping and Crabbing in South Carolina," contains information on gathering, cleaning and cooking various shellfish species, harvesting laws and regulations and detailed maps of the 30 public and state shellfish grounds.

Both the new fishing guide and the shellfish guide are being printed by the South Carolina Wildlife and Marine Research and Conservation Foundation.

Both may be ordered by writing to: Guides, P. O. Box 12559, Charleston, South Carolina, 29412. Check or money orders (fishing guide, \$4.50; shellfish guide, \$2) should be made to the South Carolina Marine Research and Conservation Foundation. Please allow three to four weeks for delivery. 🐾



The offshore artificial reef program has been so successful that both anglers and agency personnel are looking for ways to construct similar fishing hot spots in estuarine waters, which are more accessible to small-boat fishermen.

Site Locations, Funds Pose Problems In Establishing Inshore Fishing Reefs

Many saltwater anglers have complained legitimately that South Carolina's artificial reefs are built so far offshore that only daredevils and millionaires can fish on them.

The South Carolina Wildlife and Marine Resources Department welcomes any suggestions on how or where more accessible reefs could be built or how the required real estate could be obtained.

Inshore reefs present two problems that don't occur ordinarily farther offshore. First, from the surf zone out to five miles is heavily fished by commercial shrimp trawlers. It is neither economically nor politically practical to inhibit shrimping, the largest commercial fishery in South Carolina. A sec-

ond problem is that strong wave action and storm surge in the surf zone necessitate that reef material be extremely sturdy.

The next logical site for reefs would be estuaries. There they could be reached by anyone with a johnboat and a small motor. In some cases, they could even be fished from the shore or a pier.

The problems would be conflicts with navigation, oystering, shrimping, crabbing and real estate interests. Also, the site ideally should have a firm bottom guarded by shoalwater or sand bars to prevent deep vessels from striking the reef. The site should be out of navigational channels and reasonably close to a landing or ramp.

Very few reefs have been built

in estuaries, and very little information is available on those built. Some have been constructed over soft bottoms which literally swallowed everything sunk on them.

Since inshore reefs are much smaller than offshore reefs, certain materials and designs may prove practical inshore that would be too expensive offshore.

The state reef program is not currently funded, so new reefs are highly unlikely at this time. The wildlife department has started surveying our inshore waters for potential sites, however, so that the long process of obtaining permits can be started for those that look good.—DEWITT MYATT, state marine biologist 🐾

USC Baruch Institute for Marine Study Celebrates 10th Anniversary This Year

During 1980 the Belle W. Baruch Institute for Marine Biology and Coastal Research is celebrating its 10th anniversary.

Through the joint action of the Belle W. Baruch Foundation and the University of South Carolina, the institute was founded in September 1969 for teaching and research in forestry, wildlife science and marine biology. As a result, in 1972, the university began the state's only undergraduate and graduate program in marine science. Since then, 149 students have graduated in that major and 37 have received advanced degrees.

The institute is located at the university and at Hobcaw Barony, a 17,500-acre coastal property near Georgetown. Originally the property of Lord Carteret, a supporter of King George II, the barony later belonged to Wall Street financier Bernard Baruch. When his daughter Belle inherited the land, she established in her will that the barony be used to promote teaching and research related to forests, wildlife and waters.

The facility has expanded with the acquisition of a small fleet of boats and the completion of a boathouse, a field station laboratory, a meeting hall, a recreational hall and three cottages.

After 10 years, research conducted by and at the institute is contained in 11 Baruch Library Symposium volumes, six other symposium volumes, four books and 256 research papers. Research support has climbed to \$4.5 million. Visits to the research station are projected for this year to be 3,500.

Under the direction of Dr. John Vernberg, professor of marine ecology, 11 symposiums have been held at the Hobcaw House. Dr. Vernberg, along with his wife, Dr. Winona Vernberg, dean of the USC College of Health, and the institute faculty have traveled to and received researchers from many other countries in an exchange of scientific findings. 🐾



Director John Vernberg and wife, Dr. Winona Vernberg, look over educational research sites on a map of Hobcaw Barony's 17,000 acres on the northeastern shore of Winyah Bay at Georgetown.

HAILE MINE LEASED

Since publication of the article, "Legacy of Gold," by Kay B. Day in the March-April 1980 *South Carolina Wildlife*, the Haile Gold Mine has leased its mineral mining rights to GeoSurveys, a Colorado gold company.

James L. Hora, vice-president of exploration for GeoSurveys Inc., chose the Haile Gold Mine over 30 other mines in the country because it is known for gold

occurrence. It should take about one year to determine if opening the mine will be profitable.

Several new jobs may become available once mining operations begin.

GeoSurveys only has the right to mine for precious metals such as gold. Currently, mica is being mined at the Haile mine.

Since 1827, Haile Mine has mined 278,000 ounces of gold.

Boaters Use Less Gasoline

In an effort to conserve energy, the Department of Energy had decided recently to restrict the use of recreational boats during weekends, but this measure was stopped in the face of arguments espoused by boat manufacturers and owners.

Americans spend \$6.5 billion in retail sales of recreational boats. The boating industry provides more than 500,000 jobs, with an annual payroll of over \$3 billion.

"Only one-half of one percent of the annual U.S. gasoline consumption is used in recreational boating," says W. Alvin Roof, vice-president of a local boat manufacturing company. "Automobiles operated in California during the month of July will consume more gasoline than the entire boating industry will use in one season.

"Look at it this way: it takes less gas for an entire family to go boating all day on the lake than if each person took a car and went their separate ways."

Nevertheless, many Americans have had to cut back on their boating or choose recreation that requires no gasoline, like snorkeling, surfing, sailboating, swimming or canoeing.

"I've already seen a change," says Mike Williams, state wildlife department boating education officer. "Many people have begun utilizing water closer to home, buying lighter boats and smaller, more efficient motors.

"For years, having a big boat was a status symbol, especially for members of fishing clubs. Now it's getting too expensive to show off the most powerful motor; soon people will be interested in fishing, not how they get around the lake." —MARY ANNE EARLS 🐾

Beach Guarded By Council

Twice a week a helicopter flies the entire length of the South Carolina coast, looking for trouble.

The helicopter is checking for illegal activity such as dredging, dumping or disturbance of sand dunes and reporting back to the Coastal Council, according to Dr. Wayne Beam, executive director of the council.

If damage has been done to a critical coastal area, the responsible party can be required to restore the area. Beam says fewer illegal activities are started now than when the council began its spot checking.

"The citizens of South Carolina own the beach. The State holds it in trust for the people," Beam explains. "No one can build anything, or disturb the beach or the first row of dunes, without a permit from the Coastal Council."

The state's territorial limit is three nautical miles out from the beach, but its jurisdiction has been extended to 200 miles for seafloor minerals, oil reservoirs and all living and non-living resources. Foreign ships cannot fish or drill or even do research in that jurisdiction without permission from the Coastal Council.

Beam directs a staff of more than 20 persons who investigate and act on permit applications. The council itself has 18 members. One member comes from each of the eight counties, named by the governing board of the county. One comes from each of the six Congressional Districts, elected by the members of the General Assembly from that district. Two members are from the Senate and two from the House.

"We have people who are pro-development, and we have people who are pro-protectionist," Beam says. "I think the overall attitude is that of conservation.... The coastal zone must assimilate some economic

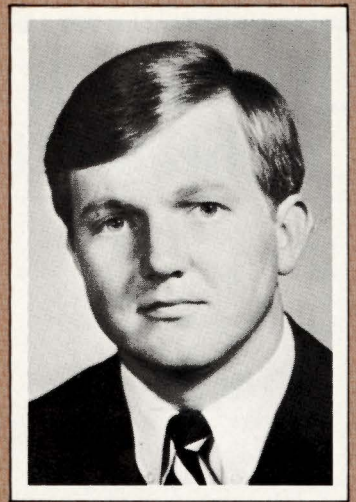
growth, but it should be done in those areas that can sustain it... If 51 percent of the people agree with us, we're awfully lucky."

The council has primary jurisdiction in the cases of construction slotted for the critical areas of the coast: the beaches, the primary ocean-front sand dunes, the wetlands and the coastal waters. Before the Coastal Council grants a permit, public notices are circulated and citizens have 30 days to review them. If as many as 20 citizens request a public hearing or if the council feels that the issue requires public input, the council calls a hearing.

Should a concerned citizen disagree with the Coastal Council's decision on a permit, that citizen can appeal to the council, which would set up a hearing to hear testimony from all sides. After a study of the record and oral arguments, the council would either sustain or overturn their previous action. If the citizen still disagrees, he or she would have to go to circuit court to try for a reversal.

"Currently, we're handling about 700 permits a year... and we'll have about 10 to 15 appeals," Beam says.

The council permits construction of homes from the back of the trough of the first row of dunes, providing the plans are environmentally safe. Walkways over the primary dunes are allowed without a permit if they follow the contour of the dunes. A landowner can plant beach grasses or trees or build sand fences parallel to the beach without a permit, because these measures can help stabilize the



Dr. Wayne Beam

dunes. But without a permit, the landowner cannot build revetments, groins or anything that might interfere with public use of the beach or cause erosion of a neighboring property. He also cannot dig a channel or build a dock or drive pilings without a permit from the Coastal Council. —BILL STEPHENS

New Mariculture Center To Be Built in Beaufort

With the demand for traditionally harvested fishery resources surpassing the supply, and with commercial fishermen facing an uncertain fuel situation, interest is growing in mariculture in South Carolina.

As a result, a Mariculture Research and Development Center is being planned in Beaufort County with a scheduled completion date of early 1982.

According to Dr. Paul A. Sandifer of the Marine Resources Research Institute, mariculture, the propagation and cultivation of aquatic animals and plants in salt and brackish water, can add significantly to the state's production of seafood.

Three major areas exist for significant opportunities in mariculture in this state:

- commercial food production (farming of fish, clams, oysters, shrimp, etc.),
- commercial and public rec-

reational fisheries (production of bait, fee fishing ponds, production and stocking of game and commercial fish),

- public research and development activities (research and educational grants, regional, national and international mariculture conferences).

After considering several sites for a large-scale mariculture center, the department selected a 1,200-acre site previously acquired from the State Ports Authority at Victoria Bluff on the Colleton River.

Eventually, the mariculture center will occupy about 200 acres. The remaining property will be maintained in the department's Heritage Trust Program for passive use, primarily as a wildlife preserve.

According to Sandifer, this site was selected because of "the near pristine nature of the Colleton River and environs, the

depth of the river and its high salinity at Victoria Bluff, the excellent ground water supplies, the elevation of the land which would prevent flooding of ponds, the limited industrial development in the area, the local climate and the local commitment to maintaining the quality of the environment."

The mariculture center will consist primarily of experimental saltwater ponds, plus the necessary water system, a floating dock for attachment of fish and shellfish rearing pens, and hatchery facilities and minimal support laboratories for rearing a number of seafood species under test conditions.

These outdoor ponds and pilot-scale production facilities will complement the extensive laboratory facilities available for marine research activities at the department's Marine Resources Center in Charleston.

NATURAL EVENTS FREE AT CAPE ROMAIN

A large portion of our coast is set aside for special events sponsored by Mother Nature and everyone is invited to attend.

On the Cape Romain National Wildlife Refuge, the young pelicans, herons, egrets and shorebirds are fledging in July and flying by August. Also during July, visitors can see wood ducks on the Bulls Island ponds. Bulls Island is an ideal place to observe wood ibis, black-crowned and yellow-crowned night herons.

In August, bird watchers can spot concentrations of whimbrels and marbled godwits. The Atlantic loggerhead sea turtle will be nesting until the end of August.

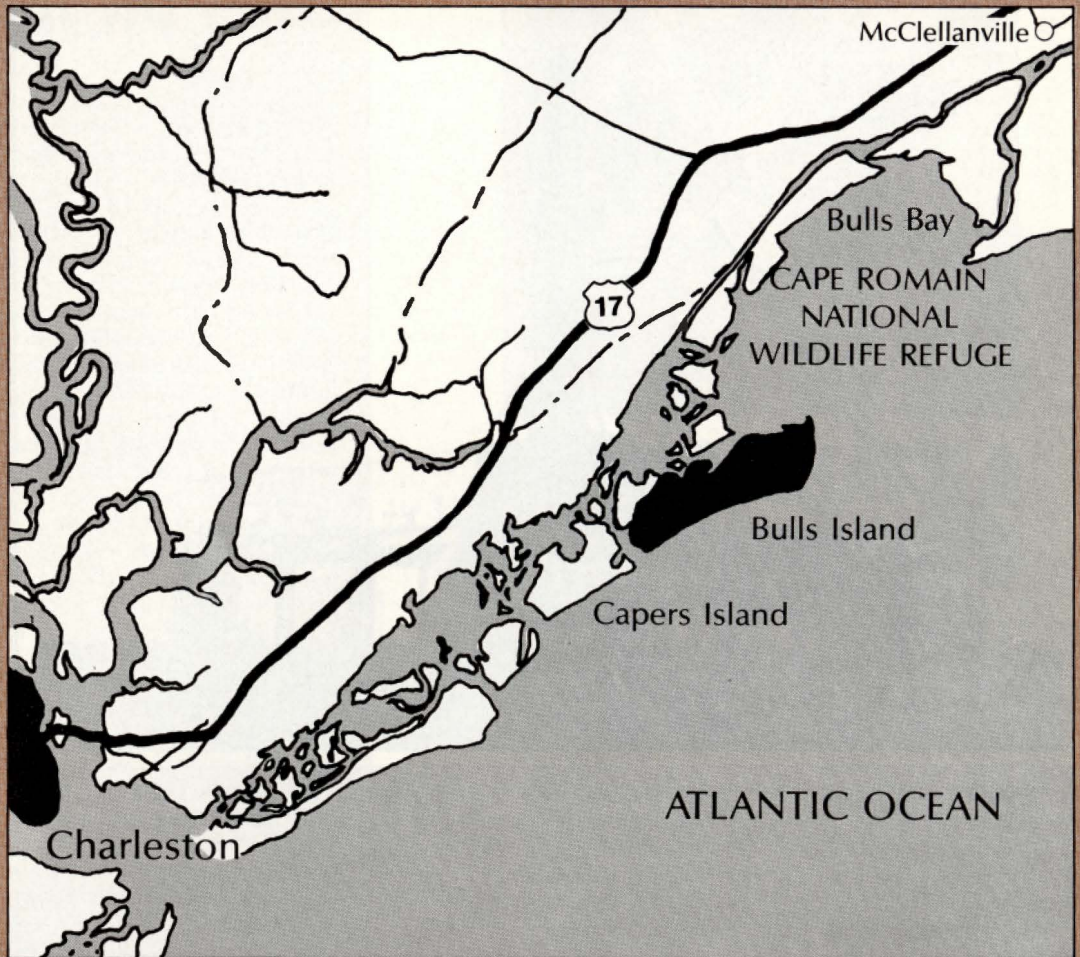
These birds or turtles are not to be disturbed while nesting or at any time. No weapons, bicycles or pets are allowed. Visitors are also reminded not to camp, build fires or litter.

Picnic tables, drinking water and restrooms are available on the refuge.

To reach the refuge's headquarters at Moore's Landing, turn east off U. S. Highway 17 about 20 miles north of Charleston onto See Wee Road for about 5 miles to the landing. Travel beyond this point must be by boat. Public ramps for launching boats are available during high tides at Moore's Landing and during all tides at Buck Hall and McClellanville. There are no public docks on Bulls Island.

Sport fishing is permitted only on areas designated by signs and only during daylight from March 15 to September 30. Boats with electric motors are permitted on the island, but other motors are not.

Surf fishing is permitted during daylight on the beaches of Bulls Island, Cape Island, Light-house Island and Raccoon Keys. Night fishing is allowed on the south end of Cape Island during February, March, October, November and December. On other islands of the refuge, surf fishing is permitted during daylight hours only from September 15 through February 15. ☀



To reach the refuge, visitors must have their own boat, which can be launched from the public ramps at Moore's Landing, Buck Hall or McClellanville. The public is asked not to enter areas marked "AREA CLOSED" for any reason.

Compton, Owen Appointed New Wildlife Commissioners

Charles L. Compton, a Laurens attorney, and Larry C. Owen, an Easley business executive, have been named to the South Carolina Wildlife and Marine Resources Commission by Governor Richard W. Riley.

Compton replaces Sam Boykin of Camden, whose six-year term expired in June, while Owen succeeds J. M. Pendarvis, who served the remainder of Jones Buchanan's six-year term

in June.

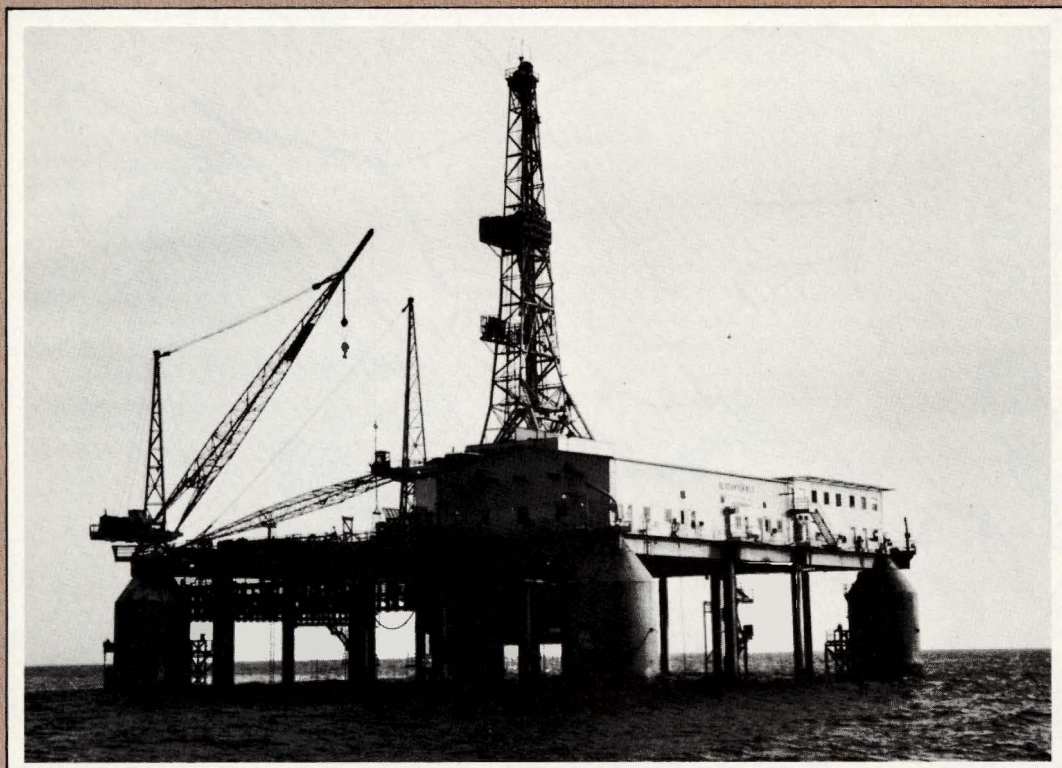
Compton and Owen serve with seven other members of the wildlife policy-making board. Six commissioners represent congressional districts, one is at-large and two are legislators. Compton represents Congressional District 5, and Owen District 3.

A native of Miami, Florida, Compton graduated from Wofford College in Spartanburg in

1969 and from the Mercer University law school in Macon, Georgia, in 1973. He resides in Laurens with his wife Jane and three children.

Owen originally hails from Balsam Grove, North Carolina. A graduate of the American Institute of Banking, he is Executive Vice President and Director of Carolina Investors, Inc. and lives in Easley with his wife Kathy and daughter Mandy. ☀

S.C.'s Sea Bottom Contains Little Oil



The South Atlantic region, including South Carolina waters, is believed to contain only moderate amounts of oil and natural gas. All industry interest in this region is owned by the federal government from the state's three-mile jurisdiction out to 200 miles.

For lease to petroleum companies, the ocean bottom is divided into tracts and offered by the federal government during sales. The first South Atlantic Lease Sale was held in 1978.

None of the tracts available for lease off of South Carolina's coast received bids in that sale. Industry interests centered off Georgia's coast. Exploration began in this area during the summer of 1979.

If a significant amount of oil and gas is discovered, the coastal area could begin to experience the impact rapidly. When a significant discovery is made, the industry moves from exploration to the developmental stage.

The developmental stage means more people moving into adjoining states, more onshore

construction, and the possibility of pipelines being laid. Drilling rigs and other offshore facilities will be required, and environmental concerns, like oil-spills, increase dramatically.

Planning at this stage is critical to accommodate whatever develops as easily as possible for the people, as productively as possible for the state, and as responsibly as possible to protect coastal resources.

Tracts available during the next sale, scheduled for August 1981, are in Southeast Georgia Embayment, the same area available in the 1978 sale. Petroleum industry interests in this upcoming sale appear somewhat greater, especially off the North Carolina coast.

Some tracts off North Carolina are in deep water on the slope of the shelf. This area presents significantly greater environmental and safety risks during exploration.

A third sale is scheduled for 1981 in the Blake Plateau area of the South Atlantic. This area is much farther offshore and in much deeper water than most of

the Southeast Georgia Embayment. Petroleum companies have much higher expectations for discovery in the Blake Plateau than elsewhere in the South Atlantic.

The technology for exploration and production in the water depths found in the Blake Plateau is not fully developed. This implies more serious environmental risks and expense. As the prices for energy rise, further development of new deep-water technology becomes profitable. By 1984, it appears likely that the Blake Plateau may be within reach of the companies.

Up until this time, response to oil spills has been primarily reactive. Reaction has been quick and effective, but not enough attention has been given to anticipating and planning for large oil spills. The Department of Health and Environmental Control has received two grants from the federal government through a program designed to help states plan for development of the other continental shelf.

DHEC's grants will enable the

state to assess how vulnerable the South Carolina coast is to oil spills and inventory equipment. Grant money will also permit the state to determine where equipment should be placed in the event of a major spill to protect susceptible resources.

In light of present exploration, upcoming lease sales and permit reviews as well as the consideration by several companies for Beaufort and Jasper counties for future refinery sites, the South Carolina coastal region is feeling growing pressure as the demand for increased domestic energy resources reaches a critical state.

Increased likelihood of oil spills is inevitable. Already oil spills are occurring intermittently in South Carolina waters such as in the Cooper and Santee rivers during the past year.

Responsibility for responding to oil spills rests with the Department of Health and Environmental Control, with the U.S. Coast Guard and the U.S. Environmental Protection Agency. DHEC has developed a cooperative relationship with the Coast Guard and EPA. In addition DHEC can call on other South Carolina agencies to assist with oil spills.

Much can be learned from other states and foreign countries which have experienced outer continental shelf development for years. South Carolina can possibly avoid mistakes which inevitably occur when people are breaking new ground.

Interested citizens should be active by attending local meetings, hearings or workshops on all other energy and coastal-related issues. South Carolina's citizens should recognize that the future of the coastal area will not only affect preservation of resources and recreation, but also the economy.

Anyone interested should contact the South Carolina Coastal Council to be put on their mailing list. Write them at 19 Hagood St., Summerville Center, Suite 802, Charleston, S.C., 29403. — ANN C. BAKER, HARRIET A. KNIGHT.

BENNETT HONORED BY FEDERATION

Representative L. Edward Bennett of Springfield was recently named the South Carolina Legislative Conservationist of the Year by the South Carolina Wildlife Federation.

Representative Bennett was among persons honored by the federation during its 15th annual awards program.

A house member since 1969, Bennett has been chairman of the Agriculture and Natural Resources Committee since 1975. As chairman, he automatically serves ex-officio on the South Carolina Wildlife and Marine Resources Commission.

Cyril Thomas Wyche of Greenville was named the South Carolina Conservationist of the Year. Wyche was recognized for his continuing efforts to preserve about 50,000 acres of upper South Carolina in an area that has come to be known as the Mountain Bridge Wilderness

Area. Some of the area has become state-owned recently in the Caesar's Head and Jones Gap state parks.

Other recipients included: Communication, Rudy Mancke of the state museum commission in Columbia; Education, Larry Sandifer with the Soil Conservation Service in Columbia; Forest, WESTVACO Southern Woodlands Division; Hunter Safety, Al Cannon of Charleston; Land, LaBruce Alexander with the Nature Conservancy, Columbia; Organization, state chapters of the Audubon Society for their Four Holes Swamp project; Water, the Cooper River Controlled Low Flow Study Task Force; Wildlife, posthumously, Katherine Jennings Gilbert of Sumter; and Youth, Roddy Medders of Beaufort (see Roundtable, January-February 1980, "12 Year Old Protects Island").



Governor Richard W. Riley presents the grizzly bear award to Representative L. Edward Bennett, a member of the Wildlife and Marine Resources Commission.



DADDY, WHAT'S A BROWN-BANDED WENTLETRAP?

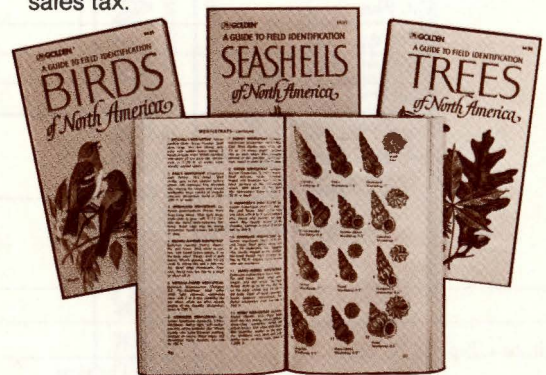
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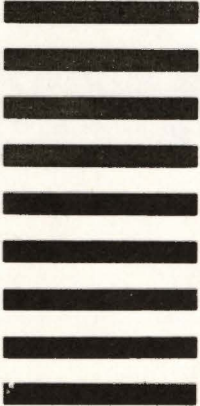


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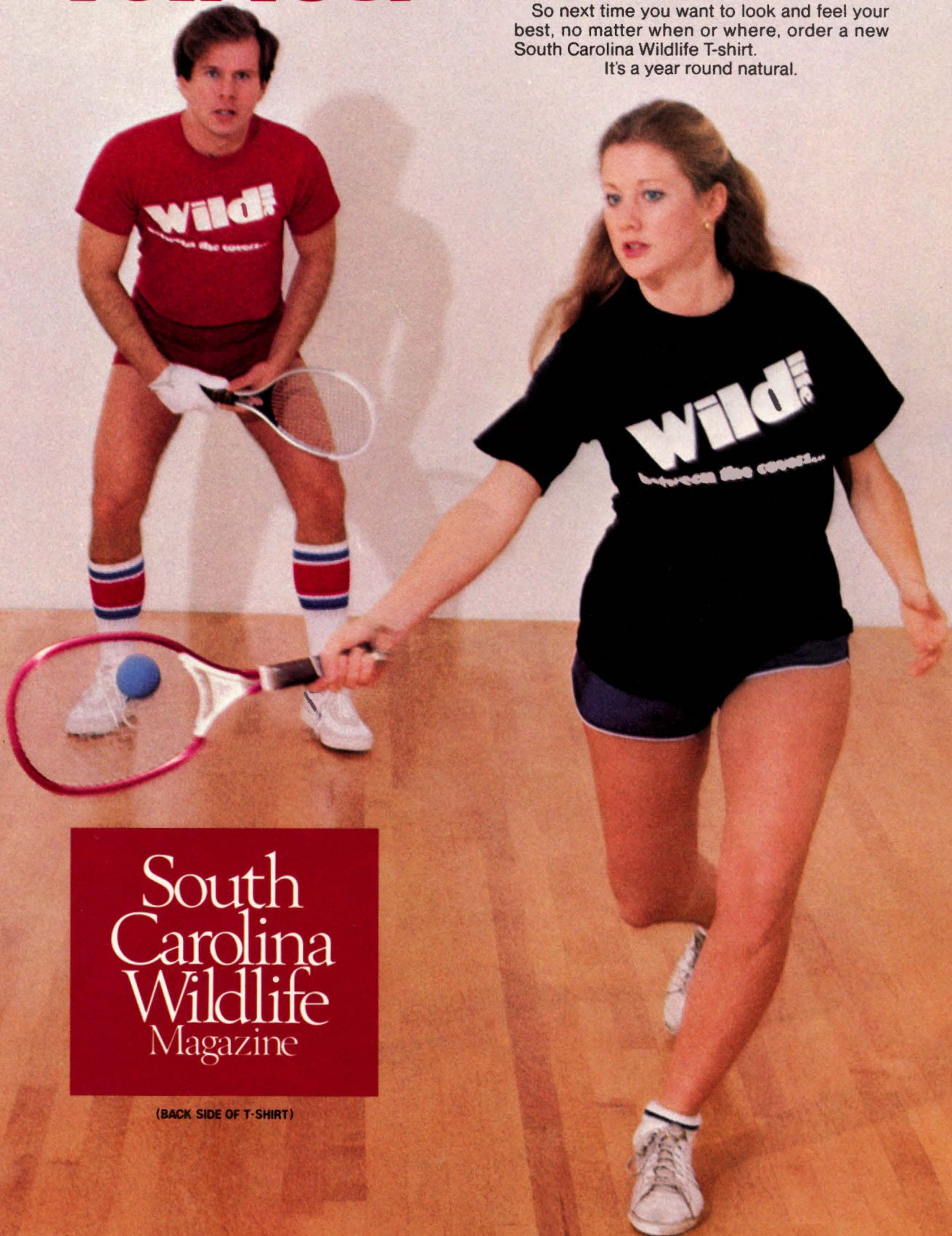
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