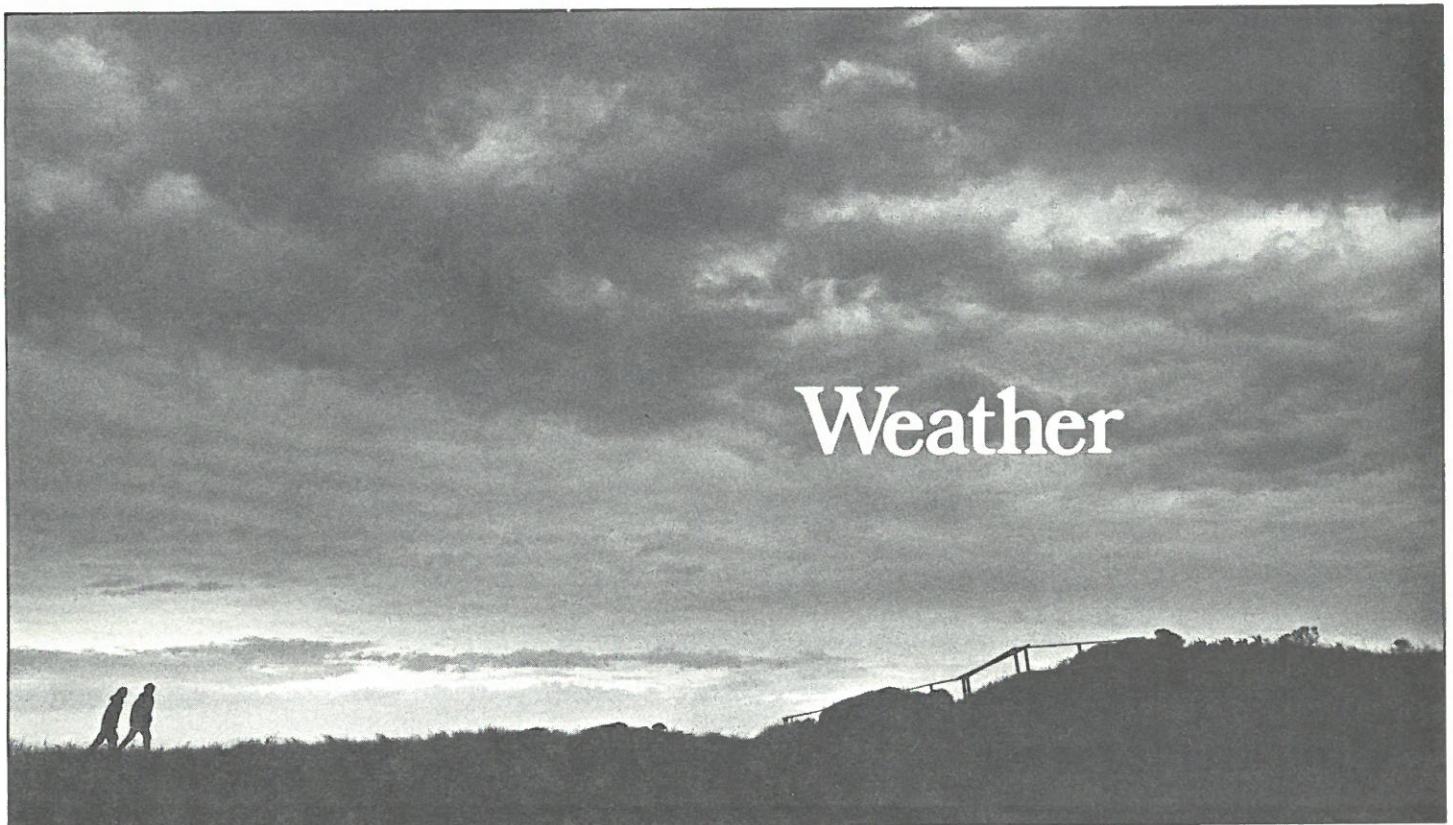




COAST WATCH



Weather

Companions under a canopy of low clouds at Cape Hatteras

Keeping an eye On the elements

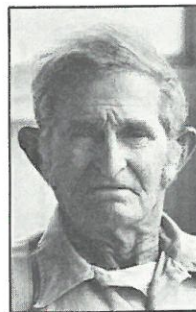
Ronald Craddock's right hand sweeps out toward the southeastern horizon, drawing a wavy, imaginary line of mounded, cumulus clouds.

"When you see those clouds piling up to the southeast," he says, "you're in for some bad, stormy weather. My daddy used to call 'em the 'sand hills,' because that's what they looked like to him."

In his seventy-six years in Mann's

Harbor, spent mostly as a fisherman, Craddock has seen his share of storms. And years before the weather began posing for satellite photographs, Craddock was reading "the signs" and forecasting the weather.

"You can get the weather on the radio nowadays," Craddock says, "but those old timers, they'd look at the elements."



Craddock

One sign in the night sky was uncanny: "If you see a circle around the moon, watch out," Craddock says. "And when there are stars inside the circle, you're looking for bad weather."

But the best sign-reading and forecasting of any generation can't offer warranties or rein in rough weather. In 1957, Craddock sat in a 32-foot shad boat and watched while a tornado danced toward him across the Albemarle Sound.

"We thought out time had come," Craddock recalls. "We saw it a-comin' out in the Alligator River, right white. We didn't have much time to get

Continued on next page

ready. We took some beating up there in the widest part, but it didn't hit us straight on. It ricocheted around us. About the only thing you could do was stand there and hope."

Like most other professional fishermen, Craddock has lost small fortunes in equipment to "the elements." Hurricane Hazel shanghaied all of his pound nets and "cleaned me out," Craddock remembers.

Twice, when hurricanes flooded his village, water climbed the steps of his house to its porch boards. Both times, he moved his house to higher ground.

Inching along

Craddock's son, Wildon, who has often helped with his father's fishing business, describes what foul weather means to someone whose livelihood depends on the elements.

"Many days, Dad and I would go out, and we'd just have to inch our way along, knowin' that it wasn't fittin' to be out, but hopin' we could get maybe one hour's work between sunrise and sunset, because the fish are going to rot if you don't get to 'em. There's a dedication to get back to those nets."

For families like the Craddocks, up and down the coast, this battle with nature is a way of life. And, because the economic life of the region depends so heavily on fishing, tourism and recreation for sustenance, foul weather touches the quick of the coastal economy.

An early spring or late fall lengthens the tourist season and enriches the economy. But late springs, or cold weather too early in the fall, strap almost everyone who has a business interest in the coast. The losses for realtors, charter-boat operators, fishermen and restaurant owners translate into losses for the merchant and laborer as well.

With their lives so entwined with the elements, coastal residents like Ronald Craddock betray an almost inexpressible awe when the conversation turns to weather. What, they wonder aloud, makes weather work the way it does? Says Craddock: "Sometimes you think there's something behind it. When you see those dark clouds, you wonder. . ."



Ronald Craddock: drawing "sand hills" on the horizon

Finding the forecast

If a summary weather forecast is all you need to plan your day at the coast, reports from local radio and TV stations may suffice. If you'd like more detailed information or personal service, here are the numbers to note:

762-3240

—The marine forecast telephone line of the National Weather Service's office in Wilmington. A recorded message describes weather systems, relates meteorological information, and gives a five-day "recreational outlook" covering the coastal area between Cape Hatteras and Little River Inlet, including the Gulf Stream and waters 100 miles off shore. You can get personal assistance weekdays (except holidays) between 7 a.m. and 9 p.m. if you

stay on the line after the recording has played. Your call will "ring through" to office personnel.

995-5610

—The weather-line to the National Weather Service's office at Cape Hatteras. A recorded message gives current meteorological information and a five-day forecast for the Outer Banks and coastal area between Kitty Hawk and Cape Lookout. The office has personnel on duty to answer ring-throughs for assistance each weekday (except holidays) between 9 a.m. and 5 p.m.

162.55, 162.40, 162.475 MHz

—The radio bands for weather information from the National Oceanic and Atmospheric Administration (NOAA).

Weather forecasts and meteorological information are revised every six hours; storm bulletins and weather advisories are renewed every two hours. To pick up the weather bands requires a special receiver. But small, inexpensive radios that can home in on the signals are commonly available in radio shops along the coast.

Here is a list of broadcast areas and their corresponding weather bands:

Asheville	162.40	Myrtle Beach	162.40
Bristol	162.55	New Bern	162.40
Cape Hatteras	162.55	Norfolk	162.55
Charlotte	162.475	Richmond	162.475
Durham	162.55	Tarboro	162.475
Fayetteville	162.475	Wilmington	162.55
Florence	162.55	Winston-Salem	162.40

Surf, sails and seasons: everything rides on the wind

What can you get from a forecast, besides the odds for rain and an educated guess at the highs and lows? Note the wind speeds and directions, as well as tides and water temperatures. Think what sort of conditions would be nice for the activities you're planning. But if the forecast is for sunny and warm, is that all you need to know? Not necessarily.

Let's say you want to try out your new surfboard in something a little more rambunctious than pond water. If Saturday's coastal forecast calls for sunshine and winds out of the south or southwest, as it often does in summer, then the surf along most of the state's beaches is likely to be flat as yesterday's cola. Your best bet might be the water off Bogue Banks, Shackleford Banks or Cape Hatteras, whose beaches more nearly face the wind, and therefore a rougher surf.

Look at the map and apply a simple principle: wind pushes water. If, on its way to the beach, the surf gets a shove from behind, presto! breakers. But, if the breeze meets the surf head-on, then the water will hunker down and be peaceable for swimmers, sailors and surfcasters.

Beach weather

Beginning in May, Summer sidles up the North Carolina coast, and stays there through September. Temperatures camp in the eighties during the day and drowse in the mid-60s to low-70s at night. Water temperatures remain above 70 degrees into October, and, as late as November, there are days when the water and air are warm enough for swimmers.

Fishing

For about ten months of the year in coastal North Carolina, the elements smile on the fisherman. June through September are the months of shirtsleeves and light jackets. Fishing in fall and spring can be equally pleasant, but carry heavy clothing, a water repellent and wind-resistant jacket for the occasional cold and wet weather.

Boating and sailing

If you've ever shoved off with only a boat between you and the elements,

then you probably know to keep at least one eye on the weather.

Peter Fricke, a licensed mariner, advises pleasure-craft operators to get accurate weather information before they launch, and to use a marine VHF radio to monitor Coast Guard stations for bulletins while boating.

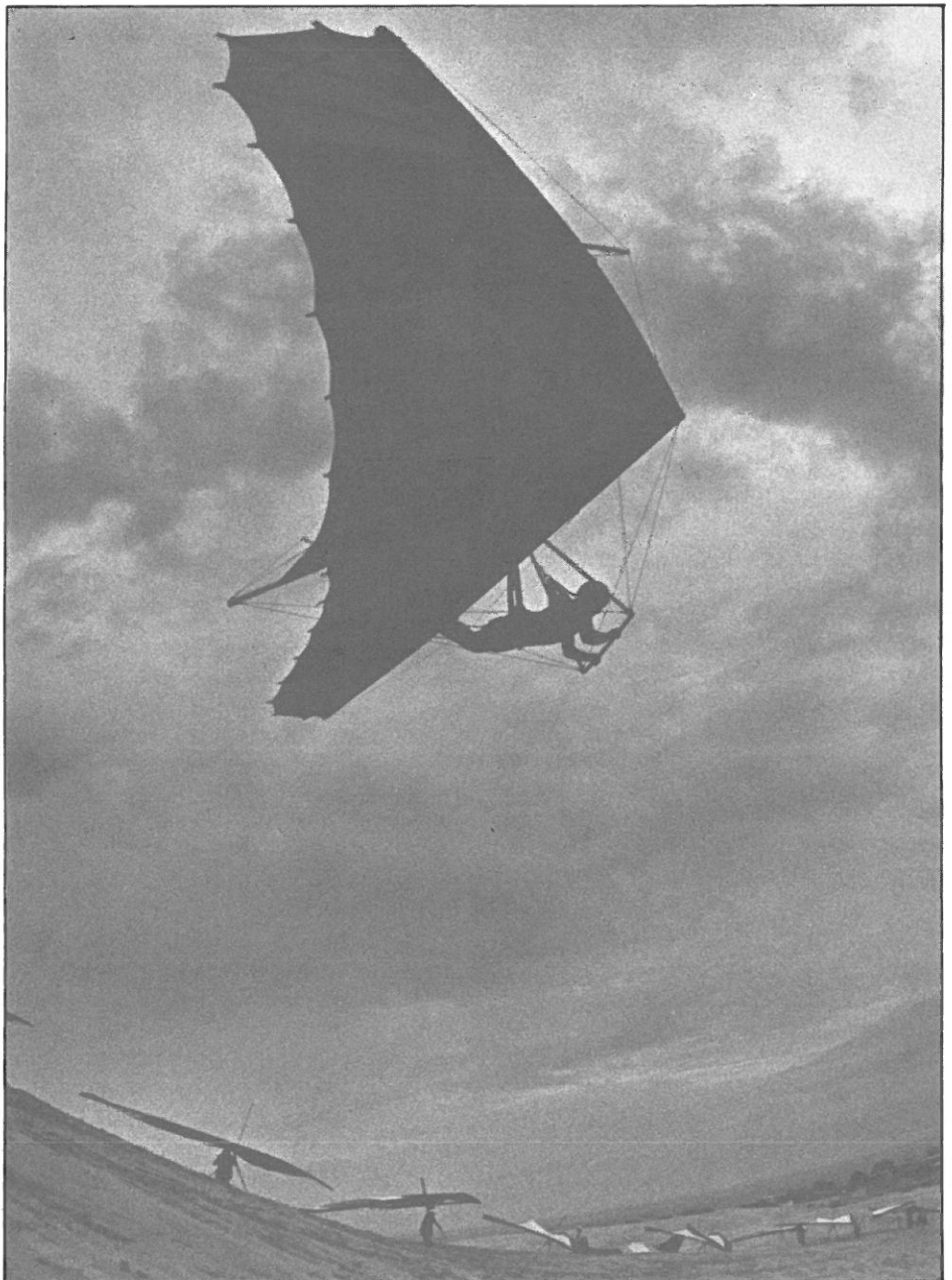
"Always listen to the forecast," Fricke says, "and never go out in anything more than a moderate breeze."

Fortunately, many days of the year are fine for boating in the state's

coastal waters. Breezes of seven to 16 knots, ideal for sailing, are common with the prevailing winds, which are southerly or southwesterly in spring and summer, but northerly and northwesterly by September. The sea breeze, a regular fixture in summer, makes local adjustments in the prevailing air flow. Autumn usually brings stronger gusts, but many fall days are beautiful for boating.

The weather man assures you that the wind is in your corner. What other

Continued on next page



Smooth-sailing at Jockey's Ridge

cooperation do you need from nature? Good visibility and merciful water.

During fall and winter, fog and rain limit visibilities to less than two miles ten per cent of the time, and to less than one-half mile four per cent of the time. But September through August, morning fog limits visibilities to under two miles only two to eight per cent of the time, and to less than one-half mile about three per cent of the time. Afternoons are usually clear.

Fricke stresses that navigation without radar is risky business when visibilities are low, because rain and fog can obscure landmarks. Unless your boat is fitted with a radar reflector to warn traffic of your position, Fricke says that you should "pull over and anchor" if a fog catches you in the sounds or inlets.

Waves

Waves are normally amicable to boaters and sailors spring through fall. Gauges along the beaches from Currituck to Sunset Beach measure summertime waves of three feet or less as much as 80 per cent of the time.

In open seas, waves are three feet or less about 35 per cent of the time in waters north of Cape Hatteras, and about 45 per cent of the time in waters to the south. Seas are usually much more choppy in fall than in summer.

Inland waters also tend to have waves of three feet or less in summer, although the sounds, because of their shallowness, sometimes become especially choppy under a stiff wind.

"In the sounds, a wind blowing for a long period of time will tend to lower the level of the water at one end of the sound, and raise it at another," Fricke explains. "If you're at the up-wind part, you can go aground." These "wind-tides" can be as much as two feet in the sounds, he says.

Hang gliding

The same winds that built Jockey's Ridge into the East Coast's largest live sand dune lift hang gliders aloft almost all year.

Hang gliding is best when winds striking a face of the ridge are forced into a vertical flow, providing lift for the kite. The ridge's orientation makes any but a northerly or northwesterly wind navigable.

John Harris, a veteran flier and part-owner of Kitty Hawk Kites, says that "one of the best things about the

weather here is that the coastal winds are generally smooth."

The waters surrounding Hatteras temper the winds and make flying less work than in the mountains, Harris says. He recommends that beginners fly when winds are flowing between five and 15 mph. Experienced pilots can safely negotiate winds of up to 30 mph. Wind-speed data taken at Cape Hatteras indicate that conditions are

good for flying at least 50 per cent of the time from March through September. Early afternoon is usually the best time to fly, but gliders can often find good breezes in the morning and evening as well.

Harris adds that, although winter days are often too blustery or wet for flying, almost every week of the year has at least one day suitable for hang-gliding.

How the weather works

Maybe you're on vacation, and your hot-line to the real world is temporarily off the hook. You'd rather not punctuate your day with news and weather broadcasts. Or, maybe you're just curious: Can a do-it-yourselfer keep up with the weather?

According to Albert Hinn, meteorologist in charge at the National Weather Service's office in Wilmington, "You can tune out the world and still tune in to the weather."

Hinn says that tuning in requires alertness and a little basic knowledge. To orient the novice to a study of coastal weather, Hinn describes the "typical summer day on the North Carolina coast."

Bermuda high

This typical day gets its sweet disposition from the Bermuda High, an area of high pressure centered approximately over Bermuda. The influence of this high creeps northward up the coast, during the summer. In spring and early summer, the high brings warm, slightly hazy air and breezes out of the southwest. By late summer and early fall, the high has moved far enough north to bathe the coast in an easterly flow of sparkling air from the Atlantic.

Occasionally, this fair-weather pattern is over-powered by major weather systems, usually moving in from the west. If the day begins with clouds, or is heavily overcast by mid-morning, you can expect that such a system is passing through, possibly with a load of rain.

So the typical beach day, thanks to the Bermuda High, dawns sunny, with a slight breeze—the sort of morning sailors and beachcombers cherish. What happens next depends largely on local conditions and a phenomenon

known as the sea breeze. As the sun heats the land mass back of the beach, air over the land also warms. The air rises as it's heated, leaving a ground-floor vacancy that cooler air from off shore rushes in to fill. This rush is called the sea breeze. Through the day, as the heating becomes more intense, the exchange of air is more rapid and the sea breeze is stronger. Toward noon, the water is choppy and a few billowy clouds ride landward on the breeze.

Sweeping the state's southern beaches, the sea breeze helps keep ocean-side temperatures in the 80s, even though the mercury may be shooting into the 90s just a few miles inland.

On days when the heating and convection of air are especially intense, this sea breeze can build into a stiff wind by mid-afternoon.

But the Outer Banks are a notable exception to this pattern. As Hinn explains it, "On the Outer Banks you don't get much of a sea breeze because you're surrounded by water. It's awfully hard for air to really heat up and get that kind of reaction."

Water - cooled

The Outer Banks get their air conditioning in another way. The waters that surround the islands temper the heat and keep the average daytime highs in the mid-80s most of the summer.

"With our sounds and the ocean, it doesn't get as hot here," says Lucy Stowe, the principal assistant at the National Weather Service's office in Cape Hatteras. Because of the marine environment, she says, spring on the islands is brief, winters are warmer than on the mainland, and storms are less intense.

"The water keeps a damper on things," she says.

Typical day, afternoon: The convection of warm, moist air is piling up mounds of cumulus clouds along a scrimmage line somewhere inland, where the prevailing wind and sea breeze are butting heads. The plot thickens. Thunder becomes a background theme in the music of the beach.

Thunderstorms

If you're still tuned in, the next character you're likely to expect on the scene is a thunderstorm.

Thunderstorms erupt in the coastal areas of North Carolina 40 to 50 times a year. Wilmington averages seven days of thunderstorms in June, eleven in July and nine in August.

"A fair statement about the North Carolina coast," Hinn says, "is that there's usually a chance of afternoon showers and thunderstorms."

Thunderstorms brew in two ways. The first and most common type begins as a concoction of moist air, heated by the land, that rises into the lower levels of the atmosphere, where it condenses and forms clouds. If there are winds aloft, say at 35,000 to 50,000 feet, they vent the system, as a breeze does a chimney, and allow the clouds to pile up, sometimes as high as ten miles.

The second general type of thunderstorm forms when an invasion of cool, heavy air pushes under warm, moist air. The warmer air, being lighter, can rise and ride the cool air piggyback. Result: condensation and clouds. This interaction can bring a line of thunderstorms across the beaches at any time of day.

In either case, the churn of wind, warmth and moisture is likely to spew rain and crackle with lightning.

"Winds and seas also come up with the thunderstorms," Hinn points out, "because you're getting the updraft, which is causing those clouds to build to such tremendous heights, but you're also getting the downdraft, which most people have experienced as that first gust before the storm."

As the sea breeze runs out of gas late in the day, these thunderstorms or showers can move off and miss the beaches altogether, or they can march toward the sea on the prevailing winds.

If the showers do come, how long will they last? Hinn says that because the average summer storm has a

diameter of about ten miles and travels about 20 mph, it usually causes about one-half hour of disruption.

Once past the beach and over cooler water, the storms usually mellow until they reach the warm Gulf Stream, 20 to 60 miles off shore. "It's like taking a pot of hot water, and it's bubbling over the land, until it gets out over the water and calms down some. Then it gets out over the Gulf Stream and starts bubbling again." Hinn calls these off-shore thunderstorms "our own coastal fireworks display."

But a few times each year, things fly off the handle. If a high-powered weather system moving east across the state lands in the lap of a local storm, the result is often a super-charged thunderstorm with high winds, driving rain and, occasionally, tornadoes.

The great acceleration of wind in these super-storms can uproot tents and raise waves stout enough to swamp boats and flood low-lying acreage.

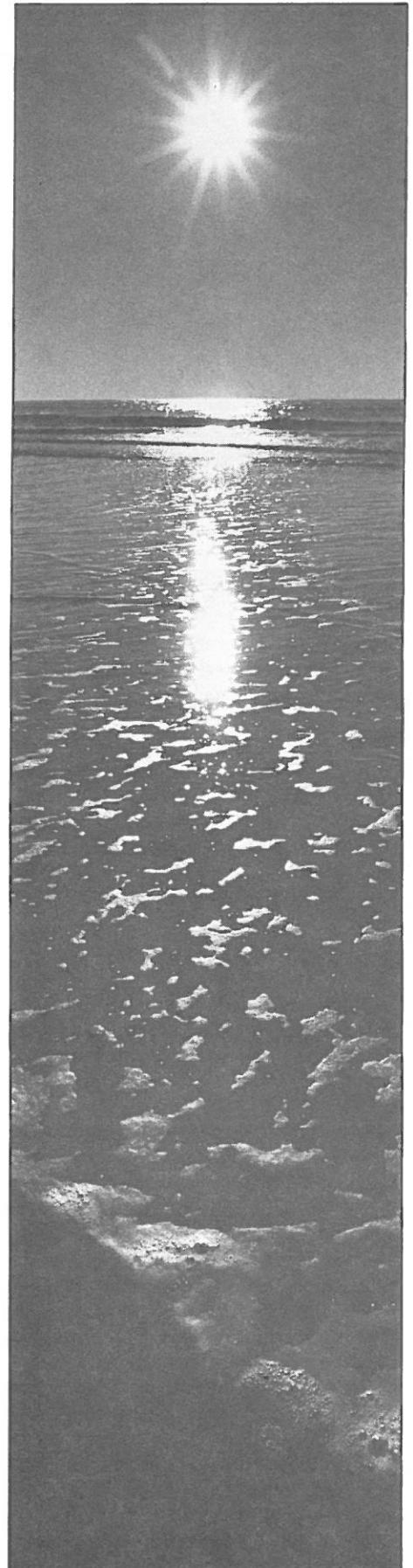
By the time things get that out of hand, the amateur meteorologist should be exactly where the pros are—under shelter.

Fall and winter

A gradual shift in the flow of air brings winds out of the north in late fall and winter, and signals cold weather. The ocean surrenders its heat slowly, so the waters along the coast stay warm, often in the 70s and low 80s, until October or November. The tempering effect of the water postpones very wintry weather until the months from December through February, when winds are often rough and waves commonly reach ten feet. Rain and fog are also more likely than in summer.

Interrupting this pattern of north winds, rain and fog is an occasional "northeaster," the infamous storm system most common in the winter months.

Northeasters are low pressure systems migrating east, or north along the coast. Since these low-pressure systems are counterclockwise motions, the force of their winds often slams into the coast with a hooking motion from the northeast. Sometimes these winds reach hurricane force and the waves they generate can maul real estate and rearrange the landscape. Powerful northeasters are often more destructive than tropical storms, since the northeasters are very large and can blow relentlessly for days.



The "typical" summer morning: sunny-side up at sunrise



The white-capped beach nester—common to the state's coast, has plumage to protect his skin from sun

Weather-proofing your beach trip — for safety's sake

If nature answered to a truth-in-packaging law, there might always be a disclaimer like this stamped across the sky:

“Caution: The weatherman has determined that today could be hazardous to your health.”

To stay one jump ahead of mishap at the coast, do a little planning and keep an eye on the elements. These are the basic trouble-makers to look out for:

Sunburn

A few hours of carelessness, or too much hurry for a golden tan, can spoil a vacation. Take a tip from the people who live at the coast: wear clothing, including a hat.

Says Dr. James A. Finger, the Health Director in New Hanover County, “The way to prevent sunburn is to minimize your exposure to the sun, and wear protective clothing.”

Mild sunburn, Finger says, can be soothed with commercial lotions and ointments. Severe burns and those with blistering are medical problems and require treatment by a doctor.

Finger suggests that a person's first sunbathing sessions of the season be limited to 15 minutes, with gradual increases over the summer, as the skin becomes more pigmented. The well-tanned sunbather can take up to two hours of sun, he says. Screening lotions can extend the safe exposure times, but only by about a third.

Remember, clouds don't shield you

completely from radiation, and it's very easy to toast yourself on a cloudy day.

Heat stroke

If you're planning some rigorous activity outdoors at the coast, take a few precautions against heat exhaustion and heat stroke.

Overheating, combined with the loss of chloride and bodily fluids, can dangerously raise the body's temperature, drop the blood pressure and cause shock. The victim of heat exhaustion or stroke should be moved into cool shade to wait for a doctor.

To prevent overheating, protect your head from the sun, drink water and exercise in moderation. Salt tablets can reduce the risk of heat exhaustion, if they are dissolved before ingestion, Finger says.

Lightning

Lightning kills more Americans each year than any other weather hazard.

If you're outside—on a golf course, a beach or in a boat—when a thunderstorm approaches, find shelter. The safest places are indoors or in a car, where tires provide some insulation from electricity. Avoid trees or anything tall that will attract lightning. If you're boating and can't reach shore, go into the cabin. The safest place in an open boat is the floor.

How do you know when to take cover? Albert Hinn suggests that you

keep track of the lightning and notice if it's coming closer.

“Time the number of seconds it takes from when you first see lightning to when you first hear thunder,” Hinn says. “If it takes about five seconds to hear the thunder, you've got roughly a mile of distance from you to where that lightning is occurring.”

If a companion is struck, don't assume the worst. Use first aid for shock and call a doctor. Even if the person seems dead, begin first aid and call an ambulance. Check for a pulse and watch the chest for breathing. If you are trained in cardiopulmonary resuscitation, and it seems necessary, use it.

“More people survive than are killed by lightning strikes,” Hinn says.

Severe storms

Thanks to modern instruments, large tropical and extra-tropical storms are usually forecast days in advance.

In recent years, North Carolina has escaped the kind of wholesale destruction caused by hurricanes in the 1950s, although some weather-watchers say that the state's luck is about to run out.

If a hurricane or tropical-storm watch is issued for the coast, don't plan to travel there until it's been lifted. If you live in the coastal area, make sure your belongings are secured and protected, and find shelter in a solid building situated on high ground.

THE BACK PAGE

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



They say you can't judge a book by its cover, but three Sea Grant researchers say that packaging can affect sales of seafood. That's why the re-

searchers are studying not only how to keep fish fresher in the store, but also how to make it more appealing.

Tyre Lanier, Frank Thomas and Ed Leonard are asking shoppers about three types of packaging systems. One is the standard overwrapped foam tray found at most grocery stores. But the other two systems are new. One is a vacuum package that allows fish processors to control the amount of air that surrounds the fish in the package. The other is a new tray made of plastic like that used in freezer containers.

Researchers are asking shoppers which package they would buy, which package they find most attractive and which package they feel keeps the fish fresh.

While the researchers are concerned about shoppers' preferences, they are also running laboratory tests at N.C. State University to see whether vacuum packaging or the currently used plastic wrap keeps fish fresher.

Lundie Mauldin, Sea Grant's education specialist, has spent most of her summer introducing groups of teachers to the North Carolina coast.

In a series of workshops held in June and July at the three N.C. Marine Resources Centers, Mauldin's groups examined the coastal environment as

both a subject and setting for study.

Field trips took teachers to boat-builders, wildlife habitats, maritime museums, fishing villages and research sites. At an excavation by Dr. David Phelps, an archeologist with East Carolina University, one group of teachers watched as the 1000-year-old fossil remains of three Indians were being uncovered.

An innovation of this year's workshops was a discussion of maritime literature led by Norma Bagnall of the Sea Grant program at Texas A & M.

Wayne Wescott, who is working on a Sea Grant project through the department of continuing education at East Carolina University, has been organizing a number of courses along the coast. A course designed to prepare navigators for the Coast Guard's captain's licensure exam has drawn about 30 people to each class since the course began on June 6.

Demand for the course has been so great that Wescott hopes to have courses in Southport, Hatteras and Manteo, later this year.

In addition, Wescott is putting together a course for shrimp fishermen that he plans to conduct at several locations along the coast.



Harkers Islanders celebrated the Fourth of July this year with their annual "pony penning" to round up the wild horses that roam Shackleford Banks.

Islanders have been holding the penning for over a hundred years to brand the new foals. Though the horses are owned, they are allowed to wander the banks freely.

Harkers Island boys run on foot to corral the horses into pens where mares with new foals are separated from the rest of the herd. The foals are then given the same brand as their mothers.

Almost 130 horses were penned this

year, but one stallion and his mares at the east end of the banks eluded the roundup. The stallion, called the Big Marsh Stallion, has never been corralled.

Marcus Hepburn, an anthropologist living on the island, observed the penning this year as part of a Sea Grant study on life in a fishing community.



As a leader in three state agencies J. C. Jones spends lots of time behind a desk. But whenever he gets the chance, he hoists sail and skims the coastal waters

of North Carolina in a sailboat.

"The coast is one of my favorite hangouts," he says. In his newest job as Sea Grant's director of Marine Advisory Services, he will develop even stronger ties to the coast.

In addition to his duties at Sea Grant, Jones will remain as director of the state Office of Marine Affairs and administrator with N.C. Agriculture Extension Service. He plans to coordinate the marine activities of the three agencies.

Jones is a native of Chatham County. He received his undergraduate degree at North Carolina State University and his master's degree at Duke University. A retired Navy captain, Jones trained the Navy's underwater demolition team for eight years.

Jones has spent 24 years in the extension service, eight as chairman of the 15-county northeastern extension district.

Dennis Regan, Sea Grant's recreation agent, has scheduled a series of lectures on Thursday nights at 8 p.m. at the N.C. Marine Resources Center on Roanoke Island. The schedule is:

Aug. 9—David Phelps on coastal plain Indian culture;

Continued on next page

Aug. 16—Paul Hosier on the effect of off-road vehicles on the beach environment;

Aug. 23—Marie Louise Peterson on wildflowers of the Outer Banks;

Aug. 30—Glen Eure on folklore of the Outer Banks.

Remember the self-cleaning oyster? Well, he tidies up even faster in warm weather.

The Back Page reported earlier that Mark Sobsey, a Sea Grant researcher, was relaying oysters from polluted waters to clean waters in the North River near Morehead City. In winter months his tests showed that contaminated oysters eliminated 99.9 percent of the viral contaminants in their systems by the end of a four-week period.

In experiments conducted in March and April when water temperatures were between 59°F and 68°F in the North River, Sobsey found that oysters flushed 99.9 percent of the contaminants from their bodies in three days.



Those are our shrimp! They grew up in our rivers," say Louisianians. "But they're in my waters now," say Texans. Whose shrimp are they and who controls the fishing rights to them? Those are the sort of questions state and federal representatives from across the country will discuss in Raleigh, Oct. 29

through 31, at a conference on state and interstate fishery jurisdiction and management.

The conference is a cooperative effort of the UNC Sea Grant College Program, the national Sea Grant office in Washington, D.C., the Coastal Plains Center for Marine Development Services, the N.C. Marine Science Council, the N.C. Department of Administration's Office of Marine Affairs and the N.C. Department of Natural Resources and Community Development. North Carolina Gov. James B. Hunt Jr. is supporting the conference.

For further information, write John T. Pittman, Office of Marine Affairs, 116 W. Jones Street, Raleigh, N.C. 27611.



It took some untangling, but the students in Jim Bahen's surf fishing classes for children eventually got their lines wet.

Bahen, a Sea Grant advisory agent in the

Wilmington area, customarily works with a more seasoned clientele.

But, on July 3, he met 20 students, ages 5 to 11, at the N.C. Marine Resources Center at Ft. Fisher, and taught them the whys and wherefores of fish, tackle and safety. Then he took them to the surf for some first-hand experience.

Several snarled lines and misplaced casts later, the youngsters were pulling in some respectable spot.

Bahen also helped with a coastal crafts day, held June 14 at the Center.



Assessing Man's Impact on Wetlands is a technical examination of wetlands and the evaluation of man's impact upon them. In this report, author G. E.

Galloway of UNC-CH proposes a comprehensive Wetland Evaluation System and discusses the application of this model. For a copy, write UNC Sea Grant and ask for UNC-SG-78-17. Single copies are free to North Carolina residents; out-of-state charges are \$4.

Atlas of Colonial Waterbirds of North Carolina Estuaries is a study of birds like the egret, heron and tern, which live along the state's estuaries. The atlas, compiled by James F. Parnell of UNC-Wilmington and Robert F. Soots Jr. of Campbell College, includes numerous photographs of the birds and charts of their nesting grounds. For a copy, write UNC Sea Grant and ask for UNC-SG-78-10. The cost is \$7 for all requests.

Coastwatch is published monthly except July and December by the University of North Carolina Sea Grant College Program, 105 1911 Building, North Carolina State University, Raleigh, NC 27650, Vol. 6, No. 6, June, 1979. Dr. B. J. Copeland, director. Written and edited by Mary Day Mordecai, Neil Caudle and Kathy Hart. Second-class postage paid at Raleigh, NC 27611.

COASTWATCH

105 1911 Building
North Carolina State University
Raleigh, NC 27650

Second-class postage paid
at Raleigh, NC 27611
(ISSN 0161-8369)



Dr. Frank B. Thomas
Dept. of Food Science
129-F Schaub
NCSU CAMPUS MAIL