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SEA GRANT COLLEGE

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The loggerhead turtle: fighting for life

The beaches are quiet now. Except for an occasional surf fisherman casting his line in the rosy glow of an early morning sun, or a gull soaring on the currents of a cool, moist, fall breeze, a certain stillness enshrouds the North Carolina coast. The summer's young have already begun their trek to wintering grounds, some thousands of miles away. And a season of rest has replaced a season of productivity.

But for the loggerhead turtle, this summer has been anything but productive, and the fall far from restful. Few adults lived through the treacherous trip to shore during late spring and early summer to lay their eggs in hollow cavities of warm, moist sand. Even fewer hatchlings survived the ordeals of beach incubation and the long mysterious journey back to deep water.

Like many of the once abundant sea turtles, the loggerhead is facing a critical period in its struggle for survival.

Over the last few decades, marine scientists throughout North and South America have observed a sharp decline in the number of sea turtles coming to shore to nest. Today three of the six species of sea

turtles found in North American waters are listed on the federal endangered species list.

Because these turtles spend so much of their lives at sea, it is difficult to determine exact population numbers. But scientists with the National Marine Fisheries Service believe that there are fewer than 80,000 leatherback turtles remaining. The picture is even grimmer for the hawksbill and the Atlantic ridley, a species which one researcher observes to be "in dire straits."

Although populations of the green, loggerhead and Pacific ridley turtles aren't in such immediate danger, dramatic declines have been seen in their numbers. A proposal was recently made to include all three on the federal "threatened" list. Approval is expected sometime this year. Such listing would give the turtles far greater protection than they currently have, though not as much as an endangered classification which prohibits any action that endangers the species.

While federal law preempts less stringent state or local laws, numerous states have already moved toward giving the green, loggerhead and Pacific (See "A struggle," p. 2)



A marine at Camp Lejeune places a protective wire cage over a loggerhead nest

A struggle at every stage

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ridley limited protection. In North Carolina it is "unlawful to willfully take, disturb or destroy any sea turtle including, but not limited to, the green, hawksbill, loggerhead, leatherback, or their nests or eggs." Violation of that statute can result in a fine of up to \$50.

It is no coincidence that the decline in sea turtle populations accompanies a period of rapid development along our coasts. While there are numerous explanations, most revolve around the activities of man.

The loggerhead is an elusive creature. Though protected by a tough, armor-like carapace, the sea turtle is an awkward and cumbersome animal on land. It seeks stretches of deserted beach on which to make its nests. There is no such thing as second best for the loggerhead. Conditions must be just right if nesting is to be successful.

The ritual of the loggerhead in search of a nesting site is a mysterious yet fascinating sight. In the cover of darkness, the female turtle suddenly appears in the surf. She slowly moves shoreward to a point just beyond the water. Here the turtle lowers her head and probes the sand with her nose. From this test she is able to determine whether the sand has the proper consistency and capillary moisture necessary for nesting and incubation.

If at any point in this process the turtle is disturbed by light or an unusual sound or activity, she immediately rejects the site and retreats back to sea. If the site is to her liking, the turtle awkwardly crawls to a spot above the high tide level and digs a nest for her eggs. An average of 106 eggs are laid. Once the eggs have been deposited, the nest is covered with sand and the turtle returns to the sea, leaving her eggs to incubate a full two months before hatching.

At every stage of life, the loggerhead faces death.

On the beach, the eggs are subject to predation by such scavengers as the raccoon, ghost crab and sea gull. On the average, only 65 percent of the eggs survive the incubation period. Once the eggs have hatched, the young turtles must then face still another maze of hurdles as they struggle to return to sea. As temperatures drop with the arrival of night, the tiny reptiles emerge in mass from the nest for a mad scramble to the water. Unlike adult loggerheads which shy away from light, hatchling turtles orient themselves to the light reflected by the ocean. Easily confused, however, the young turtles will unknowingly crawl toward the bright lights of a nearby house or highway. Thus many die in a futile effort to reach the sea.

Adult turtles are frequently caught in shrimp trawls as they make their way shoreward during the nesting season. Because it is illegal in North Carolina for a fisherman to be caught with these turtles, most fishermen throw the hefty 100 to 200-pound reptiles overboard before they dock.



Birkhead and turtle carcass

According to fisherman Lonni Burriss of Carolina Beach, "Most of the turtles are alive when we get 'em." But he notes that it is not uncommon to catch the same turtle over and over again. Exhausted by each encounter, the turtle will literally drown in the nets if the trawls are under water for more than several hours.

Frank Schwartz has studied the loggerhead for many years. Through his work at the University of North Carolina's Institute of Marine Science in Morehead City, he has learned much about the life history of sea turtles and their vulnerability to such environmental factors as temperature and light. According to Schwartz, man is the prime culprit in the decline of the loggerhead.

Like Schwartz, Bill Birkhead believes that many of the loggerhead's problems are people-related. Birkhead is a research biologist at North Carolina State University's Cape Fear Estuarine Lab in Southport. He first became involved with sea turtles last summer as a pastime. Local police who knew of his interest in turtles began calling him whenever they received reports of dead turtles washing ashore. In a few weeks Birkhead had become the area's resident turtle authority. By August, he had collected a total of eight loggerhead carcasses along a three-mile stretch of Long Beach. According to Birkhead, all of the dead turtles were female and all but one were found in a bloated state without any visible sign of injury. Several other loggerheads were found on the intake screens of the Carolina Power and Light nuclear power plant in Southport, but were later freed and safely returned to open water.

(See "Habitat protection," p. 4)

Unravelling the mystery of seabirds

To most people rarity is a function of how often something is seen. If you don't see it, then its rare or endangered. Simple, right?

Well, for some species like the loggerhead turtle that may be true. But Sea Grant researcher David Lee is finding out that for offshore or pelagic birds, it could well depend on how hard you look.

If you're an avid birdwatcher, you probably know that the sooty tern is usually seen only after a hurricane or violent storm and that the bridled tern is a casual visitor to Atlantic waters. At least that's what it says on page eight of the birder's Bible, *Birds of North America*.

Yet in five months Lee has already seen record numbers of both.

With the funds of a UNC Sea Grant mini-grant and the aid of several North Carolina State University zoology graduate students, Lee and his skillful navigator John Booth, Jr. of Manteo, were able to survey waters off Oregon Inlet this summer for offshore birds.

Weather permitting, Lee, Captain Booth, and a crew of three or four "mates" traveled across the inlet out into the Gulf Stream and the edge of the continental shelf. During each trip, birds were identified, counted and collected for further study in the laboratory. Mammal sightings were also recorded. And by the end of the summer, a 50-mile area had been surveyed in a huge gridiron pattern, following the oscillations of the Gulf Stream.

Studying offshore birds and mammals is not a typical afternoon sight-seeing trip. It's a pre-dawn to dusk day of hard work. It means peering through binoculars across endless miles of ocean for even the slightest sign of life flitting across the horizon or rising out of the water. It means standing upright to count a group of birds while your boat is bounced back and forth by rough, choppy seas. And it means ignoring that wave of seasickness as you run along the side of the boat to retrieve a bird.

So why bother?

Lee finds offshore birds and marine mammals fascinating. As curator of birds and mammals at the North Carolina Natural History Museum in Raleigh, he has been studying these species for several years. But it was not until he received additional mini-grant support that he was able to pursue such studies with any degree of regularity.

"Seabirds in general represent our weakest area in knowledge of North American birds," Lee remarks. "Previously, our knowledge of pelagic birds in North Carolina has been limited to dead birds that had washed up on the beach and reports from bird watchers." Because of this informational void, Lee sees the offshore system as "virgin territory—you're starting from ground zero so almost anything you find is new."

Of course there are some legitimate reasons why offshore birds have been neglected in the past. For one thing they aren't very accessible. Most seabirds migrate along the continental shelf where upwellings bring nutrient-laden waters to the surface. As a result, surveying can be an expensive proposition. Lee paid an average of \$240 per trip to charter a boat. Multiply that cost by several trips and it adds up to a lot in a hurry.

Equally important, surveying is time consuming. Most of the pelagic birds seen near North Carolina breed in either the tropics or on the arctic tundra. To complicate things, migration periods vary from species to species. Thus Lee believes year-round censusing is necessary to fully understand the birds' migration patterns, feeding habits and other life history characteristics.

One more hurdle

And there is still yet another hurdle that Lee has run into—getting well-seasoned birdwatchers to go out on more than one trip. "Eighty per cent of the birdwatchers that I go out with get violently seasick," muses Lee. "And once they get sick, well, they don't want any part of it."

Despite the adverse conditions, Lee's perseverance has paid off. From black-capped petrels, to Cory's shearwaters, bridled terns, sandwich terns, and albatrosses, he's seen them all. And he is discovering that for pelagic birds, North Carolina waters are among the most productive in the Atlantic. "On a typical trip you would see five to ten species that you wouldn't see from the beach . . . We are seeing more tropical stuff up here than they are off of Florida." According to Lee, the meeting of the Labrador Currents and Gulf Stream off the Outer Banks creates ideal conditions for a diverse mix of both northern and southern species of birds and mammals.

For Lee each trip has been a unique experience. "Each trip I go on I get more and more excited." Probably the most significant finding was made late in September when Booth spotted and collected a white-faced storm petrel about 40 miles off the coast. Though there have been scattered reports of similar sightings in earlier years, Lee notes that this particular species is not officially known in North America. This is the first confirmed observation. He theorizes that the bird may have become lost during a storm and wandered into coastal waters.

Although colder weather has arrived and most of the birds are well on their way to wintering grounds thousands of miles away, Lee is continuing his survey. Little information has been collected on North Carolina's offshore bird fauna in late fall and winter. Lee hopes that the data gathered during these seasons will fill some of the many gaps in our understanding of pelagic birds.

Habitat protection may be the ultimate key to survival

(Continued from p. 2)

While Birkhead is fairly certain that the bloated turtles were drowned in fishing nets, neither he nor Schwartz believe that the fisherman should shoulder the full blame. "I hate to blame the fisherman," remarks Schwartz. "He's in the picture, but he's not the real key."

Perhaps Donald Ekberg, a biologist with the National Marine Fisheries Service (NMFS) in St. Petersburg, Florida, best summarizes these observations when he states that "there is no one real cause . . . there are really several causes." He stresses, however, that the negative impacts of the "encroachment of people on beaches and the disappearance of nesting beaches" continue to be major factors in the turtle's decline.

What does the future hold for these ancient reptiles?

Scientists are beginning to learn more and more about the habits of the loggerhead and other sea turtles. Until recently little was known about the loggerhead, how long it lived, how often it nested or where it spent the first few years of its life. Today we know that the loggerhead spends at least its first year, previously known as its "lost year," in the Sargasso Sea. And we know that the female returns to her place of birth to lay her own eggs. Such basic information is important to researchers as they look for ways to save the turtle from extinction.

In Pascaguola, Miss., NMFS researchers are testing new trawl equipment that will keep turtles out of nets. One design includes a 12-inch mesh barrier that can be placed across the mouth of a trawl during the nesting season.

In addition, NMFS is helping to teach fishermen what to do if they find unconscious turtles in their nets. According to Ekberg, an unconscious turtle should be placed on the ship's deck, bottom side up. It

should be kept in the shade to avoid sunburn and overexposure to heat. Once the turtle recovers, it should immediately be thrown overboard.

Placement of the loggerhead on the federal "threatened" list is expected to give far greater leverage to efforts to uniformly protect the species. This is especially important to states like North Carolina which currently do not have the financial resources needed to implement a full-blown enforcement program.

Of course not everyone believes that listing is the ultimate panacea. Most researchers agree, however, that preservation of nesting habitat will be the most critical element in saving the loggerhead. Various programs have been launched at both the state and federal level to set aside particularly important sites. At the Marine base at Camp Lejeune, N.C., base biologists Julian Wooten and Charles Peterson are studying the habits of loggerheads who nest along a 14-mile stretch of deserted beach within the camp. Female turtles are watched from safe distances as they move onshore to construct their nests. Once the eggs have been deposited and the nests covered over, the adult turtles are tagged, measured and safely returned to sea. Wire cages are placed over the eggs during incubation to protect them from predators.

Today Camp Lejeune is one of the most active nesting sites in North Carolina. It offers the loggerhead the rare opportunity to nest in relative seclusion—far from the clutter and glare of ocean highways and beachside developments. It offers the loggerhead a chance for survival.

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