

Sea Turtle Survival

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By Daniel Evans and Gary Appelton

It was a typical Florida summer night: hot and muggy. Fortunately, we were on a beach along the eastern coast, and there was a nice onshore breeze that removed the insects. We were leading a group of adults and children in search of a nesting loggerhead sea turtle as part of a state-permitted sea turtle watch. The scouts, searching in advance of the group, reported a female loggerhead had begun laying eggs just to the north of the access point where we waited with the group.

We walked down to the water's edge and quickly made our way to where the turtle's tracks emerged from the ocean. While the group waited with the scouts, we crawled up behind the turtle to position a red L.E.D. flashlight to shine into the nest chamber so everyone could see the eggs. We signaled for the group to approach. Making sure not to disturb the female turtle, the group quietly gathered around behind her and watched a ritual that has been occurring on tropical and subtropical beaches across the world for over 150 million years.

Leatherback sea turtles (*Dermochelys coriacea*) represent the largest sea turtle species. They can reach between 5 and 6 feet in shell length and weigh up to 1,000 pounds.

Photography by Daniel Evans

Ancient Nomads

Based on observational records and ship logs, it is estimated that sea turtle populations were once vastly greater than they are today. One ship's log reported sailors could have walked across the backs of sea turtles to dry land. Today, the world's seven sea turtles species are considered Threatened, Endangered or Critically Endangered by the International Union for the Conservation of Nature and Natural Resources (IUCN).

Sea turtles are often called "ancient nomads." These ancient creatures travel hundreds to thousands of miles between their nesting grounds and foraging areas. Tiny hatchlings, after scampering down the beach and entering the surf, drift in ocean currents, hiding and feeding in floating mats of seaweed until they are large enough to survive in near-shore areas and lagoons.

Florida's Indian River Lagoon, which runs between the mainland and the barrier islands along most of the state's Atlantic coast, is an important habitat for juvenile green and loggerhead sea turtles. Most of these non-nesting juvenile green sea turtles have traveled from nesting beaches along the Caribbean coast of Central America where they were born, whereas many of the loggerheads are from nesting beaches along the Mediterranean Sea. Sea turtles are international travelers, making their conservation and population recovery efforts dependent upon international agreements and cooperation.

United States Species

The six sea turtle species found in U.S. waters have been protected since the 1970s under the Endangered Species Act. Stretches of beach are protected for sea turtle nesting, and regulations are aimed at reducing the incidental capture of sea turtles in commercial fishing nets and by long-line fisheries. Sea turtle nesting numbers in the United States have increased since protections were implemented.

The U.S. sea turtle species include five species: loggerhead (*Caretta caretta*), green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), Kemp's ridley (*Lepidochelys kempii*) and hawksbill (*Eretmochelys imbricata*). They nest on U.S. beaches, and one species, the olive ridley (*Lepidochelys olivacea*), is found in U.S. waters off the Pacific coast and waters around Puerto Rico and the U.S. Virgin Islands in the Caribbean.

Over 90 percent of sea turtle nesting in the continental United States takes place in Florida. The state hosts nesting populations of loggerheads, greens and leatherbacks with the occasional Kemp's ridley and hawksbill. Loggerheads are found nesting along the Gulf of Mexico from just west of the Alabama/Florida border up the Atlantic coast into North Carolina. Green turtles and leatherbacks are primarily found nesting along the Atlantic coast of Florida, though leatherback nests in Georgia and the Carolinas have increased over the past few years. The Kemp's ridley is fairly isolated in the United States. Most of the nesting occurs in and near the Padre Island National Seashore in Texas.

Loggerheads, greens and Kemp's ridleys are often observed in waters as far north as Massachusetts, whereas leatherbacks are known to feed in waters off the coast of Nova Scotia, Canada, due to their ability to regulate their body

temperature.

Leatherbacks, the largest sea turtle species, are one of the most amazing reptiles in the world. They do not have a hard shell made of scutes or scales; they can reach between 5 and 6 feet in shell length and weigh up to 1,000 pounds; they can tolerate cold water temperatures; and they have been recorded diving to depths of 3,900 feet, the deepest of any air-breathing marine animal. Why do they dive so deep? That is the depth where they find abundant jellyfish, their primary food source.

Nesting Patterns

All sea turtles in the United States are listed as endangered, except for the olive ridley and loggerhead, which are listed as threatened. Because loggerheads are classified as threatened and not as endangered (which carries a higher level of protection), permitted groups, such as the nonprofit Caribbean Conservation Corporation, are able to lead guided watches to observe nesting female loggerheads during the peak summer nesting months of June and July.

In Florida, sea turtle season is from March through October on the Atlantic coast and May through October on the Gulf coast. The earlier start date on the Atlantic coast is to protect leatherbacks, which nest from March into June. Greens and loggerheads nest from late May through August. Since egg incubation lasts around 60 days, the months of September and October are included to protect sea turtle hatchlings as they emerge from nests. Sea turtles do not nest every year, but when they decide to return to nest, they lay between three and eight clutches during a nesting season.

The status of sea turtles in the United States seems to be stable or increasing based on nesting trends. Nesting beaches are monitored for tracks to provide an annual count of nests for each species. However, this does not provide the number of males or other age classes in the overall population.

It takes anywhere from 15 to 25 years for a hatchling to reach sexual maturity, so any decline in the younger nonbreeding population may not be reflected in the overall number of nests laid for 15 years or longer. The nesting numbers may be going up, and then all of a sudden there is a decline, like we are observing in the Florida loggerhead population. Such a decline may be the result of higher than normal mortality of the nonbreeding individuals, such as juveniles and subadults.

In Florida, loggerheads lay about 100 eggs in a nest. Most of the eggs will survive and produce hatchlings, and most of the hatchlings will make it out of the nest, but of those, only a few will survive to adulthood. It is estimated only one in 1,000 hatchlings will reach reproductive age; some estimates put the odds at one in 2,500 when including all human threats.

Global Threats

Threats to survival are generally broken down into two categories: natural threats and human threats. Natural threats include predation by raccoons, ghost crabs, birds, sharks and weather events. Human threats include harvesting eggs and turtles for food and products, incidental capture in fishing nets, coastal armoring, beach nourishment, light pollution and marine pollution.

The IUCN's Marine Turtle Specialist Group identified the major categories of threats facing sea turtles worldwide, including local consumption or use of turtle meat, eggs and shells (either legally or illegally); incidental capture and marine habitat destruction by commercial fisheries (especially shrimping, long-line fishing and gill netting); coastal development resulting in nesting beach and near-shore habitat destruction (including shoreline light pollution that disrupts nesting behavior and disorients hatchlings); and marine pollution, which includes dumping of raw sewage, marine debris, discarded plastics, petroleum byproducts and toxic chemicals that weaken turtle immune systems.

Recently, global warming has also been identified as potentially having an impact on natural sex ratios of hatchlings, as well as increasing the frequency of extreme weather events and the likelihood of disease outbreaks. Global warming also results in the loss of nesting beaches, coral reef destruction and other alterations critical to sea turtle habitats and basic oceanographic processes.

Many countries in the Americas and Europe now protect sea turtles in their waters or on their beaches, but few countries along the western Pacific Rim and bordering the Indian Ocean have measures to protect turtles during any part of their life cycle. Nevertheless, growing international interest in sea turtle protection is motivated by numerous factors, such as appreciation for endangered species and concern for maintaining marine biodiversity.

Although sea turtles' placement on the IUCN Red List draws attention to their worldwide plight and status, it does not bestow any laws or regulations that protect listed species. International protection of sea turtles is based upon separate local, national, regional or international conventions and treaties, such as the Convention on International Trade of

Endangered Species of Wild Fauna and Flora (CITES) and the Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC).

CITES lists all species of sea turtles on Appendix I, which represents species that are or may become threatened with extinction. This classification prohibits live sea turtles and any products derived from them from being traded between countries without proper permits and subject to certain controls.

The IAC is the only international agreement created to promote the protection and recovery of marine turtle populations and their associated habitats, specifically in the Americas. Originally drafted over a series of meetings in the 1990s, the IAC has been signed and ratified by 11 countries: Belize, Brazil, Costa Rica, Ecuador, Guatemala, Honduras, Mexico, the Netherlands Antilles, Perú, Venezuela and the United States. Nicaragua and Uruguay have also signed, but have not yet ratified the treaty.

U.S. Sea Turtle Perils

In the United States, the greatest threats to sea turtle survival are incidental capture (known as bycatch) by commercial fisheries and loss of habitat. Sea turtles are captured in fishing nets or caught by hooks strung out by the long-line fishing industry. Recent studies indicate that since 1982, leatherback numbers in the Pacific have dropped by 97 percent, mostly due to long-line fisheries. Although there has not been a similar decline in the Atlantic, long-line fishing still poses a serious threat to leatherback populations.

Annually, the U.S. shrimp fishery kills tens of thousands of loggerhead turtles, but this number has been reduced due to federal requirements that all U.S. shrimp boats carry specially designed nets with turtle excluder devices (TEDs) to limit bycatch. It is possible, even probable, that the decline we are currently seeing in loggerhead nesting in the United States is due in part to the large number of turtles killed by the shrimp fishery before new TED size regulations were implemented in 2003.

Each year, tens of thousands of sea turtle nests are laid on the thin ribbon of sand surrounding the Florida Peninsula. On the ocean side, this fragile habitat is sculpted by rising sea levels, natural and human-caused erosion, and coastal storms. From the upland side, this nesting habitat is under increasing pressure from human development and its associated impacts.

Coastal Land Development and Policies

The fate of Florida's sea turtle populations, and the bulk of turtles nesting in the United States, depends largely on Florida's coastal development and management policies. Almost half of the state's 825 miles of sandy beaches are in a state of "critical erosion." State policies continue to allow development on or adjacent to the frontal dunes of eroding beaches. This development increases the demand for either sand pumping for beach nourishment or sea wall construction to protect structures.

In the last two years, the state and federal government spent almost \$400 million on beach and dune restoration programs in Florida. While these projects can restore nesting habitat on extremely eroded beaches lined with sea walls, an increasing number of beach-building projects are taking place during sea turtle nesting season, resulting in the potential burying of sea turtle nests. After these projects are completed, nesting usually declines for a couple of years — due to the alteration of the beach profile and the sand composition — before recovering.

Sea walls are one of the greatest threats to the nesting beach and now extend along an estimated 20 percent of Florida's sandy beaches. In some counties up to 40 percent of their coastlines are lined with walls. They increase erosion, prevent turtles from reaching suitable dry nesting habitat and discourage nesting altogether. Scores of new sea wall permits are issued following major coastal storms. Florida's coastal policies ignore mounting evidence that sea levels will continue to rise as well.

Even with state and federal laws to protect sea turtles, they still face many threats on the nesting beach. Human disturbances can hinder a female's attempt to dig a nest and lay eggs. Rows of lawn chairs, sand fencing and other structures often block nesting areas. Despite the implementation of many local lighting ordinances designed to reduce light pollution on nesting beaches, bright lights disorientate thousands of hatchlings each year, luring them inland to their death. Bright lights can also discourage females from nesting.

Florida's inshore lagoons, sea grass beds and near-shore reefs provide important development and foraging habitat, as well as refuge for large numbers of juvenile sea turtles. Pollution and runoff from land-based sources can degrade important marine habitats and impact both sea turtles and the food they eat. New research suggests a disease now killing many sea turtles (fibropapillomas) may be linked to coastal water pollution. Red tide events have also killed large numbers

of sea turtles in recent years.

As the loggerhead crawled back to the ocean after camouflaging her nest, the group walked along behind her. After we could no longer see her in the surf, a girl asked her father if one of the eggs she witnessed being laid would produce a hatchling that would survive and return to this very beach in 20 years to lay her own eggs in the sand. Her father replied that there was a chance but added that without help there may not even be a beach for the turtle to return to.