

Loggerhead turtle

Caretta caretta

Contributors (2005): Sally Murphy and DuBose Griffin, SCDNR

Reviewed and Edited (2013): DuBose Griffin, SCDNR

Reviewed and Edited (2024): Michelle Pate, SCDNR



DESCRIPTION

Taxonomy and Basic Description

The loggerhead was described by Linnaeus (1758) and named *Testudo caretta*. Over the next two centuries more than 35 names were applied to the species (Dodd 1988), but there is now general agreement on *Caretta caretta* as the valid name. The carapace, head scales, and dorsal scales of the flippers of adult and juvenile loggerheads are reddish-brown to brown in color. The plastron, neck, ventral surface of the flippers, and margins of the head scales are cream to yellow in color, but with some variation. Adult loggerheads in the southeastern United States have a mean straight carapace length (SCL) of 92 cm and weigh about 116 kg (NMFS & USFWS 2008).



Hatchlings vary from light to dark brownish to dark gray dorsally, lacking the reddish-brown coloration of adults. Both pairs of flippers are dark brownish to dark gray with distinct white margins. The plastron and other ventral surfaces are a dull tan. Hatchlings have three dorsal keels (prominent spines extending from their scutes) on their carapace and two plastral keels. At emergence their mean straight carapace length is about 45 mm (1.8 in), and they weigh approximately 20 g (0.7oz) (NMFS & USFWS 2008).

Conservation Status

The United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) share jurisdiction for sea turtles under the Endangered Species Act (ESA), with the USFWS's responsibility for turtles on the beach and NMFS's jurisdiction in the marine environment. The loggerhead sea turtle was listed as threatened on July 28, 1978 (43 FR 32800) under the ESA. In 2011, the listing was later revised from a single threatened population to nine distinct population segments (DPSs) designated as either threatened or endangered (76 FR 58868). These DPSs are isolated from each other, considered discrete

populations, based on tagging data, telemetry studies, demography, and genetic data (76 FR 58868).

Within the Northwest Atlantic Ocean DPS there are five recovery units because loggerheads are a wide-ranging species, have multiple populations and varying ecological pressures, and differing threats in different parts of their range. The five recovery units include the Northern Recovery Unit, Peninsula Florida Recovery Unit, Dry Tortugas Recovery Unit, Northern Gulf of Mexico Recovery Unit, and the Greater Caribbean Recovery Unit (NMFS & USFWS 2008). Loggerhead sea turtles that nest in southern Virginia, North Carolina, South Carolina, and Georgia fall within the Northern Recovery Unit.

POPULATION SIZE AND DISTRIBUTION

The Northern Recovery Unit is the second largest loggerhead nesting assemblage in the US. Annual nest totals from beaches north of Florida averaged 5,125 nests from 1989-2008, representing approximately 1,272 nesting females per year (NMFS & USFWS 2008). South Carolina loggerhead nesting effort represents over 65% of the Northern Recovery Unit. Historically, the Northern Recovery Unit nesting population showed a significant declining trend of 1.3% annually from 1983-2008 (NMFS & USFWS 2008). Recent data indicate that the overall nesting trend may be stable, neither increasing nor decreasing (NMFS & USFWS 2023).

Research by the South Carolina Department of Natural Resources (SCDNR) Marine Resources Division indicates that juvenile loggerheads in coastal waters off GA, SC, and northern Florida are more abundant by an order of magnitude than they were in the late 1970's and early 1980's (Maier et al. 2004).

HABITAT AND NATURAL COMMUNITY REQUIREMENTS

Adult females inhabit temperate coastal waters during the nesting season, from mid-May to mid-August. During this time of egg laying, the females are not feeding. After nesting, females migrate to foraging areas both north and south of their nesting beaches. The predominate pattern for South Carolina females is to move to the Mid-Atlantic Bight until November and then return south of Cape Hatteras, North Carolina during winter. In spring, they return to their same foraging area as the previous season. They repeat this until it is time for their breeding migration back to the nesting beach (Hawkes et al. 2011; Griffin et al. 2013). Females nest every three years for a good portion of loggerheads in South Carolina.

The loggerhead sea turtle nests on ocean beaches within the continental US from Texas to Virginia. They are the predominant species nesting on South Carolina coastal islands and estuarine shorelines with



suitable sand (NMFS & USFWS 2008). Nests are typically made between the high tide line and the primary dune front in dry sand.

For early life stages of hatchlings through ages 10-12 years, loggerheads maintain a pelagic existence living amongst sargassum weed and drifting with ocean currents (NMFS & USFWS 2008). Current data suggests hatchlings exhibit swimming instead of passive drifting during the sea turtle “lost years” (Putnam and Mansfield 2015). At 10-12 years of age, loggerheads return to inhabit nearshore coastal waters to also include creeks and tidal rivers of South Carolina’s salt marshes.

Juveniles from the various Recovery Units mix on foraging grounds, which include estuarine, neritic, and continental shelf waters in the Gulf of Mexico and the eastern seaboard (NMFS & USFWS 2008). Juvenile loggerheads 40 to 91 cm in carapace length are found in South Carolina on a seasonal basis from early April through November.

CHALLENGES

Because of their highly migratory behavior, with life stages that occupy different habitats, conservation efforts for loggerhead populations in one country and/or state may be offset by activities in another.

One major challenge faced by loggerheads includes the loss or degradation of nesting habitat from sea level rise, erosion, coastal development, and beach armoring, although beach armoring is no longer allowed in South Carolina (Beachfront Management Act 1988), previously built rock revetments and sea walls exist. Even if a suitable sandy beach is available, nesting can be aborted because of beach furniture and equipment left overnight that blocks access to these suitable nest sites. Beach vitex (*Vitex rotundifolia*), an exotic introduced plant, found historically in areas in northern Georgetown and Horry Counties still exists in other communities.

Climate change is a potential threat to sea turtles as it may affect these species in three ways: loss of dry sand beaches to sea level rise or inundation of existing nests (Daniels et al. 1993; Fish et al. 2005; Baker et al. 2006); lethal high temperatures within the nest that would cause egg/hatchling mortality or decreased hatchling fitness; or a female-biased sex ratio of hatchlings due to increased nest temperatures (Glen and Mrosovsky 2004). Sea turtles, like some other reptiles, have temperature-dependent sex determination (TDSD), with higher temperatures favoring the development of female offspring and lower temperatures favoring males (Spotila 2004; Wyneken and Lolavar 2015). Foraging grounds in the marine environment may also be affected as increased sea water temperatures and acidification alter prey species availability (Goudarzi, F et al 2024).

Artificial light pollution along the coast is disruptive to both nesting adult females and emerging hatchlings. The presence of humans using flashlights or cell phone lights at night can also disrupt nesting females. Artificial lighting that illuminates the beach causes females to avoid certain areas to nest and disorients hatchlings when direct and timely migration to the ocean is critical to their survival. Excessive predation by native and non-

native predators, as well as erosion and storm events, destroy nests. Coyotes, feral hogs, raccoons, foxes, and armadillos destroy loggerhead nests as well as negatively impact the maritime forest community on some coastal islands (NMFS & USFWS 2008). Killing of adult loggerheads on land is rare, but human poaching of turtle nests and clandestine markets for eggs may continue to be a problem (NMFS & USFWS 2008).

Another major impact on sea turtles can result from the incidental take in commercial fishing operations. Historically it was estimated that between 5,000 and 50,000 loggerheads were killed annually by the shrimping fleet in the southeastern Atlantic and Gulf of Mexico (National Research Council 1990) and this fishery was responsible for most adult loggerhead deaths at sea. All trawl fisheries operating in South Carolina now require the use of a turtle excluder device (TED) to prevent mortality of sea turtles and allow safe passage out of a net. The shark longline fishery, which operates all year long off the south Atlantic, may impact loggerheads in the neritic environment (Lewison et al. 2004). Loggerheads have been found entangled in a wide variety of materials including fishing line, crab pot lines, buoys associated with marking underwater equipment, rope, and discarded netting (NMFS & USFWS 2008; SCDNR unpublished data). They also ingest many types of marine pollution and debris, resulting in gut blockage (NMFS & USFWS 2008).

Vessel interaction (boat strikes) has become more prevalent and the predominant challenge for sea turtles occupying South Carolina waters. Upwards of one-third of the stranded sea turtles reported in South Carolina had wounds indicating some type of vessel interaction (SCDNR unpublished data).

The use of hopper dredges to manage material in shipping channels and other areas continues to be a threat to sea turtles, especially when allowed to operate during time periods when sea turtles are known to occupy those coastal areas (Van Dolah and Maier 1993; Arendt et al. 2012; SCDNR unpublished data).

Natural mortality factors in-water include predation by large sharks, disease, and parasites (NMFS & USFWS 2008).

Degradation of foraging habitat by physical damage occurs when there is trawling over live bottoms. Clam dredges can cause similar damage in areas further offshore. Over-harvesting of prey species, such as horseshoe crabs and whelks, can deprive loggerheads of their food resource, resulting in longer remigration intervals between nesting (Bjorndal 1997). Data on the quantity and quality of foraging habitat is scarce. Continued protection of foraging habitat, where loggerheads spend most of their time, and migration corridors is necessary to ensure minimal interaction with fishing operations and dredging operations.

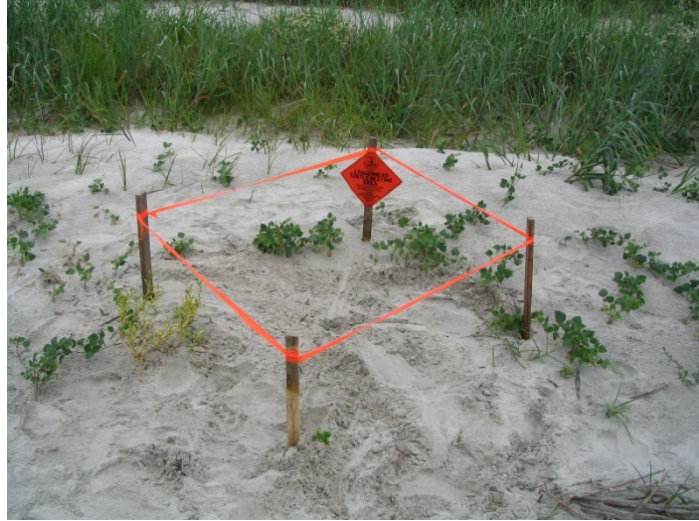
CONSERVATION ACCOMPLISHMENTS

Some conservation accomplishments achieved for this species span a regional scale by federal agencies while others were made locally in South Carolina. The Sea Turtle Stranding and Salvage Network (STSSN) was established in 1980 to document the number of sea turtle carcasses that wash ashore.

The loggerhead turtle was designated the State Reptile of South Carolina in 1988 (Act # 588, June 1, 1988).

South Carolina became the first state to enact Turtle Excluder Device (TED) regulations in 1988. Federal regulations requiring TEDs in all waters throughout the year came into effect in 1991.

In 1991, South Carolina also became the first state to require the US Army Corps of Engineers to restrict hopper dredge channel maintenance to the winter months. However, recent changes to the South Atlantic Regional Biological Opinion for dredging (2020) have seen a removal of the previous seasonal hopper dredging windows.



South Carolina became the first state to enlarge TED openings in 2002. Federal regulations requiring larger TED openings came into effect in 2003.

SCDNR in conjunction with local electric service providers continues to produce and distribute large “Lights Out” causeway signs that are erected on roadways leading to beaches. Volunteer turtle projects produce newspaper articles and social media content to inform beach residents and visitors about the necessity to have lights out during the nesting and hatching seasons as well as other conservation measures to aid sea turtles.

Nest protection projects and an associated volunteer network were established along the South Carolina coast from 1981 to the present to increase hatchling productivity. Over 70% of the nests laid in South Carolina are under nest protection management and achieve at least a 60% hatching success (Hopkins-Murphy et al. 1999). Statewide aerial beach surveys were carried out from 1980 to 2007 to provide a standard index for monitoring the nesting population (Hopkins-Murphy et al. 2001). Currently, statewide on the ground beach surveys have replaced the aerial surveys and include an index beach portion to monitor the nesting population that consists of six beach projects continuously operating since 1982 under the same methodology. Use of *Vitex rotundiflora* (Beach Vitex) has been banned in at least 12 municipalities in North and South Carolina to limit its further spread.

Since 2010 SCDNR has participated in a regional loggerhead genetics research study conducted by state sea turtle coordinators in Georgia, North Carolina, and South Carolina in collaboration with the University of Georgia to answer critical reproductive biological questions.

SCDNR Marine Turtle Conservation Program produced and installed signage on piers to educate anglers what to do in case of an incidental take of a sea turtle while recreational

fishing. Signs were produced in both English and Spanish.

SCDNR Marine Turtle Conservation Program produced and installed signage at boat ramps and marinas alerting boaters to the presence of sea turtles in our inshore waters to avoid collisions. Additionally, a QR code on the sign provides access to our ArcGIS Survey 123 online form to report live healthy sea turtles observed in the water during their travels.

SCDNR continues to partner with and permit the South Carolina Aquarium Sea Turtle Care Center™, which opened in 2000, to provide medical care for sea turtles in need from both South Carolina waters and surrounding states. SCDNR partners with the South Carolina Aquarium staff on educational outreach.

Endangered Species Act Section 6 funding from both the US Fish and Wildlife Service and the National Marine Fisheries Service provide program support for the SCDNR Marine Turtle Conservation Program.

CONSERVATION RECOMMENDATIONS

- Protect any remaining significant loggerhead nesting beaches that are still threatened with development through fee simple purchase or conservation easement (i.e. Bay Point).
- Continue to work with partners to model sea level rise with loggerhead nesting beaches in South Carolina.
- Establish partnerships to determine the quantity and quality of foraging habitat.
- Ensure that important nesting beaches destroyed by storm events are restored. Collaborate with the US Army Corps of Engineers to complete beach restoration projects.
- Reduce coyote, armadillo, and feral hog populations on coastal islands.
- Ensure that predator control is conducted on important loggerhead nesting beaches.
- Continue to monitor effects of a changing climate on sex ratios.
- Consider establishing Marine Protected Areas based on satellite telemetry data of adult female loggerheads on resident foraging areas. This should be done in collaboration with the Atlantic States Marine Fisheries Commission, Fisheries Management Councils, and relevant states.
- Work with the US Army Corps of Engineers to address changes in the South Atlantic Regional Biological Opinion for dredging (2020) where seasonal hopper dredging windows have been removed.
- Increase education of boaters to raise awareness of sea turtles in our coastal waters.
- Increase education of anglers both on land (piers, shore-based) and on boats regarding sea turtles in our coastal waters.
- Collaborate with other states in the southeast on emerging issues affecting loggerheads as the needs are identified.
- Ensure existing surveys that are providing a standardized index to the population are adequately funded.
- Continue to publicize and promote the “Lights Out” efforts and enlist the

- assistance of electric utility companies when necessary.
- Continue to work with partners to establish coastal lighting ordinances in coastal counties to reduce artificial illumination of nesting beaches.
- Maintain and improve the SCDNR Marine Turtle Conservation Program web page.

MEASURES OF SUCCESS

As research and management needs are identified, we will initiate projects to address those needs. This was done previously with TED opening sizes when they were found to be too small and with the management of beach vitex through the establishment of a Beach Vitex Task Force using funding from a National Fish and Wildlife Foundation grant.

Because there are multiple threats to loggerheads, both on the nesting beaches and at sea, there are likewise multiple management strategies being implemented to bring about their recovery. We may not know which ones have been responsible for recovery of the species, should population numbers on nesting beaches begin to increase. The state will work to implement any Loggerhead Recovery Plan Tasks where South Carolina is the Responsible Agency.

LITERATURE CITED

Arendt, M. D., J. A. Schwenter, A. L. Segars et al. 2012. Catch rates and demographics of loggerhead sea turtles (*Caretta caretta*) captured from the Charleston, South Carolina, shipping channel during the period of mandatory use of turtle excluder devices (TEDs). *Fish. Bull.* 110:98-109.

Baker, J.D., C.L. Littnan, and D.W. Johnston. 2006. Potential effects of sea level rise on the terrestrial habitats of endangered and endemic megafauna in the Northwestern Hawaiian Islands. *Endangered Species Research* 2:21-30.

“Beachfront Management Act”. 1988. Coastal Tidelands and Wetlands Act, as amended, §48-39-250 et seq.

Bjorndal, K.A. 1997. Foraging ecology and nutrition of sea turtles. Pp 199-231. In: *The Biology of Sea Turtles*, P. Lutz and J. Musick, eds. Chemical Rubber Company Press. Boca Raton, Florida. 431 pp.

Daniels, R.C., T.W. White, and K.K. Chapman. 1993. Sea-level rise: destruction of threatened and endangered species habitat in South Carolina. *Environmental Management* 17(3):373-385.

Dodd, C.K. Jr. 1988. Synopsis of the biological data on the loggerhead sea turtle *Caretta caretta* (Linnaeus 1758). U.S. Department of Interior, Fish and Wildlife Service. Biological Report 88(14). 110 pp.

Federal Register. Final Rule. 50 CFR Part 17 (22 September 2011), pp. 58868-58952.

Fish, M.R., I.M. Cote, J.A. Gill, A.P. Jones, S. Renshoff, and A.R. Watkinson. 2005. Predicting the impact of sea-level rise on Caribbean sea turtle nesting habitat. *Conservation Biology* 19:482-491.

Glen, F. and N. Mrosovsky. 2004. Antigua revisited: the impact of climate change on sand and nest temperatures at a hawksbill turtle (*Eretmochelys imbricata*) nesting beach. *Global Change Biology* 10:2036-2045.

Griffin, D.B., S.R. Murphy, M.G. Frick, A.C. Broderick, J.W. Coker, M.S. Coyne, M. G. Dodd, et al. 2013. Foraging habitats and migration corridors utilized by a recovering subpopulation of adult female loggerhead sea turtles: implications for conservation. *Marine Biology* 160(12):3071-3086.

Goudarzi, F., Doxa, A., Hemami, MR. et al. Thermal vulnerability of sea turtle foraging grounds around the globe. 2024. *Communications Biology* 7(347).
<https://doi.org/10.1038/s42003-024-06013-y>.

Hawkes L.A., Witt M.J., Broderick A.C., Coker J.W., Coyne M.S., Dodd M.G., Frick M.G., Godfrey M.H., Griffin D.B., Murphy S.R., Murphy T.M., Williams K.L., Godley B.J. (2011) Home on the range: spatial ecology of loggerhead turtles in Atlantic waters of the USA. *Diversity and Distributions* 17:624-640

Hopkins-Murphy, S.R. 1987. Sea Turtle Recovery Efforts in the Southeastern United States. Pp 63-71. In: *Proceedings of the Third Southeastern Nongame and Endangered Wildlife Symposium*, August 8-10, 1987. Athens, Georgia. 253 pp.

Hopkins-Murphy, S.R., C.P. Hope and M.E. Hoyle. 1999. A History of Research and Management of the Loggerhead Turtle (*Caretta caretta*) on the South Carolina Coast. Final report to the U.S. Fish and Wildlife Service. 72 pp.

Hopkins-Murphy, S.R., T.M. Murphy, C.P. Hope, J.W. Coker, and M.E. Hoyle. 2001. Population Trends and Nesting Distribution of the Loggerhead Turtle (*Caretta caretta*) in South Carolina 1980-1997. Final Report to the U.S. Fish and Wildlife Service. 41 pp.

Lewis, R.L., S.A. Freeman and L.B. Crowder. 2004. Quantifying the effects of fisheries on threatened species: the impact of pelagic longlines on loggerhead and leatherback sea turtles. *Ecology Letters*. 7:221-231.

Maier, P.P., A.L. Segars, M.D. Arendt, J.D. Whitaker, B.W. Stender, L. Parker, R. Vendetti, D.W. Owens, J. Quattro, and S. R. Murphy. 2004. Development of an index of sea turtle abundance based upon in-water sampling with trawl gear. Final Project Report to National Marine Fisheries Service, NOAA Grant Number NA07FL0499. 86 pp.

National Marine Fisheries Service, United States Fish and Wildlife Service. 2023. Loggerhead Sea Turtle (*Caretta caretta*) Northwest Atlantic Ocean DPS 5-Year Review: Summary and Evaluation, NOAA NMFS, Washington, DC.

National Marine Fisheries Service, United States Fish and Wildlife Service. 2008. Recovery plan for the Northwest Atlantic population of loggerhead sea turtle (*Caretta caretta*), second revision. National Marine Fisheries Service, Silver Spring, MD.

National Marine Fisheries Service, United States Fish and Wildlife Service. 2007. Loggerhead Sea Turtle (*Caretta caretta*), 5-year review: summary and evaluation. NOAA NMFS, Washington, DC.

National Research Council. 1990. Decline of the sea turtles: causes and prevention. National Academy Press. Washington, D.C. 259 pp.

Putnam, N. F. and K. L. Mansfield. 2015. Direct Evidence of Swimming Demonstrates Active Dispersal in the Sea Turtle “Lost Years”. *Current Biology*: 25:9 pp. 1221-1227. 158:571-587.

Spotila, J. R. 2004. *Sea Turtles: A Complete Guide to Their Biology, Behavior, and Conservation*. The Johns Hopkins University Press.

Van Dolah, R. F., and P. P. Maier. 1993. The distribution of loggerhead turtles (*Caretta caretta*) in the entrance channel of Charleston harbor, South Carolina, U.S.A. *Journal of Coastal Research* 9(4):1004– 1012.

Wyneken, J. and Lolavar, A. 2015. Loggerhead sea turtle environmental sex determination: implications of moisture and temperature for climate change-based predictions for species survival. *Journal of Experimental Zoology Part B: Molecular and Developmental Evolution* 324:295-314.