

Resident Juvenile Sea Turtles Guild

Kemp's Ridley Turtle *Lepidochelys kempii*

Green Turtle *Chelonia mydas*

Hawksbill Turtle *Eretmochelys imbricata*

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DESCRIPTION

Taxonomy

Samuel Garman first described the Kemp's ridley sea turtle in 1880 as *Thalassochelys kempii*. It was named for Richard M. Kemp, a fisherman interested in natural history who submitted the type specimen from Key West, Florida (USFWS and NMFS 1992). Later *kempii* was allocated to the genus, *Lepidochelys*, when it was realized by Baur in 1890 that the Kemp's ridley and Indo-Pacific olive Ridley were congener. Others considered *L. kempii* as a sub-species of *L. olivacea*. A review by Pritchard justified their status as a full, separate species and this determination is accepted by most authors (USFWS and NMFS 1992).

Linnaeus described the green turtle in 1758 as *Testudo mydas*. Schweigger first applied the binomial, *Chelonia mydas*, in 1812. Although trinomials have been applied to various populations in the past, they are generally not in use today (NMFS and USFWS 1991).

The hawksbill was originally named *Testudo imbricata* by Linnaeus in 1766. Two subspecies (*Eretmochelys imbricata imbricata* in the Atlantic Ocean and *Eretmochelys imbricata bissa* in the Pacific and Indian oceans) are recognized. However, a complex pattern of phenotypic variation exists.

Basic Description

The Kemp's ridley turtle is one of the smallest and rarest of the seven sea turtle species; it has an adult straight carapace length of approximately 65 cm (26 in.) and weighs less than 45 kg (99 lbs.). Adults have an almost round carapace that is as wide as it is long. The coloration changes significantly during development from the almost black hatchlings to the lighter, grey-olive carapace and cream-white or yellowish plastron of adults. There are four inframarginal scutes, each of which contains a pore. Kemp's ridleys possess a hooked beak and almond shaped eyes. Hatchlings generally range from 42 to 48 mm (1.7 to 1.9 in.) straight carapace length and weigh between 15 and 20 g (0.5 and 0.7 oz.) (USFWS and NMFS 1992).



Green turtles are the largest of the hard-shelled sea turtles with adults reaching 1 m (3.3 ft.) in carapace length and 150 kg (330 lbs.) in weight as an adult. They have a smooth carapace with four pairs of lateral scutes and a single pair of elongated prefrontal scales between the eyes. The coloration changes significantly during development. The plastron remains a yellowish white, but the carapace changes color from solid black as a hatchling to a variety of shades of grey, green, brown and black in starburst or irregular patterns as juveniles and adults. Their name is derived from the green fat, or calipee, in their body due to their herbivorous diet. Different from loggerheads, green sea turtles have a significantly smaller head as compared to the rest of the body size as adults. They have a serrated lower jaw for tearing grass. Green turtle hatchlings are about 50 mm (2.0 in.) long and weight about 25 g (0.88 oz.).



Adult hawksbills shell length for nesting females varies between 62.5 and 95 cm (25.0 and 37.0 in.) in the Atlantic. Distinguishing features of hawksbills are four pairs of overlapping scutes, a long neck compared to other sea turtles, and beak-like mouth resembling a hawk that allows them to forage in hard-to-reach cracks and crevices. The adult shell is usually amber with streaks of red-brown, black-brown and/or yellow with the plastron whitish-yellow and may have black spots.



Status

Kemp's ridleys were listed as Endangered throughout their range on December 2, 1970, and are the most seriously endangered of the sea turtles (35 FR 18319). They are also listed as endangered by the International Union for the Conservation of Nature and Natural Resources (IUCN) and are listed in Appendix 1 of the Convention on International

Trade in Endangered Species of Wild Fauna and Flora (CITES) which prohibited all commercial international trade. The International Union for Conservation of Nature lists the Kemp's ridley as Critically Endangered.

Green turtles were listed as Threatened under the U.S. Endangered Species Act of 1973 on July 28, 1978. Breeding populations in Florida and on the Pacific coast of Mexico were listed as endangered (43 FR 32800). Critical habitat was designated to include waters surrounding Culebra Island, Puerto Rico and its outlying keys in 1998 (63 FR 46693). In 2016 the population was further recognized into eight distinct population segments (DPS) under the ESA with three DPSs listed as endangered and eight as threatened. The North Atlantic DPS, which includes greens nesting in South Carolina, is listed as Threatened (81 FR 20057).

Hawksbills were listed as Endangered in 1970 under the precursor to the Endangered Species Act (35 FR 8491). They are also listed as endangered by the International Union for the Conservation of Nature and Natural Resources (IUCN) and are listed in Appendix 1 of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Kemp's ridleys and green turtles use South Carolina waters as developmental foraging grounds. Hawksbills are rarely seen in South Carolina waters.

POPULATION SIZE AND DISTRIBUTION

Kemp's Ridley

Kemp's ridleys have a restricted distribution with nesting primarily occurring on beaches in

western Gulf of Mexico. In 1947, over 42,000 nesting Kemp's ridleys were estimated in a single day's arribada (mass nesting) (Hildebrand 1963). Their numbers precipitously declined since then. The nesting population produced a low of 702 nests in 1985 (Ross et al. 1989). This initial decline was brought about by decades of harvesting females and the exploitation of eggs. Exploitation was brought under control in 1976 when Mexican marines and biologists began protecting nesting females and their nests. In 1978, the program expanded into an international effort with the assistance of United States biologists where among other goals a secondary nesting colony was established at Padre Island National Seashore in Texas (Ross et al. 1989). Since the mid-1980s, the number of nests laid in a season has been increasing primarily due to bi-national nest protection efforts and the implementation of TED regulations for shrimp trawlers. The total annual number of nests recorded at Rancho Nuevo and adjacent camps in Mexico has exceeded 10,000 in recent years (NMFS et al. 2011).

Green

Green sea turtles are found throughout the world in tropical and subtropical waters. In United States Atlantic waters, green turtles are found around the Virgin Islands, Puerto Rico, and in the continental United States in inshore and nearshore waters from Texas to Maine. (USFWS and NMFS 1992). Historically they were exploited for their fat, meat and eggs resulting in a global population decline. Green turtles were an important source of protein for coastal dwellers, commercial exploitation from the 16th to 18th centuries decimated stocks (Mager 1985) and were fished commercially in Florida and Texas (Hildebrand 1982). Conservation efforts implemented over the decades have improved population numbers.

Hawksbill

Female hawksbills are solitary nesters with nests laid quickly and hidden under vegetation (NMFS and USFWS 1993). Therefore, the hawksbill is a difficult turtle to census by aerial surveys. They nest in small numbers on remote beaches. The largest populations are found in the Caribbean, Indian, and Indo-Pacific Oceans. The largest nesting populations occur in Australia and Solomon Islands. Because of the general lack of intensive effort needed to survey hawksbill populations, reliable estimates for the population size are available for only a few localities. Major nesting and foraging areas in the United State territories in the North Atlantic occur in Puerto Rico and US Virgin Islands. The main cause of depletion of hawksbill populations is the direct harvest (NMFS and USFWS 1993).

HABITAT AND NATURAL COMMUNITY REQUIREMENTS

Kemp's Ridleys

Kemp's ridleys nest primarily in the daytime on a beach near Rancho Nuevo in Tamaulipas, Mexico and require dry sand beaches for successful nesting. This locale is the only place in the world where large, synchronized nesting aggregations (arribadas) of the species are known to occur (TEWG 2000). Nesting has been documented along the coast of Texas (Shaver and Caillouet 1998) and occurs as a very rare event in the Carolinas and Florida (Bowen et Al. 1994).

Early life stages of hatchlings are assumed to be like other species of sea turtles where they maintain a pelagic existence drifting with ocean currents, either currents of the northern and western Gulf of Mexico or transported to the Gulf Stream of the Northwest Atlantic. The major

foraging habitat for Kemp's ridleys is the nearshore and inshore waters of the northern Gulf of Mexico as well as the Gulf of Campeche in the southern Gulf of Mexico. Kemp's ridleys are often found in salt marsh habitats. Though they do not typically nest in South Carolina, juveniles can be regularly found in South Carolina waters from April through November foraging in our salt marsh habitats and inshore waters. In recent years, the numbers of Kemp's ridley have increased significantly, indicating that the juvenile population in South Carolina's coastal waters is increasing (Duermit et al. 2017).

Green

Adult green sea turtles require dry sand beaches for successful nesting and are found in the Hawaiian Islands, Pacific Island territories, Puerto Rico, the Virgin Islands and Florida. The largest green nesting populations exist at Tortuguero (Costa Rica) and Raine Island (Australia). Nesting in Florida occurs from June through late September in almost every coastal county but is predominantly observed along the southeast coast. Nesting in Florida has been on the increase, although the annual nesting effort fluctuates from year to year. Between 2019 and 2023 green nest counts range between 26,656 to 77,040 (Florida Fish and Wildlife Conservation Commission). Nesting in significantly lower numbers occurs annually in North Carolina, South Carolina, Georgia and Texas.

Juvenile green sea turtles are herbivores but have also been found to consume small invertebrates and mollusks as well. As adults they are exclusively herbivores. Feeding grounds are relatively shallow, sheltered waters. Most commonly, these foraging habitats are pastures of seagrasses and/or algae. Hatchlings and post-hatchlings maintain a pelagic existence drifting with ocean currents. When they reach a carapace length of about 20 to 25 cm (7.9 to 9.8 in.), green turtles leave oceanic habitats and move into benthic habitats. Some feeding grounds only support certain size classes of green turtles; in South Carolina, juvenile green turtle size class ranging from 21 to 40 cm are the most common life stage found in coastal and estuarine waters of South Carolina. In recent years, the numbers of green turtle strandings have increased significantly, indicating that the juvenile population in South Carolina's coastal waters is increasing (Duermit et al. 2017) and that a fair number of juvenile greens may remain in South Carolina inshore waters over the winter.

Hawksbill

Hawksbills are a circumtropical species, preferring warm shallow water areas such as coral reefs, lagoons, shoals and bays. They are omnivorous (feeding on plants and animals) such as marine algae, sea grasses, soft corals, crustaceans and jellyfish, but sponges are the principal diet of hawksbills once they enter shallow coastal waters and begin feeding on the bottom (NMFS and USFWS 1993). The species has been recorded in the continental US from all the Gulf States and from along the eastern seaboard as far north as Massachusetts, but sightings north of Florida are rare (NMFS and USFWS 1993). Hawksbills are infrequent in South Carolina waters likely due to no coral reef habitat. No nesting of this species has occurred in South Carolina, although hybrid hawksbill/loggerhead nests were recorded in 2020, all laid by the same genetically identified female within the Cape Romain National Wildlife Refuge.

CHALLENGES

Coastal development and shoreline hardening and armoring could adversely affect nesting turtles resulting in loss or degradation of dry suitable nesting habitat. Even if a suitable sandy beach is available, nesting can be aborted because of beach furniture and equipment blocking access to nest sites. Beach vitex (*Vitex rotundifolia*), an exotic introduced plant, found historically in areas in northern Georgetown and Horry Counties. Its aggressive growth and impenetrable roots quickly cover the dunes, making them unsuitable for nesting.

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, misdirect females return to the ocean and disorients hatchlings when direct and timely migration to the ocean is critical to their survival. (NMFS & USFWS 1992).

Climate change is a potential threat to sea turtles as it may affect these species in three ways: (1) 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); (2) lethal high temperatures within the nest that would cause egg/hatchling mortality or decrease hatchling fitness; or (3) 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). Foraging grounds in the marine environment may also be affected as sea water temperatures increase. Warming waters can result in changes in the abundance and distribution of food resources, leading to shifts in migratory and or foraging ranges.

Loss or degradation of Foraging Habitat in the marine environment is another challenge. Anchors and anchor chains of cruise ships and yachts are destroying portions of the reefs, and some ships run aground, causing widespread damage (NMFS and USFWS 1993). Land-based runoff and coral bleaching events can damage coral reefs for which hawksbill rely on as a food resource. Bottom trawling can degrade live bottom habitat on the ocean floor. Sea turtles may ingest many types of marine pollution and debris which they mistake as food, resulting in gut blockage, disease and or death.

Egg clutches on beaches and emerging hatchlings are subject to native and non-native predators such as raccoons, coyotes, ghost crabs (*Ocypode quadratus*) especially in areas where nest management does not exist. Killing of adult greens is rare, but human poaching of turtle nests with clandestine markets for eggs continues to be a problem (NMFS and USFWS 1991). Sharks and other large fish predate on hatchlings and adults.

The main cause of depletion of hawksbill populations is direct harvest associated with the exploitation of eggs, meat, shell, and whole young animals that are stuffed and sold as curios to tourists (NMFS and USFWS 1993). However, the greatest challenge for this species is the continuing demand for “tortoise shell” or the carapace and plastral scutes of the animal. These are reworked to produce hairpins, broaches, fans, inlaid furniture, eyeglass frames and numerous other items (Mager 1985).

Vessel strikes continue to be a threat to sea turtles (NMFS & USFWS 1991; NMFS, USFWS &

SEMARNAT 2011). In South Carolina, greens and Kemp's ridley turtles are vulnerable to boat strikes where interaction with propellers and boat skegs lead to direct mortality and has become more prevalent over the years.

Challenges are associated with unintended captures especially larger juvenile and adult turtles from commercial fishing operations. Juvenile turtles appear to reside in the more sheltered estuarine creeks and marshes and are thus not typically exposed to the threat of incidental catch in shrimp trawlers. The shark longline fishery, which operates all year long off the south Atlantic, may impact sea turtles in the neritic environment.

Sea turtles can become entangled in a wide variety of fishing gear existing within the water



column including fishing line, crab pot line, rope, onion sacks, and discarded netting. The unintended capture of sea turtles on fishing gear is an increasing challenge that can result in drowning or injuries that can lead to death or debilitation (swallowing hooks, flipper entanglement). The full scale of these unintended captures is not known as many are not reported or the carcass does not wash ashore. These types of events are typically observed with juvenile Kemp's ridleys and green sea turtles on hook and line fisheries and make up the largest cause of strandings for juvenile greens and Kemp's

ridleys in South Carolina.

Cold Stunning is a condition where sea turtles become very weak and unable to swim when water temperatures fall below 50F (10C). Cold stun event regularly occurs in the northeast part of the United States (Massachusetts) from November through January with a small number of cases reported during the winter in South Carolina.

Green turtles develop lobulated tumors (fibropapilloma) on their skin, scales, scutes, eyes (including surrounding tissues), oral cavities, and viscera. The cause of this disease is unknown, but it has increased to epidemic proportions in areas as far apart as Florida and Hawaii (Balazs and Pooley 1991). Fibropapilloma was first positively confirmed on a sea turtle in South Carolina in 2014 and since then a few live captures or stranded carcasses in South Carolina have shown signs of this disease.



CONSERVATION ACCOMPLISHMENTS

Nest protection projects and an associated volunteer network were established along the South Carolina coast from 1981 to the present to monitor nesting activities and increase hatchling

productivity. Use of *Vitex rotundiflora* (Beach Vitex) has been banned in at least 12 municipalities in North and South Carolina to limit its further spread.

Kemp's ridley nesting beach protection at Rancho Nuevo has significantly increased over the past decades; there has also been an increase in the number of Kemp's ridley nests documented at Rancho Nuevo since 1985 (Márquez-M. et al. 2005). An increasing number of Kemp's ridley nests are being laid annually on the Texas coast, some of which are "head-started" turtles (Fontaine and Shaver 2005).

Green turtle nesting is increasing in Florida (Florida Fish and Wildlife Conservation Commission). Research into the cause of fibropapilloma in green turtles is progressing, and field studies have documented cases of natural remission of the disease (Hirama and Ehrhart 2002). This is encouraging since there was no known treatment or cure.

Japan ended import of hawksbill shell in 1993 and dropped its CITES reservation on sea turtles in 1994. Because Japan is the largest importer of hawksbill shells in the world, this should diminish the demand for the species (NMFS and USFWS 1993). The two most important hawksbill nesting beaches in the US Caribbean are now fully protected (NMFS and USFWS 1993).

The US ratified Optional Annex V of the MARPOL Protocol in 1987, which prohibits dumping of all plastics and fishing gear from all ships at sea (O'Hara et al. 1988).

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. Cases involving fibropapilloma are isolated from other turtles and tanks to ensure no spread of the disease while undergoing medical care. Removal of recreational fishing gear in a structured medical environment ensures a better outcome for turtles incidentally caught on hooks.

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.

CONSERVATION RECOMMENDATIONS

- Ensure that live bottoms and marine algae habitats are protected from dredging and dredge spoil dumping through coordination with the US Army Corps of Engineers.
- Map the location of juvenile sea turtle foraging areas for inclusion in protected areas.
- 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.

- Increase number of estuarine sample areas conducted by SCDNR's Marine Resources Division to discover new foraging areas for juvenile sea turtles.
- Monitor all known juvenile sea turtle foraging areas to document changes in habitat condition, species composition, abundance, and size classes in coordination with SCDNR's Marine Resources Division.
- Collaborate with other institutions, such as the South Carolina Aquarium and the College of Charleston, to protect juvenile sea turtles.

MEASURES OF SUCCESS

As new Recovery Plans are updated and Status Reviews are completed, we will review the needs of the species and implement research and/or management as indicated.

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