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Status and Distribution of the Green Turtle, *Chelonia mydas,* in the Wider Caribbean Region

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Identity and Description

The generic name *Chelonia* was introduced by Brongniart (1800). The specific name *mydas* was first used by Linnaeus (1758). Common Caribbean vernacular names include green (or green-back) turtle in English, tortuga verde in Spanish, tortue verte in French, and tartaruga verde in Portuguese (Eckert, 1995), referring to the predominately green color of its body fat.

The green turtle is the largest of the hard-shelled sea turtles and is the second largest (after *Dermochelys*) of the seven species. Adults commonly attain weights of 150 kg and generally measure from 95 to 120 cm in carapace length. The color of the broadly oval carapace is light to dark brown, sometimes shaded with olive, with radiating streaks of yellows, browns, greens, and black. The plastron or belly is whitish cream to a light yellow in color. There are five vertebral scutes and four pairs of costal (lateral) scutes on the carapace which do not overlap one another. There is a single claw on each flipper. The anteriorly rounded head is characterized by a blunt beak with serrated cutting edges and a single pair of enlarged scales between the eyes.

Green turtle hatchlings weigh about 26 g and are about 5 cm in shell length. Hatchlings are uniquely marked with a blue-black color above and white margins on the trailing edge of the flippers and around the carapace. The plastron of hatchlings is typically a creamy white color. The hatchling gait on land is asymmetrical (alternating flipper movements), as opposed to the symmetrical gait of the adult.

For additional information, the reader is referred to Parsons (1962), Carr et al. (1978), Groombridge and Luxmoore (1989), NMFS/ FWS (1991), Eckert (1995), Hirth (1997), and Pritchard and Mortimer (1999).

Ecology and Reproduction

The green turtle is a circumglobal species found in tropical and sub-tropical waters. After leaving their natal beaches, individuals spend several years in the open ocean becoming widely dispersed by ocean currents. During this period they are omnivorous, feeding opportunistically at the ocean surface (Carr and Meylan, 1980; Carr, 1986). In the Caribbean, once juveniles reach approximately 20–25 cm in carapace length they move to coastal waters where they shift to an herbivorous diet (Bjorndal and Bolten, 1988). The benthic vegetarian feeding habit of juvenile and adult green turtles is unique among the sea turtles. The principal food item of Caribbean populations is *Thalassia testudinum*, commonly known as turtle grass (Mortimer, 1976).

Green turtles are estimated to take 27-50 years to reach sexual maturity (Limpus and Walter, 1980; Balazs, 1982; Frazer and Ehrhart, 1985; Frazer and Ladner, 1986), the longest age to maturity estimate for any sea turtle species. During the decades prior to adulthood, juveniles move long distances between areas of developmental habitat. Genetic studies show that mature females return to their natal beach to nest throughout their reproductive life (Meylan et al., 1990). Both males and females make long seasonal migrations between foraging and nesting sites, migrations that often span thousands of kilometers. Thus, during the life cycle of green turtles, animals from a single population can traverse an entire ocean basin, making them a truly international resource.

Gravid females typically spend two and one-half hours on the beach for nesting. Individuals return to nest at 2–4 year intervals, depositing an average of three clutches of eggs (and as many as nine) at 12–14 day intervals throughout the nesting season

(which at most Wider Caribbean localities peaks in June, July and August). Clutch size varies widely, and there is a relationship between clutch size and carapace length (summarized by Hirth, 1997). The average clutch size at the well-studied rookery at Tortuguero, Costa Rica is 112 eggs (range: 3-219) (Bjorndal and Carr, 1989). Eggs average 44 mm in diameter. After 55-60 days of incubation, hatchlings emerge from the sand and orient toward the open horizon of the sea.

For decades female green turtles have been flipper tagged on the nesting beach. Tag returns provide us with information about the distribution of mature females away from the nesting beach, as well as documenting their highly migratory habits (see Hirth, 1997, for a review). Females tagged while nesting at Tortuguero, Costa Rica have been recovered from foraging grounds and along migratory pathways in Belize, Colombia, Cuba, USA (Florida), Honduras, Jamaica, Martinique, Nicaragua, Panama, Puerto Rico, Colombia (San Andres), Venezuela, and Mexico (Yucatán), with the majority of tag returns coming from the foraging ground off the coast of Nicaragua (Carr et al., 1978). Similarly, females tagged while nesting at Aves Island, Venezuela have been recaptured in Brazil, Carriacou, Colombia, Cuba, the Dominican Republic, Grenada, Guadeloupe, Guyana, Haiti, Martinique, Mexico, Nevis, Nicaragua, Puerto Rico, St. Kitts, St. Lucia, and Venezuela, with the majority of these tag returns coming from the coasts of Nicaragua and the Dominican Republic (Solé, 1994).

More recently, immature and adult green turtles have been tagged in developmental and foraging habitats, as well as along migratory pathways. Immature and adult green turtles tagged in Caribbean Panama, a developmental habitat and migratory pathway, have been recovered predominantly in Nicaragua (Meylan and Meylan, unpubl. data). Immatures tagged in developmental habitat in Bermuda have been recaptured from throughout the Caribbean, with the majority from Nicaragua (Meylan et al., in prep.). The accumulation of recovered tags from an area can indicate the importance of that area to different life stages of green turtles. The coastal waters of Caribbean Nicaragua are clearly important to the survival of this species, since immature and adult green turtles tagged in nearly a dozen countries throughout the Wider Caribbean Region have been recaptured there (Lagueux and Campbell, unpubl. data).

Distribution and Historical Considerations

Throughout history, the green turtle has been prized for its meat and calipee, the cartilagenous material found on the inside of the plastron. Green turtle meat and eggs sustained the crews of ships during the period of exploration, expansion, and settlement of the New World (Carr, 1954; Parsons, 1962). Because of unsustainable use, all Wider Caribbean green turtle populations are depleted and some nesting populations are locally extinct. There are several examples throughout the world of green turtle populations that have been destroyed due to over-harvesting, two examples are given below.

The first example is from Bermuda where there was once a large assembly of nesting and foraging green turtles (Ingle and Smith, 1949; Parsons, 1962). However, in spite of legislation adopted in 1620 to protect against the taking of juveniles, by the end of the 1700s the green turtle population was so reduced that a commercial harvest was no longer profitable (Garman, 1884b cited in Carr, 1952; Parsons, 1962), and the nesting population was destroyed. Even today there are no green turtles nesting in Bermuda.

The second example is from the Cayman Islands. The Caymans were once known for what was probably the largest green turtle rookery in the Atlantic system. In 1503, during Columbus' final voyage to America, he named these islands Islas Tortugas. At one time, there were so many turtles migrating towards the Cayman Islands during the nesting season that lost ships could navigate towards the islands by the sound of swimming turtles (Long, 1774 cited in Lewis, 1940). For almost 200 years boats from many nations arrived at the Cayman Islands to harvest nesting females (Parsons, 1962). By the early 1800s, the population had become so depleted that Cayman turtlers sailed to the south of Cuba, then to the Gulf of Honduras and finally to the Caribbean coast of Nicaragua in search of ever-decreasing stocks of turtles to harvest (Lewis, 1940; Carr, 1954; Parsons, 1962; King,

1982). Today, there is no longer a viable wild nesting green turtle population in the Cayman Islands.

It has been over 200 years since the demise of the nesting populations in Bermuda and the Cayman Islands and still they have not recovered. Is there anything we can learn from these examples? If we agree that it is important to maintain biologically healthy green turtle populations, can we learn from the mistakes of our ancestors and implement the actions necessary to halt the continued decline of Caribbean green turtle populations?

Today the largest green turtle nesting colonies in the Wider Caribbean Region occur at Tortuguero, Costa Rica and Aves Island, Venezuela, with the Tortuguero rookery by far the largest (Carr et al., 1982). Much smaller nesting rookeries are scattered throughout the region. These include Florida, Mexico (Tamaulipas, Veracruz and the Yucatán Peninsula), Belize, Panama, the coastline of northern South America, and at selected sites in the Eastern Caribbean (Carr et al., 1982).

The largest foraging aggregation of juveniles and adults is found on the extensive seagrass beds along the Caribbean coast of Nicaragua. Smaller foraging aggregations have been documented in Florida, the Yucatán Peninsula, Panama, the Guajira Peninsula of Colombia, the Lesser Antilles, Puerto Rico, Cuba, Jamaica, Grand Cayman, Bermuda and the southern Bahamas (Carr et al., 1982).

Conservation Status

Green turtles are classified as Endangered by the World Conservation Union (Baillie and Groombridge, 1996) and are protected by various international agreements. They are listed in Annex II of the SPAW Protocol to the Cartagena Convention (a Protocol Concerning Specially Protected Areas and Wildlife), Appendix I of CITES (Convention on International Trade in Endangered Species of Wild Flora and Fauna), and Appendices I and II of the Convention on Migratory Species (CMS). The species is also included in the annexes to the Western Hemisphere Convention, a designation intended to convey that their protection is of "special urgency and importance" (Eckert, 1995). Recently, the governments of Costa Rica and Panama signed a cooperative agreement toward the conservation of marine turtles on their Caribbean coasts.

International laws, classifications, and agreements, however, do not adequately protect nesting and foraging green turtle populations and their habitats. Both legal and illegal green turtle fisheries and egg harvesting still continue.

Conclusions

Tag recoveries from females tagged on their nesting beaches, and adult and immature turtles tagged on their foraging grounds or along migratory pathways make it evident that regional cooperation is not only important but imperative for the conservation of green turtles. Because of the highly migratory nature of this species, conservation efforts of one nation can be negated by the lack of, or ineffective actions of other nations. Thus, we must work together, within countries, between nations, and on a regional level to ensure our conservation efforts are the most effective for the recovery of green turtle populations throughout the wider Caribbean.

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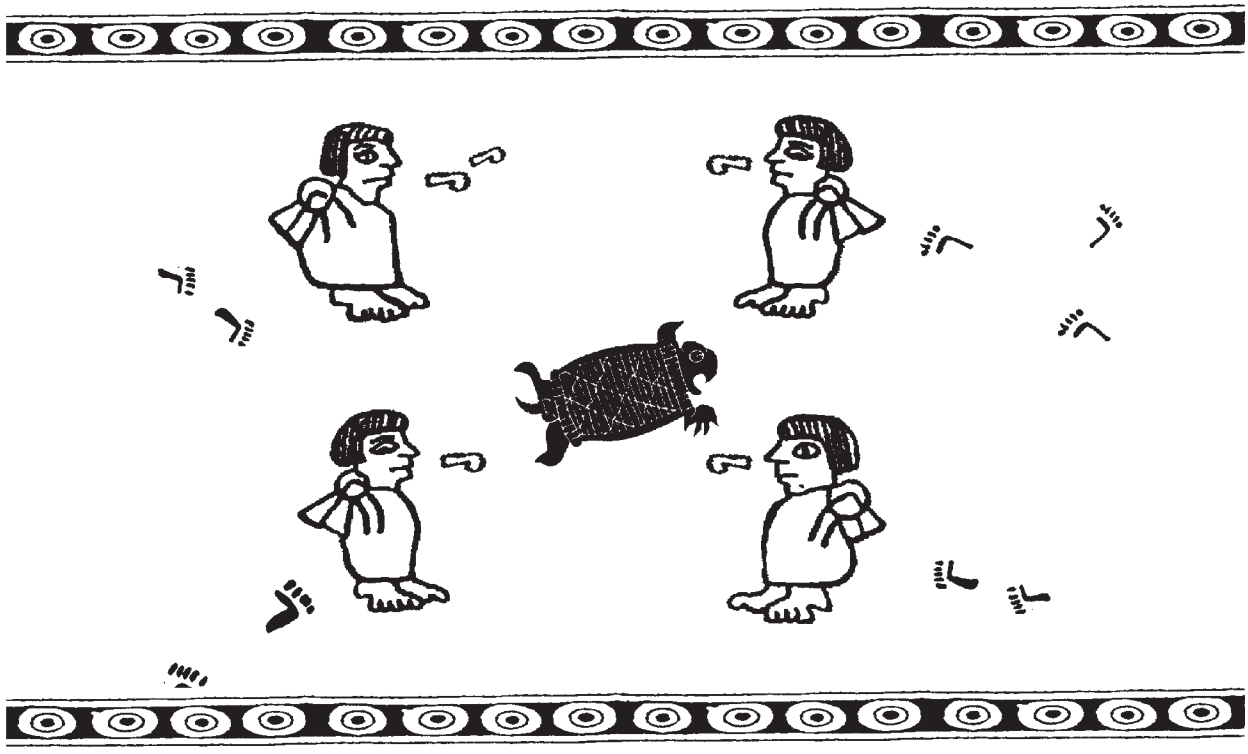

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About the cover

The designs for the cover were extracted from various Mexican pre-Columbian codices. The human figures, footprints, and the speech symbols were taken from the *Códice Boturini*, also known as *Tira de la Peregrinación*, which depicts the migration of the Mexicas (ancient Aztecs) towards the Valley of Mexico. The turtle figure in the center comes from an ancient Mayan codex. We felt that this symbolism, taken from pre-Colombian art, well reflected the nature and purposes of the people attending the workshop — bringing together many people, traveling from far and wide, to dialogue about marine turtles.