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Green turtles in the Caribbean: A Shared Resource

Alan B. Bolten and Karen A. Bjorndal
Archie Carr Center for Sea Turtle Research
University of Florida
PO Box 118525
Gainesville, FL 32611

Green turtles, *Chelonia mydas*, are one of five species of Caribbean sea turtles and were once extremely abundant. Because they could be stored alive on ships for months, green turtles were a critical source of food to early explorers and colonists. As Archie Carr wrote in his book *The Windward Road* (1956): *"More than any other dietary factor, the green turtle supported the opening up of the Caribbean"*…and…"*All early activity in the New World tropics - exploration, colonization, buccaneering, and even the maneuverings of naval squadrons - was in some way or degree dependent on turtle.*" As a result of unsustainable harvest for the past 500 years, green turtle populations have been reduced to less than 1% of pre-Columbian population levels and are classified by *IUCN: The World Conservation Union* as an endangered species.

Although thousands of green turtles are still legally killed in the Caribbean each year for food, the value of live sea turtles as an ecotourism resource has been recognized and is now being exploited by many nations. Healthy green turtle populations are also essential for maintaining the natural productivity, structure, and biodiversity of seagrass ecosystems. Green turtles are the primary herbivore in the Caribbean seagrass ecosystem, and as a result, have a major effect on structure and function of this very important marine system. Therefore, to manage and conserve seagrass ecosystems, green turtle populations must be protected and allowed to recover to natural levels.

Conservation efforts require the cooperation of many nations in the Greater Caribbean region because green turtles are highly migratory throughout their life cycle. Green turtles are long lived and have complex life histories that span a number of diverse habitats and geographic regions. Female green turtles congregate at specific nesting beaches, or rookeries, where they excavate nests and deposit their eggs. After about two months, the eggs hatch, and the hatchlings run down the beach and enter the sea. Carried by currents, these 5-cm turtles enter the open ocean where they remain for several years before returning to shallow coastal areas where they feed on seagrasses. Green turtles are slow growing, requiring about 40 years to reach sexual maturity. During this long juvenile stage, green turtles move among foraging grounds throughout the Caribbean

where seagrasses grow. When they reach sexual maturity, they migrate back to their natal beach to reproduce.

Our studies in The Bahamas have demonstrated the extent of international movement of green turtles. The Bahamas Archipelago is characterized by extensive shallow seas with rich seagrass pastures and diverse coral reef habitats that provide some of the best sea turtle foraging areas in the Caribbean. Where do the green turtles we see in Bahamian waters come from? Genetic tags (i.e., mitochondrial DNA sequence patterns) have allowed us to determine the source rookeries for juvenile green turtles in The Bahamas (figure 1). As you can see from the figure, rookeries throughout the Atlantic contribute to the juvenile feeding populations in The Bahamas. By attaching metal or plastic tags to the front flippers of turtles, we have been able to determine where turtles go when they leave Bahamian waters (figure 2). Recently, using satellite telemetry, we have begun to track the movement patterns of large juvenile green turtles as they leave the shallow feeding areas in The Bahamas and disperse to feeding areas in other regions of the Caribbean (figure 3).

The figures demonstrate that green turtle populations are a shared resource throughout the Greater Caribbean that require a coordinated, region-wide management plan to ensure their survival. Negative effects on nesting aggregations (e.g., harvest of eggs or nesting females or degradation of nesting beach habitat) in one country will result in changes to foraging populations throughout the region. Likewise, negative effects on foraging aggregations from exploitation or habitat degradation will impact nesting aggregations throughout the region. Therefore, to be successful, conservation and management plans must be shared by all nations in the region — protection by one country alone will not be sufficient, and over-exploitation by any one country may result in loss of sea turtle populations for all nations in the region. The importance of regional management for sea turtles is recognized in the *Inter-American Convention for the Protection and Conservation of Sea Turtles* which will come into force when ratified by 8 countries (6 countries have ratified as of October 2000). CITES (*Convention on International Trade in Endangered Species of Wild Fauna and Flora*) is a global convention that has provided significant protection for sea turtle populations by controlling international trade.

Figure 1: Using mitochondrial DNA (mtDNA) sequences as genetic markers, we have demonstrated that green turtle rookeries throughout the Atlantic contribute to the population of juvenile green turtles at Great Inagua, The Bahamas (marked with a star). We have shown similar patterns for other feeding grounds in The Bahamas. The size of the turtles in the figure are proportional to the contribution of the rookeries or rookery regions (shaded areas).

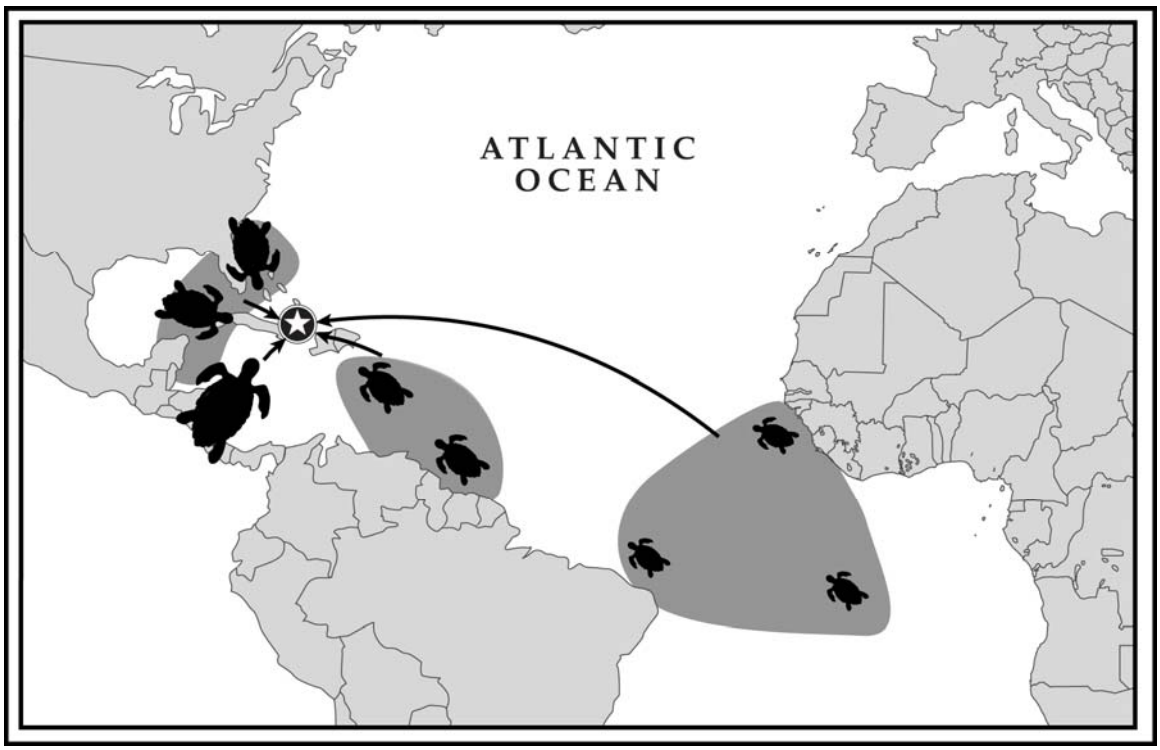

Figure 2: Using flipper tags with individual tag numbers and a return address, we have been able to determine destinations of green turtles after they have left foraging grounds at Great Inagua, The Bahamas (marked with a star). In most cases, tags have been returned to us by fishermen who have caught the turtles for food. Size of the arrows is proportional to the number of tag returns.

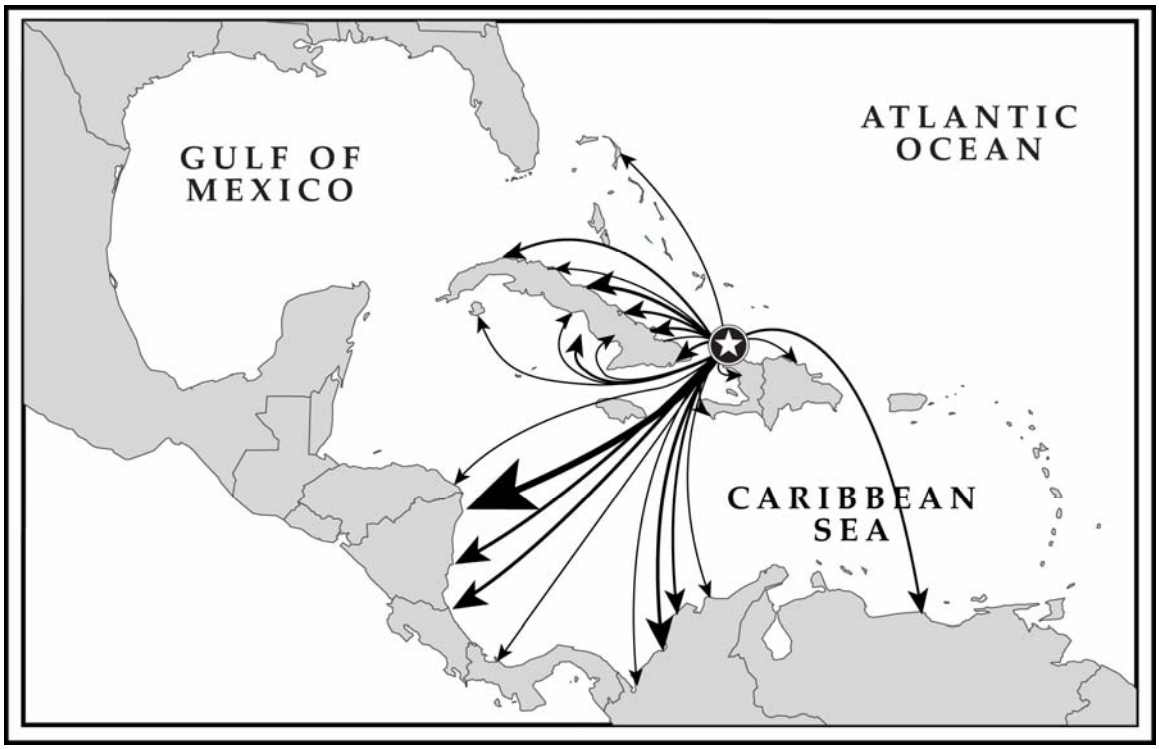

Figure 3: Using satellite telemetry, we have been able to track the movement patterns of 3 turtles from Great Inagua, The Bahamas (marked with a star) to other feeding grounds in the Caribbean. These movement patterns are consistent with the locations from which we have received tag returns (see Figure 2).