

SOLVING THE MYSTERIES OF MALE TURTLES IN THE CARIBBEAN

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Most of the knowledge about the biology, ecology, and conservation needs of sea turtles has been obtained from studies of adult females on nesting beaches and, to a lesser extent, from observations of juveniles and subadults in their foraging and development habitats. Those studies have principally sought to understand natal homing and nest site fidelity, migratory movements, nesting trends, and survival rates. However, comparatively little effort has been invested in studying and understanding male sea turtle biology and ecology, and even less research has focused on the potentially important role of male turtles in management and conservation. Because male turtles do not come ashore as their female counterparts do, they are seldom seen by beach-bound researchers or included in tag-recapture studies, and the difficulties posed by capturing males at sea have made locating their feeding, courtship, and mating areas an ongoing challenge.

Despite the complications inherent in studying male sea turtles, understanding their differing biology and natural history traits is critically important for a variety of conservation reasons, especially now. For example, climate change is expected to increase the proportion of females in some populations because sex determination is temperature dependent, so understanding male sea turtles' roles in population viability will be crucial to formulating appropriate conservation strategies. The proportion of males to females that is necessary to maintain a healthy sea turtle population was determined by the IUCN Marine Turtle Specialist Group in 2006 to be one of the key unsolved mysteries (see *SWOT Report*, vol. II, pp. 6–13), and this mystery requires greater attention by scientists.

Aves Island Wildlife Refuge is unique among sea turtle reproductive sites because significant numbers of males and females of the same population congregate there for courtship and mating, and females do not face any anthropogenic threats on the nesting beach. Located approximately 670 kilometers (416 miles) north of continental Venezuela, in that country's maritime boundary, Aves Island is a mere 580 by 120 meters (1,902 by 393 feet). The refuge is one of the few areas on the planet where male green turtles are found in large mating aggregations in clear, shallow waters where they can be easily observed and studied.

Far to the west along the Miskito Coast of Nicaragua, the expansive Caribbean continental shelf of Mesoamerica provides some of the most extensive seagrass pastures in the Atlantic. Green turtles come from all over the region to feed. At the southern extent of this vast foraging area, green turtles exhibit a sex ratio of approximately three males to one female, making it yet another unique area for studying male green turtles. Researchers suggest that the high concentration of males is evidence of sexual segregation on the foraging ground and is

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likely a mating strategy to increase encounters with reproductive females migrating to near and distant nesting areas, particularly nearby Tortuguero, Costa Rica. Female green turtles nesting at Aves Island are known to use Nicaragua's Miskito Coast foraging grounds.

Studying male sea turtles in these and other important foraging and mating areas across the globe is vital to better understanding sea turtle mating strategies, contributions to genetic stocks, operational sex ratios, population dynamics, habitat needs, and other important aspects of their biology and ecology. To improve global knowledge of the biology and ecology of male sea turtles, we will use applied research to improve the conservation strategies for the species. Initially, we propose to work with existing data to create a global distribution map of courtship, mating, feeding, and basking sites for each species, and to identify links to nesting populations where known. We will also characterize male mating patterns and operational sex ratios on Aves Island and in Nicaragua using genetic analysis, and estimate effective population size. In addition, we will explore the pre- and post-reproductive behavior using satellite tracking of males at both sites.

Management strategies and actions to conserve sea turtle populations in the future will need to address the roles of male turtles more effectively and to consider how the impacts of regional climatic cycles, primary threats, and conditions in foraging areas apply to both females and males. To ensure that these concerns are addressed in sea turtle populations across their range, we have created a global initiative—the Global Male Sea Turtle Initiative—to promote the biological and ecological study of male sea turtles. We invite our colleagues from around the world to join this effort. ■

AT RIGHT: Mating green turtles accompanied by satellite males near Aves Island, Venezuela. © GABY CARIAS TUCKER

