Introduction

Green sea turtles (Chelonia mydas) are a global migratory species that use a variety of terrestrial and marine habitats throughout their life history (Bjorndal et al., 2005). Most population estimates on sea turtles are based on nesting females, the most accessible and concentrated life stage. Because of this focus, there has been a lack of information collected on juvenile turtles’ densities, abundance, and distribution (Pichler et al., 2008; Bjorndal et al., 2005). Juvenile green sea turtles can be found in shallow tidal creeks and bays throughout the Caribbean.

Factors that have been shown to affect the abundance of juvenile turtles include predation, food availability, overexploitation, climate change, pollution, and bycatch (Semlitsch et al., 2003). Since the ban on the harvesting of sea turtles in The Bahamas in 2009, South Eleuthera has become a safe and largely undeveloped environment for turtles. With reduced anthropogenic effects, predation and food availability become the main drivers of abundance, specifically sharks and seagrass (Heithaus et al., 2007). In a healthy ecosystem, the sea turtle populations are controlled by shark abundance, while seagrass function as greater, increasing productivity of seagrass and species richness in their ecosystem (Wilson et al., 2005).

Currently, green sea turtles are classified as globally endangered by the IUCN. If they go extinct, they will leave an irreplaceable gap in healthy marine ecosystems (Wilson, E.G. Miller, K.L, Allison, D. and Magliocca, M. Why Healthy Oceans Head to Earthwatch: Initiatives to Protect the Tropical Coral Reef, Teachers Working Guide, 2003). Researching factors that affect green sea turtle abundance will help build the knowledge of a less understood life stage, protect turtles and their ecosystems from extinction, and focus conservation efforts on critical environments and vulnerable life stages. The purpose of this study was to determine the size and relative abundance of turtles on South Eleuthera and their ecosystems from extinction, and focus conservation efforts on critical environments and vulnerable life stages of green sea turtles. Because of this focus, there has been a lack of information collected on juvenile turtles’ densities, abundance, and distribution (Pichler et al., 2008; Bjorndal et al., 2005). Juvenile green sea turtles can be found in shallow tidal creeks and bays throughout the Caribbean.

Methodology

Abundance Surveys

Abundance surveys began with collecting environmental conditions and a starting GPS point. The best flow was a transit for thirty minutes at a constant speed. Turtles are spotted and their location is recorded along with a final GPS point of the transit. The turtles are then returned to their original location, and a GPS point is taken.

BRUVS

Biased Remote Underwater Video Surveys (BRUVS) are placed in the mouth of a creek bottom on an outgoing tide. Freshly, frozen bonito tuna is secured in the bait cage, and releases a scent plume as it melts. The bait cage is filmed for 90-120 minutes to observe predators attracted from the area. Surveys are reviewed and predation typed to species.

Results

Abundance of Green Sea Turtles

The abundance surveys showed that there was a significant difference in the number of turtles observed in each of the eight sites (Kruskal-Wallis chi-squared = 10.9, p-value < 0.05). Half Sound had the greatest mean abundance (42 turtles/hour), more than twice the amount of any other creek, with the lowest mean abundance in Broad and Kemps Creek (1 turtle/hour) (Figure 5). Where creeks are grouped according to coastline, there is a significant difference between their abundance. The Atlantic coastline has the highest abundance of turtles; the Exumas Sound coastline has the second highest abundance whereas the least abundance of turtles is found on the Bahama Banks coastline.

Abundance of Sharks

The location had a significant effect on the shark abundance (Kruskal-Wallis chi-squared = 10.9, p-value < 0.05) (Figure 8). Broad Creek had the greatest relative abundance (0.3 sharks/hour), whereas Kemps creek had the least (0.03 sharks/hour). Half Sound and Deep creek were also low (0.096 and 0.1 sharks/hour respectively).

Discussion

This study revealed significant differences in turtle abundance per creek, shark abundance per creek, and turtle size per coastline. A significant difference in abundance was observed according to coastline, with the greatest abundance observed in the Atlantic, followed by the Exumas Sound, and the least in Bahama Banks. All turtles were within the expected juvenile size range (<780mm) (Bjorndal et al., 2005). Future research could determine whether turtles are moving from the Atlantic side to the Bahama Banks side as they grow through their juvenile life stage.

Sharks abundance was greatest in Bahama Banks creeks, then in the Exumas Sound creeks, and least abundant on the Atlantic coastline. Tursiops, Bulls, and Lemonos are the most likely to prey on juvenile (Bjorndal et al., 1995), but they were seen very rarely in this data set. However, other shark species could still affect the turtle behavior and abundance in these study sites. For example, Broad Creek had the greatest shark abundance, which could explain the low turtle abundance in the creek. Future research could also seek to determine the influence of individual shark species on turtle abundance, through either predation or non-lethal influences, such as changing when or where turtles forage (Heithaus et al., 2007). Together, with a better understanding of food resources, home ranges, and human influences, this research will enable us to understand and protect juvenile green sea turtles.

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Literature Cited
