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DOES RECREATIONAL DIVING IMPACT HAWKSBILL SEA TURTLE FORAGING BEHAVIOR? RESULTS FROM A MARINE PROTECTED AREA, HONDURAS

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ABSTRACT

Recent studies indicate that recreational diving may cause unintended behavioral changes in marine macrofauna. The hawksbill sea turtle (*Eretmochelys imbricata*) is a critically endangered species encountered pantropically by recreational divers in marine protected areas (MPAs). No other studies to date however, have examined the impacts of recreational diving on sea turtle behavior. We conducted in-water observations of 61 juvenile hawksbill turtles from June 12 to September 2, 2014 in the Sandy Bay West End Marine Reserve (SBWEMR), Roatán, Honduras, to quantify impacts of recreational diving on hawksbill behavior. We recorded turtle behaviors and the number of behavioral bouts to test the effects of diver approach on sea turtle behavior. As a control for diver interactions, we began all observations by recording turtle behavior for approximately 3 – 5 min. To test if diver approach affected a change in turtle behavior, we instructed different sized groups of divers (1 - 4) to slowly approach each turtle. We used the Interactive Individual Identification System (I³S): Pattern (Version 4.0.1) to test for repeat individuals. To test for associations between behavioral bouts and behavior time, we ran Spearman's correlations. We also ran repeated measures ANCOVAs, comparing the total time

turtles engaged in each behavior before and after divers approached turtles. Our results for 1027.3 min of observation time indicated the amount of time turtles engage in eating (16.5%), investigating (16.3%), and breathing (4.0%) activity was highly correlated with the number of behavior bouts of each behavior. We also found the mean time turtles spent eating (2.2 ± 0.5 min) and investigating (2.2 ± 0.4 min), as well as the median time turtles spent breathing (0.5 ± 0.1 min), decreased when approached by divers. Our results suggest diver habituation may negatively impact sea turtle eating, investigating, and breathing behaviors, however, it is unknown if recreational diving has a cumulative effect on turtle behavior over time. We recommend that MPA managers implement monitoring programs that assess the impacts of dive and snorkel tourism on sea turtles. In our study, we established monitoring of hawksbills, which have the potential to be heavily impacted by dive tourism, as a representative species of reef inhabitants. Furthermore, we provide specific recommendations for continued monitoring of sea turtle populations in other MPAs, recognizing the importance of accounting for diver impacts during in-water studies.

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