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Using Drones to Assess Great White Shark Behavior Along Coastal Beaches

Researchers use new drone technology to advance our understanding of white shark (*Carcharodon carcharias*) behavioral movements for development of non-destructive shark mitigation strategies.

SOURCE: *Frontiers in Marine Science*

By: *Alydia Moorhead* 09 October 2020

Large sharks, such as the white shark (*Carcharodon carcharias*), have long been known for their ecological importance as apex predators in the marine environment. However, populations are vulnerable to decline due to human-driven exploitation. Human-shark interactions along coastal beaches present a dilemma for social attitudes towards conservation efforts. Interactions near surf zones (including unprovoked shark bites and “attacks”) can lead to cull-based mitigation strategies, which can present fear-based misconceptions that threaten wildlife health and conservation efforts. Researchers are using new drone technology to improve white shark conservation strategies.

In a recent study, Colefax et al. monitored the tracks of 108 white sharks in the surf zone off the east coast of Australia, where 650-700 targeted drone flights were performed. More than 30 beaches were haphazardly sampled, but white sharks were only encountered at 10 of them. Upon detecting a shark, multirotor drones were lowered to 20-25 meters, and shark tracks were recorded in UHD 4K resolution. The authors extracted data on the coordinates and altitude for each shark, allowing them to determine metrics on movement, shark length, average swim speed, net velocity, and track straightness. After analyzing the data from statistical models, the researchers were able to determine how shark size and environmental covariates affect swim direction and other track metrics.

Overall, white sharks tend to move behind the surf break in constant motion parallel to the shoreline, traveling at speeds of approximately 0.61 m/s. Furthermore, the white sharks displayed fairly predictable track trajectories and relatively slow movement speeds along surf zones. White sharks also displayed inquisitive behavior when exposed to both food and non-food objects. Lastly, the study suggests that humans are likely at a greater risk for harmful shark encounters during periods of increased food source availability. This can occur due to increased foraging activity by sharks along the surf zone.

Human-wildlife conflicts can have a negative impact on conservation and management strategies; white sharks are one of several species that have been negatively impacted by both direct and indirect human exploitation. This study provides valuable insight into the track metrics of white sharks in order to better understand behavioral patterns of these sharks and promote non-destructive management strategies. The researchers suggest further development of management techniques, such as implementing visual stimuli that could help direct sharks away from surf zones and provide a new method of mitigation regarding shark bites.

The use of transect-based drone surveillance was shown to be successful in monitoring localized movement behavior of white sharks along coastal beaches. This drone-based technology may present new opportunities for improved surveillance approaches to shark mitigation and healthy conservation strategies.

Citation: Colefax, A.P., Kelaher, B.P., Pagendam, D.E. and Butcher, P.A. (2020). Assessing White Shark (*Carcharodon carcharias*) Behavior Along Coastal Beaches for Conservation-Focused Shark Mitigation. *Front. Mar. Sci.* 7:268. doi: 10.3389/fmars.2020.00268