

Mitigating the impact of the tropical tuna purse seine fisheries on silky sharks (*Carcharhinus falciformis*): small scale behavioral analyses and future improvements in the protocol for videodata acquisition in the purse seine net

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Sharks are top predators in marine ecosystems. Due to their low fecundity and late maturity, they are considered among the most vulnerable species to human exploitation. Silky sharks (*Carcharhinus falciformis*) figure among the most frequent shark species that are accidentally caught in the purse seine tropical tuna fisheries worldwide. Juveniles are commonly attracted by floating objects together with tropical tuna aggregations. Possible mitigation measures that reduce the bycatch of silky sharks have been considered, among which the possibility to attract them out of the purse seine net. This research has been the first step towards assessing the key stimuli that may be employed in such conservation measures, by studying the behavior of silky sharks in the purse seine net at a fine scale. We analysed the videos filmed in the net during three scientific cruises conducted in the Pacific Ocean in the period 2012-2014. We found indications of different behavioral patterns of silky sharks in the net that may guide future developments of mitigation measures.

Swimming speed and distance between individuals in a group were found constant throughout all the cruises. Also, the results showed a bimodal distribution of group sizes that suggests that social interactions may play an important role in the spatial distribution of silky sharks. Other analysed categories, like the attraction to the net, have shown a certain disparity among years, possibly caused by the difference in sample sizes or bias while filming. What is certain is that there was a need for an established protocol for video data collection which the scientists would follow in the years to come. To this purpose, we developed a protocol as a set of step-by-step advice that could be applied in the future cruises in order to standardize the data collection procedure.

Keywords: purse seine fisheries; silky sharks; bycatch mitigation; shark behavior