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Best Practices to Reduce Mobula Ray Bycatch: A Literature Review for Global Tuna Fisheries

Manta and devil rays (genus *Mobula*) are a charismatic but poorly understood group of widely ranging, filter-feeding batoid rays. While all species are declining in global abundance, eight mobulid species are Near Threatened or of higher concern by the IUCN Red List, while the other two are Data Deficient, meaning all species of mobulid rays are of conservation concern. Due to their late maturation and very low fecundity and growth rates, mobulid populations are globally threatened as being caught as bycatch. Commercial tuna fisheries managed internationally by tuna Regional Fisheries Management Organizations (tRFMOs) unintentionally catch over 13,000 mobulids in their purse seine nets a year. While some tRFMOs have banned landing mobulid rays, few mitigation efforts have been made to reduce the capture and mortality rates of bycaught mobulid rays. However, both small- and large- scale mitigation efforts have developed solutions and implemented practices to reduce mobulid bycatch. Here, we present a policy analysis of current tRFMO policies that identify the policy and mitigation gaps in existing policies addressing mobulid rays. We also present a comprehensive review of initiatives implemented by both tuna and non-tuna fisheries that address fishing, handling, and practices to reduce mobulid post-release mortality rates. Adopting these results, we present a series of best practices for mobulid bycatch reduction that can be implemented in large-scale tuna fisheries. This work presents tangible conservation solutions for tuna fisheries to reduce their impact on threatened mobulid rays.