

14. By-catch in a tropical shrimp fishery: are TEDs effective in excluding rays?

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Tropical shrimp trawling generally produces significant amounts of by-catch, including endangered marine species. To avoid incidental capture of marine turtles, Turtle Excluder Devices (TEDs) are now widespread. TEDs are effective in avoiding turtle by-catch and theoretically exclude all organisms large enough not to pass in between the TED's vertical bars. Rays (Batoidea; Chondrichthyes: Elasmobranchii) are particular in this respect, because even large sized individuals might pass through a TED as a result of their flattened body shape. Several ray species are listed as threatened and they are very vulnerable to fishing mortality due to their life-history characteristics. By-catch of rays in tropical shrimp trawling is thus highly undesirable. The current study assessed the potential of TEDs in reducing ray by-catch in the seabob shrimp (*Xiphopenaeus kroyeri*) fishery in Suriname. Sixty-five catch-comparison hauls were conducted, comparing ray by-catch in trawls fitted with TEDs (test-net) and without TEDs (control-net). Overall, catch rate of rays was reduced by 36% in the test-net. Rays caught in the test-net were on average 21% smaller than those in the control-net meaning larger ones were indeed able to escape, while smaller individuals passed through the TED, ending up in the codend. As such, TEDs were most efficient in excluding *Dasyatis geijskesi*, the largest ray species, while no significant reduction was observed for the small-sized *Urotrygon microphalmum*. A GLMM was fitted to calculate exclusion-at-size for the two most abundant species. Exclusion of *Dasyatis guttata* reached 100% for individuals over 50cm (body width), while *Gymnura micrura* only approached 80% exclusion even for the largest individuals (70cm).

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