

Modeling incidental marine debris bycatch in the Hawaii-based pelagic longline fishery

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The remoteness of the North Pacific Ocean hampers at-sea detection and removal of marine debris. Commercial longline fishing gear, with its array of suspended hooks, can snag marine debris and may provide an opportunity to assess floating and mid-water marine debris abundance and distribution at a regional scale. Observations of species-specific catch and other operational details from vessels participating in the Hawaii-based pelagic longline fishery were initiated in 1994 as part of NOAA's Pacific Islands Regional Observer Program. In 2007, onboard observers began additionally recording longline encounters with marine debris. We used an existing zero-inflated negative binomial model developed for standardizing catch-per-unit effort (CPUE) of bycatch species to explore incidental "catches" of marine debris in this fishery from data spanning 2008-2016. Data collected from 128 vessels (457 trips) yielded 966 marine debris encounters dominated by derelict nets and associated gear from other fisheries. Mean CPUE (catch per 1000 hooks) for marine debris was four times greater in the shallow-set sector of the fishery (targeting primarily swordfish) versus the deep-set sector (targeting primarily bigeye tuna). There was no temporal trend in debris CPUE but CPUE was higher at higher latitudes. There was a significant effect of observer experience; observers averaging 2.5 years of experience prior to 2008 reported more debris than observers with less experience. Marine debris observations from the Hawaii-based pelagic longline fishery can provide an opportunistic, yet regular, mechanism for assessing the distribution and abundance of derelict fishing gear. Some longline fishermen voluntarily haul snagged debris from the ocean. Thus, incentivizing at-sea removal may elicit further cooperation.