Accounting for selective reporting in occupancy-abundance models for fishery-dependent data on bycatch species

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Abstract: Data collected as part of fisheries monitoring programs are often the only regular source of information on occurrence of marine species that are widely distributed, owing to the high cost of fishery-independent surveys. These types of data are notorious for their propensity to contain time-varying biases due to changes in fishing behavior. Not surprisingly, trends in abundance of dolphin species estimated from data of tuna purse-seine observer monitoring programs in the eastern tropical Pacific Ocean (ETP) have a long and controversial history. In the ETP, yellowfin tuna (*Thunnus albacares*) is often found in association with spotted (*Stenella attenuata*) and spinner (*S. longirostris*) dolphins. Purse-seine vessels use this co-occurrence to locate the tuna by searching for dolphins, and associated birds, with high-power binoculars, high-resolution radar and helicopters. Indices of relative abundance were originally developed in the late 1980s based on line transect methodology when the primary method of detection was binoculars. However, trend estimation was discontinued in 2000 due to concerns about changes in reporting rates of dolphin school detections with increased use of helicopter and radar search. At present, as a result of a hiatus in fishery-independent surveys since 2006, fisheries observer data remain the only source of information with which to monitor dolphin population status. Analysis has shown that proportionally more helicopter detections lead to purse-seine sets, suggestive of an under-reporting of dolphin schools not associated with tunas by this search method. Using zero-inflated occupancy-abundance models we cautiously revisit trend estimation for spotted and spinner dolphins. Our main goal is to account for changes in dolphin sighting reporting rates with changes in detection platforms through zero-inflation. We present model results that are based on explicit modeling of selective reporting, using fisheries operational covariates to describe the process of zero-inflation.