

Estimating density of non-tracked dFADs with spatial capture-recapture models

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Summary

Tropical tuna are known to associate with floating objects, property used by fishermen for as indicators. Since the early 1990s, massive use of man-made drifting Fish Aggregating Devices (dFADs), i.e. mostly buoys with GPS, to aggregate tropical tunas has strongly modified global purse-seine fisheries. This has introduced major changes in the efficiency and selectivity of purse seiners as well as raised serious concerns regarding increased by-catch and juvenile catch, possible changes in fitness and migrations. dFAD-associated purse-seiners monitor their deployed buoys and a large part of buoys GPS positions and trajectories are available to map dFADs density. However, a remaining part, i.e. dFADs for which trajectories data are unavailable still needs to be estimated. Indeed, in order to determine how dFADs can be used in a sustainable way, as well as to integrate this type of information in the CPUE standardization process, their total density needs to be known. Considering dFADs without available trajectories as animals and using data from voluntary contributions of French tuna vessels shipmasters and tuna fishery associations in the Atlantic ocean, Spatial Capture-Recapture (SCR) models can be applied to estimate remaining dFADs spatial and temporal distribution, density and more widely time-at-sea and detection probability.