

Drifting Fish Aggregating Device (dFAD) ocean trajectories and their consequences for fisher “foraging strategies” and pelagic ecosystems

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Abstract

Since the mid 1990s, drifting Fish Aggregating Devices (dFADs) have become an increasingly important means of catching tropical tunas. These devices consist of bamboo rafts, which tuna schools concentrate under, and attached GPS tracking buoys. The massive use of dFADs has raised serious concerns regarding the potential impacts on tuna ecology and pelagic ecosystems, but relatively little is known on the modalities of dFAD use by fishing vessels. For the first time, the three French fishing companies operating in the Atlantic and Indian Oceans have made accessible to scientists the GPS buoy tracks from their dFADs. After initial processing using discriminative classification methods (e.g. Artificial Neural Networks, Random Forests) to separate the useful ‘at sea’ trajectories from ‘on board’ positions (Maufroy et al. 2013), this data is used to describe the spatial and temporal patterns in dFAD use in the Atlantic and Indian Oceans. ‘at sea’ dFAD trajectories are combined with multiple sources of information: on board observers data, declarative data of the fishery, interviews with fishing masters and trajectories of the French fishing vessels. In particular, we describe the spatio-temporal patterns of the population of floating objects monitored with GPS buoys, develop a method for extrapolating the total number of dFADs based on spatialized raising factors, define the key factors determining dFAD deployment and assess some of the impacts of dFAD use on fisher “foraging strategies” (Bertrand et al. 2007) and pelagic ecosystems. The results we obtain provide a first overview of dFAD use in the Atlantic and Indian Oceans that is key for sustainable exploitation and conservation of pelagic ecosystems.

References

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