FADBASE AND FUTURE DIRECTIONS FOR ECOLOGICAL STUDIES OF FAD-ASSOCIATED FISH

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Fish aggregating devices, or FADs, are used throughout the tropics by recreational, artisanal and commercial fishers to concentrate pelagic fish for capture. Currently, approximately 1.2 million tonnes of yellowfin, skipjack and bigeye tuna and over 100,000 tons of bycatch are caught around drifting FADs in the Atlantic, Indian and Pacific oceans, which is approximately 1.5% by weight of the world's capture fishery each year. The global extent of catches around moored FADs is unknown, but they are an important component of fisheries strategies in many areas.

Given the increasingly widespread use of FADs over the past 20 to 30 years, a review of what was known about how they affect the fish they attract seemed timely. We traced the literature on FADs from the earliest observations, such as those made by Thor Heyerdahl of dolphinfish and tuna aggregating under his Kontiki expedition rafts, to modern research on both moored and drifting FADs. The result was "FADbase", a database of more than 400 references relating to FADs. Using FADbase we looked for trends in publication number and type over time, study topics, approaches and techniques, where FAD research had been done, what fish species it has focussed upon, and whether research effort has been biased towards moored or drifting FADs.

Publications before 1980 were predominantly peer reviewed, although non-peer reviewed literature has dominated since 1980, due to the numerous technical reports produced as FADs became more widely used in artisanal and large-scale industrial fisheries in the 1980s. Most studies of the ecology of FAD-associated fish were descriptive, with few mensurative experimental studies and even fewer manipulative experimental studies that tested specific hypotheses, due to inherent difficulties in working in the open ocean on objects that are temporary in space and time. Research on the ecology of FAD-associated fish has focused on moored FADs, despite the major FAD-based fisheries being around drifting FADs. Publications presenting information on moored FADs outnumbered papers on drifting FADs by a ratio of 3.5:1.

While the eternal question of "why are fish attracted to FADs?" will continue to fascinate many, there are pressing research needs concerning the current widespread use of FADs and their effects on fish stocks. Our review revealed large gaps in our knowledge of the ecology of fish associated with FADs. We suggest that FAD research should focus on:

1) describing how fish interact with FADs (spatial and temporal patterns of association with FADs by fish);

2) determining how fish locate and remain associated with FADs (sensory processes) and;

Mooring the deadweight (2 t concrete block)

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3) establishing the consequences of association with FADs for both individual fish stocks and the wider pelagic ecosystem.

We make several key recommendations for future research. Most of the research so far has been descriptive. To generate a better understanding of the mechanisms of attraction and aggregation at FADs, manipulative experimental approaches must replace the dominance of observational and descriptive studies. Because we know comparatively little about how fish interact with drifting FADs, far greater emphasis should be placed by fisheries scientists and funding agencies on researching them to provide better information for management of large-scale FAD-based industrial fisheries. Detailed information of the sensory capabilities of pelagic fish, and more specifically information that relates to their ability to sense FADs, is almost completely lacking. Physiological studies to develop such information are a vital first step in researching how fish locate and remain associated with FADs.

Finally, our analysis of FADbase highlights the enormous mismatch between the amount and value of tuna caught around FADs and the amount of research conducted on the use and effects of FADs. We call for a "paradigm shift" in the focus of pelagic fisheries scientists, managers and funding agencies to re-direct both human and monetary resources towards research of the use and effects of drifting FADs.

FADbase is freely available at www.ifremer.fr/dcp/ and the full review is available from Reviews in Fish Biology and Fisheries through:

www.springerlink.com

or by contacting Tim Dempster for a pdf file at tim.dempster@sintef.no

We intend FADbase to be a living information resource for those who use and research FADs and we will update it regularly. If you have published an article/report regarding FADs or the aggregative behaviour of fish around floating structures and you want it to be included in FADbase, please send an email to Marc Taquet at Marc.Taquet@ifremer.fr, with a copy as a pdf or txt file.

Reference

Dempster T, and Taquet M. 2004. Fish aggregation device research: Gaps in current knowledge and future directions for ecological studies. Reviews in Fish Biology and Fisheries 14(1):21–42.

The Indian Ocean-type FAD has been completely deployed