Toward true FAD deployment limits in the t-RFMOs

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Summary

All four tropical tuna RFMOs (t-RFMOs) have adopted provisions related to the proliferation of fish aggregating devices (FADs) in use by purse seine operations. Addressing the growing numbers of FADs in use has been a challenge for the t-RFMOs, as a review of the existing measures shows they are not restrictive at the fleet level and would allow a considerable number of purse seine operators to increase their FAD use. The need to consider development of science-based limits on the deployment of the devices was a key conclusion of scientists at the 2017 Global FAD Science Symposium as well as participants at the 1st Meeting of the Joint t-RFMO FAD Working Group that same year. To transition those provisions to true limits, the t-RFMOs should develop management objectives that clearly identify their goals for impacted fisheries. We offer options for management objectives including avoiding adverse impacts to tropical tuna populations (via a proxy measurement of catch-per-unit-of-effort of purse seine operations) and limiting impacts to habitat from FADs that become marine debris.

Introduction

Since the development of fish aggregating device (FAD)-associated fisheries in the 1990s, the number of these devices deployed annually by fishing operations has increased dramatically (Maufroy et al., 2017). Environmental NGOs, industry representatives, and scientists have expressed concern for this unmanaged proliferation of FADs. Although precise data is not available, up to 120,000 FADs may be deployed annually worldwide (Gershman, 2015). So many FADs are currently in use that free schools of skipjack in some areas are becoming more difficult to find (Fonteneau, 2014). FAD density is so high in some areas that one could reasonably argue that nearly every purse seine set should be presumed to be on a FAD-associated school. Although the use of FADs helps purse seine vessels locate and catch skipjack tuna, unrecovered FADs become marine debris and wash up on coastlines and coral reefs (Davies et al., 2017). FADs built according to traditional designs may continue to entangle, injure and kill marine life even after they drift outside the productive purse seine fishing grounds. Further, areas of greater FAD density may result in lower catch-per-unit-of-effort (Sempo et al., 2013; Escalle et al., 2018) or catch per positive set (Hall and Roman, 2017) of total tropical tunas in the purse seine fishery, potentially indicating a fragmentation of aggregated schools (Marsac et al., 2017). The four t-RFMOs (IATTC, ICCAT, IOTC and WCPFC) have responded by adopting differently-defined and separate quantitative limits on the number of FAD buoys that a single purse seine vessel can monitor in the ocean at any one time. These limits were adopted without significant analysis or clearly articulated objectives that can be used to judge whether the limits are meeting the goals set for them by the RFMOs.

Materials and Methods

Despite the insufficient amount of data reported on FAD activity to the t-RFMOs, we reviewed several studies that have attempted to estimate per vessel use of the devices in the years before and after the t-RFMOs agreed to their limitations, beginning with ICCAT in 2015, IOTC in 2016, and followed by IATTC and WCPFC in 2017. Although each of the studies contains important caveats, comparing these estimates against the limitations in **Table 1** yields important insights. We also reviewed additional references regarding the use and fate of FADs after they have been deployed.

Results and Discussion

Fonteneau et al., 2014 estimated the average Spanish purse seiner in ICCAT followed a daily average of 200 active FADs in the 2010-13 period, while Delgado et al., 2014 estimated 429 active FADs followed per year in 2013. In IOTC, many fleets, such as the French and Spanish, operate vessels of similar age and size to ICCAT, and therefore may operate similarly with respect to FAD use, though Zudaire et al., 2018 noted a decrease in FADs tracked through the Seychelles EEZ in 2017 that may be a consequence of the IOTC limit. In IATTC, very few vessels made more than 400 FAD deployments in 2016, meaning at any one time they followed fewer than 400 FADs (Hall and Roman, 2018). Lastly in WCPFC, very few to no vessels have more than 350 active FADs deployed, with the average vessel having an estimated 117 in the water at any one time, as estimated by Escalle et al., 2018.

Therefore, the t-RFMO per vessel FAD limitations are set above current activity levels and do not constrain fleet activity in certain ocean areas, a conclusion also reached by scientists at the 2017 Global FAD Science Symposium (Hampton et al., 2017). Although they may limit the activity of a handful of vessels with past histories of deploying and monitoring many hundreds of FADs, the provisions will not reduce FAD use and actually allow the average vessel to increase its FAD use.

Table 1 – RFMO measures specifying limits on the number of FADs.

RFMO	Year adopted	Most recent provision	Limit
IATTC	2017	Res. C-17-02, Para 8	Class 6 purse seiner (1,200 m^3 and greater): 450 active FADs Class 6 (< 1,200 m^3): 300 active FADs Class 4-5: 120 active FADs Class 1-3: 70 active FADs
ICCAT	2015	Rec. 16-01, Para 16	500 FADs with or without instrumented buoys active at any one time
IOTC	2016	Res. 18/08, Para 3	350 active instrumented buoys at any one time; no more than 700 acquired annually for each purse seine vessel
WCPFC	2017	CMM 2018-01, Para 23	350 FADs with activated instrumented buoys deployed at sea

Faced with scientific advice to reduce FAD deployments, the t-RFMO members have struggled to agree on how to lower the limits. Some managers have explained this inaction by citing the inability to calculate a scientifically-derived maximum number of FAD deployments/active FADs in a respective RFMO area. However, the lack of specific basin-wide scientific advice on the appropriate number of FADs is at least partly due to the lack of clearly defined management objectives stating the managers' goals with respect to FAD management (Galland, 2018). As a starting point, managers should define objectives that establish agreed-upon purposes of the limitations and measuring sticks to assess their success. Scientific analysis can then be used to identify tradeoffs between permitting a certain amount of FAD use and achieving the management objectives to help managers select the most effective limit.

Management objectives could include avoiding adverse impacts to tropical tuna populations (such as via a measurement of CPUE of purse seine operations) and limiting impacts to habitat from FADs that become marine debris. As an alternative, an objective could specify that FAD deployments not increase beyond a reference year. The limits could be adjusted to address other goals of FAD management (e.g., minimizing impacts on juvenile tunas) and consider the impact of other strategies (i.e., if FAD recovery policies were required in the region). Additional data collection would be valuable, including collection of transmissions of FAD buoys, and submissions of per vessel information that include total number of monthly deployments, average number of FAD buoys monitored per month, total number of buoys acquired yearly, and number of buoys deactivated and not recovered per month.

Limiting FAD deployments also does not have to be initiated by a purely scientific exercise. While objectives should include ecological considerations, they can be informed by socio-economic, legal and other priorities. Some coastal states, for instance, have prohibited the use of FADs in their domestic waters for purposes including protection of coral reefs. States would be within their rights to advocate that RFMO policies should mirror their domestic policies, for legal reasons, particularly when FADs deployed by other states' fleets passively drift into their EEZs.

Because the number of vessels is not capped, to be effective, an overall FAD limit must be calculated as an RFMO-wide cap, and then divided among individual states/fleets/vessels. Or FADs could be owned by the RFMO or other regional entity, with data from the buoys sent directly to scientists and managers in addition to fishing vessels. Alternatively, fleets could share a pool of allocated FADs, or allocations of FADs could be traded among entities, allowing highly reliant participants to purchase additional FAD opportunities from less dependent ones and providing an incentive for both to use fewer. Should FAD ownership still be tied to individual vessels, one strategy could be to develop limits based on the size of the vessel, keyed to a similar reduction in percentage in FAD use or a sliding scale to ensure the vessels most reliant on FAD use bear the greatest burden to mitigate its impact.

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