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TECHNICAL CONSULTATION ON THE MARKING OF FISHING GEAR

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Executive Summary of Stakeholder Views on Methods to Identify the Ownership and Track the Position of Drifting Fish Aggregating Devices used by Tuna Purse Seine Fisheries

Executive Summary

This document provides the abstract and executive summary of the FAO Fisheries Circular Stakeholder view on Methods to identify the Ownership and Track the Position of Drifting Fish Aggregating Devices used by Tuna Purse Seine Fisheries. The full report will be made available as TCMFG/2018/Inf. 3 Rev. 1

Abstract

In 2016 the Food and Agriculture Organization of the United Nations (FAO) convened an Expert Consultation on the Marking of Fishing Gear, resulting in the development of Draft Guidelines for the Application of a System on the Marking of Fishing Gear. At their 32nd Session in 2016 the Committee on Fisheries (COFI) welcomed FAO's work on abandoned, lost or otherwise discarded fishing gear, supported a Technical Consultation to continue developing the FAO Draft Guidelines and encouraged FAO to conduct pilot projects to mitigate ghost fishing, including by marking fishing gear. To implement COFI's recommendations and support the Technical Consultation, recognizing challenges with applying conventional methods for marking fishing gear to identify the ownership of drifting fish aggregating devices (dFADs) used by tuna purse seine fisheries, in 2017, FAO conducted a global survey to obtain stakeholder views on sections of the FAO Draft Guidelines on methods to mark and track the position of dFADs. dFADs improve fishing efficiency relative to other purse seine fishing strategies and make it possible to successfully fish in new areas. However, when not responsibly managed, dFADs can cause adverse effects. Use of physical and electronic methods to assign a unique identification code and track the position of dFADs can improve the monitoring and management of ecological and socio-economic effects of this fishing gear. This document contains the executive summary of an FAO Fisheries Circular on the study.

Executive Summary

Fish aggregating devices (FADs) used by tuna purse seine fisheries improve fishing efficiency relative to other purse seine fishing strategies and make it possible to fish successfully in new areas. However, when not managed responsibly, FADs can cause adverse effects. Abandoned, lost and otherwise discarded FADs cause ghost fishing, damage sensitive coastal habitats and litter coastlines. FADs with conventional entangling designs can capture turtles, sharks and other sensitive species. Recently introduced non-entangling designs, however, have reduced such incidents. The effects of the density, drift and distribution of FADs on tuna population ecology, stock dynamics and concomitant fishing efficiency are poorly understood, as are the broader community- and ecosystem-level effects. The use of physical and electronic methods to assign a unique identification code and to track the position of drifting FADs (dFADs) can improve the monitoring, understanding and management of ecological and socio-economic effects of this fishing gear.

In 2016 the Food and Agriculture Organization of the United Nations (FAO) convened an Expert Consultation on the Marking of Fishing Gear, resulting in the development of Draft Guidelines for the Application of a System on the Marking of Fishing Gear. The Draft Guidelines included recommendations on marking and tracking the position of FADs, and on defining, reporting and recovering abandoned, lost and discarded FADs. FAO has tasked a Technical Consultation on the Marking of Fishing Gear, to be convened in 2018, with the continued development of the Draft Guidelines. Having considered the recommendations of the Expert Consultation, and recognizing that gear marking can mitigate abandoned, lost and otherwise discarded fishing gear (ALDFG) and illegal, unreported and unregulated (IUU) fishing, at their 32nd Session in 2016 the Committee on Fisheries (COFI) encouraged FAO to support the implementation of the Draft Guidelines by conducting pilot projects on fishing gear marking.

Recognizing challenges with defining dFAD ownership and with applying conventional methods of marking fishing gear to identify dFAD ownership, in 2017 FAO conducted a global survey to obtain stakeholder views on the sections of the FAO Draft Guidelines on physical and electronic methods to identify the owner and track the position of dFADs used by tuna purse seine fisheries. Conducted to support both the work of the Technical Consultation and implement COFI's recommendations, the survey obtained stakeholders' views on defining dFAD ownership and defining when a dFAD or its components are abandoned, lost or discarded. The survey also compiled views on reporting and retrieval of derelict dFADs, and the use of port reception facilities for retired dFAD components. Stakeholder assessments of measures adopted by tuna regional fisheries management organizations, Parties to the Nauru Agreement (PNA) and Republic of Kiribati on dFAD marking and tracking were also collected. This report presents the results of the survey of 91 experts. Survey respondents were purse seine fishing

masters and skippers, support vessel captains, vessel owners, purse seine fishery associations, manufacturers of instrumented buoys that are attached to FADs and other floating objects used by purse seine fishers, fishing gear technologists, and fisheries management authorities.

Current practices for dFAD marking and position tracking

Satellite buoys, now attached to almost all dFADs, enable the purse seine industry to track the spatial position of dFADs. When these satellite buoys are equipped with echo-sounders, fishers obtain an estimate of the biomass of fish aggregated at individual dFADs. PNA and some scientific bodies receive parallel feeds of satellite buoy positional data, enabling them to track the spatial position of dFADs and potentially to monitor the history of companies that sequentially exchanged buoys and tracked the position of an individual dFAD. Some respondents delay their provision of satellite buoy data to avoid the possibility of leaking current dFAD positions to competitors. In addition to a physical mark included on dFADs by satellite buoy manufacturers, which enables fishery managers to identify the company that is currently tracking the attached dFAD, satellite buoy owners also add their own unique physical mark onto satellite buoys, typically by painting a code onto the buoy surface. This mark enables other vessels that encounter a dFAD to identify who owns the attached satellite buoy, reducing the incidence of exchanging buoys. The mark added by the buoy owner also enables buoys removed by other vessels to be returned to the owner. This also enables the return of buoys attached to abandoned dFADs that are found when they drift into coastal waters. Many ports have facilities where skippers turn in satellite buoys that they have removed or found, and retrieve their buoys exchanged or found by other vessels. A very small proportion of dFADs have unique physical identification marks directly on the dFAD structure, and these marks are not used by managers to monitor dFAD fishing activities.

When they encounter dFADs with attached satellite buoys belonging to other vessels, purse seine and support vessels routinely exchange satellite buoys, taking control over the dFAD from the company that had previously been tracking it. While the frequency of buoy exchanges varies by region, this practice is conducted globally. This practice may reduce the abandonment of dFADs: If there were no buoy exchanging, then a larger proportion of dFADs would drift out of range and be abandoned.

Mainly synthetic materials are used to construct dFADs. A majority of respondents' dFADs in the western and central Pacific Ocean have conventional designs, with open netting used for the subsurface appendage and to cover the surface structure. These conventionally designed dFADs risk entangling marine animals, including endangered, threatened and protected species, such as species of sharks and sea turtles. Most dFADs used by respondents in other regions, however, have non-entangling (no netting) or less-entangling (appendage netting tied into sausage-like bundles and/or with small meshes) designs that have a lower entanglement risk. While there is variability by region and vessel capacity, respondents indicated that each purse seine vessel has a mean of 343 dFADs with attached satellite buoys at sea at one time, and actively monitors about 10 percent of these dFADs, which are located in nearby fishing grounds. Respondents reported that they lose about 21 percent of their satellite buoys due to buoy exchanges, and to a lesser extent, buoy malfunctions.

Desired improvements to identify the company controlling a dFAD

Almost all survey participants considered current satellite buoy technology and methods for physically marking satellite buoys to be effective, affordable and practical techniques for identifying the company that is currently tracking a dFAD and for tracking the position of dFADs. Respondents, however, identified some desired improvements in technology. Respondents indicated that it would be useful to be able to predict the trajectory of dFADs so that they could be intercepted before grounding on sensitive habitat and drifting out of fishing grounds. Use of navigable dFADs, propelled either autonomously or remotely, could reduce the proportion of dFADs that are abandoned and that run aground. Improving the durability of physical marks added by owners to satellite buoy, used to identify the owner, and enabling owners to add marks without obstructing buoys' solar panels were two additional desired improvements identified by survey respondents.

Considerations for physically marking dFAD structures

Respondents suggested that the following issues be addressed when considering a requirement to have a physical mark directly on the structure of dFAD rafts or appendages:

- a mark on the dFAD structure would identify the company that originally deployed the dFAD but not companies that subsequently took over control of the dFAD by exchanging the attached satellite buoy;
- the physical mark would need to be sufficiently durable to last for the life of a dFAD;
- marks on biodegradable dFADs may have lower durability than marks on dFADs made of conventional synthetic materials;
- in regions with per-vessel caps on the number of dFADs or satellite buoys, vessels may falsely mark dFADs to indicate they are owned by a competitor;
- vessels exchanging buoys on a dFAD may remove or modify the physical mark on the dFAD structure;
- the fishing industry would not want to use a mark that would increase the visibility of a dFAD to competitors searching from vessels or helicopters;
- purse seine vessels need to be in close proximity to a dFAD in order to enable observers and electronic monitoring systems to read physical marks on the dFAD structure (as well as physical marks on satellite buoys);
- when dFADs change hands, they are often modified by refurbishing and replacing components, which could result in the removal of a physical mark.

Defining dFAD ownership

Almost all respondents stated that the owner of a dFAD and responsibility for any damage caused by a dFAD should be the company that owns the satellite buoy that is currently attached to the dFAD. If a satellite buoy is not attached, then the company that last had their satellite buoy attached, if this can be determined, should be considered the dFAD's owner. Defining dFAD ownership is complicated because the fishing company tracking the position of dFADs may change numerous times over a dFAD's lifetime, and because fishers refurbish and add new components to dFADs so that over time, many of the materials of the original dFAD may no longer be present.

Defining and reporting abandoned, lost and discarded dFADs

A proportion of dFADs deployed each year by purse seine and support vessels are abandoned when the dFAD drifts out of fishing grounds, including into areas where a vessel does not have access and into areas with piracy. The high at-sea operating cost for purse seine vessels makes it cost-prohibitive to retrieve distant dFADs. Some respondents explained that when a dFAD that they are tracking drifts far from their fishing grounds, they monitor the buoy location and try to identify another vessel that can exchange buoys on the dFAD so that the vessel can return their satellite buoy. When a dFAD drifts out of their fishing grounds, some respondents direct their satellite buoy service provider to unsubscribe (stop the transmission of) the buoy attached to that dFAD, resulting in the dFAD being abandoned.

In addition to losing dFADs when another vessel removes an attached satellite buoy, respondents explained that, although infrequently, they genuinely lose dFADs. This includes losing dFADs when a satellite buoy permanently malfunctions, when a satellite buoy detaches from the dFAD due to mechanical action, and when a dFAD and attached satellite buoy sink.

Respondents explained that dFADs and components are very rarely discarded at sea. Fishers routinely refurbish dFADs, reusing old, worn-out components of the appendage and raft. A very small proportion of worn-out dFAD components cannot be reused. Some vessels modify dFADs by replacing unwanted components that have entangling designs with less- or non-entangling designs. Most respondents retain unwanted synthetic materials from dFADs that cannot be reused. They either incinerate the unwanted synthetic components onboard or dispose of it in port. However, some respondents reported that worn-out dFAD gear is also discarded at sea. When vessels exchange

satellite buoys, fishers may let the old satellite buoy drift away after detaching it from the dFAD, or may destroy the old satellite buoy and discard the debris at sea. The most common practice, however, is to retain the old buoy and return it to port so that it can be retrieved by the owner. When they replace worn-out biodegradable components of the dFAD raft, including reeds and bamboo, fishers discard these old components at sea.

Onboard observers are tasked with recording satellite buoy exchanges. However, observers are not always able to record the identification number of the old buoy removed from a dFAD. Observers are not able to detect all buoy exchanges, such as those conducted by helicopters and support vessels. In some regions, observers are also currently tasked with recording incidents when fishers discard garbage, including fishing gear, at sea. However, observers likely do not detect some discard incidents, such as when discarding occurs at night, when the observer is on the well deck, or when the observer is asleep.

Given the large number of dFADs that each vessel tracks, loses and abandons, some respondents suggested that having fishers periodically report to management authorities their loss and abandonment of dFADs, such as at monthly intervals, would make such a reporting requirement more feasible. The selection of a maximum time period for reporting lost dFADs to management authorities should also account for issues such as that satellite buoys can temporarily cease but then resume transmissions after a few days, and that determining that a satellite buoy has been removed from a dFAD can require a substantially longer time period.

Retrieving derelict dFADs at sea

There are substantial challenges with establishing programmes to retrieve derelict dFADs that are adrift at sea. The largest challenge identified is that the cost to the purse seine sector of abandoning dFADs and replacing them with new ones is much lower than the cost of retrieving dFADs that drift out of range, especially if purse seine vessels conduct the retrieving. The expense for fuel and availability of vessels to retrieve dFADs over extensive areas would be the main costs for dFAD retrieval. The logistics of tracking the position of a large number of primarily abandoned dFADs over broad areas, including areas where purse seine and support vessels are prohibited from entering, was another commonly referenced constraint. Respondents also raised the question of whether the environmental impacts from fuel required to be consumed to retrieve derelict dFADs would exceed the environmental costs of leaving derelict dFADs at sea. It is not possible to track a dFADs position, which is necessary to retrieve it, when a dFAD is truly lost, including when a satellite buoy permanently malfunctions, becomes detached from the dFAD, or is switched off, and when a dFAD sinks or breaks down into multiple pieces. Clear definitions would need to be adopted to enable dFAD retrieval programmes to differentiate between active, in-use and derelict dFADs, and to identify dFADs at risk of grounding.

Conversely, some survey respondents commented that it is feasible to establish site-specific programmes that monitor dFAD satellite buoy data to determine when dFADs approach specific, sensitive sites so that the dFADs could be intercepted by locally-based vessels before running aground. Respondents referenced an existing dFAD retrieval programme in the Seychelles as evidence that this is feasible. Some respondents clarified that it would likely be feasible to retrieve derelict dFADs in some ‘hot spot’ areas where dFADs accumulate in relatively high densities during certain seasons. Furthermore, on the open ocean some respondents explained that ‘sister’ vessels from the same company routinely communicate the positions of the dFADs that they are tracking and have drifted out of their fishing grounds so that sister vessels may be able to take over control of these dFADs, reducing the incidence of abandonment. Based on the efficacy of this current practice, some respondents commented that it may also be feasible to coordinate all purse seine and support vessels of a region to avoid and minimize dFAD abandonment. Issues over maintaining the confidentiality of data on dFAD positions, however, would need to be addressed. Some respondents commented that it is technically feasible for the purse seine sector to stop the practice of abandoning dFADs and instead retrieve them, and that these companies should adjust their annual operating budget to cover the costs to retrieve their fishing gear, which may require reducing the number of dFADs that they currently deploy. Other respondents

suggested that management authorities should charge purse seine operators a per-dFAD fee to cover the costs incurred by managers to track and retrieve all dFADs deployed by vessels that they authorize to fish.

Disposal of unwanted dFADs

Almost all respondents explained that they very infrequently dispose of synthetic dFAD components, either at sea or in port, but instead reuse them to refurbish dFADs. Furthermore, the reasons that fishers decide to abandon dFADs do not include issues with port disposal (availability, cost, practicality). Therefore, most respondents commented that incentivizing disposal of unwanted dFADs and components in port instead of discarding and abandoning at sea is not needed. However, a few respondents conversely stated that low or no-cost port disposal facilities that are practical to use might possibly increase the likelihood of vessels disposing unwanted dFAD components in port instead of discarding them at sea. A few respondents suggested that having facilities in port that assist vessels to refurbish and reuse worn-out components of dFADs would be useful.

Potential technological and management improvements

Respondents recommended investing in technology research to develop self-navigable or remotely navigable dFADs to reduce or eliminate the current causes of abandonment and risk of grounding. Respondents suggested that developing the technology to enable observers to remotely detect, from a distance of several hundred metres, the unique electronic identification number of satellite buoys would eliminate observer reliance on crew to obtain the identification of buoys being removed from dFADs. Research to develop the technology to remotely sink biodegradable dFADs that are at risk of grounding on sensitive coastal habitat was another recommended research priority. Respondents also recommended research to enable satellite buoys to detect and transmit the unique identity of an attached electronically tagged dFAD as a potential means to track the history of fishing companies successively exchanging satellite buoys on individual dFADs.

Respondents also identified potential improvements in dFAD management methods. Some respondents recommended developing additional site-specific programmes to retrieve dFADs at risk of grounding on sensitive coastal habitat, and developing regional programmes that coordinate the retrieval of dFADs that are drifting out of fishing grounds and are at risk of being abandoned. If reporting satellite buoy spatial positions to managers were prescribed, then industry concerns over maintaining the confidentiality of data on the current and recent positions of their dFADs require consideration. These concerns could be addressed, for example, by allowing a delay in reporting buoy data and using best practices to manage time-sensitive confidential fisheries data. Having management authorities own dFADs and satellite buoys and lease them to the purse seine companies that they license to fish was identified as a potential approach being considered by one sub-regional management authority in order to improve government control of dFAD designs, densities, numbers, buoy exchanging practices, and dFAD abandonment, loss and discarding.

Comments on the FAO Draft Guidelines

Based on survey responses, considerations to improve the sections on dFADs in the FAO Draft Guidelines were presented. Regarding the guidelines' recommendations on marking dFADs, applying conventional methods for marking fishing gear to identify ownership to dFADs is complicated by the prevalent practices of exchanging satellite buoys attached to, and the concomitant control over, dFADs, and as well as the frequent refurbishing and replacing of dFAD components at sea. Considerations related to the guidelines' recommendations on tracking the position of dFADs included industry concerns over maintaining the confidentiality of data on the current and recent spatial positions of their dFADs when there is near real-time reporting of satellite buoy data to management authorities. Considerations related to the guidelines' recommendations on defining, reporting and retrieving abandoned, lost and discarded dFADs included issues related to defining dFAD ownership, complications in determining when dFADs are lost due to satellite buoy exchanging, and difficulties with differentiating between in-use active vs. derelict dFADs. Gaps in the guidelines on issues related

to marking and tracking dFADs and on priority research to assign a unique identification code to dFADs and track dFAD spatial location were also identified.

Conclusions

Applying conventional methods of marking fishing gear to identify ownership to dFADs used by tuna purse seine fisheries is complicated by the prevalent practices of exchanging satellite buoys and the concomitant control over dFADs and refurbishing dFAD components at sea. Despite the complexity of defining dFAD ownership, however, existing practical and affordable technology can effectively assign a physical or electronic unique identification code to a dFAD and enable the tracking of its position to meet various management objectives. The use of satellite buoys by the purse seine industry to track the real-time spatial position of dFADs, the increasing use of non- and less-entangling dFAD designs, and the possible future industry uptake of biodegradable dFAD designs would help minimize adverse effects of abandoned, lost and otherwise discarded dFADs. Recent dFAD management measures in some regions, including requiring dFAD marking and near real-time reporting of satellite buoy positional data to management authorities, have strengthened management authorities' capacity to identify the history of companies sequentially tracking the position of this fishing gear. Various potential technological improvements, combined with opportunities for strengthened management, would augment the capacity to: track the history of dFAD control; further avoid and reduce dFAD abandonment, loss and discarding; and mitigate the adverse ecological effects of derelict dFADs.

Provisional contents of the report Stakeholder Views on Methods to Identify the Ownership and Track the Position of Drifting Fish Aggregating Devices used by Tuna Purse Seine Fisheries with Reference to the FAO *Draft Guidelines on the Marking of Fishing Gear*