SOME ASPECTS OF THE FAD FISHERY IN THE INDIAN OCEAN FROM OBSERVERS DATA ANALYSIS

Mina X.[1], J. Ariz[2], R. Prellezo[1], A. Delgado de Molina[2], I. Artetxe[1], P. Pallarés[3] and H. Arrizabalaga[1]

ABSTRACT

Observers data on purse seiners and auxiliary boats from the period November 1998 – January 1999 was used to see the characteristics of FAD inputs and turnover performed by the fleet. FAD input was assessed from the number of FADs seeded and the number of floating objects found that were marked with a buoy. 22 vessels released a total of 380 FADs into the ocean during the study period (266 self constructed and 114 floating objects found at sea that were marked with a buoy). Considering FAD turnover, these 22 vessels found a total of 191 not owned FADs that were remarked with their own buoys These results should be interpreted with caution, because data collection was not specifically designed for this study. For this reason, we think that these estimates may be underestimating the real number of FAD inputs and turnover. We do not know whether the abnormal behaviour because of the moratorium made the fleet seed more or less FADs than in normal conditions.

[1] AZTI. Txatxarramendi Ugartea z/g. 48395 SUKARRIETA (Bizkaia). Spain
[2] Instituto Español de Oceanografia. PO Box 1373. S/C Tenerife. Spain
[3] Instituto Español de Oceanografia. Corazon de Maria, 8. 28002, Madrid. Spain

INTRODUCTION

The use of FADs in the purse seine fishery has increased significantly in recent years, and it is not well known how this may be affecting the ecosystem. Moreover, the activity of the fleet around FADs is not documented at all. For instance, the number of FADs used by the purse seine fleet is not known precisely, even if it is accepted that it may be an important parameter to know.

A very simplified model of what the dynamics of FADs would be in the ocean may be summarized as follows: If we consider as FAD every floating object with a buoy that makes it detectable to the vessel, **FAD inputs** to the ocean would come both from FAD seeding operations and from marking natural logs found at sea with a buoy. On the other hand, **FAD outputs** would be due to sinking, stranding, breaking… of the FAD. In the mean time (during their life time), FADs are subject to several processes. For instance, a common process is the remarking of the buoy, this happening when a vessel finds someone else's FAD and changes it's the buoy so that from that moment it is detected by it. Although we may think that this process is not relevant thinking in terms of the effect of FADs in the ecosystems, it may contribute in the way that the FAD may be onboard the new vessel for a certain period of time before it is reseeded. This would reduce the effective life period of the FAD at sea, and this also happens with one's own FADs when it is considered that they are not attracting fish efficiently and it is decided to move them somewhere else. In addition to this, malfunctioning of the buoys, displacement to far areas, etc. may reduce the use the fleet makes of the FADs. Technology also plays a very important role on this, since FADs with RDF (Radio Direction Finder) may not be as well detected as the ones with GPS system, and FADs incorporating echosounders may present a very different pattern in the frequency they are visited by purse seiners.

Addressing the question of FAD dynamics in the purse seine fishery and their effect on the pelagic ecosystem in an efficient manner is really difficult, moreover taking into account the rapid changes that are occurring in the fishery (buoy technology for instance) and the difficulties to get good data.

In that sense, the aim of this paper is only to provide some information collected by observers during November 1998 – January 1999 that we think is interesting in order to have first very rough estimates of some parameters related with FAD inputs to the ocean. In addition to this, some characteristics of the species composition that were aggregated under the different types of FADs are described.

Data used was collected during a FAD moratorium period, although it was considered that the moratorium period was not placed in the best FAD fishing period. This may have changed the behaviour of the fleet in some way, and so, although almost 100% of the Spanish purse seine fleet was covered with observers simultaneously, it is considered that the results obtained in this paper should not be extrapolated in any way to the whole fishery.

MATERIAL AND METHODS

Data collection by observers onboard 30 purse seiners and 10 auxiliary boats is described in (Arrizabalaga and Artetxe 2000).

Information of 23 vessels (20 purse seiners and 3 auxiliary boats) was used to calculate the amount of FAD seeding operations done in the study area during the study period. The reason why the rest of the vessels ware not used is the following: FAD seeding activities are recorded under the activity named "FAD seeding or modifying", but this activity is not exclusively for seeding operations, and other activities with FADs that are already seeded (such as changing the buoy to the FAD) are also considered under the same activity code. In this situation, it is necessary to read the notes of the observer to know exactly if the vessel is FAD seeding, and this kind of notes were taken regularly by 23 out of 40 observers. When FAD seeding is done during the night it will not be well reflected in the data, as data collection was designed for daily activities.

A description of the spatial distribution of the fishing operations on FADs with and without buoys is done according to the information of 30 purse seiners. There is a total of 46 fishing operations on FADs without buoys, these being natural (brances, trees…) or artificial (bamboo grids, cans…) floating objects. Among the 396 fishing operations on FADs with buoys, 120 were on GPS FADs and the rest were on RDF FADs.

The species composition of the catches on FADs without buoys, FADs with RDF buoys and FADs with GPS buoys was calculated to see if there was any significant difference between them. Species composition (skipper estimates are corrected by observers' sampling) is based on information of 22 purse seiners. The rest were not considered in the analysis as catches had not been randomly sampled.

RESULTS AND DISCUSSION

Figures 1 and 2 show the spatial distribution of fishing operations on FADs with and without buoys, respectively. As stated in the previous section, the number of operations on FADs with buoys is much higher, although the spatial distribution pattern is similar. According to this and the higher incidence of FADs with buoys on the behavior of the fleet, fishing on FADs without buoys may be considered as a more casual activity that occurs while the fleet works on FADs with buoys or free schools.

Another important consideration is that by the end of 1998, RDF FADs were more used by the fleet than GPS FADs. It would be interesting to test how spread are the new buoy technologies nowadays.

Figure 3 represents the histogram of the time period between two successive FAD seeding operations, considering a FAD seeding operation any FAD (with buoy) release into the water (release of garbage with no clear fish aggregating purpose is not considered). Most of the seeding operations observed were separated a few (less than 10) days from the previous one, and the majority of the operations had had another operation the day before. This should be interpreted with caution, as sometimes the seeding operation may last several hours and finish the following day, which may be interpreted by the observer as two separate operations in consecutive days. In addition to this, the 2 month observation period did not allow to observe operations that were separated a lot of days in between. There is only one auxiliary boat that repeated consecutive fishing operations with 55 days in between them.

The number of FADs seeded in each seeding operation is reflected in figure 4, and shows that the more frequent operations are for seeding a small amount of FADs (1 to 5). It was observed that some purse seiners did repetitive seedings of sets of 5 FADs separated a few days one each other. On the other hand, there are some observations in which up to 21 FADs were seeded one after the other in the same seeding operation.

The seeding operations described up to now are mainly referred to FADs built with bamboo grids, and the total number observed was 266 (from 22 vessels). In addition to this, the input of FADs to the ocean is enriched by floating objects (without FADs) that are found at sea and marked with a buoy. The total number of these operations was of 114 in 1240 days at sea, giving an average rate of encounter of 0.09 floating objects per day. So, the total input of FADs to the ocean observed for the 22 vessels during the period studies was of 380 FADs.

As explained in the introduction, the FADs that are already seeded may suffer many changes of buoys, as every time a vessel finds some others FAD, it puts its own buoy. During the study period, this operation was observed 191 times, giving an average encounter rate of “others” FADs of 0.15 FADs per day in the same time period. This may suggest that the population of FADs may be much higher than the population of floating objects without buoys in the area of study, but for this to be true, both FADs and logs without buoy should have the same probability of encounter, and this may not be true as logs are not detected in the radar (and probably with binoculars) as well as buoys are.

Figure 5 show the species composition of the catches on FADs without buoys (n=39), GPS FADs (n=70) and RDF FADs (n=244), showing that yellowfin is better represented in the formers, with no big differences between GPS and RDF FADs. In spite of the difference observed for yellowfin in the first case, this information should be interpreted with caution as there are much more variables, other than the presence and type of a buoy in the FAD, that could affect the species composition.

CONCLUSIONS:

During the study period, the total FAD input to the ocean by 22 vessels was of 380 FADs in 1240 days at sea, and 191 FADs suffered changes of buoys. The experiment was not designed explicitly to address questions on FAD input and turnover in the ocean, so we think that the total FAD number seeded estimated may be under reflecting the real FAD number seeded. We do not know whether the fleet tended to seed more or less FADs because of the abnormal behaviour during the moratorium period, so these estimates should be interpreted with caution.

A proper experimental design for data collection to address questions related with FAD input and turnover should take into account 24 hours sampling, long continuous observation periods as well as type of vessel, time and area variability in seeding practices. Studies on FAD outputs would allow to have a better estimate of alive FADs in the ocean.

Information from buoy supplier companies would also be a good source of information for this kind of studies.

REFERENCES:

ARRIZABALAGA, H. AND I. ARTETXE (2000). Preliminary analysis of observers data available from the 1998-1999 moratorium in the Indian ocean. Working Party on Tropical Tunas, Seychelles.

FISHING OPERATIONS ON FADs WITH BUOYS

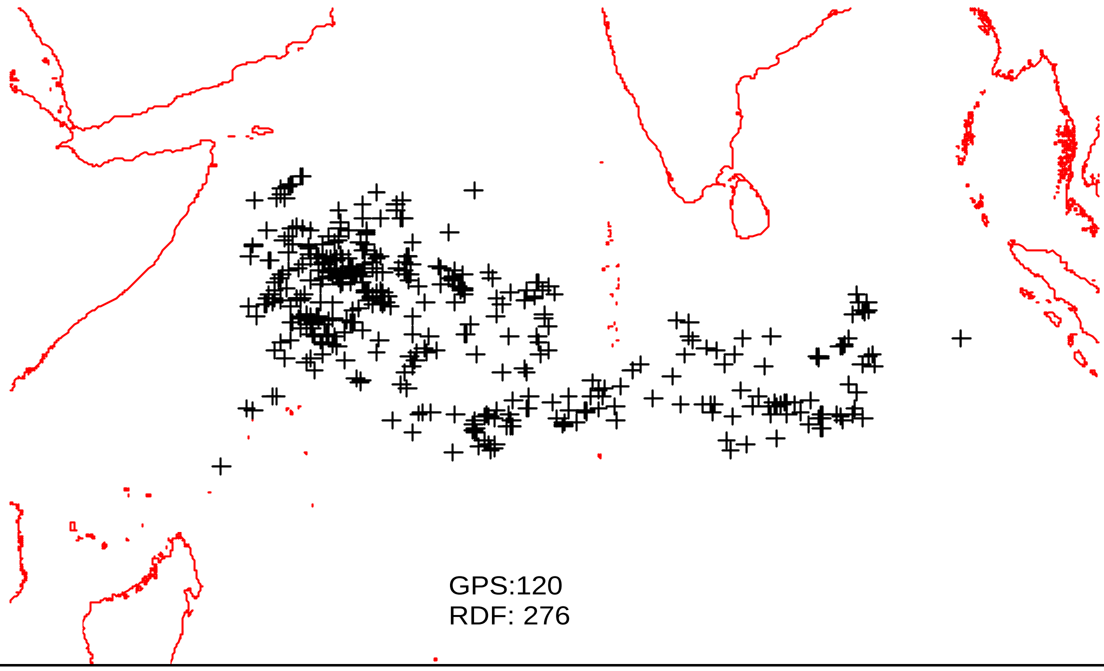

Figure 1. Spatial distribution of fishing operations on FADs with buoys.

FISHING OPERATIONS ON FADs WITHOUT BUOYS

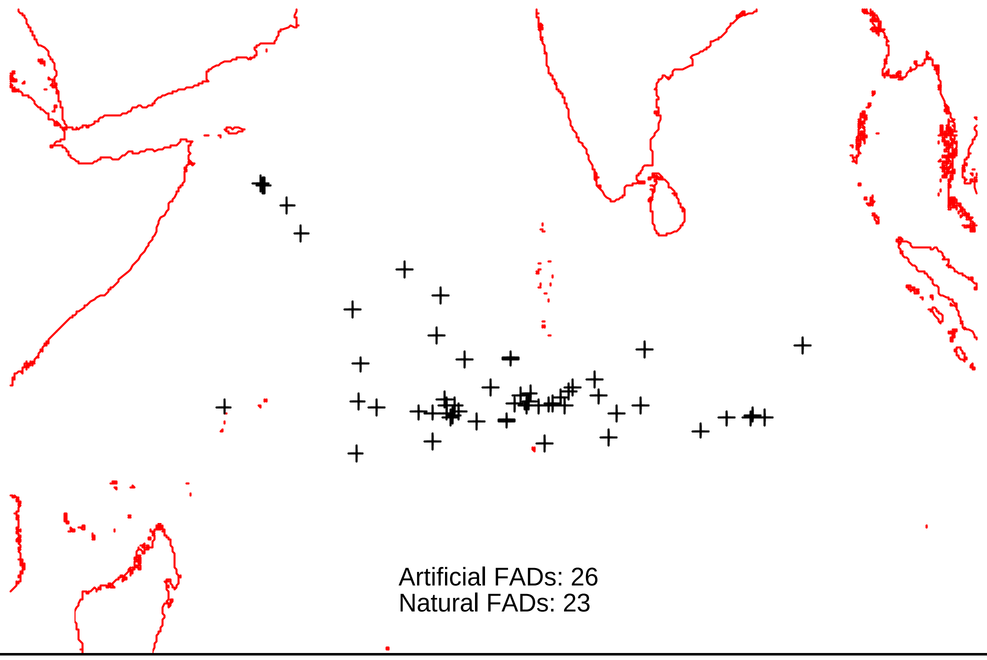

Figure 2. Spatial distribution of fishing operations on FADs without buoys.

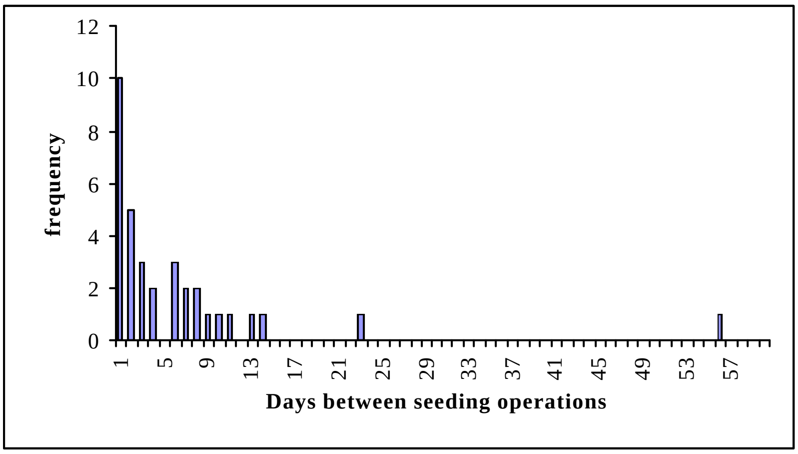

Figure 3. Time period between two successive FAD seeding operation.

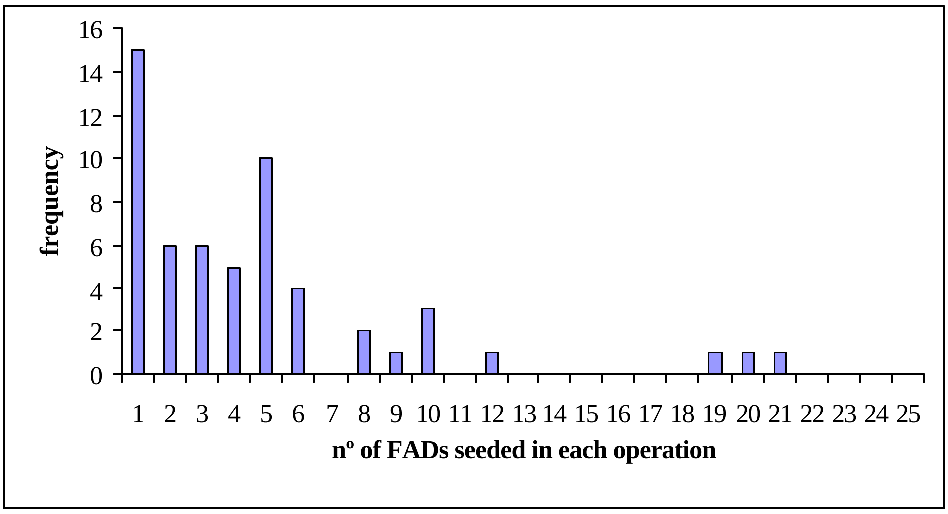

Figure 4. Number of FADs seeded in each seeding operation.

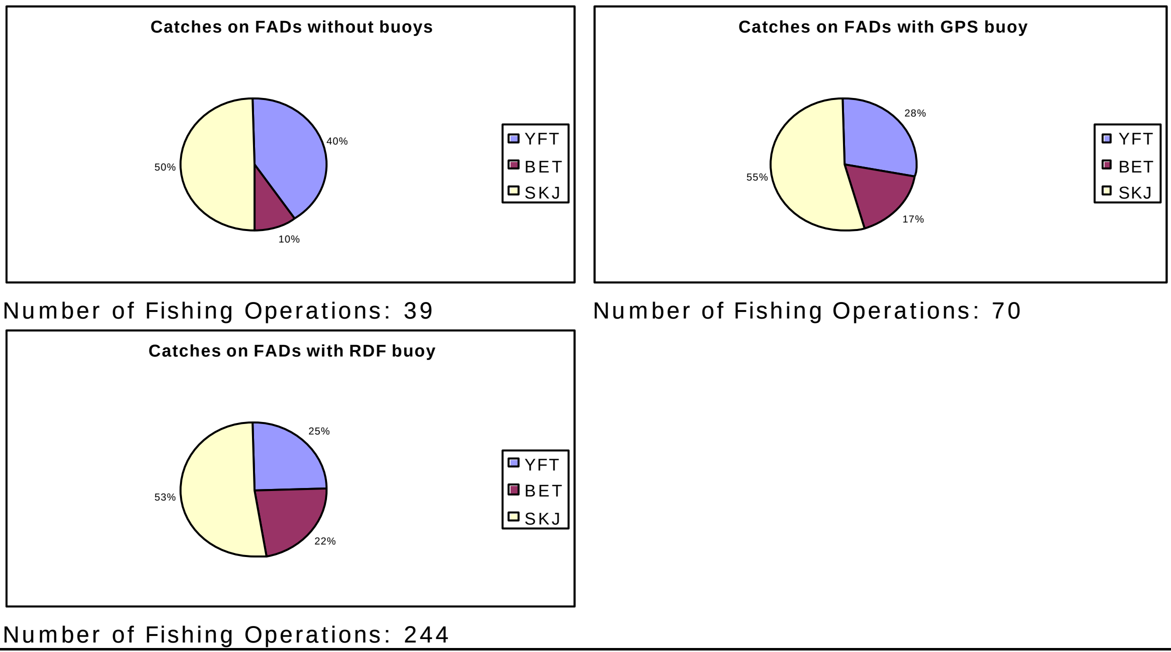

Figure 5. Species composition of the catches on FADs without buoys, GPS FADs and RDF FADs.