**Supplementary Material S2:** Details on GPS buoy strategies of deployment

*Seasons of GPS buoy deployment*

The stability of the patterns in GPS buoy deployment was explored by varying the scale of the analysis (1°, 2° and 5°), using mean monthly density maps of GPS buoy deployment for the French fleet over 2007-2013. In the Atlantic and the Indian Oceans, deployment patterns were generally stable, whatever the resolution of the analysis, except in the Atlantic Ocean at the scale of 5° were the seasons October-December and January-February were grouped into a unique season (Figs. S2.1-S2.2).

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**Fig. S2.1.** *Seasons of GPS buoy deployment in the Atlantic Ocean (2007-2013) at the scale of 1°, 2° and 5°. Green rectangles indicate that seasons are similar to those detected at the scale of 1°, red rectangles indicate that seasons are different from those detected at the scale of 1°.*

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**Fig. S2.2 S***easons of GPS buoy deployment in the Atlantic Ocean (2007-2013) at the scale of 1°, 2° and 5°. Green rectangles indicate that seasons are similar to those detected at the scale of 1°, red rectangles indicate that seasons are different from those detected at the scale of 1°.*

Interannual variability in the deployment was assessed by performing the cluster analysis separately for each year of 2007-2013. In the Atlantic Ocean, the seasonality was not stable from year to year. There are at least two possible explanations for these results. First, there may be a high variability from year to year in the Atlantic Ocean. Second, the fishery may have occupied the same “FOB activity grounds” at different times each year. The clustering method may be sensitive to this reduced or variable spatial extent. The season *October-December* was almost never detected except in 2008 and 2009 were the month of November and December were grouped together. It was also the case for the season *January-February* except in 2008 and 2009. At the beginning of the period, the season *March-May* was generally split into a season *March-April* (in 2007 and 2008) while a season *April-May* was detected in 2009 and 2012 or *April-June* in 2013, indicating a possible shift in the beginning of the season off Senegal. September was generally not grouped with the months June-August, though a season *June-September* had been detected using all years of 2007-2013, but was grouped with October from 2010 to 2013, suggesting that this month was a period of transition between different FOB fishing grounds.

In the Indian Ocean, seasons of deployment were relatively more stable from year to year than in the Atlantic Ocean. Except in 2011, all seasons *March-May*, *June-July*, *August-October* and *November-February* were detected, at least partially. In this ocean, the variability seems more related to the beginning of a given season, that can occur earlier or later depending on the year. For example, the month of May was sometimes grouped with the months June-July (in 2007 and 2008) and sometimes part of the group March-May (in 2009, 2010, 2012 and 2013).

*Seasons of fishing on FOBs*

Using logbook data, a FOB fishing season was defined as a group of successive months with similar relative fishing set densities in the same zones. Twofold Pearson correlations between monthly maps were used in a cluster analysis to determine FOB fishing seasons. A similar approach was used on densities of GPS buoy deployments, resulting in similar zones and seasons, showing that FOB deployment and FOB fishing activities are correlated in time and space (Figs. S2.3-S2.4). Correlation between the two types of activities tended to be highly significant. There was generally a stron­ger correlation between FOB deployment and FOB fishing in the Indian Ocean than in the Atlantic Ocean. In the Atlantic Ocean, the correlation was lower during the season January-February and higher from October to December. In the Indian Ocean, the correlation was lower from June to July when purse seiners anticipate the northward drift of FOBs deployed off Tanzania and Kenya to use them later of Somalia.

**Table S2.1:** *Correlation coefficients between FOB deployment and FOB fishing activity by season and ocean*

|  |  |  |  |
| --- | --- | --- | --- |
| Temporal scale | Atlantic Ocean | Temporal scale | Indian Ocean |
| Year | 0.69 (P <0.001) | Year | 0.85 (P < 0.001) |
| Jan-Feb | 0.58 (P < 0.001)   |  | | --- | |  | | Mar-May | 0.89 (P < 0.001)   |  | | --- | |  | |
| Mar-May | 0.70 (P <0.001) | June-July | 0.72 (P < 0.001) |
| Jun-Sep | 0.67 (P <0.001) | August-October | 0.86 (P < 0.001) |
| Oct – Nov | 0.71 (P < 0.001) | November- December | 0.83 (P < 0.001) |

*D:\Thèse\2_FAD_modalities_of_use\2.Fishers_behavior_with_FADs\ICES_paper\smoothed_fishing_AO.tif***Fig. S2.3.***French seasons of fishing on dFADs and logs in the Atlantic Ocean.*

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**Fig. S2.4** *French seasons of fishing on dFADs and logs in the Indian Ocean.*

*Seasonal use of currents*

In the Atlantic Ocean, although seasonal variations can be observed, drift patterns are mainly dominated by two systems. Above the equator and east of 20°W, an eastward system, corresponding to the area of influence of the eastward North Equatorial Counter Current (NECC; Ariz *et al.*, 1999; Philander, 2001), transport FOB inwards the Gulf of Guinea with a maximal mean speed of 0.31 m.s-1 from June to September. Two eastward systems, corresponding to the area of influence of the North Equatorial and the South Equatorial Currents (NEC and SEC), transport FOBs away from fishing grounds and should avoided during dFADs and GPS buoy deployment activities. These intense westwards patterns of drift reach a mean speed of 0.27 m.s-1 from March to May, when they intensify and cover a larger zone south of the Equator and east of 10°W (Fig. S2.5).

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**Fig. S2.5** *Average speed vectors of French FOBs in the Atlantic Ocean (2007-2013)*

In the Indian Ocean, during the transition from the North West Winter and South East summer monsoon circulation systems (Hallier *et al.*, 1992), dFAD and GPS buoy deployments mainly occur in the Mozambique Channel area. At the scale of 5 degrees, two patterns of westward drift are visible transporting FOBs towards the North in an area of influence of the South Equatorial Current (SEC) and towards the South in an area of influence of the Agulhas current Eddies, that form in the North of the Mozambique Channel (Sætre and Da Silva, 1984). and are used by fishers to maintain FOBs as long as possible in productive areas where they can rapidly attract fish, are only visible at a lower scale of one degree. During the next season, fishers seem to target East African Counter (EACC) and Somali (SC) currents that become more active along the coast of Africa (Sætre and Da Silva, 1984; Shankar *et al.*, 2002) for a northward drift of FOBs. These systems transport FOBs from the West of the Seychelles, to eastern coasts of Tanzania, Kenya and finally off Somalia where the South Gyre around 4°N and the Great Whirl around 10°N form (Schott and McCreary Jr., 2001). From June to July and August to October, FOBs reach the cold waters of the upwelling of Somalia and maintained in this enriched area using the gyres to increase the probability of presence of fish under the objects. As the winter monsoon begins, strong eastward patterns of drift of 0.5 m.s-1 appear during the season August to September and extend during the next season. Fishers consider that this drift pattern, corresponding to the eastward South Eastern Counter Currents (SEC, Schott and McCreary Jr., 2001), can be responsible for a loss of up to 50% of their GPS buoy-equipped FOBs, as they reach the East of the Maldives-Chagos area, that is too far from fishing grounds to be visited (Fig. S2.6).

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**Fig. S2.6 A***verage speed vectors of French FOBs in the Indian Ocean (2007-2013)*

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