**Supplementary Material S1:** Details on GPS buoy tracking data and observer data

**Calculating the coverage of French GPS buoy tracking data**

Three French fishing companies operated in the Atlantic and Indian Oceans over 2007-2013. Over time, the coverage of their fishing vessels increased to reach 100% on a yearly basis in 2010. Indeed, during several periods, no data was available for 2 of the 3 fishing companies. However, at a finer time scale, due to storage and exporting issue, data are missing for 2 of the 3 fishing companies for periods of a few days to a few months. During these periods, we calculated a vessel coverage as the ratio between French fishing vessels belonging to the companies having provided data and the total number of French fishing vessels.

Besides, for the last fishing company, in the Indian Ocean, only a fraction of the total number of GPS buoys was provided for 2007 and for the beginning of 2008 but the corresponding coverage was unknown. To solve this problem, fishing company 1 indicated that 100 buoys were in use per vessel in the Indian Ocean at that time. Using data available for this company over 2009-2013, we evaluated the expected number of GPS buoys for fishing company 1 as the mean ratio between buoys used each month and buoys used on a yearly basis. Combining this information with the number of purse seiners of company 1, we assumed that the coverage of this company was the ratio between provided buoys and expected buoys.

Coverage of French fishing vessels and fishing company 1 GPS buoys were combined to provide a final coverage of all French GPS buoys each month of 2007-2013 (Figure S1.1).

F:\Thèse\2_FAD_modalities_of_use\Writing\Figures\coverage_rate.tif

**Figure S1.1:** *coverage rate of French GPS buoys tracks (coverage French vessels x coverage fishing company 1)*

**Coverage of French and Spanish observer data**

Observer data were collected by French and Spanish institutes over 2007-2013 (Chassot *et al.*, 2014; Chavance *et al.*, 2012; Delgado de Molina *et al.*, 2014.). They covered varying fraction of fishing trips, with a fraction of fishing trips being generally larger in the Atlantic Ocean than in the Indian Ocean, primarily due to piracy off Somalia (for security reasons, less observers were onboard Indian Ocean purse seiners since 2010).

**Table S1.1:** *quarterly coverage (%) of French trips by onboard observers. AO: Atlantic Ocean, IO: Indian Ocean*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | **Jan-Mar**  **AO - IO** | **Apr-Jun**  **AO - IO** | **Jul-Sep**  **AO - IO** | **Oct-Dec**  **AO - IO** |
| 2007 | |  | | --- | | 10 ; 5.1 | | 0 ; 10.3 | 18.2 ; 10.3 | 0 ; 9.8 |
| 2008 | |  | | --- | | 10 ; 6.4 | | 16.7 ; 7.7 | 10 ; 11.6 | 7.7 ; 7.1 |
| 2009 | |  | | --- | | 7.7 ; 7.5 | | 0 ; 6.5 | 4.8 ; 3 | 17.6 ; 0 |
| 2010 | 11.8 ; 3.6 | 13.7 ; 0 | 15.8 ; 0 | 11.1 ; 0 |
| 2011 | |  | | --- | | 14.3 ; 3.3 | | 13.7 ; 20 | 9.1 ; 7.1 | 0 ; 5.3 |
| 2012 | |  | | --- | | 20 ; 6.9 | | 9.5 ; 20 | 8.3 ; 7.4 | 5.6 ; 15.2 |
| 2013 | |  | | --- | | 44.4 ; 12.1 | | 8.3 ; 20.7 | 22.9 ; 7.7 | 8.3 ; 14.7 |

**Table S1.2:***quarterly coverage (%) of Spanish trips by onboard observers in the Indian Ocean*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | **Jan-Mar** | **Apr-Jun** | **Jul-Sep** | **Oct-Dec** |
| 2007 | 0.0 | 9.8 | 15.2 | 14.0 |
| 2008 | 5.0 | 7.0 | 10.0 | 12.2 |
| 2009 | 4.8 | 2.9 | 3.0 | 0.0 |
| 2010 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2011 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2012 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2013 | 0.0 | 0.0 | 0.0 | 0.0 |

**References**

Chassot, E., Floch, L., Amandè, J., Cauquil, P., Rahombanjanahary, D. M., and Chavance, P. 2014. Fishing activities of the French and associated flags purse seiners targeting tropical tunas in the Indian Ocean (1981-2013). IOTC-2014-WPTT16-12, IOTC, Victoria, Seychelles, 47p

Chavance, P., Damiano, A., Cauquil, P., and Relot, A. 2012. Observer Program on the French Tropical Tuna purse seine fishery in the Atlantic Ocean. Collect. Vol. Sci. Pap. ICCAT, 68(5): 2021-2024

Delgado de Molina, A., Floch, L., Rojo, V., Damiano, A., Ariz, J., Chassot, E., Gom, F. N., *et al.* (2014). Statistics of the European and associated purse seine and baitboat fleets in the Atlantic Ocean. Collect. Vol. Sci. Pap. ICCAT, 70(6): 2654-2668.