STATISTICS OF THE FRENCH PURSE SEINE FISHING FLEET TARGETING TROPICAL TUNAS IN THE ATLANTIC OCEAN (1991-2017)

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SUMMARY

In 2017, a total of 12 French vessels operated in the eastern Atlantic Ocean with 1 Bait Boat, 10 Purse Seiner and 1 supply vessel deploying FAD and managing a part of the FAD stock in the water. The total capacity weighted by the months of activity for each vessel is 9 907 t. The total nominal effort in 2017 was of 2794 fishing days and 2335 sets. The total catch of the French component of the EU purse seine fleet of the Atlantic Ocean was 45,730 t, being composed of 56%, 33%, and 8% of yellowfin tuna, skipjack tuna, and bigeye tuna respectively and with 2% of other species.

KEYWORDS : Tropical tuna fisheries, French purse seining, floating objects, free swimming school, fish aggregating devices, Katsuwonus pelamis, Thunnus albacares, Thunnus obesus

1   Introduction

French tuna purse seiners have been fishing yellowfin tuna (Thunnus albacares), skipjack tuna (Katsuwonus pelamis), and bigeye tuna (Thunnus obesus) in the eastern Atlantic Ocean since the early 1960s. Tuna schools are harvested through two major fishing modes that result in different species and size composition of the catch, i.e. tunas in free-swimming schools (FSC) and tunas associated with drifting Floating OBjects (FOB) now predominated by artificial Fish Aggregating Devices (FAD). The French purse seine fishery has been monitored by the 'Institut de Recherche pour le D´eveloppement' (IRD) since the late 1960s in collaboration with the 'Centre de Recherches Oc´eanologiques' (CRO, Ivory Coast) and the 'Centre de Recherches Oc´eanographiques de Dakar-Thiaroye' (CRODT, S´en´egal). Here, we report a synthesis of the fishing activities of the French purse seiners during 1991-2017 based on the collection of logbooks and landing reports and sampling operations conducted at ports during unloading for target species (i.e skipjack, yellowfin tuna and bigeye tuna).

2   Material and methods

2.1   Fishing data from professional activities

Logbooks and sale reports were collected in collaboration with fishing companies and covered 100% of the fishing trips that occurred during 1991-2017. For each trip, at unloading, shipment was sort by species (and by commercial categories) and weight at the cannery. For each sets, vessels crew reported in the logbook all information on their activities including:

- Catch weight visually assessed
- Raw species composition of the sets visually assessed
- Date of the sets;
- Geographic location of the sets.

2.2   Sampling

In 2017, 226 well samples were collected at unloading of French purse seiners in the ports of Abidjan and

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Dakar. These samples were used to estimate the size and species composition of the catch following a sampling and processing protocol common with purse seiners flying the flag of Spain and other flags associated with the French purse seine fleet (Pallar'es and Petit, 1998). A total of about 88 000 tunas counted and measured were used in the T3 (Traitement des Thons Tropicaux) processing of the French purse seine fishery data for 2017.

2.3   Fishing effort

Nominal fishing effort was derived from logbooks and expressed in days-at-sea and fishing days considering that fishing operations purse seiners occur only during daylight. Searching time (days), which accounts for the expected time required for setting the purse seine, was also used to describe the nominal purse seine effort. In Atlantic ocean, the maximum duration of a day for the purse seine fishing fleet targeting tropical tunas is 12 hours.

3   Results and interpretations

3.1   Fleet capacity

In 2017, 10 French purse seiners (Fig. 1) operated in the eastern Atlantic Ocean and conducted a total of 86 fishing trips lasting on average 34 days. The fleet was composed of 2 vessels of carrying capacity (CC) of 600-800 t, 6 vessels of CC 800-1200 t, and 2 vessels of CC >1,200 t (Table 1). Total carrying capacity in 2017 is similar to the last years and confirm the trend to use larger vessels since 2009. The total capacity weighted by the months of activity for each vessel is 9 907 t.

In addition, a supply vessel has been operating in the eastern Atlantic Ocean since the second quarter of 2010 in support of French purse seiners. Support vessel's activities mainly consist in searching for tuna schools and both deploying and managing the stock of FADs and associated buoys through deployment of FADs, visits and retrieval of some buoys or FADs that drift outside the purse seine fishing grounds. The French support vessel spent a total of 293 days at sea in 2017, contributing to 10.3% of the cumulated time-at-sea of the French fishing fleet.

3.2   Activity effort

The total nominal effort in 2017 for fishing and searching was respectively about 2,800 and 2,300 days (Fig. 2 and Table 2) which is similar to the trend of the last years. Indeed, after the drop from 1991 to 2008, activities duration slightly increased. Duration for both activities actually represent the half of the 1991's level.

3.3   Fishing sets

The total annual number of fishing sets in 2017 reached 2335 (1996 positive sets and 339 null sets). A total of 1044 sets were associated to FOBs (mainly FADs) and 1291 sets associated to free swimming schools (FSC) (Table 4). The proportion of positive sets is 96% on FOBs and 77% on FSC. In 2017, the percentage of FOB sets is in the range of value since 2012 confirming a consistency in fishing activity type (Fig.3).

3.4   Fisheries production, specific composition and size distribution

Total catch of tropical tuna in eastern Atlantic Ocean was marked since 1991 by a huge drop between 2003 and 2008 mainly due to the departure of vessels for Indian Ocean (Fig.4). As instance, the French fleet was composed with 14 vessels in 2003 and only 6 in 2007 (Table 1). In 2017, landings of the principal market tunas by the French purse seine fleet operating in the eastern Atlantic Ocean reached a total of 45,730 t corresponding to an slightly decrease of 6% compared to 2016 (Fig.4). Those landings are composed of 56%, 33%, 8% and 2% of yellowfin, skipjack, bigeye tunas and other species (see details in table 5 and 6). However, no change in the production dynamic can be interpreted as the production level stayed high, compared to the huge increased since 2007 (catch tonnage has double). Catch composition on FSC was usually dominated by yellowfin tuna where as it was dominated by skipjack tuna on FOB. In 2017, catches on FSC, yellowfin tuna represented 90% of the total while skipjack and bigeye tunas represented 5% each (Fig.5). Catches on FOB were predominated by skipjack tuna representing 65% of the catch while yellowfin and bigeye tunas represented 19% and 11% of catches, respectively. Finally, species composition value were quite similar to last year's species composition whatever the school type.

The size frequency distributions for the three species collected in 2017 either for both FOB-associated and FSC fishing sets are quite similar with the average frequency distributions observed for the period 2012-2016 (Fig.6 and 7). Considering the mean weight of catched fishes, it seems the average weight continue to increase for every species in FSC catches only (Fig.8). However, Skipjack catched seemed to be smaller in 2017 than in the 2012-2016 period, which support the results on size distribution.

3.5   Fishing yield

Spatial extent used by vessels increased in 2017 following the trend since 2009 (Fig. 11). However, the area where catches occurred was stable since 2010. We could so conclude that the supplementary zone used by vessels served for other activities as FAD management or exploration. Figure 12 to 14 respectively represent maps of the fishing effort and catches on FOB and FSC.

3.6   Spatial distribution of fishing

Spatial extent used by vessels increased in 2017 following the trend since 2009 (Fig. 11). However, the area where catches occurred was stable since 2010. We could so conclude that the supplementary zone used by vessels served for other activities as FAD management or exploration. Figure 12 to 13 respectively represent maps of the fishing effort and catches on FOB and FSC.

4   Conclusion

Fisheries activities of the French fleet in eastern Atlantic Ocean in 2017 was in the continuity of these last years in many aspects: fleet capacity, fishing effort and catch production. However, discrepancies in size distribution and fishing yield have been identified. Indeed catch skipjack tuna seemed to be smaller since these two last years, which could explain the decrease in fishing yield during the same period. This new trend have to be confirm with the next years.

5 Figures

Figure 1 Fishing capacity of the French purse seine fishing fleet in the Atlantic Ocean. Annual changes in the number of purse seiners by tonnage category (barplots) and total carrying capacity (dashed line with circles) during 1991-2017. Capacity was weighted
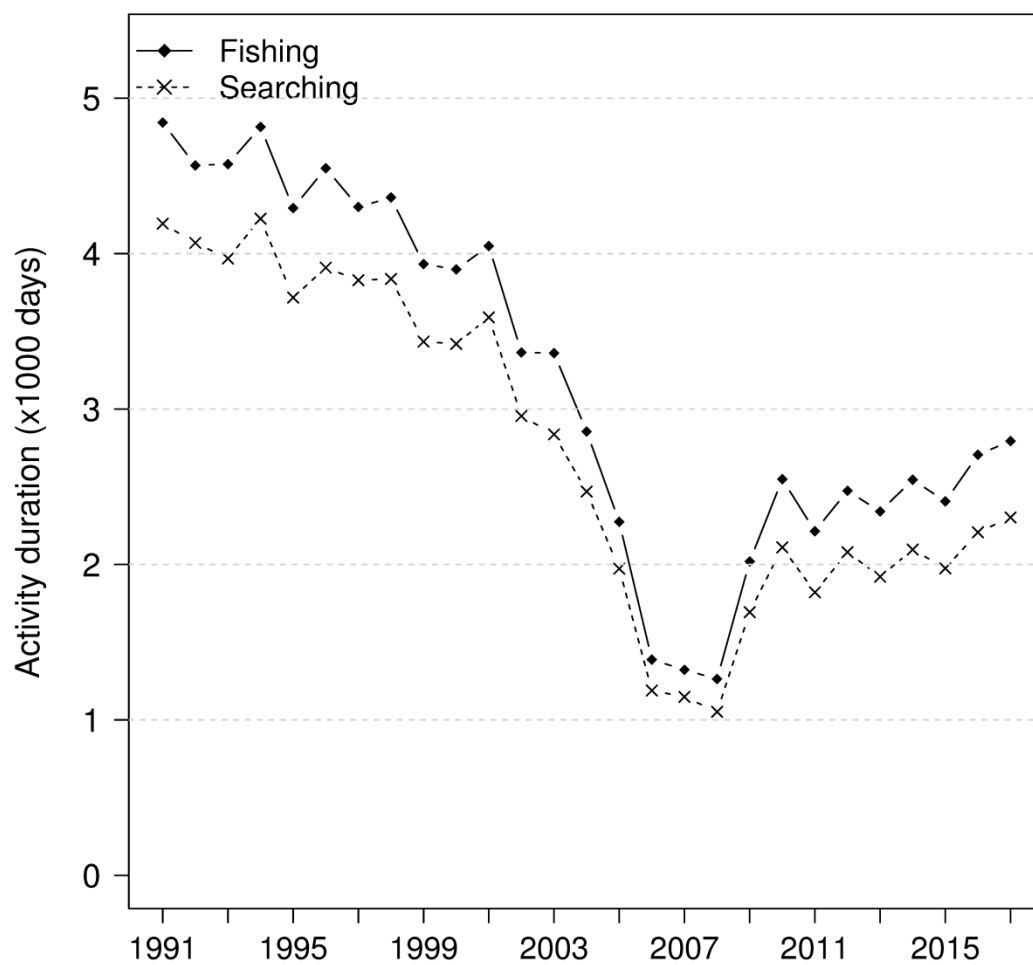
Figure 2 Changes in nominal effort over time. Annual total number of fishing and searching days for   the French purse seine fishing fleet in the Atlantic Ocean during 1991-2017
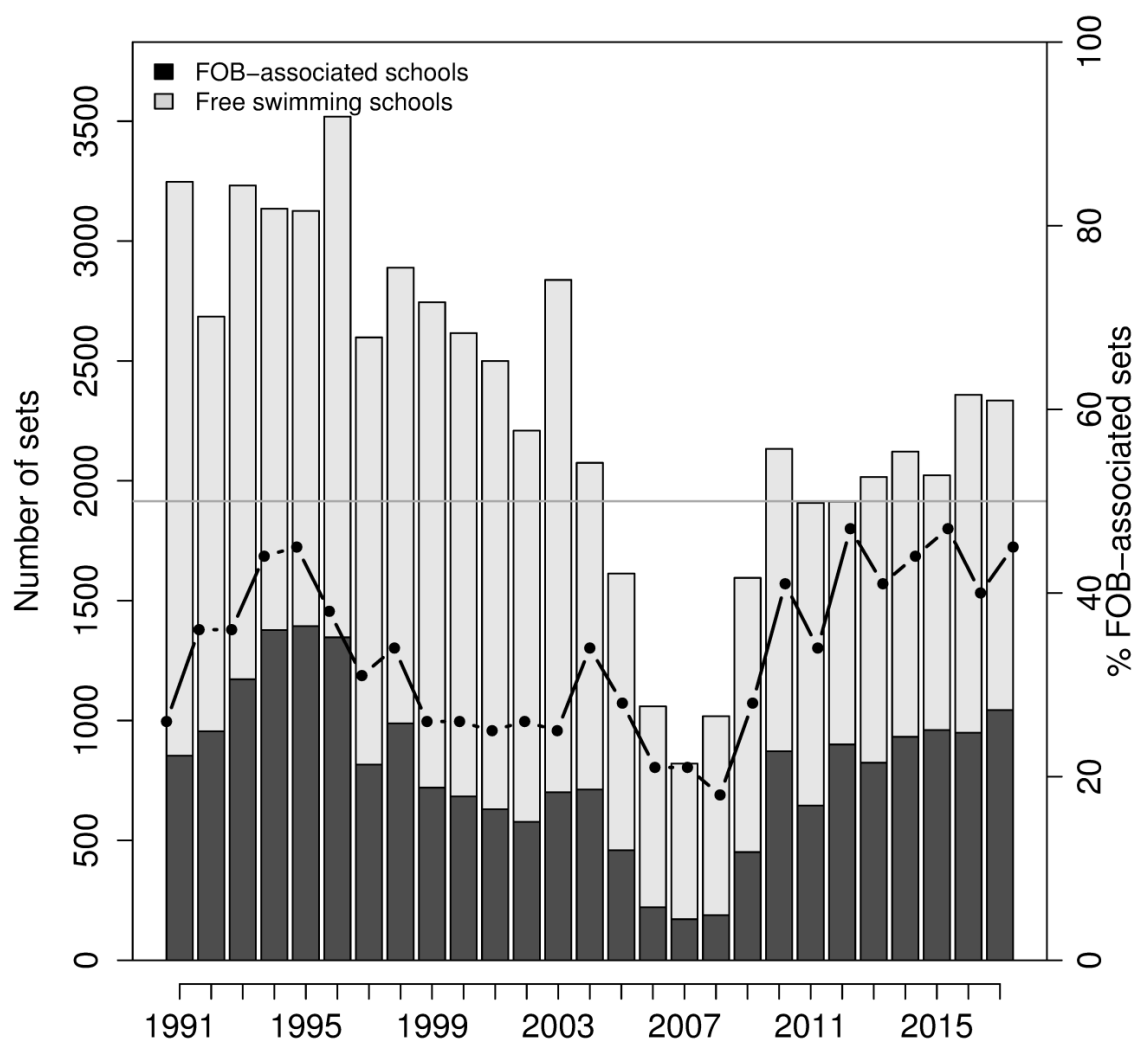
Figure 3 Fishing operations. Annual number of fishing sets in the French purse seine fishery on FOB-associated and free-swimming schools during 1991-2017. Line with solid circles indicates the percentage of sets on FOB-associated schools. Grey solid line indicates the 50% value.
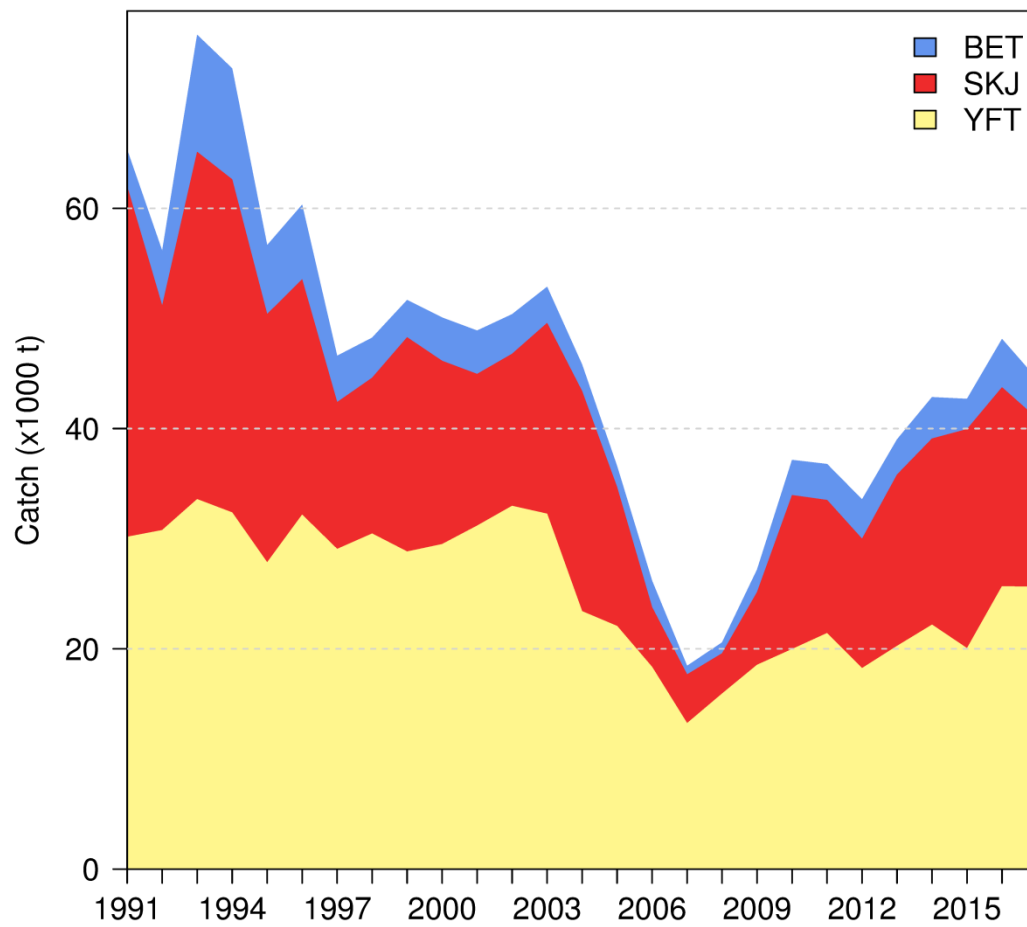
Figure 4 Total fishery production. Catch by species of the French purse seine fishing fleet during 1991-2017
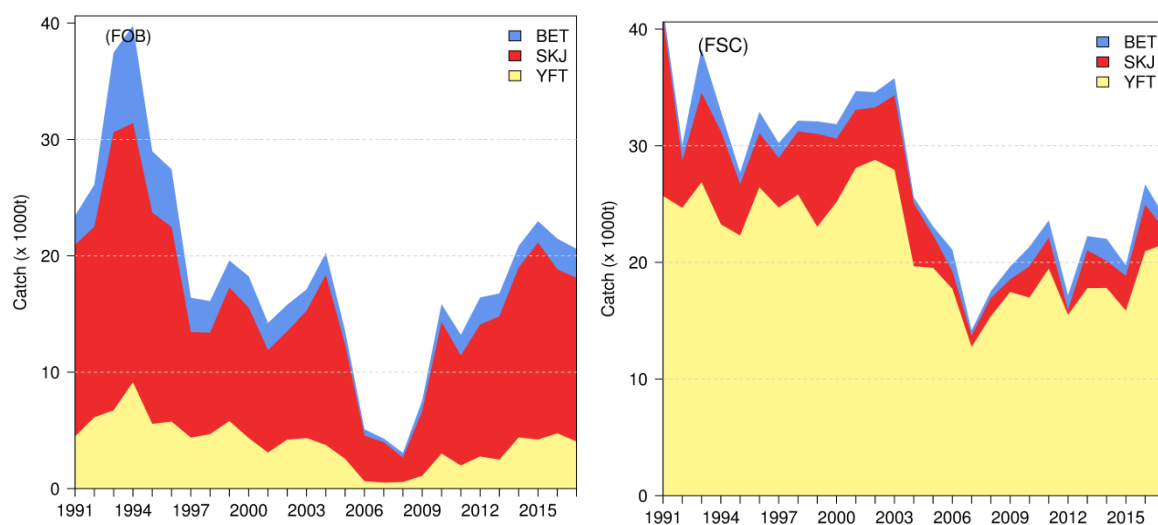
Figure 5 Fishery production by major fishing mode. Catch by species of the French purse seine fishing fleet on FOB-associated and free-swimming schools during 1991-2017
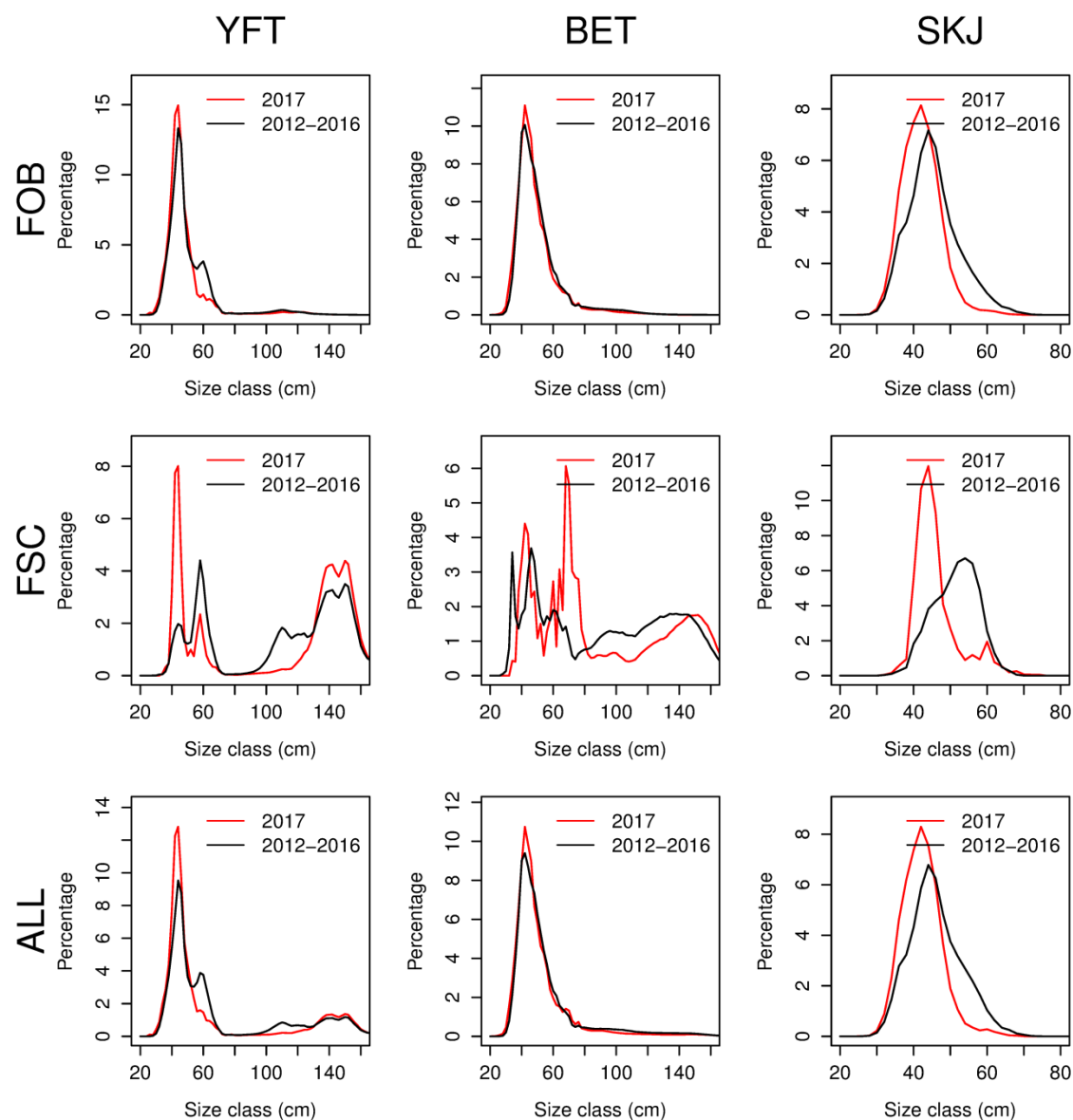
Figure 6 Distribution by size class of the catch (in percentage of the total number of fishes) for the French purse seine fleet in 2017 (red line) and for an average year representing the period 2012-2016 (black line)
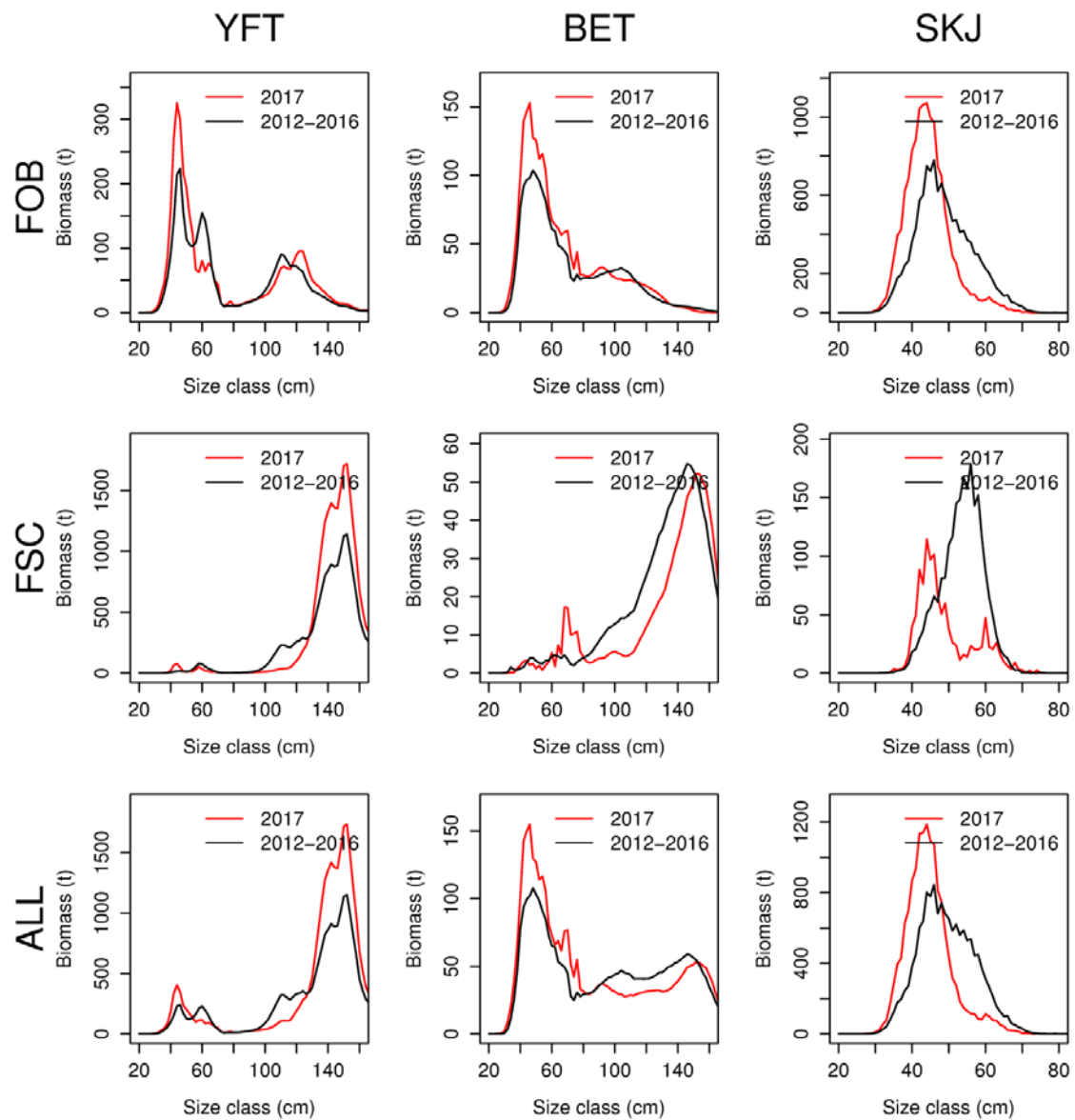
Figure 7 Weight distribution of the catch for the French purse seine fleet in 2017 (red line) and for an average year representing the period 2012-2016 (black line)
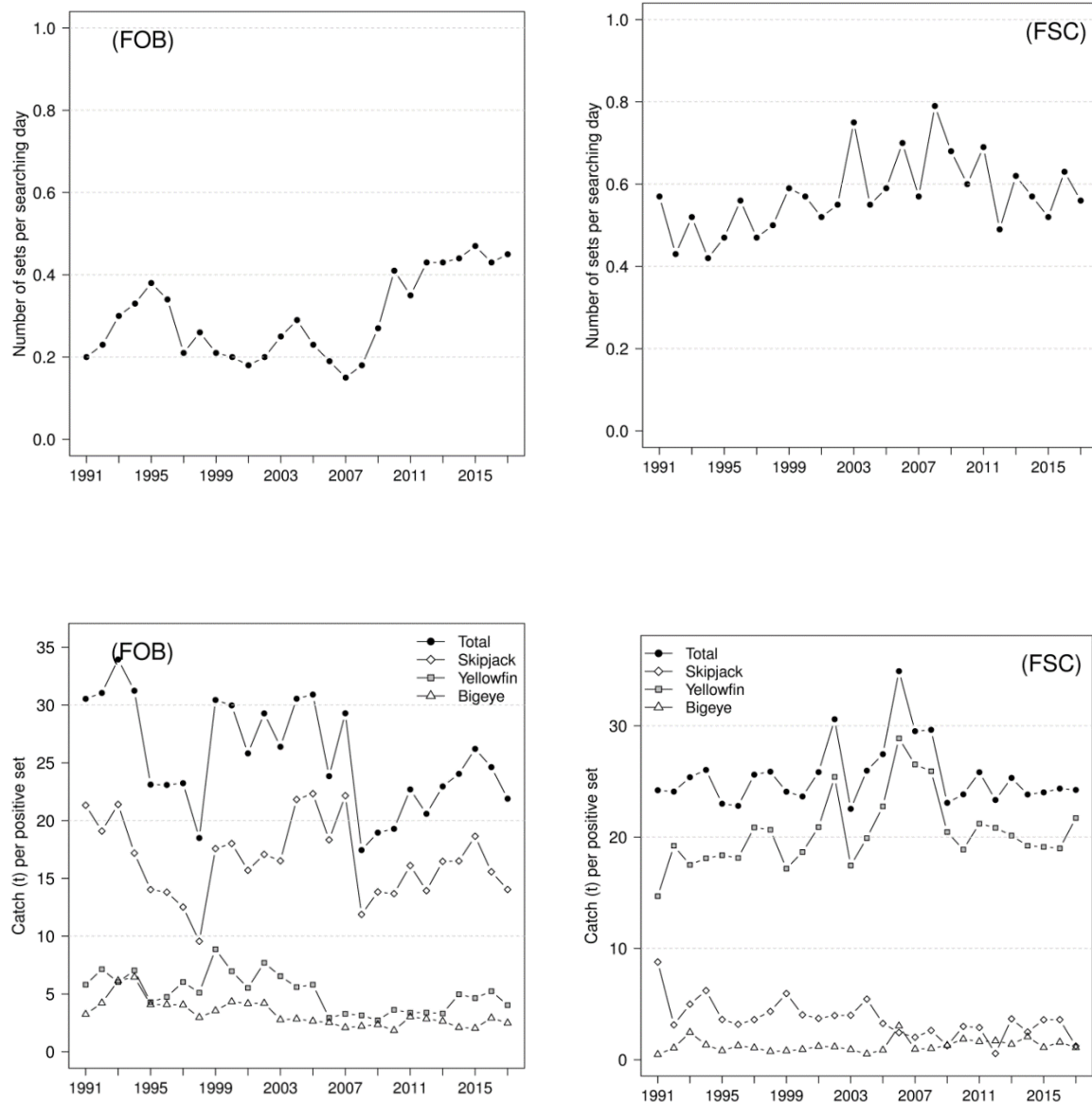
Figure 8 : Annual number of sets per searching day and catch per positive set on FOB-associated (left panel) and free-swimming schools (right panel) for the French purse seine fishing fleet in the Atlantic Ocean during 1991-2017
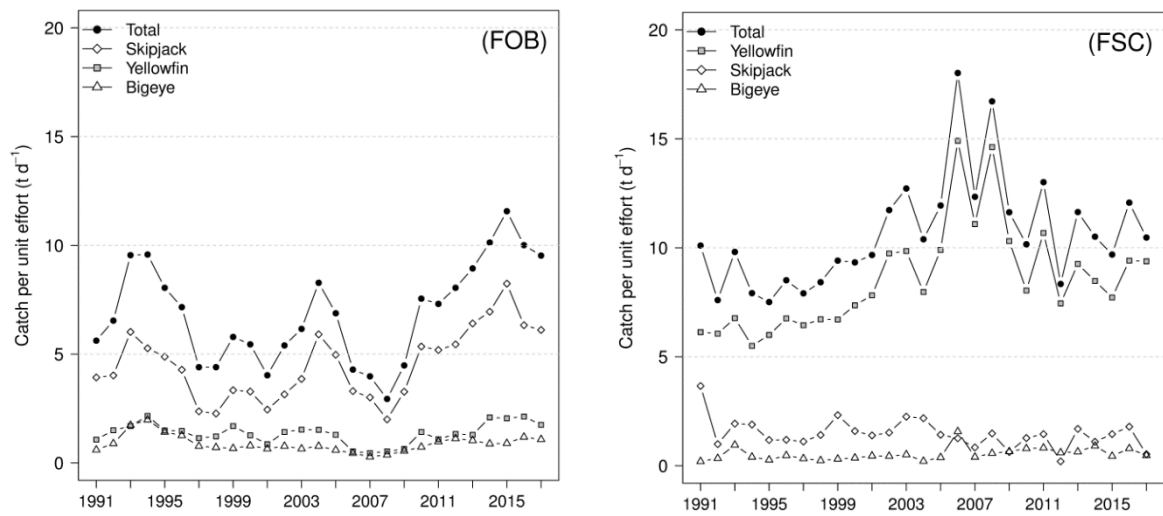
Figure 9 Annual catch rates (in t per searching day) of the French purse seine fishing fleet on FOB-associated and free-swimming schools in the Atlantic Ocean during 1991-2017
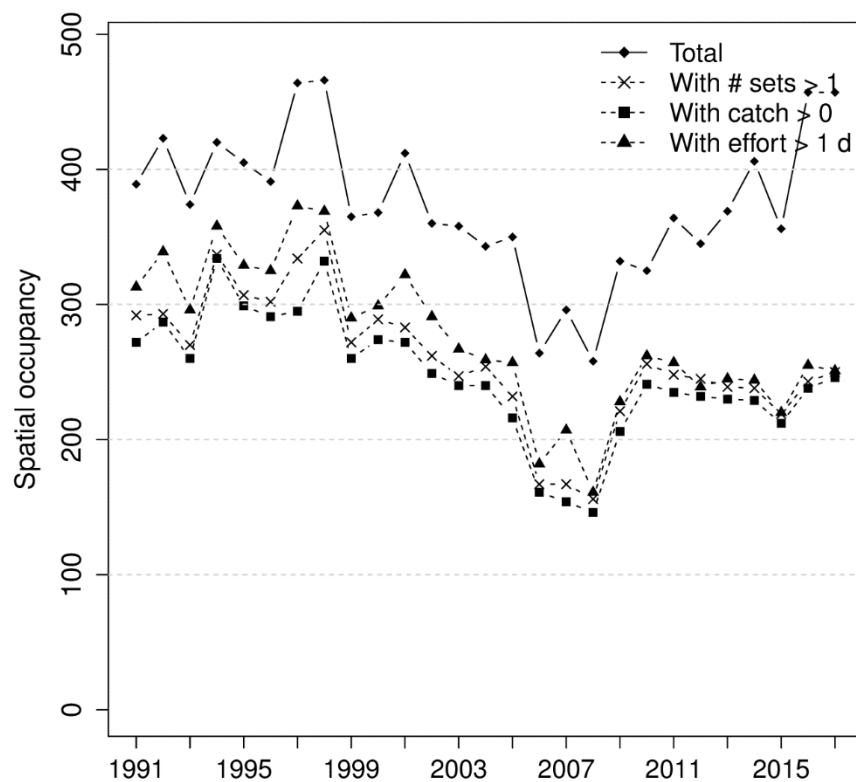
Figure 10 Changes in spatial extent of the fishery over time. Annual number of 1-degree squares explored by each vessel of the French purse seine fishing fleet during 1991-2017. Only vessels in activity during 12 months were selected.
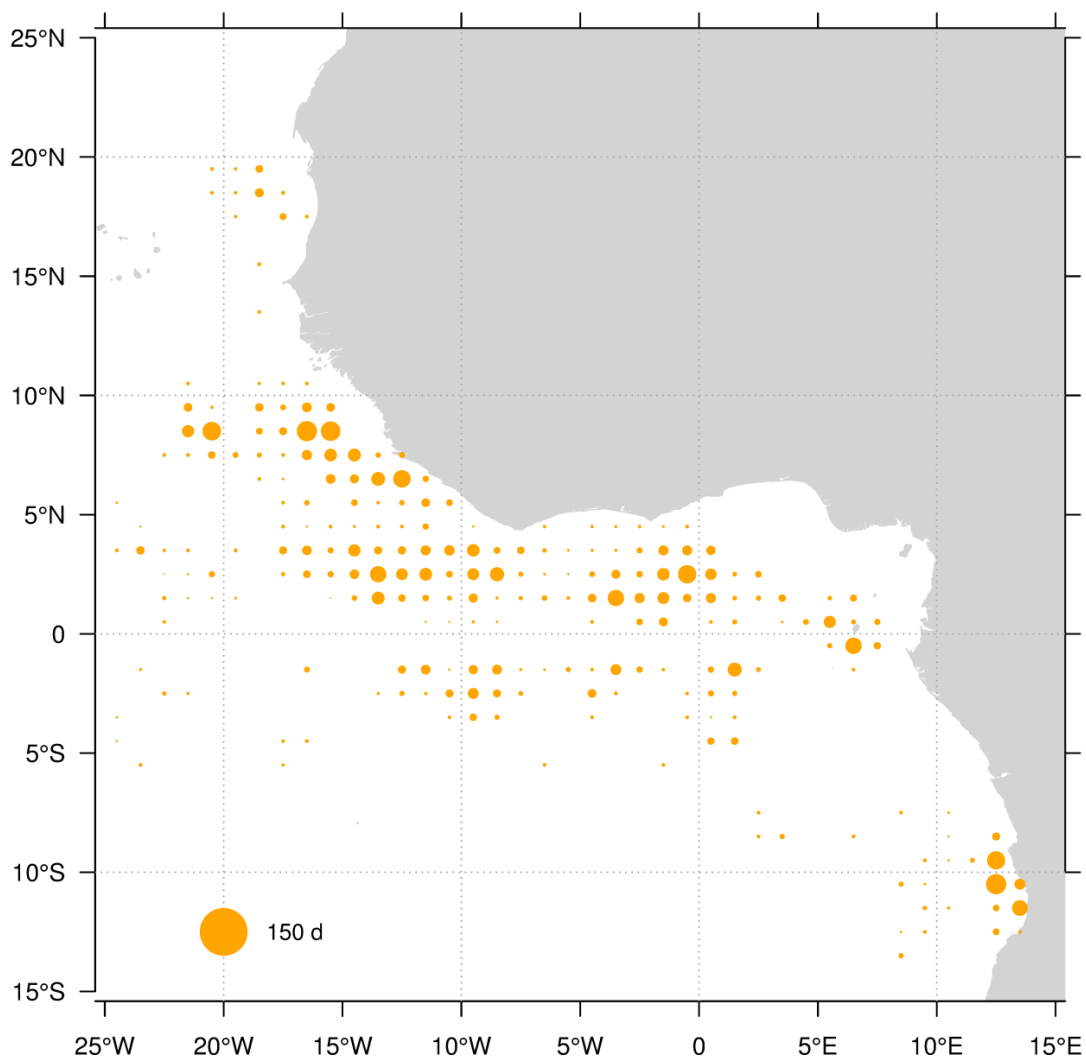
Figure 11 Fishing grounds. Spatial distribution of fishing effort (in searching days) of the French purse seine fishing fleet in 2017
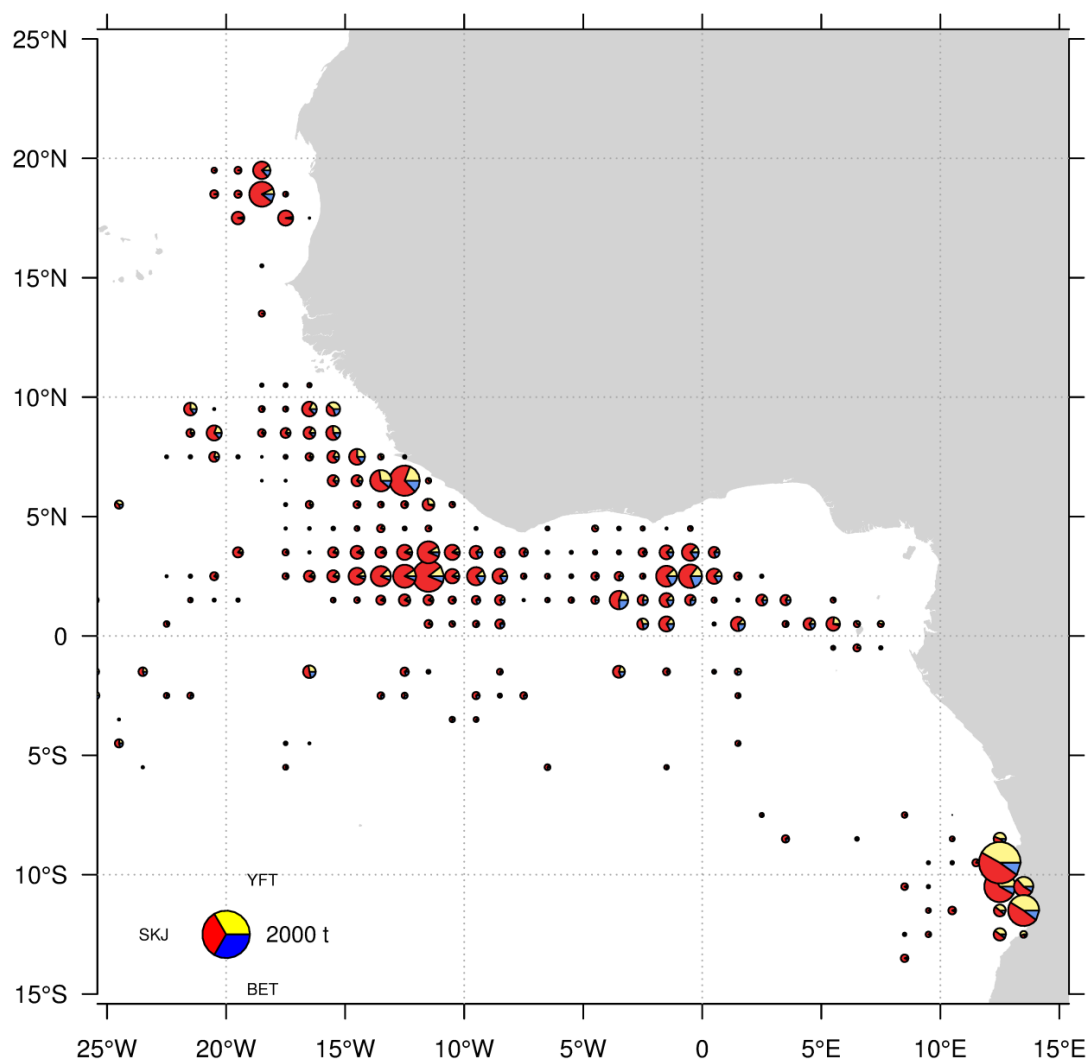
Figure 12 Spatial distribution of tuna catches of the French purse seine fishing fleet made on FOB-associated schools in 2017
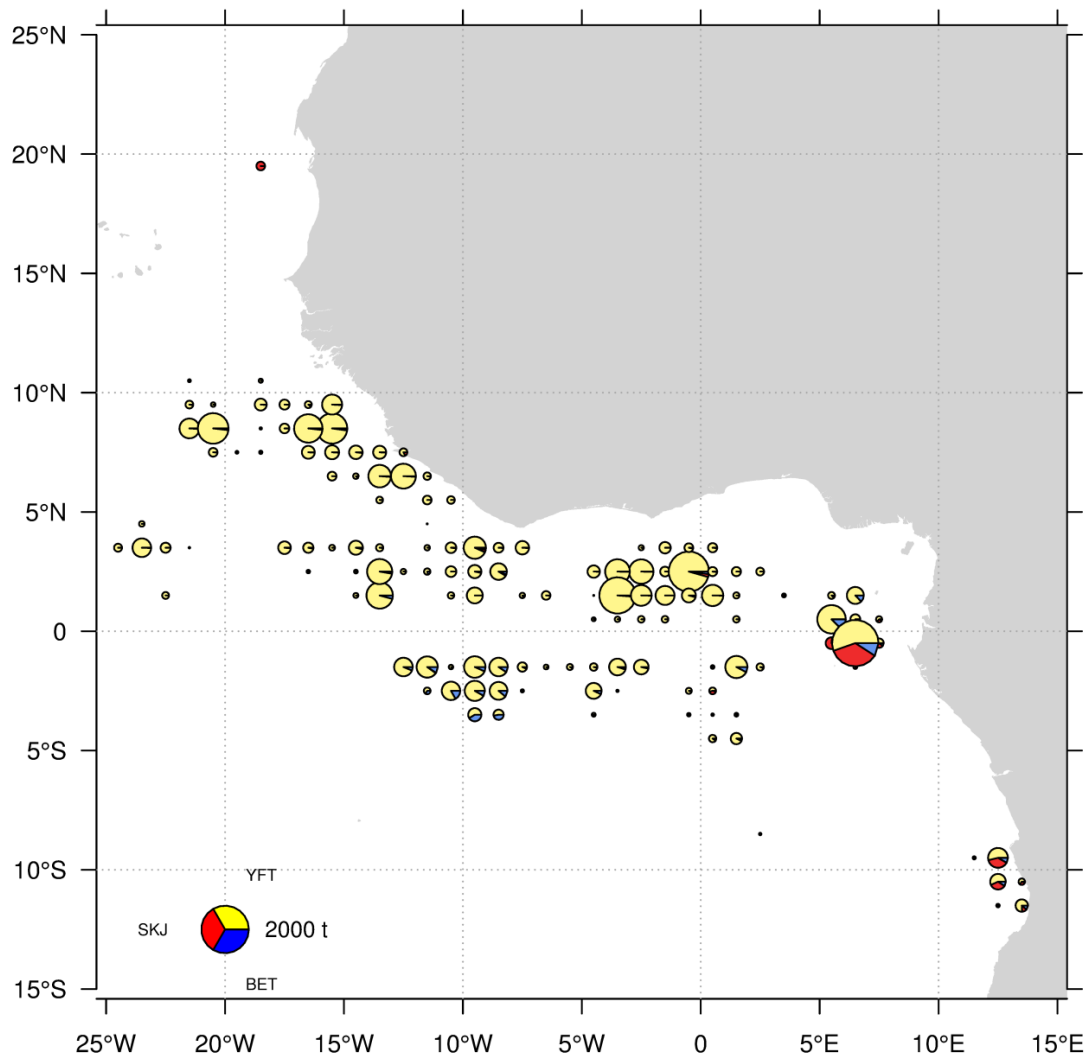
Figure 13 Spatial distribution of tuna catches of the French purse seine fishing fleet made on FSC-associated schools in 2017

6   Tables

Table 1 Annual number of purse seiners by size category and total carrying capacity of the European tropical tuna purse seine fishing fleet of the Atlantic Ocean during 1991-2017. Total carrying capacity (CC) was weighted by the proportion of the year at sea (in months)

Year	50-400	401-600	601-800	801-1200	1201-2000	>2000	Nb vessels	Nb vessels weighted	CC
1991	1.2	7.7	4.1	4.5	0	0	23	17.42	11850
1992	1	7.6	2	5.5	0	0	17	16.08	11457
1993	0.9	7.4	2.1	5.9	0	0	18	16.33	11870
1994	0.8	7.8	2.7	5.6	0	0	18	16.83	12121
1995	0	7.9	2	5	0	0	17	14.92	10863
1996	0	8.8	2	4.9	0	0	16	15.75	11243
1997	0	7.3	1.8	5	0.7	0	19	14.67	11331
1998	0	6.9	2	5.7	0	0	15	14.58	11071
1999	0	7.2	1.8	5	0	0	15	14	10538
2000	0	6.9	1.6	5	0	0	14	13.5	10248
2001	0	6.2	1.8	5.3	0.8	0	17	14	11314
2002	0	6.8	0.3	4.8	0.4	0	17	12.25	9601
2003	0	6.6	1	4.8	0	0	14	12.42	9610
2004	0	4.9	0.3	4.9	0	0	12	10.08	8345
2005	0	3.9	0	4.3	0	0	9	8.25	6980
2006	0	3.4	0	2	0	0	7	5.42	4040
2007	0.3	2.8	0	1.8	0	0	6	4.92	3609
2008	0	2.3	0.6	1.8	0	0	7	4.67	3678
2009	0	0.9	2	3	1.4	0	10	7.33	6876
2010	0	1	1.9	3.9	2.3	0	10	9.08	8846
2011	0	0.8	2	3.5	1.9	0	9	8.17	7945
2012	0	0	1.9	4.8	1.9	0	9	8.67	8986
2013	0	0	1.9	4.7	1.8	0	9	8.42	8715
2014	0	0	2	5	1.9	0	9	8.92	9240
2015	0	0	1.8	5	1.9	0	9	8.75	9118
2016	0	0	2	5.5	2	0	11	9.5	9780
2017	0	0	2	5.8	1.8	0	10	9.58	9756

Table 2 Annual nominal fishing effort of the French purse seine fishing fleet expressed in fishing and searching days during 1991-2017. Searching days was derived from the total time spent at sea corrected for periods of damage, route towards port, and purse seine operation. The duration per day for fishing activities is 12 hours

Year	CC	Fishing days	Searching days
1991	11850	4843	4193
1992	11457	4568	4069
1993	11870	4576	3969
1994	12121	4815	4225
1995	10863	4293	3717
1996	11243	4550	3910
1997	11331	4300	3829
1998	11071	4361	3837
1999	10538	3933	3434
2000	10248	3898	3419
2001	11314	4049	3590
2002	9601	3364	2955
2003	9610	3360	2837
2004	8345	2855	2469
2005	6980	2274	1973
2006	4040	1388	1189
2007	3609	1322	1148
2008	3678	1263	1052
2009	6876	2019	1693
2010	8846	2549	2110
2011	7945	2214	1821
2012	8986	2474	2079
2013	8715	2341	1921
2014	9240	2545	2096
2015	9118	2406	1975
2016	9780	2706	2207
2017	9756	2794	2302

Table 3 Annual number of 1-degree squares explored by the French purse seine fishing fleet during 1991-2017. #sets indicates squares where a least 1 fishing set was made.

Year	TOTAL	#sets	Catch >0	Effort > 1 d	Effort > 5 d
1991	389	292	272	313	213
1992	423	293	287	339	215
1993	374	270	260	296	192
1994	420	337	334	358	256
1995	405	307	299	329	200
1996	391	302	291	325	209
1997	464	334	295	373	220
1998	466	355	332	369	214
1999	365	272	260	290	184
2000	368	289	274	299	184
2001	412	283	272	322	195
2002	360	262	249	291	185
2003	358	247	240	267	163
2004	343	254	240	259	149
2005	350	232	216	257	137
2006	264	167	161	182	85
2007	296	167	154	207	84
2008	258	156	146	161	80
2009	332	221	206	228	121
2010	325	256	241	262	142
2011	364	248	235	257	128
2012	345	245	232	239	126
2013	369	239	230	245	122
2014	406	238	229	244	134
2015	356	219	212	220	123
2016	457	243	238	255	142
2017	457	250	246	251	137

Table 4 Number of positive and null sets by fishing mode made by the French purse seine fishing fleet in the Atlantic ocean during 1991-2017. FOB = Floating Object; FSC = Free-Swimming School

	ALL			**FOB**			**FSC**		
	Total	Positive	Null	Total	Positive	Null	Total	Positive	Null
1991	3247	2521	726	853	772	81	2394	1749	645
1992	2685	2140	545	955	857	98	1730	1283	447
1993	3232	2650	582	1172	1116	56	2060	1534	526
1994	3135	2581	554	1377	1296	81	1758	1285	473
1995	3126	2508	618	1394	1294	100	1732	1214	518
1996	3519	2670	849	1347	1212	135	2172	1458	714
1997	2598	1908	690	816	725	91	1782	1183	599
1998	2889	2162	727	988	913	75	1901	1249	652
1999	2745	1995	750	720	653	67	2025	1342	683
2000	2616	1971	645	683	622	61	1933	1349	584
2001	2500	1904	596	630	560	70	1870	1344	526
2002	2209	1678	531	577	545	32	1632	1133	499
2003	2838	2263	575	701	662	39	2137	1601	536
2004	2075	1657	418	712	669	43	1363	988	375
2005	1613	1297	316	459	439	20	1154	858	296
2006	1059	828	231	221	214	7	838	614	224
2007	820	636	184	171	156	15	649	480	169
2008	1018	770	248	188	177	11	830	593	237
2009	1595	1253	342	451	400	51	1144	853	291
2010	2133	1725	408	872	826	46	1261	899	362
2011	1908	1503	405	645	586	59	1263	917	346
2012	1913	1556	357	900	813	87	1013	743	270
2013	2016	1631	385	824	748	76	1192	883	309
2014	2122	1810	312	932	884	48	1190	926	264
2015	2023	1736	287	960	907	53	1063	829	234
2016	2359	2008	351	949	905	44	1410	1103	307
2017	2335	1996	339	1044	1002	42	1291	994	297

Table 5 Catch by species made on FOB-associated schools for the French purse seine fishing fleet of the Atlantic Ocean during 1991-2017

Year	YFT	SKJ	BET	ALB	OTH	TOTAL
1991	4476	16465	2501	0	112	23554
1992	6116	16370	3619	0	28	26133
1993	6723	23884	6853	0	72	37532
1994	9124	22273	8372	0	59	39827
1995	5549	18155	5274	4	103	29084
1996	5750	16736	4941	0	173	27599
1997	4371	9076	2945	0	122	16515
1998	4669	8725	2712	0	113	16219
1999	5795	11478	2316	0	74	19663
2000	4335	11207	2696	0	84	18322
2001	3090	8792	2335	0	76	14292
2002	4198	9308	2287	0	110	15903
2003	4332	10937	1833	0	155	17256
2004	3742	14602	1901	0	94	20338
2005	2547	9805	1165	5	47	13569
2006	626	3925	541	0	10	5102
2007	512	3457	326	0	248	4543
2008	557	2103	391	0	0	3051
2009	1089	5531	939	0	24	7583
2010	3001	11297	1530	13	92	15932
2011	1978	9443	1776	12	96	13305
2012	2756	11335	2321	15	250	16677
2013	2476	12317	1972	15	208	16989
2014	4391	14599	1852	19	140	21002
2015	4206	16919	1844	22	232	23222
2016	4742	14088	2639	23	414	21905
2017	4035	14069	2494	9	1096	21702

Table 6 Catch by species made on free-swimming schools for the French purse seine fishing fleet of the Atlantic Ocean during 1991-2017

Year	YFT	SKJ	BET	ALB	OTH	TOTAL
1991	25696	15349	826	50	417	42339
1992	24662	4013	1366	451	208	30700
1993	26867	7653	3776	565	11	38872
1994	23257	7979	1703	130	81	33150
1995	22301	4387	988	79	78	27834
1996	26430	4634	1837	191	11	33102
1997	24694	4259	1264	39	35	30290
1998	25799	5419	930	40	33	32221
1999	23038	7980	1067	13	30	32128
2000	25170	5435	1240	23	10	31878
2001	28094	4982	1608	11	33	34727
2002	28784	4498	1310	18	3	34614
2003	27936	6382	1456	63	4	35840
2004	19671	5380	516	19	73	25660
2005	19527	2801	749	472	0	23548
2006	17727	1498	1861	347	0	21433
2007	12733	970	455	12	0	14170
2008	15372	1558	598	50	0	17578
2009	17456	1071	1104	60	0	19691
2010	16973	2687	1668	97	8	21433
2011	19449	2646	1493	41	56	23685
2012	15486	414	1253	146	23	17323
2013	17784	3242	1224	58	47	22356
2014	17801	2303	1911	29	10	22055
2015	15849	2974	908	39	35	19805
2016	20942	3976	1748	42	68	26777
2017	21591	1226	1088	90	32	24028

Table 7 Number of sets per searching on FOB-associated (FOB) and free-swimming schools (FSC) for the French purse seine fishing fleet of the Atlantic Ocean during 1991-2017

Year	ALL	FOB	FSC
1991	0.77	0.20	0.57
1992	0.66	0.23	0.43
1993	0.81	0.30	0.52
1994	0.74	0.33	0.42
1995	0.84	0.38	0.47
1996	0.90	0.34	0.56
1997	0.68	0.21	0.47
1998	0.75	0.26	0.50
1999	0.80	0.21	0.59
2000	0.77	0.20	0.57
2001	0.70	0.18	0.52
2002	0.75	0.20	0.55
2003	1.00	0.25	0.75
2004	0.84	0.29	0.55
2005	0.82	0.23	0.59
2006	0.89	0.19	0.70
2007	0.71	0.15	0.57
2008	0.97	0.18	0.79
2009	0.94	0.27	0.68
2010	1.01	0.41	0.60
2011	1.05	0.35	0.69
2012	0.92	0.43	0.49
2013	1.05	0.43	0.62
2014	1.01	0.44	0.57
2015	0.99	0.47	0.52
2016	1.06	0.43	0.63
2017	1.01	0.45	0.56

Table 8 Catch per unit of effort (in t per positive set) on FOB-associated schools for the French purse seine fishing fleet of the Atlantic Ocean during 1991-2017

Year	YFT	SKJ	BET	ALB	OTH	TOTAL
1991	5.8	21.33	3.24	0	0.18	30.54
1992	7.14	19.1	4.22	0	0.59	31.05
1993	6.02	21.4	6.14	0	0.39	33.95
1994	7.04	17.19	6.46	0	0.56	31.24
1995	4.29	14.03	4.08	0	0.72	23.12
1996	4.74	13.81	4.08	0	0.46	23.09
1997	6.03	12.52	4.06	0	0.63	23.24
1998	5.11	9.56	2.97	0	0.86	18.5
1999	8.87	17.58	3.55	0	0.44	30.44
2000	6.97	18.02	4.33	0	0.65	29.97
2001	5.52	15.7	4.17	0	0.43	25.82
2002	7.7	17.08	4.2	0	0.3	29.28
2003	6.54	16.52	2.77	0	0.56	26.39
2004	5.59	21.83	2.84	0	0.29	30.55
2005	5.8	22.33	2.65	0.01	0.11	30.91
2006	2.93	18.34	2.53	0	0.06	23.85
2007	3.28	22.16	2.09	0	1.76	29.29
2008	3.15	11.88	2.21	0	0.21	17.45
2009	2.72	13.83	2.35	0	0.06	18.96
2010	3.63	13.68	1.85	0.02	0.11	19.29
2011	3.38	16.11	3.03	0.02	0.16	22.7
2012	3.39	13.94	2.85	0.02	0.38	20.59
2013	3.31	16.47	2.64	0.02	0.52	22.96
2014	4.97	16.51	2.1	0.02	0.45	24.05
2015	4.64	18.65	2.03	0.02	0.86	26.21
2016	5.24	15.57	2.92	0.03	0.88	24.63
2017	4.03	14.04	2.49	0.01	1.34	21.9

Table 9 Catch per unit of effort (in t per positive set) on free-swimming schools for the French purse seine fishing fleet of the Atlantic Ocean during 1991-2017

Year	YFT	SKJ	BET	ALB	OTH	TOTAL
1991	14.69	8.78	0.47	0.03	0.24	24.21
1992	19.22	3.13	1.06	0.35	0.33	24.09
1993	17.51	4.99	2.46	0.37	0.04	25.38
1994	18.1	6.21	1.33	0.1	0.31	26.04
1995	18.37	3.61	0.81	0.07	0.14	23.00
1996	18.13	3.18	1.26	0.13	0.11	22.81
1997	20.87	3.6	1.07	0.03	0.04	25.61
1998	20.66	4.34	0.74	0.03	0.11	25.88
1999	17.17	5.95	0.8	0.01	0.16	24.08
2000	18.66	4.03	0.92	0.02	0.02	23.65
2001	20.9	3.71	1.2	0.01	0.02	25.84
2002	25.41	3.97	1.16	0.02	0.04	30.59
2003	17.45	3.99	0.91	0.04	0.15	22.54
2004	19.91	5.45	0.52	0.02	0.07	25.97
2005	22.76	3.26	0.87	0.55	0.00	27.45
2006	28.87	2.44	3.03	0.57	0.00	34.91
2007	26.53	2.02	0.95	0.03	0.00	29.52
2008	25.92	2.63	1.01	0.08	0.00	29.64
2009	20.46	1.26	1.29	0.07	0.00	23.08
2010	18.88	2.99	1.86	0.11	0.01	23.84
2011	21.21	2.89	1.63	0.04	0.06	25.83
2012	20.84	0.56	1.69	0.2	0.05	23.34
2013	20.14	3.67	1.39	0.07	0.06	25.32
2014	19.22	2.49	2.06	0.03	0.03	23.83
2015	19.12	3.59	1.1	0.05	0.17	24.02
2016	18.99	3.6	1.58	0.04	0.14	24.36
2017	21.72	1.23	1.09	0.09	0.1	24.24

Table 10 Catch per unit of effort (in t per searching day) on FOB-associated schools for the French purse seine fishery of the Atlantic Ocean during 1991-2017

Year	YFT	SKJ	BET	ALB	OTH	TOTAL
1991	1.07	3.93	0.6	0.00	0.03	5.62
1992	1.5	4.02	0.89	0.00	0.13	6.54
1993	1.69	6.02	1.73	0.00	0.11	9.55
1994	2.16	5.27	1.98	0.00	0.17	9.58
1995	1.49	4.88	1.42	0.00	0.25	8.05
1996	1.47	4.28	1.26	0.00	0.14	7.16
1997	1.14	2.37	0.77	0.00	0.12	4.4
1998	1.22	2.27	0.71	0.00	0.21	4.4
1999	1.69	3.34	0.67	0.00	0.08	5.79
2000	1.27	3.28	0.79	0.00	0.12	5.45
2001	0.86	2.45	0.65	0.00	0.07	4.03
2002	1.42	3.15	0.77	0.00	0.06	5.4
2003	1.53	3.86	0.65	0.00	0.13	6.16
2004	1.52	5.91	0.77	0.00	0.08	8.28
2005	1.29	4.97	0.59	0.00	0.02	6.88
2006	0.53	3.3	0.45	0.00	0.01	4.29
2007	0.45	3.01	0.28	0.00	0.24	3.98
2008	0.53	2.00	0.37	0.00	0.04	2.94
2009	0.64	3.27	0.55	0.00	0.01	4.48
2010	1.42	5.35	0.73	0.01	0.04	7.55
2011	1.09	5.19	0.98	0.01	0.05	7.31
2012	1.33	5.45	1.12	0.01	0.15	8.05
2013	1.29	6.41	1.03	0.01	0.2	8.94
2014	2.09	6.95	0.88	0.01	0.19	10.13
2015	2.05	8.24	0.9	0.01	0.38	11.57
2016	2.13	6.33	1.19	0.01	0.36	10.01
2017	1.75	6.11	1.08	0.00	0.58	9.53

Table 11 Catch per unit of effort (in t per searching day) on free swimming schools for the French purse seine fishery of the Atlantic Ocean during 1991-2017

Year	YFT	SKJ	BET	ALB	OTH	TOTAL
1991	6.13	3.66	0.2	0.01	0.1	10.1
1992	6.06	0.99	0.34	0.11	0.1	7.6
1993	6.77	1.93	0.95	0.14	0.02	9.81
1994	5.5	1.89	0.4	0.03	0.09	7.92
1995	6.00	1.18	0.27	0.02	0.04	7.51
1996	6.76	1.19	0.47	0.05	0.04	8.51
1997	6.45	1.11	0.33	0.01	0.01	7.91
1998	6.72	1.41	0.24	0.01	0.04	8.42
1999	6.71	2.32	0.31	0.00	0.06	9.41
2000	7.36	1.59	0.36	0.01	0.01	9.33
2001	7.82	1.39	0.45	0.00	0.01	9.67
2002	9.74	1.52	0.44	0.01	0.02	11.73
2003	9.85	2.25	0.51	0.02	0.09	12.72
2004	7.97	2.18	0.21	0.01	0.03	10.39
2005	9.9	1.42	0.38	0.24	0.00	11.94
2006	14.91	1.26	1.57	0.29	0.00	18.02
2007	11.09	0.84	0.4	0.01	0.00	12.34
2008	14.62	1.48	0.57	0.05	0.00	16.72
2009	10.31	0.63	0.65	0.04	0.00	11.63
2010	8.04	1.27	0.79	0.05	0.00	10.16
2011	10.68	1.45	0.82	0.02	0.03	13.01
2012	7.45	0.2	0.6	0.07	0.02	8.34
2013	9.26	1.69	0.64	0.03	0.03	11.64
2014	8.48	1.1	0.91	0.01	0.01	10.51
2015	7.72	1.45	0.44	0.02	0.07	9.69
2016	9.41	1.79	0.79	0.02	0.07	12.07
2017	9.38	0.53	0.47	0.04	0.04	10.47