

STATISTICS OF THE EUROPEAN AND ASSOCIATED PURSE SEINE AND BAITBOAT FLEETS, IN THE ATLANTIC OCEAN (1991-2017)

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SUMMARY

The document presents an overall summary of the fishing activities of the European and assimilated purse seine and bait boat fleets operating in the eastern Atlantic Ocean over the period 1991-2017. We describe the annual changes in fleet technical characteristics (carrying capacity, size), fishing effort (fishing and searching days), extent of fishing grounds, catches and nominal Catch per Unit Effort by species, as well as the average individual weight by species. Maps are also presented indicating the fishing effort distribution in the Atlantic, as well as the spatio-temporal distribution of European and assimilated purse seine catches in 2017 compared to previous years (2010-2016).

KEYWORDS: *Tuna fishery, yellowfin, skipjack, purse seiners, catch/effort, CPUE, species composition, size composition.*

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Introduction

Statistical data for the industrial purse seine fishing fleet have been collected by the 'Institut de Recherche pour le Développement' (IRD) since the late 1960s in collaboration with the 'Centre de Recherches Océanologiques' (CRO; Ivory Coast) and Instituto Español de Oceanografía (IEO) and the 'Centre de Recherches Océanographiques de Dakar-Thiaroye' (CRODT; Sénégal) since the 1980s. Tuna purse seiners target schools of yellowfin (*Thunnus albacares*), skipjack (*Katsuwonus pelamis*), and bigeye tuna (*Thunnus obesus*) through two major fishing modes that result in different species and size composition of the catch: free-swimming (or unassociated) schools (FSC) and fish aggregating device associated (FAD) schools.

Materials and Methods

Data Collection

The data collection system is composed of three major components that give an overview of the different fishing activities of the purse seine fleet. First, the collection of logbooks and landing reports is done in collaboration with the fishing companies and it covers 95 % of the fishing trips and activities. The current system of statistics starts from 1980, the same methodology for Spain, France, some coastal countries and Spanish or French NEI-vessel are used. Sampling operations are made during the unloading of the purse seiners at fishing ports to estimate both size and species composition of the catch. Second, complementary sampling operations are conducted to estimate the landings destined to the local market of Abidjan, which are generally not reported in logbooks and include small and damaged tunas not purchased by tuna canneries as well as several other fish species. The sampling system was developed in the early 1980s and the current protocol is described in Chavance *et al.* (2011).

Data processing and analysis

The current sampling protocol, strata, and algorithms used for the logbook data processing were established during the European project '*Analyse du schéma d'échantillonnage multispécifique des thonidés tropicaux*' (Pallarés and Hallier 1997). Overall, the processing aims to adjust the tropical tuna catch to the landings an estimate the size and species composition of the catch based on large sampling areas, fishing mode, and quarter (Pallarés and Petit 1998). In 2017, the data processing was based on the collection of 1.146 samples collected on European purse seiners and associated flags during unloading at port, which corresponded to a total of about 519.496 tunas counted and measured.

EU and NEI PS Fleet

The fleet was composed of 4 vessels of carrying capacity (CC) of 601-800 t, 11 vessels of CC 801-1200 t, 23 vessels of CC 1,201-2000 t and 1 vessel of CC >2000 t (**Table 4**). In 2017, a total of 38 European and associated purse seiners operated in the eastern Atlantic Ocean, by flags 3 of Belize, 1 of Cape Verde, 5 of Curaçao, 4 of Salvador (1 vessel changed flag in 2017 from Cape Verde to Belize), 10 of Spain, 11 of France, 2 of Guatemala and 2 of Panamá (**table 5**). The total current capacity in 2017, fishing days and searching days were bigger than 2016 (**table 6**). The number of boats, TRB category and carrying capacity of European and associated purse-seine fleet is presented in **figure 2**.

Fishery production

The total production of the all EU-Associated purse seine fleets of the Atlantic Ocean was about 220.087 t, being composed of 128.838 t skipjack, 63.745 t, yellowfin and 19.300 t bigeye respectively. The total catch decreased by 4,85 % between 2016 and 2017, mainly due all species decrease with respect 2016 (**table 1**). The total catch, by species and fishing effort, in current capacity for the European and associated purse-seine fleet according to their fishing mode: combined (top), Objects (middle) and free schools (bottom) is presented in **figure 1**. The distribution of the catches by species on all school (top), on Log-associated school (middle) and on free schools (down), in 2017 (left) and on average over the 2011-2016 period (right) is presented in **figure 4**.

The small decrease of total catch in 2017 on FSC around 9 % and 6 % on FAD was produced. The current capacity in 2017 was more or less the same value than 2016 and the access of the fleet to the traditional fishing grounds of Mauritania, Ivory Coast and Gabon where free-swimming schools and FAD respectively of where generally high during 2017 (**table 2** and **table 3**).

EU and NEI BB Fleet

In 2017, a total of 14 European and associated purse seiners operated in the eastern Atlantic Ocean, by flags 8 of European flag (7 of Spain, 1 from France) and 6 of Senegal (**table 9**). The total current capacity in 2017, the fishing days and searching days were bigger than 2016 (**table 6**). The number of boats, TRB category and carrying capacity of European and associated purse-seine fleet is presented in **figure 2**.

The total catches by species of European and associated bait boat fleet is presented in **table 7**. The total catch by species decreased around 4 % with respect 2016. And by species around 9,7 % YFT, by 3,1 % SKJ and by 19,35 % BET respectively with respect 2016. The possible explanation is due to not access to all fishing grounds for all the PS fleet, in 2017 the European vessels did not fish in the Gabon's ZEE for example.

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Table 1. Catches by species (t) of European and associated purse-seine fleet.

Year	YFT	SKJ	BET	ALB	Others	Total
1991	92476	125536	14188	416	1735	234351
1992	96706	87244	18230	2518	1255	205952
1993	90102	124875	30857	1450	1246	248530
1994	88062	105633	32379	1079	2239	229391
1995	84684	99208	25096	412	2302	211703
1996	82476	83928	25006	258	3799	195468
1997	68311	60204	15918	118	2733	147284
1998	73339	56439	12622	434	3065	145898
1999	58248	76845	15593	264	2004	152955
2000	64190	64493	13698	32	1741	144154
2001	77098	60918	14030	24	2460	154531
2002	75207	48068	14282	39	1008	138604
2003	66043	73424	14303	308	1561	155639
2004	53206	77033	10816	19	1784	142858
2005	49326	58509	9685	533	1528	119581
2006	49892	47556	10919	441	1216	110024
2007	43183	54178	10794	45	1972	110172
2008	62576	58269	12603	76	1802	135326
2009	67103	62960	16790	149	2578	149581
2010	62071	75957	19090	303	2329	159749
2011	51577	84445	21368	146	1967	159503
2012	56949	95341	17681	360	3112	173443
2013	50161	121364	16606	110	3454	191695
2014	53592	116788	18901	50	4746	194077
2015	62792	121607	17587	241	4753	206981
2016	70931	133631	22946	84	3714	231306
2017	63745	128838	19300	222	7981	220087

Table 2. Catches by species (tones), on logs, of European and associated purse-seine fleet.

Objects						
Year	YFT	SKJ	BET	ALB	Others	TOTAL
1991	15775	82330	12193	6	970	111274
1992	18121	65424	14660	24	695	98925
1993	19653	76822	22215	6	798	119495
1994	23400	67023	26478	0	1515	118416
1995	21245	75704	21598	5	1937	120490
1996	20246	71203	21860	0	3053	116362
1997	12378	38590	13280	0	2227	66475
1998	10869	29833	10383	0	1904	52989
1999	12360	39971	12695	181	985	66192
2000	12885	45054	11164	0	1487	70590
2001	11665	45584	11611	1	2222	71084
2002	11526	36947	11262	3	881	60620
2003	12660	43940	11198	101	1014	68914
2004	11913	52419	9086	0	1267	74685
2005	10818	48329	7827	28	1442	68443
2006	10328	40887	6479	1	1148	58843
2007	9921	50364	7597	2	1956	69841
2008	14256	51671	10335	5	1639	77906
2009	12191	58190	12744	1	2365	85490
2010	15890	68124	14960	13	2222	101208
2011	13260	77429	17778	16	1782	110266
2012	13357	88983	13458	15	2822	118635
2013	11100	107755	13980	15	3121	135971
2014	15654	110118	14597	19	4513	144902
2015	20062	112079	15357	21	4474	151994
2016	24580	121263	18946	23	7583	172395
2017	20068	118343	16509	9	7374	162303

Table 3. Catches by species (tones), on free schools, of European and associated purse-seine fleet.

Free School						
Year	YFT	SKJ	BET	ALB	Others	TOTAL
1991	76701	43206	1995	410	764	123077
1992	78585	21819	3569	2494	560	107027
1993	70448	48053	8642	1444	448	129035
1994	64662	38610	5901	1079	724	110975
1995	63439	23504	3497	407	365	91213
1996	62230	12725	3146	258	746	79106
1997	55933	21615	2638	118	505	80809
1998	62470	26605	2239	434	1161	92909
1999	45888	36874	2898	83	1020	86764
2000	51305	19439	2534	32	254	73564
2001	65433	15334	2419	23	238	83446
2002	63681	11121	3020	36	126	77984
2003	53382	29483	3105	207	547	86725
2004	41294	24614	1730	19	517	68173
2005	38508	10180	1859	505	86	51138
2006	39564	6669	4440	440	69	51181
2007	33261	3814	3197	43	15	40331
2008	48320	6598	2268	71	163	57420
2009	54912	4771	4047	148	213	64091
2010	46181	7833	4130	291	107	58541
2011	38316	7016	3590	130	185	49237
2012	43592	6358	4223	345	290	54808
2013	39061	13609	2626	95	333	55724
2014	37934	6564	4292	31	232	49053
2015	42679	9288	2229	220	279	54694
2016	46351	12369	4000	61	506	63287
2017	43677	10494	2791	213	650	57800

Table 4. Purse seine number by size categories and carrying capacity of the European and associated fleet.

<i>Year</i>	<i>50-400</i>	<i>401-600</i>	<i>601-800</i>	<i>801-1200</i>	<i>1201-2000</i>	<i>> 2000</i>	<i>Total</i>	<i>C. capacity</i>
1991	5	28	11	18	8	1	71	41844
1992	3	27	9	16	9	1	65	43050
1993	3	24	10	16	10	1	64	39509
1994	3	24	9	14	8	1	59	38655
1995	1	24	9	14	7	0	55	34814
1996	2	23	9	13	7	0	54	32811
1997	1	23	9	13	6	0	52	28957
1998	1	20	7	10	5	1	44	29879
1999	1	21	5	9	5	0	41	25352
2000	1	20	7	10	3	0	41	27425
2001	1	18	7	12	6	0	44	30851
2002	1	19	5	10	6	0	41	25036
2003	1	16	3	11	4	0	35	25787
2004	1	14	3	11	5	0	34	25310
2005	0	10	2	10	5	0	27	21967
2006	0	10	2	7	5	0	24	17708
2007	0	9	3	8	7	0	27	19106
2008	0	9	4	9	9	0	31	23212
2009	0	7	4	14	11	0	36	30615
2010	0	6	4	13	11	0	34	32529
2011	0	6	4	13	10	0	33	31219
2012	0	5	4	13	10	0	32	29557
2013	0	5	4	14	9	0	32	29313
2014	0	5	3	10	20	0	38	30653
2015	1	0	4	10	23	1	39	31344
2016	1	0	4	11	23	1	38	28262
2017	1	0	4	11	23	1	38	39233

Table 5. Purse seine number from the European and associated fleet according to their flag.

Flag	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
Neth. Antilles						3	3	3	3	3	3	2	3	3		1	1	1	3	3	3	3	3	2				
Belize								1		1	1								2	1	1	1	1	3	2	2	3	
Cape Verde															2	2	2	2	2	2	2	2	2	3	4	2	1	
Curaçao																									4	5	5	
El Salvador											1														2	4	4	
Spain	37	37	30	30	24	24	20	19	19	19	17	16	15	15	10	8	13	15	16	15	15	14	14	15	12	10	10	
France	23	17	18	18	17	16	19	15	15	14	17	17	14	12	9	7	5	7	10	10	9	9	9	9	9	9	11	11
Ghana							1	1	1	1	1	1	1	1	1	1	1	1	1									
Guatemala													1	2	2	2	2	2	1	1	1	1	1	2	2	2	2	
Guinea Conakry					2	2	2																					
Honduras			1																									
Italy	1	1																										
Liberia				2	1																							
Malaysia							1																					
Malta	1	1	1																									
Morocco	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
Norway	1																											
Panama	7	5	7	7	6	5	2	1	1	1	1	1			3	3	3	3	2	3	2	2	2	2	3	2	2	
Seychelles					1						1	1																
St. Vincent	2	4	4	2	3	2	2	3	1	3	3																	
Vanuatu		1	2	2	2	2	2	1																				
Venezuela												2	1															
Total Ps	73	67	64	62	57	55	53	45	41	43	46	41	36	34	28	25	27	31	37	35	33	32	32	36	38	38	38	

Table 6. Carrying capacity (CC) and fishing efforts (raw fishing days and searching days) of the European and associated purse seine fleet.

Year	CC	Fishing days	Searching days
1991	41844	15354	13436
1992	43050	16900	15332
1993	39509	15904	14154
1994	38655	15235	13563
1995	34814	14028	12328
1996	32811	13750	12195
1997	28957	12382	11154
1998	29879	12590	11220
1999	25352	11657	10503
2000	27425	10579	9396
2001	30851	11345	10117
2002	25036	9826	8814
2003	25787	8964	7742
2004	25310	8523	7558
2005	21967	7115	6260
2006	17708	5795	5098
2007	19106	6123	5400
2008	23212	7087	6099
2009	30615	8928	7682
2010	32529	9262	8254
2011	31219	8876	7506
2012	29557	8556	7184
2013	29313	8254	8254
2014	30653	8264	6887
2015	31344	9560	7960
2016	28262	10062	8216
2017	39233	10370	9939

Table 7. Catches by species (tones) of European and associated bait boat fleet.

Year	YFT	SKJ	BET	ALB	Others	TOTAL
1991	4986	2011	2831	0	30	9858
1992	3460	1955	2305	0	2	7722
1993	3147	3059	2741	0	3	8951
1994	3474	3534	3269	0	21	10299
1995	2298	3772	3188	0	117	9376
1996	2313	2703	3766	0	0	8782
1997	1878	6071	3005	0	227	11181
1998	852	10019	3853	0	24	14748
1999	3179	6714	7236	0	803	17931
2000	1470	7765	5956	0	342	15534
2001	1694	7882	4969	0	37	14583
2002	3495	9167	2721	0	28	15411
2003	2773	10356	2512	0	49	15691
2004	2887	9706	2646	0	51	15290
2005	2146	15042	2328	4	162	19682
2006	2187	9012	2674	0	1319	15191
2007	1658	11382	2225	0	1553	16819
2008	1586	10059	1431	0	1353	14428
2009	2101	12693	2084	0	90	16968
2010	2266	10256	2040	0	202	14764
2011	3324	15949	1458	0	301	21032
2012	2793	17721	1030	0	223	21767
2013	1603	11635	885	0	42	16178
2014	1768	9570	823	0	84	14259
2015	1847	8474	847	0	156	13339
2016	2294	11913	1587	0	107	17916
2017	1702	11444	1385	0	47	14578

Table 8. Bait boats number by size categories and carrying capacity of the European and associated fleet .

Year	50-400	N° vessels	Carrying Capacity
1994	14	14	350
1995	14	14	367
1996	14	14	332
1997	16	16	448
1998	18	18	480
1999	19	19	606
2000	24	24	770
2001	15	15	747
2002	19	19	765
2003	24	24	693
2004	22	22	815
2005	18	18	874
2006	16	16	908
2007	17	17	856
2008	18	18	776
2009	17	17	801
2010	14	14	642
2011	14	14	1461
2012	14	14	1463
2013	14	14	1001
2014	14	14	1375
2015	14	14	1408
2016	14	14	1410
2017	14	13	1420

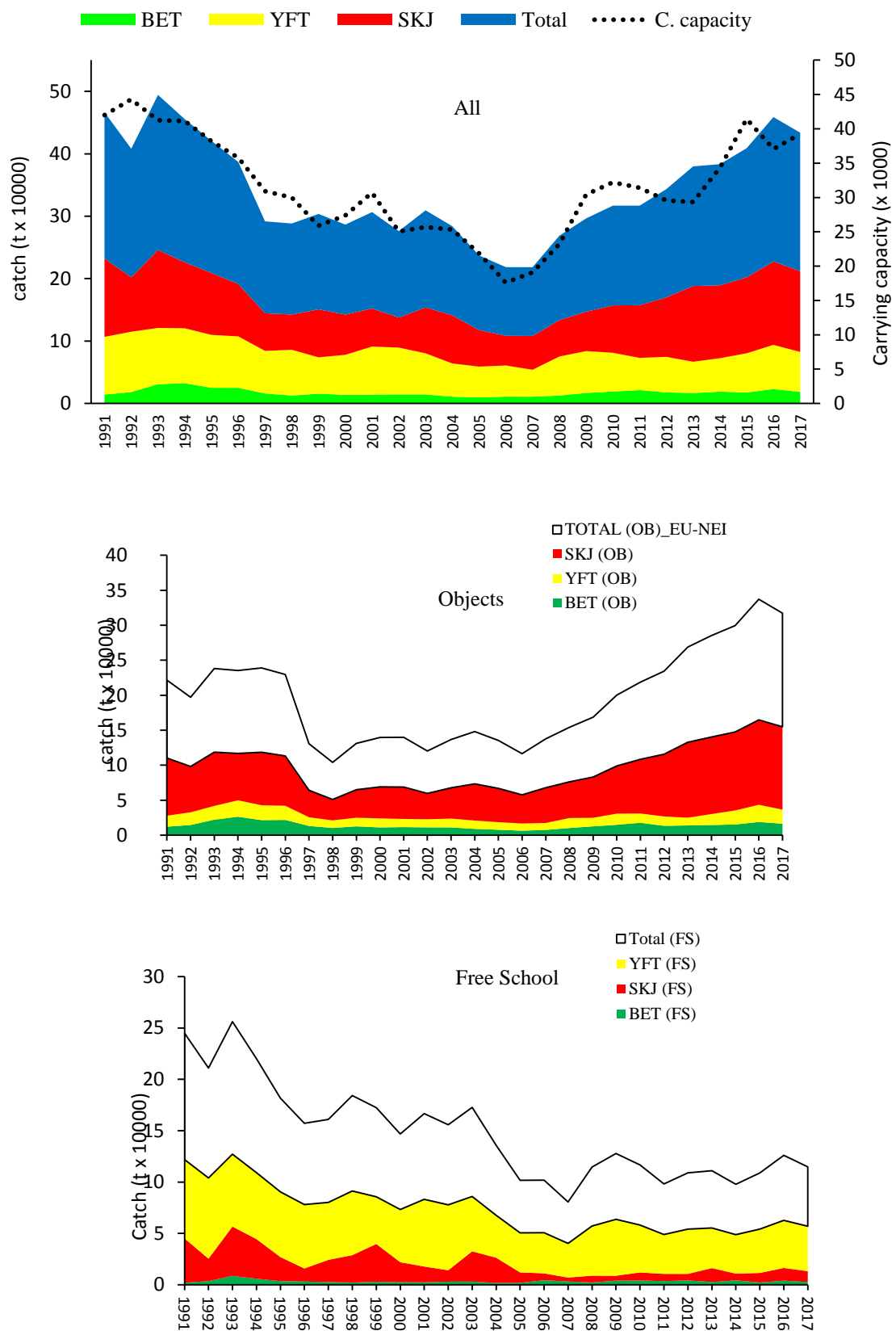


Figure 1. Catches by species and fishing effort in current capacity of the European and associated purse-seine fleet according to their fishing mode: combined (top), Objects (middle) and free schools (bottom).

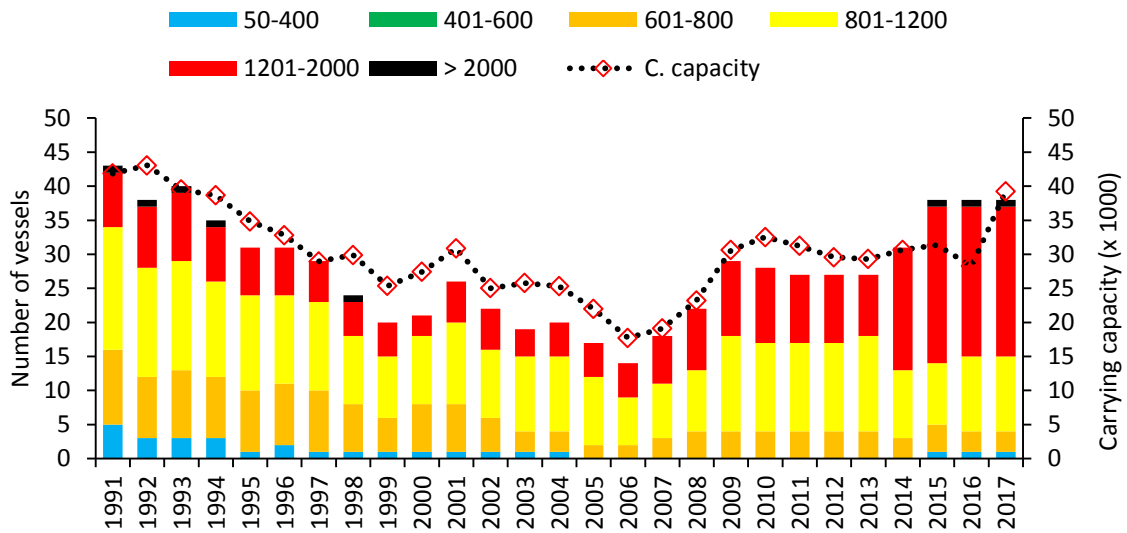


Figure 2. Boats number, TRB category and carrying capacity of European and associated purse-seine fleet.

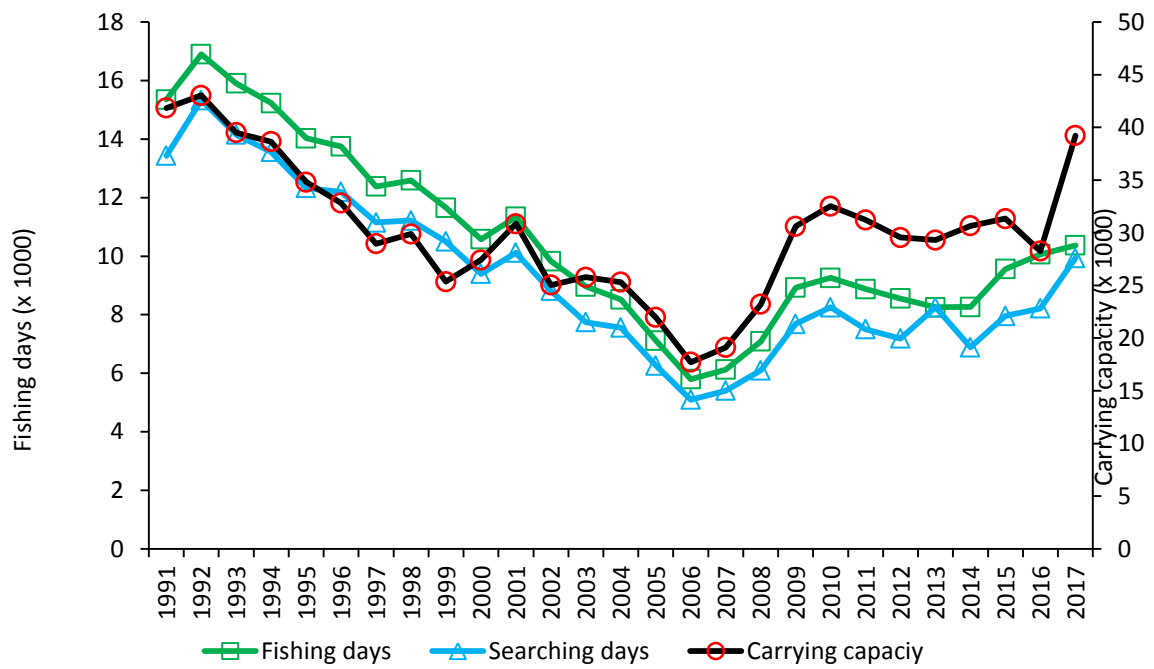


Figure 3. Fishing effort of European and Associated purse-seine fleet in number of fishing days, searching days and carrying capacity.

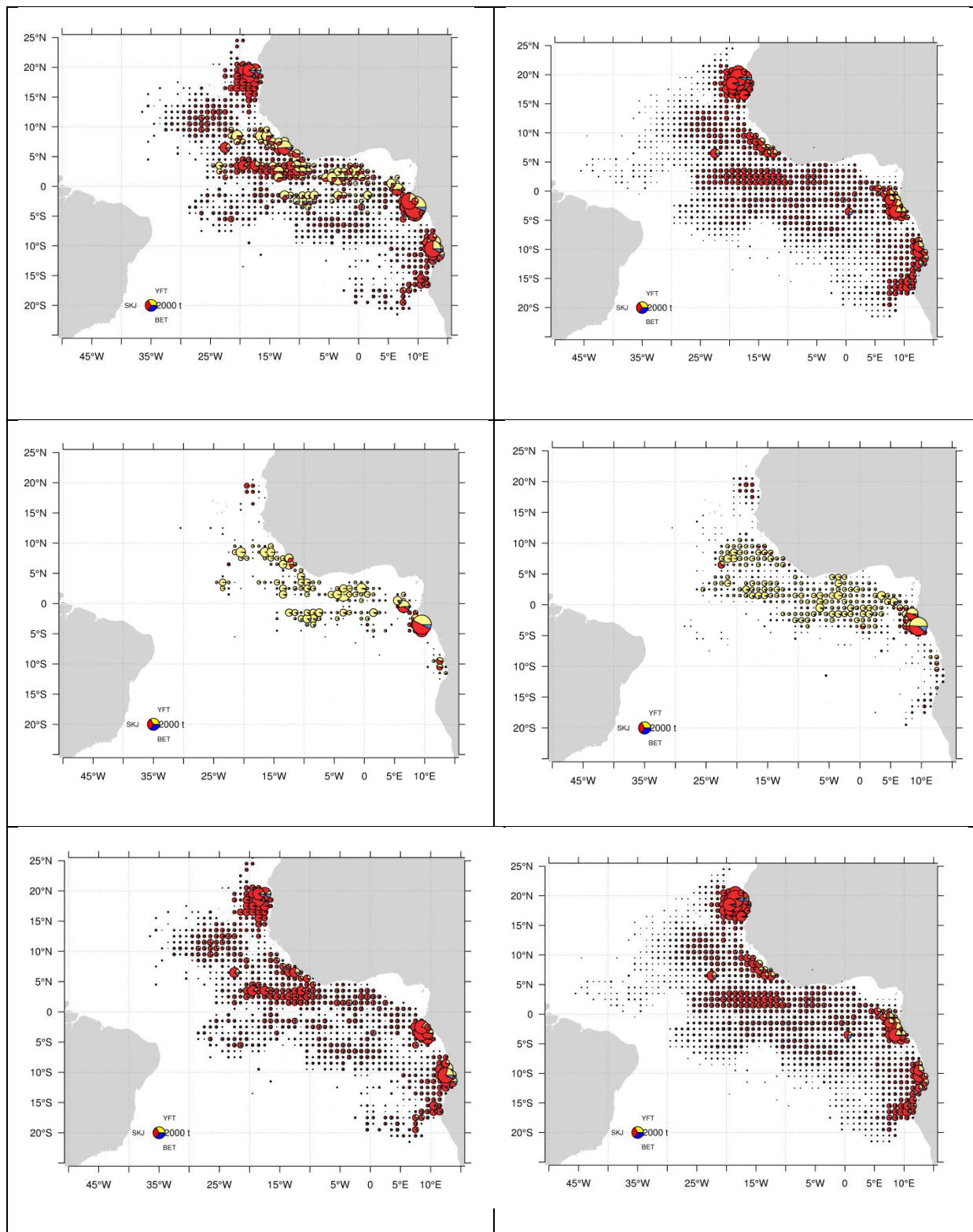


Figure 4. Distribution of the catches by species of the European and associated purse-seine fleet, on all school (top), on Log-associated school (middle) and on free schools (down), in 2017 (left) and on average over the 2012-2016 period (right).

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