

**Updating the statistics reported for the EU-Spain purse seine fishing fleet in the Indian Ocean (period 1984-2019) and the effects of the COVID-19 pandemic on the port sampling activity in Victoria (Seychelles)**

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**Abstract**

*This document provides an update on the statistics reported for the Spanish purse seine fleet fisheries in the Indian Ocean for the period 1984 to 2019. Data include catch and effort statistics, as well as some fishery indicators by species and fishing mode. Information about the coverage of the sampling, together with maps and diagrams illustrating the spatial-temporal fishing patterns of this fleet are also provided.*

**Keywords:** *Tropical tuna, purse seiner, EU-Spain, fishing mode, COVID-19, catch, sampling, size, FAD seeding*

**Background**

In line with the work undertaken recently on the Spanish fleet (e.g., Soto & Fernández, 2016; Báez et al., 2017, 2018, 2020), the current paper provides an update on the reported statistics for the Spanish purse seine fleet fishing in the Indian Ocean in the period 1984 to 2019. Data include catch and effort statistics, as well as some fishery indicators by species and fishing mode. Information about the scheme and coverage of the sampling, together with maps and diagrams illustrating the spatial-temporal patterns followed by this fleet are also provided.

## Results

### *Carrying capacity*

Ending the third quarter of 2019 a new vessel has joined the Spanish freezer purse seiner fleet, increasing the whole carrying capacity of the fishery and reaching more than 24000 tonnes. Despite this, the total catch of the fleet during 2019 (172700 t) was lower than in 2018 (> 200 thousand t), but above the average catch of the previous ten years (approximately 137 thousand tons, by around 26% of total catch). This increase is mainly related to SKJ catches. Thus, 2018 and 2019 have been the years with the highest volume of catch of SKJ of the Spanish fleet.

### *Catch data*

Since 2017, the Indian Ocean yellowfin tuna stock has been subject to an interim Rebuilding Plan (current IOTC Resolution 19/01). In 2018 the Spanish General Secretariat for Fisheries (SGP) adopted Individual Vessel Quotas which cannot be monitored using T3 processing (to see Báez et al., 2020 for major detail), as an average catch is estimated for every whole national EU fleet following this scientific methodology (Duparc et al., 2018). For the YFT, it was then decided to provide as official data the sales notes required to monitor the quota consumption by the Spanish purse seine vessels, which are in accordance with the TAC control and management per vessel. The T3 processing was used for the standardization of catches of the rest of the main target tuna species.

The nominal catch reported by the Spanish General Secretariat for Fisheries, per species and fishing mode, is shown in **Tables 1-3**. **Tables 4 and 5** display the Spanish purse seiners total catch by species in the FAO areas 57 and 51 respectively, for the period 1991-2019.

By species, in 2019, 119138 tonnes of SKJ, 42243 tonnes of YFT and 11303 tonnes of BET have been caught. Considering these three species, the most significant increase in the catches was in the case of the SKJ for the recent years. Thus the 5-year average SKJ catches in the 2013-2017 period was 10883 tons versus 133 thousand and 119 thousand tons for the years 2018 and 2019 respectively. Furthermore, if we take into account that during 2018 the maximum catch in SKJ was reached in the historical series, during 2019 the second highest catch of SKJ in the historical series was reached. In 2019 BET catches have dropped below the average of the last 5 years. The trend in YFT is a decrease in catches, which is due to the management rules imposed.

The number of FOB-associated school sets (FADs and logs) has increased steadily from the early period (1984–1990), with a 31.9% of the sets focused on associated schools, reaching by around 76% of the sets in recent years (2008–2017 period) A maximum peak was recorded in 2018 (96%) (Báez et al., 2020) and by around 83% in 2019. This arises from the unusual behaviour of the fishing fleet during 2018 year.

**Figure 1** shows in detail the total catches by species and effort in searching days, and **figures 2, 3 and 4** show the catches by fishing mode and species. In the **figures 5 and 6** the distribution of the catches by species and fishing mode are detailed.

It seems to be a tendency to stabilization in the effort (searching days) for the two recent years and a slight decrease in the catches, less pronounced for catches on free schools.

### *Fishing Effort*

The number of Spanish purse seiners by category of carrying capacity, total carrying capacity in tons and number of purse seiners and supply vessels associated to this fishery, period 1990 - 2019 is showed in the **Table 6**.

On the other hand, during 2019 the fishing effort measured in searching days (time spent on searching to perform setting with a maximum of 13 hours per day) was the lowest for the all historical series (**Table 7**), but the number of sets was higher than in previous years (4280 sets in average for the period 2009- 2018 vs. 5038 recorded during the 2019 year) (**Table 8**). Therefore, in a short space-time period the number of sets has increased. Searching time between sets has been shorter than in previous years.

The number of 1x1 degree squares explored by the purse seine Spanish fleet in the Indian Ocean, considering different minimum effort limits in the period 1991-2019 is showed in the **Table 9**.

**Figure 7** details the annual progress of some parameters commonly used to quantify the effort in the case of the EU-Spain tropical purse seiner fleet. The number of support vessels (data available since 1999), number of purse seiner vessels, fishing and searching days, carrying capacity and number of sets by fishing are illustrated. The **Figure 8** shows the number of supply vessels associated to the Spanish purse seiner fleet. The **Figure 9** shows the fishing and searching days, and carrying capacity. The **Figures 10-12** show the number of positives and nulls sets per fishing mode.

### *Sampling in port*

In 2019, 137618 tuna fishes were sampled during the landing. The number of sampling units in wells was 538 (1091 wells in total). Taking into account that the number of landings performed by the EU-Spain purse seiner fleet was 161, the sampling effort covered by around 83% of the yearly unloading (133 trips).

The **Figure 13** shows the number of sampling in Spanish Purse seiners in Victoria port by month during 2019-2020. The number of tuna fishes sampled in Port Victoria during 2019 is registered in the **Table 10**.

### *Size distribution*

The **Figure 14** shows the size distribution of the catches by main tropical tuna species and fishing mode, in 2019 and on average over 2014 - 2018 period.

### *FADs deployed trend*

**Table 11** shows the trend in the number of man-made FADs deployed by the Spanish fleet, including supply vessels during the period 2017-2019. **Figure 15** shows the distribution of the man-made FADs deployed during the period 2017-2019.

## **Discussion**

A trend of the fleet is observed to setting more towards the North. An unexpected effect of the COVID-19 pandemic has been the suppression of the sampling surveys in the port of Victoria between March and October 2020. For example, during 2019 and for the same period comprised between March and October, by around the 57% of the samplings were performed. This could imply some difficulties in 2020 standardization of the tropical tuna catches.

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**Table 1. Total catch** reported by Spanish purse seiners (on free-swimming schools and FOB-associated schools) by main species in the Indian Ocean, period 1984-2019. Key: YFT, yellowfin tuna; SKJ, skipjack tuna; BET, bigeye tuna; ALB, albacore; FOB, floating object

TOTAL CATCH BY SPECIES (t)					
YEAR	YFT	SKJ	BET	ALB	TOTAL
1984	11453	6393	759	197	18802
1985	18431	18643	1330	145	38549
1986	20030	19108	1845	0	40983
1987	26301	27936	4974	4	59215
1988	44948	39742	6810	65	91565
1989	41146	64003	5863	0	111012
1990	43728	47926	4867	145	96666
1991	44023	41790	6005	1066	92884
1992	37836	46694	3638	1461	89629
1993	47792	51272	5418	904	105386
1994	43128	61608	5924	1773	112433
1995	65143	69587	12233	561	147524
1996	59431	66276	11374	826	137907
1997	60977	62914	15897	1029	140817
1998	38565	58646	11245	269	108725
1999	51875	74285	16034	232	142426
2000	52070	77187	10769	410	140436
2001	47571	68346	7930	339	124186
2002	53205	91462	11096	217	155980
2003	78968	88035	8544	520	176067
2004	80810	64393	8634	76	153913
2005	77519	94312	10290	48	182169
2006	70924	118857	9952	438	200171
2007	37763	65006	9756	246	112771
2008	46051	65096	12490	299	123936
2009	33511	66570	11781	52	111914
2010	45209	75131	10022	130	130492
2011	52256	67247	10702	121	130326
2012	57745	42892	7589	378	108604
2013	68352	64632	13880	117	146981
2014	57892	66597	8988	188	133665
2015	52631	58283	9832	144	120890
2016	51489	75264	9371	22	136146
2017	54513	84432	12345	100	151390
2018	46992	132986	28167	0	208145
2019	42273	119138	11303	40	172754

**Table 2.** Total catch reported by Spanish purse seiners associated with **FOBs**, by species, in the Indian Ocean, 1984-2019. Key: YFT, yellowfin tuna; SKJ, skipjack tuna; BET, bigeye tuna; ALB, albacore.

CATCH ON FOBs BY SPECIES (t)					
YEAR	YFT	SKJ	BET	ALB	TOTAL
<b>1984</b>	2115	3142	281	0	5538
<b>1985</b>	5286	12465	686	0	18437
<b>1986</b>	5765	10187	1273	0	17225
<b>1987</b>	10644	14949	2766	0	28359
<b>1988</b>	13578	30148	3578	0	47304
<b>1989</b>	15995	37185	3820	0	57000
<b>1990</b>	11789	35320	2375	40	49524
<b>1991</b>	9900	33906	3748	55	47609
<b>1992</b>	13726	37055	3118	6	53905
<b>1993</b>	13932	36839	2753	0	53524
<b>1994</b>	12822	43072	4117	39	60050
<b>1995</b>	36328	56534	10280	29	103171
<b>1996</b>	25996	45944	9396	12	81348
<b>1997</b>	38170	54240	14654	63	107127
<b>1998</b>	22043	49422	8562	18	80045
<b>1999</b>	34689	63459	14301	1	112450
<b>2000</b>	32046	67961	8719	43	108769
<b>2001</b>	18860	56964	6404	4	82232
<b>2002</b>	24710	84063	9566	4	118343
<b>2003</b>	32808	73288	5590	2	111688
<b>2004</b>	20264	56556	7597	0	84417
<b>2005</b>	29367	76328	6775	15	112485
<b>2006</b>	37072	104022	6843	0	147937
<b>2007</b>	18861	54232	7569	1	80663
<b>2008</b>	17647	58032	8220	32	83931
<b>2009</b>	21623	62096	9692	14	93425
<b>2010</b>	34448	70458	8580	9	113495
<b>2011</b>	36854	63709	7822	0	108385
<b>2012</b>	32946	41298	4948	17	79209
<b>2013</b>	55758	61364	12431	17	129570
<b>2014</b>	43478	63454	7558	124	114614
<b>2015</b>	31948	55290	6694	66	93998
<b>2016</b>	38662	72972	8461	10	120105
<b>2017</b>	36584	83426	7926	10	127945
<b>2018</b>	45257	131447	26373	0	203077
<b>2019</b>	33547	104938	7731	3	146220

**Table 3.** Total catch reported by Spanish purse seiners on **free-swimming schools**, by species, in the Indian Ocean, 1984-2019. Key: YFT, yellowfin tuna; SKJ, skipjack tuna; BET, bigeye tuna; ALB, albacore.

CATCH ON FREE SCHOOLS BY SPECIES (t)					
YEAR	YFT	SKJ	BET	ALB	TOTAL
<b>1984</b>	9338	3251	478	197	13264
<b>1985</b>	13145	6178	644	145	20112
<b>1986</b>	14265	8921	572	0	23758
<b>1987</b>	15657	12987	2208	4	30856
<b>1988</b>	31370	9594	3232	65	44261
<b>1989</b>	25151	26818	2043	0	54012
<b>1990</b>	31939	12606	2492	105	47142
<b>1991</b>	34123	7883	2257	1011	45274
<b>1992</b>	24110	9638	520	1455	35723
<b>1993</b>	33860	14432	2664	904	51860
<b>1994</b>	30306	18536	1807	1734	52383
<b>1995</b>	28815	13054	1953	531	44353
<b>1996</b>	33435	20332	1977	814	56558
<b>1997</b>	22807	8673	1243	966	33689
<b>1998</b>	16522	9224	2683	250	28679
<b>1999</b>	17186	10826	1732	231	29975
<b>2000</b>	20024	9225	2050	367	31666
<b>2001</b>	28712	11382	1526	335	41955
<b>2002</b>	28494	7398	1530	212	37634
<b>2003</b>	46160	14746	2954	517	64377
<b>2004</b>	60546	7837	1036	76	69495
<b>2005</b>	48152	17984	3515	33	69684
<b>2006</b>	33852	14835	3109	438	52234
<b>2007</b>	18902	10774	2187	245	32108
<b>2008</b>	28405	7064	4271	267	40007
<b>2009</b>	11888	4475	2089	39	18491
<b>2010</b>	10761	4672	1442	121	16996
<b>2011</b>	15402	3538	2880	121	21941
<b>2012</b>	24728	1594	2641	361	29324
<b>2013</b>	12595	3268	1449	100	17412
<b>2014</b>	14414	3143	1430	65	19052
<b>2015</b>	20682	2994	3137	78	26891
<b>2016</b>	12827	2291	910	12	16040
<b>2017</b>	17929	1006	4419	90	23444
<b>2018</b>	1735	1539	1794	0	5059
<b>2019</b>	8726	14200	3572	37	26535



**Table 4.** Spanish purse seiners total catch by species in the **FAO area 57**, period 1991-2019.

<b>CATCH AND EFFORT PS DATA AREA: F57</b>							
<b>YEAR</b>	<b>YFT</b>	<b>SKJ</b>	<b>BET</b>	<b>ALB</b>	<b>TOTAL</b>	<b>FISH. DAYS</b>	<b>#SETS+</b>
1991	0	0	0	0	0	1	0
1992	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0
1996	27	107	23	0	157	21	6
1997	123	147	35	0	305	33	14
1998	5736	4468	2716	6	12926	762	328
1999	59	149	40	0	248	33	11
2000	67	88	13	0	167	30	9
2001	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0
2004	1	4	1	0	5	1	1
2005	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0
2009	464	961	216	0	1641	47	51
2010	12	0	0	0	12	3	1
2011	15	62	16	0	94	1	3
2012	0	0	0	0	0	0	0
2013	29	129	26	0	184	16	9
2014	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0
2017	118	364	119	21	522	14	17
2018	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0

**Table 5.** Spanish purse seiners total catch by species in the **FAO area 51**, period 1991-2019.

<b>CATCH AND EFFORT PS DATA AREA: F51</b>							
<b>YEAR</b>	<b>YFT</b>	<b>SKJ</b>	<b>BET</b>	<b>ALB</b>	<b>TOTAL</b>	<b>FISH. DAYS</b>	<b>#SETS+</b>
<b>1991</b>	44023	41790	6005	1066	92923	4324	2402
<b>1992</b>	37836	46694	3638	1461	89629	4296	2594
<b>1993</b>	47792	51272	5418	904	105385	4565	2693
<b>1994</b>	43128	61608	5924	1773	112433	4463	2814
<b>1995</b>	65143	69587	12233	561	147524	5221	3341
<b>1996</b>	59404	66169	11351	826	138977	5771	3818
<b>1997</b>	60855	62767	15862	1029	140720	6374	3886
<b>1998</b>	32829	54179	8529	262	95799	4882	3053
<b>1999</b>	51816	74137	15994	232	142179	5192	3208
<b>2000</b>	52004	77099	10756	410	140705	4496	3160
<b>2001</b>	47571	68346	7930	339	124389	4940	3105
<b>2002</b>	53205	91462	11096	217	156386	4570	3088
<b>2003</b>	78968	88035	8544	520	176200	4468	2926
<b>2004</b>	80809	64389	8633	76	154101	4729	3020
<b>2005</b>	77519	94312	10290	48	182562	5808	4228
<b>2006</b>	70924	118857	9952	438	200543	6462	4688
<b>2007</b>	37763	65006	9756	246	112848	5895	3647
<b>2008</b>	46051	65096	12490	299	124004	4792	3505
<b>2009</b>	33047	65609	11566	52	110311	3737	3296
<b>2010</b>	45197	75131	10022	130	130507	3822	3705
<b>2011</b>	52241	67184	10686	121	130255	3850	3747
<b>2012</b>	57745	42892	7589	378	108608	3991	3415
<b>2013</b>	68323	64503	13854	114	146798	4208	3776
<b>2014</b>	57892	66597	8988	188	133739	4185	3472
<b>2015</b>	52631	58283	9832	144	120890	4157	3584
<b>2016</b>	51489	75264	9371	22	136174	4261	4256
<b>2017</b>	54395	84068	12226	79	150769	3498	3650
<b>2018</b>	46992	132986	28167	0	208145	3627	4259
<b>2019</b>	42273	119139	11304	40	172746	3680	4424

**Table 6.** Number of Spanish purse seiners by category of carrying capacity, total carrying capacity in tons and number of purse seiners and **support vessels** associated to this fishery, period 1990 - 2019.

Year	Capacity category class (t)						#P.seiners	C.Cap. (t)	#Supp
	50-400	401-600	601-800	801-1200	1201-2000	>2000			
1990	-	-	3	8	9	0	20	17908	-
1991	0	0	3	6	8	0	17	16568	-
1992	0	0	1	6	11	0	18	16711	-
1993	0	0	1	6	11	1	19	18953	-
1994	0	0	2	4	11	1	18	18779	-
1995	0	0	2	5	11	1	19	20908	-
1996	0	0	2	6	13	1	22	24090	-
1997	0	0	2	6	14	1	23	26128	-
1998	0	0	2	6	12	0	20	21243	-
1999	0	0	2	6	12	0	20	20260	6
2000	0	0	1	7	9	0	17	19473	7
2001	0	0	1	7	9	0	17	20479	5
2002	0	0	1	6	10	1	18	20490	8
2003	0	0	1	6	9	2	18	21007	8
2004	0	0	1	4	10	5	20	23832	15
2005	0	0	1	4	10	5	20	29052	13
2006	0	0	1	5	11	5	22	31224	13
2007	0	0	1	4	11	5	21	29438	13
2008	0	0	0	3	10	4	17	24212	11
2009	0	0	0	2	9	4	15	20805	11
2010	0	0	0	1	8	4	13	20677	6
2011	0	0	0	1	8	4	13	20458	7
2012	0	0	0	1	9	4	14	21657	6
2013	0	0	0	1	9	4	14	22056	4
2014	0	0	0	2	9	4	15	20761	7
2015	0	0	0	1	11	5	17	23251	10
2016	0	0	0	0	10	4	14	23507	11
2017	0	0	0	0	10	4	14	22811	10
2018	0	0	0	0	10	4	14	22811	6
2019	0	0	0	0	11	4	15	24061	6

**Table 7.** Nominal fishing effort in **fishing days** and **searching days** of the purse seine Spanish fleet, period 1990-2019

YEAR	F.DAYS	S.DAYS
1990	5006	4205
1991	4325	3544
1992	4296	3591
1993	4565	3842
1994	4463	3771
1995	5221	4470
1996	5793	4925
1997	6407	5584
1998	5644	4888
1999	5224	4496
2000	4526	3825
2001	4940	4214
2002	4570	3889
2003	4468	3671
2004	4730	3891
2005	5808	4619
2006	6462	5180
2007	5895	4916
2008	4792	3882
2009	3784	2992
2010	3825	2938
2011	3851	2944
2012	3991	3150
2013	4224	3326
2014	4185	3340
2015	4157	3287
2016	4261	3268
2017	3512	2618
2018	3627	2632
2019	3680	2616

**Table 8.** Total number of sets, positive sets and null sets. Same statistics by fishing mode.

YEAR	ALL			FOB-ASSOCIATED SCHOOLS			FREE-SWIMMING SCHOOLS		
	N° total SETS	N° SETS +	N° SETS -	N° total SETS	N° SETS +	N° SETS -	N° total SETS	N° SETS +	N° SETS -
1990	4131	2876	1255	1612	1461	151	2519	1415	1104
1991	3291	2402	889	1409	1311	98	1882	1091	791
1992	3422	2594	828	1435	1377	58	1987	1217	770
1993	3756	2693	1063	1425	1372	53	2331	1321	1010
1994	3974	2814	1160	1413	1328	85	2561	1486	1075
1995	4197	3341	856	2287	2151	136	1910	1190	720
1996	4929	3824	1105	2166	2102	64	2763	1722	1041
1997	4592	3900	692	3004	2892	112	1588	1008	580
1998	4339	3381	958	2651	2512	139	1688	869	819
1999	4040	3219	821	2363	2267	96	1677	952	725
2000	3856	3169	687	2331	2236	95	1525	933	592
2001	4050	3105	945	2088	2004	84	1962	1101	861
2002	3681	3088	593	2331	2239	92	1350	849	501
2003	3801	2926	875	1932	1822	110	1869	1104	765
2004	4247	3021	1226	1884	1775	109	2363	1246	1117
2005	5815	4228	1587	2768	2620	148	3047	1608	1439
2006	6244	4688	1556	3333	3100	233	2911	1588	1323
2007	4940	3647	1293	2955	2624	331	1985	1023	962
2008	4495	3505	990	2564	2369	195	1931	1136	795
2009	3824	3347	477	2940	2773	167	884	574	310
2010	4309	3706	603	3442	3219	223	867	487	380
2011	4393	3750	643	3402	3196	206	991	554	437
2012	4135	3415	720	2855	2643	212	1280	772	508
2013	4253	3785	468	3626	3419	207	627	366	261
2014	4040	3472	568	3271	3045	226	769	427	342
2015	4235	3584	651	3109	2932	177	1126	652	474
2016	4809	4256	553	3991	3844	147	818	412	406
2017	4246	3667	579	3354	3197	157	892	470	422
2018	4558	4259	299	4387	4163	224	171	96	75
2019	5038	4424	614	4190	3932	258	848	492	356

**Table 9.** Number of **1x1 degree squares** explored by the purse seine Spanish fleet in the Indian ocean, period 1991-2019. The same, considering different minimum effort limits and number of squares with sets and with catch.

NUMBER OF 1°X1° SQUARE PROSPECTED BY THE SPANISH FLEET					
YEA R	N. CWP VISITED	N. CWP with SET	N. CWP with CATCH	N. CWP Eff >12hrs	N. CWP Eff >60hrs
1990	395	319	199	301	286
1991	370	290	197	289	277
1992	419	347	223	338	324
1993	415	318	202	317	308
1994	479	380	218	359	348
1995	447	357	210	343	339
1996	574	459	280	446	437
1997	627	490	281	454	437
1998	742	547	263	525	512
1999	584	438	247	459	442
2000	585	428	223	450	430
2001	506	412	262	426	405
2002	534	448	430	436	259
2003	511	421	403	396	252
2004	492	376	359	368	221
2005	514	414	383	391	250
2006	563	473	464	449	275
2007	579	488	466	457	263
2008	577	504	483	476	276
2009	629	524	517	485	239
2010	531	480	464	411	232
2011	522	458	452	405	221
2012	500	416	405	398	224
2013	568	503	493	456	233
2014	460	390	382	352	200
2015	476	430	419	391	200
2016	554	532	524	450	263
2017	541	491	478	409	190
2018	544	518	510	479	232
2019	511	456	450	393	215

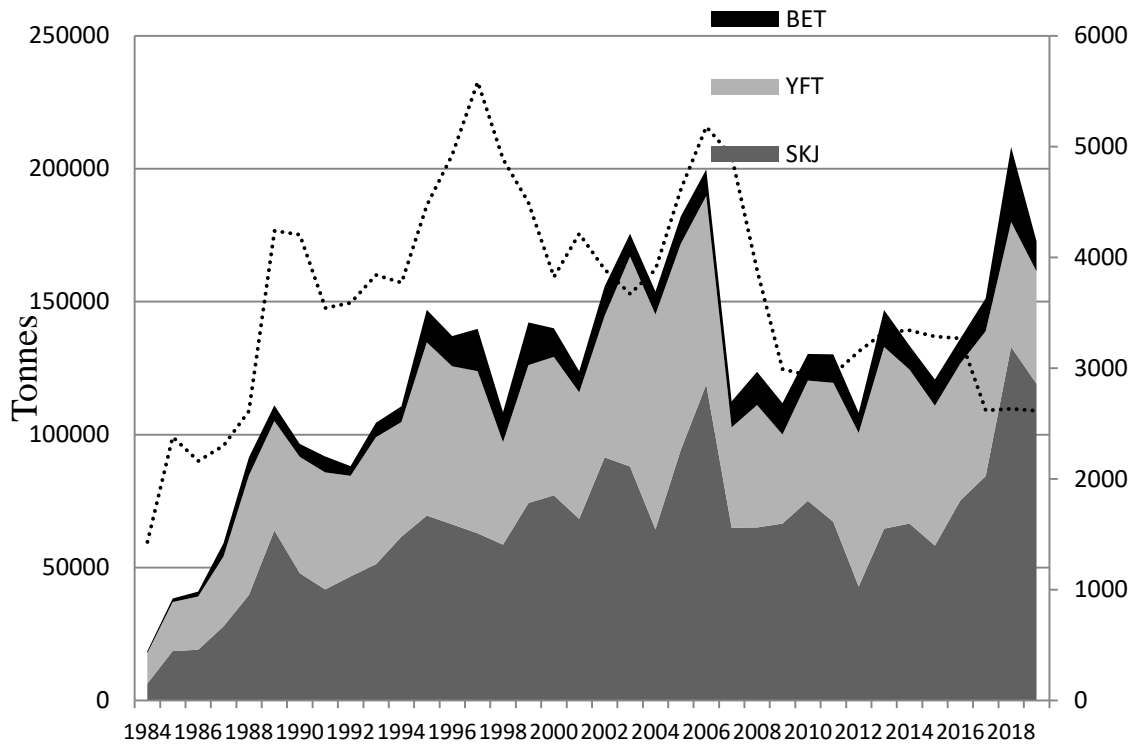
**Table 10.** Number of tuna fishes sampled in Victoria port during 2019 by month and species.

Month	Tuna species	Number of fishes counted	Number of fishes measured
January	<i>Thunnus albacares</i>	3070	3070
January	<i>Auxis thazard</i>	446	446
January	<i>Katsuwonus pelamis</i>	9103	2200
January	<i>Thunnus obesus</i>	728	728
February	<i>Thunnus albacares</i>	7427	7427
February	<i>Auxis thazard</i>	830	830
February	<i>Katsuwonus pelamis</i>	22455	5800
February	<i>Thunnus obesus</i>	1678	1678
February	<i>Euthynnus affinis</i>	34	34
March	<i>Thunnus albacares</i>	4116	4116
March	<i>Auxis thazard</i>	495	495
March	<i>Katsuwonus pelamis</i>	14692	3700
March	<i>Thunnus obesus</i>	1219	1219
March	<i>Euthynnus affinis</i>	1	1
April	<i>Thunnus albacares</i>	2038	2038
April	<i>Auxis thazard</i>	121	121
April	<i>Katsuwonus pelamis</i>	12067	2700
April	<i>Thunnus obesus</i>	371	371
April	<i>Euthynnus affinis</i>	1	1
May	<i>Thunnus albacares</i>	3894	3894
May	<i>Auxis thazard</i>	168	168
May	<i>Katsuwonus pelamis</i>	19037	4100
May	<i>Thunnus obesus</i>	329	329
June	<i>Thunnus albacares</i>	4565	4565
June	<i>Auxis thazard</i>	675	675
June	<i>Katsuwonus pelamis</i>	13656	3500
June	<i>Thunnus obesus</i>	177	177
June	<i>Euthynnus affinis</i>	122	122
July	<i>Thunnus albacares</i>	6244	6244
July	<i>Auxis thazard</i>	128	128
July	<i>Thunnus alalunga</i>	8	8
July	<i>Katsuwonus pelamis</i>	5928	1800
July	<i>Thunnus obesus</i>	674	674
July	<i>Euthynnus affinis</i>	43	43
August	<i>Thunnus albacares</i>	6981	6981
August	<i>Auxis thazard</i>	591	591
August	<i>Katsuwonus pelamis</i>	25841	6600
August	<i>Thunnus obesus</i>	1682	1682
September	<i>Thunnus albacares</i>	5807	5807
September	<i>Auxis thazard</i>	1127	1127
September	<i>Katsuwonus pelamis</i>	24651	6150
September	<i>Thunnus obesus</i>	1006	1006
October	<i>Thunnus albacares</i>	6266	6266
October	<i>Auxis thazard</i>	619	619
October	<i>Katsuwonus pelamis</i>	19884	5100
October	<i>Thunnus obesus</i>	940	940
November	<i>Thunnus albacares</i>	7556	7556
November	<i>Auxis thazard</i>	1112	1112
November	<i>Katsuwonus pelamis</i>	30115	7500
November	<i>Thunnus obesus</i>	668	668
November	<i>Euthynnus affinis</i>	2	2
December	<i>Thunnus albacares</i>	8256	8256
December	<i>Auxis thazard</i>	302	302
December	<i>Katsuwonus pelamis</i>	25540	4550
December	<i>Thunnus obesus</i>	1401	1401
	<b>TOTAL</b>	<b>306887</b>	<b>137618</b>

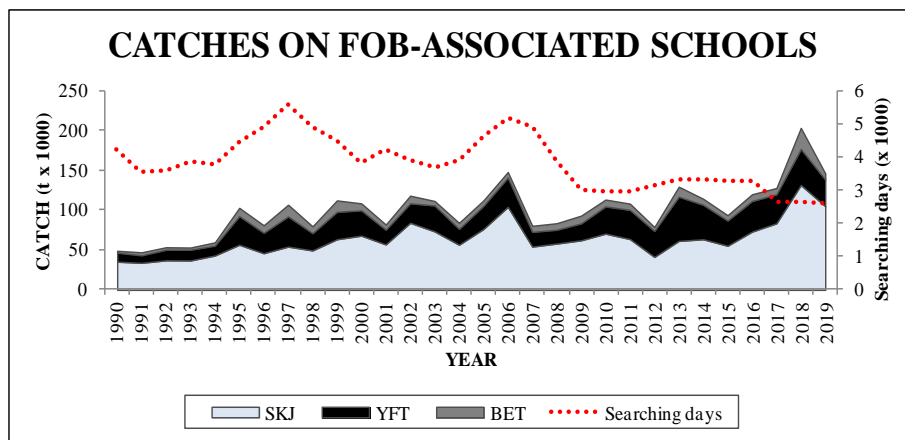
**Table 11** Trend in the number of man-made FADs deployed by the Spanish fleet, including supply vessels. Key: PS, Purse seiners; SV, Supply vessel.

Year	TOTAL FADs deployed	PS_FADs deployed	SV_FADs deployed	Total Vessels	Number PS	Number SV
2017	12688	6526	6162	24	14	10
2018	10177	5976	4201	20	14	6
2019	8364	5033	3331	21	15	6

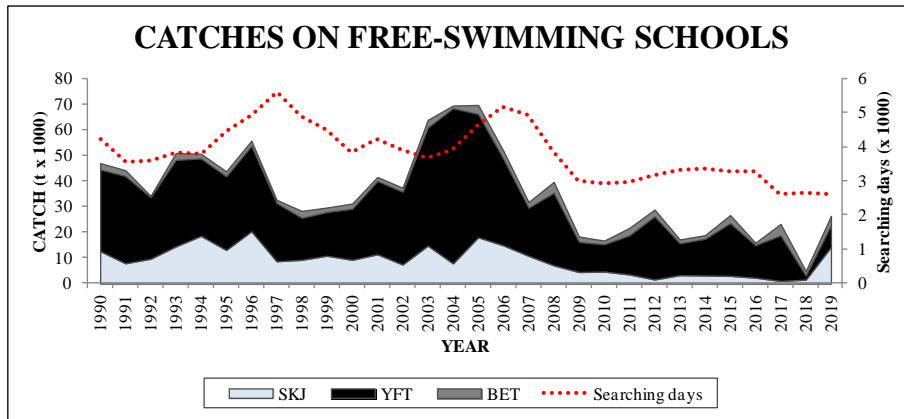




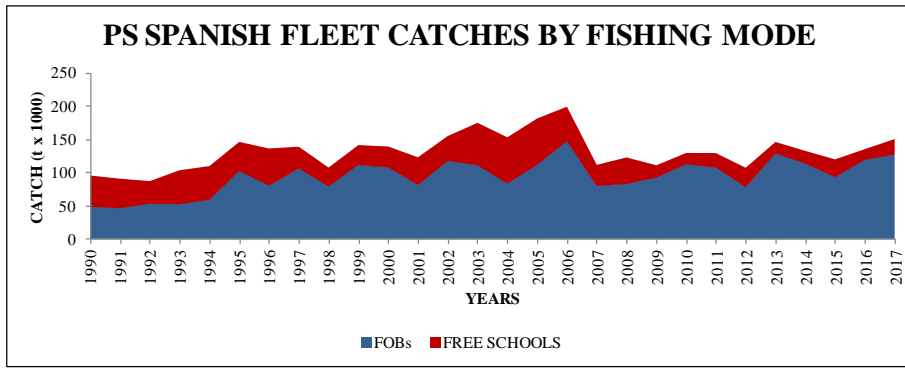
**Figure 1.** Catch by species and effort in searching days of the purse seine Spanish fleet.



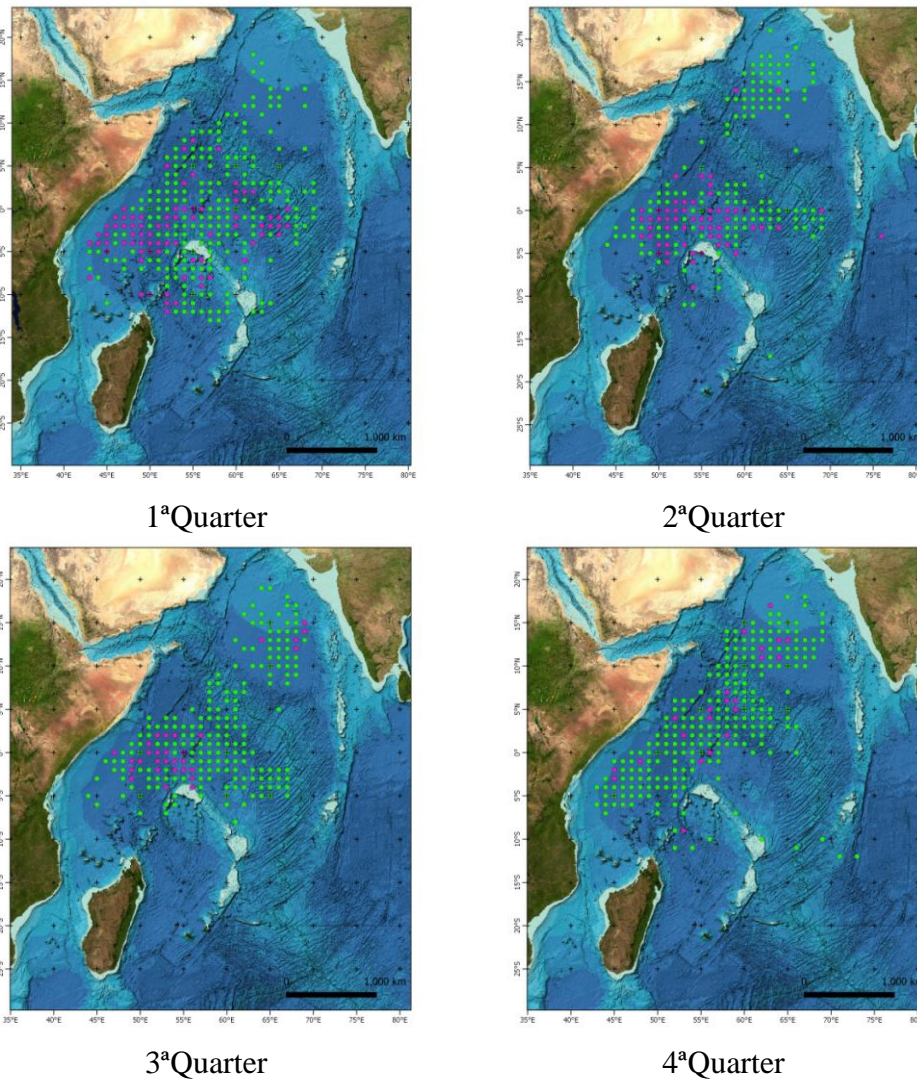
**Figure 2.** Catch by species on floating objects and effort in searching days of the purse seine Spanish fleet.



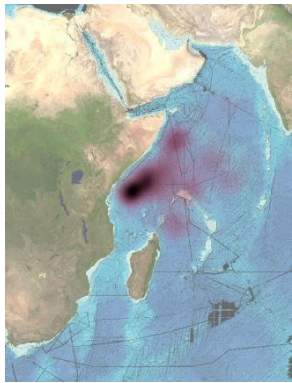
**Figure 3.** Catch by species on free schools and effort in searching days of the purse seine Spanish fleet.



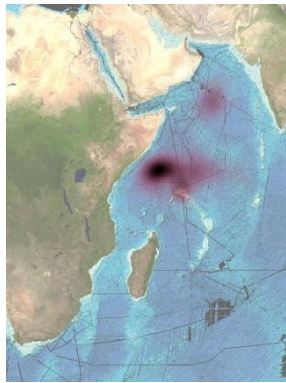
**Figure 4.** Catch by fishing mode (floating object and free school) of the purse seine Spanish fleet.



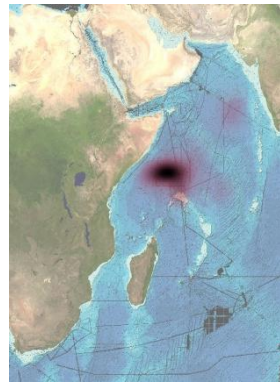
**Figure 5.** Distribution of the effort (fishing days) of the purse seine Spanish fleet in 2019 per quarter and fishing mode. Key: Green, FOB-associated sets; Pink, Free-swimming school sets.



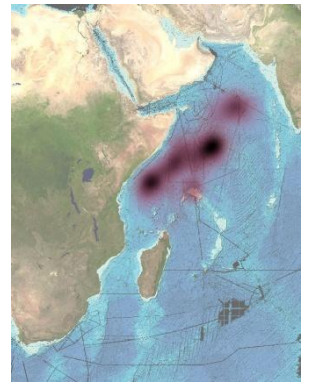
Skipjack tuna catches 1<sup>o</sup>Quarter FOB associated Sets



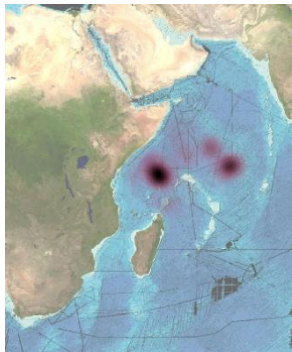
Skipjack tuna catches 2<sup>o</sup>Quarter FOB associated Sets



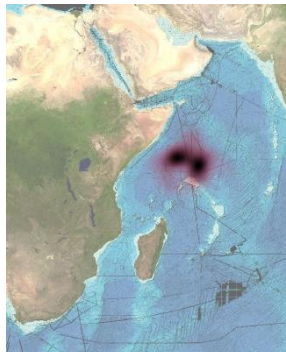
Skipjack tuna catches 3<sup>o</sup>Quarter FOB associated Sets



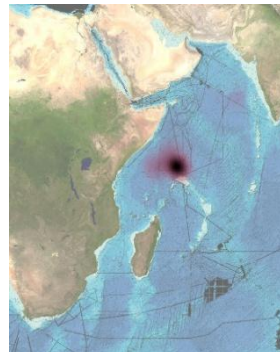
Skipjack tuna catches 4<sup>o</sup>Quarter FOB associated Sets



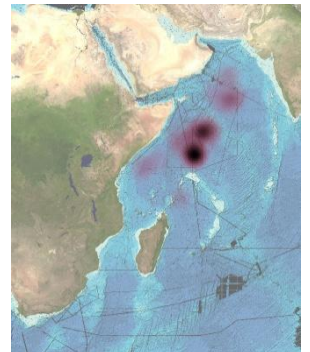
Skipjack tuna catches 1<sup>o</sup>Quarter Free school Sets



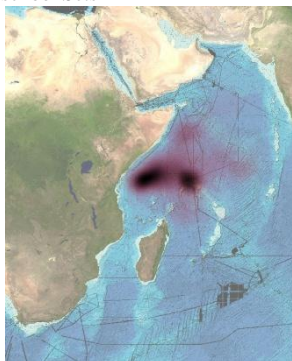
Skipjack tuna catches 2<sup>o</sup>Quarter Free school Sets



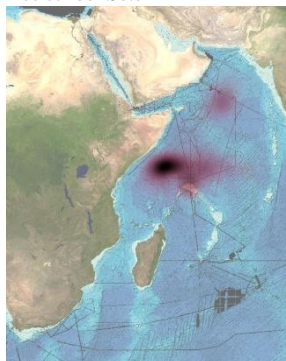
Skipjack tuna catches 3<sup>o</sup>Quarter Free school Sets



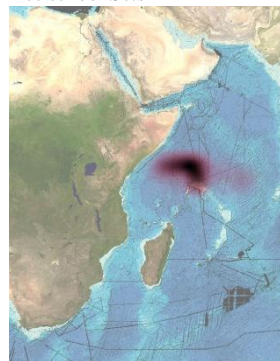
Skipjack tuna catches 4<sup>o</sup>Quarter Free school Sets



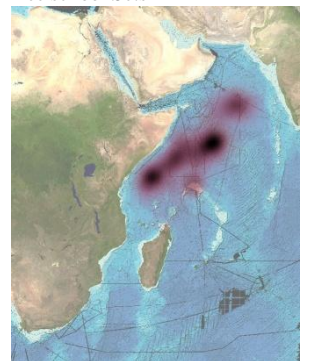
Yellowfin tuna catches 1<sup>o</sup>Quarter FOB associated Sets



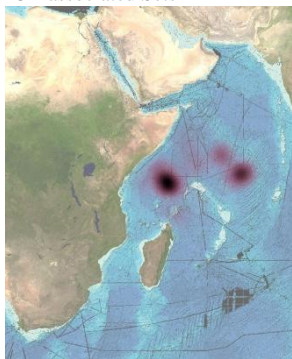
Yellowfin tuna catches 2<sup>o</sup>Quarter FOB associated Sets



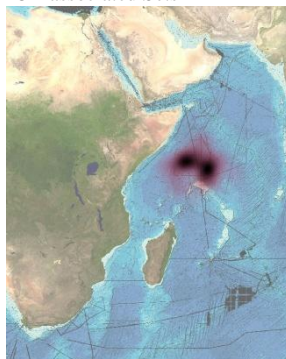
Yellowfin tuna catches 3<sup>o</sup>Quarter FOB associated Sets



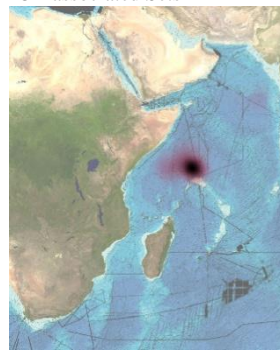
Yellowfin tuna catches 4<sup>o</sup>Quarter FOB associated Sets



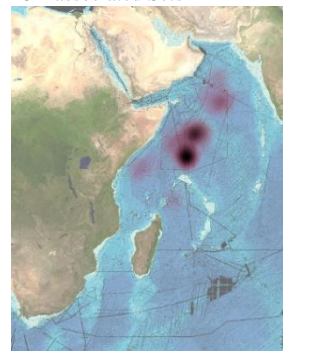
Yellowfin tuna catches 1<sup>o</sup>Quarter Free school Sets



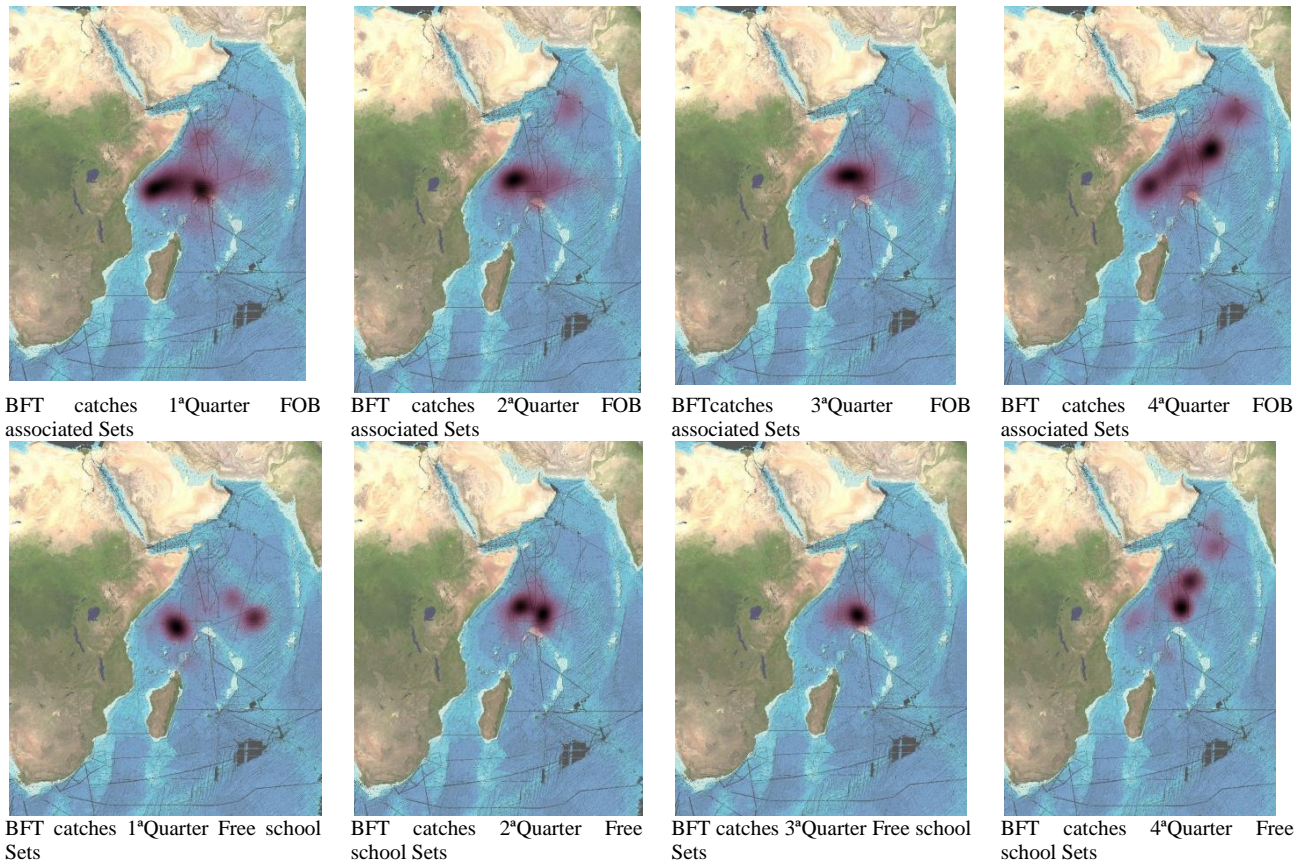
Yellowfin tuna catches 2<sup>o</sup>Quarter Free school Sets



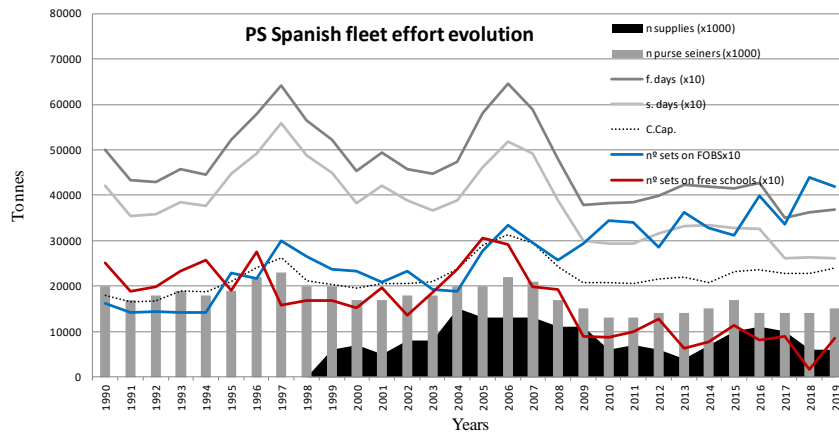
Yellowfin tuna catches 3<sup>o</sup>Quarter Free school Sets



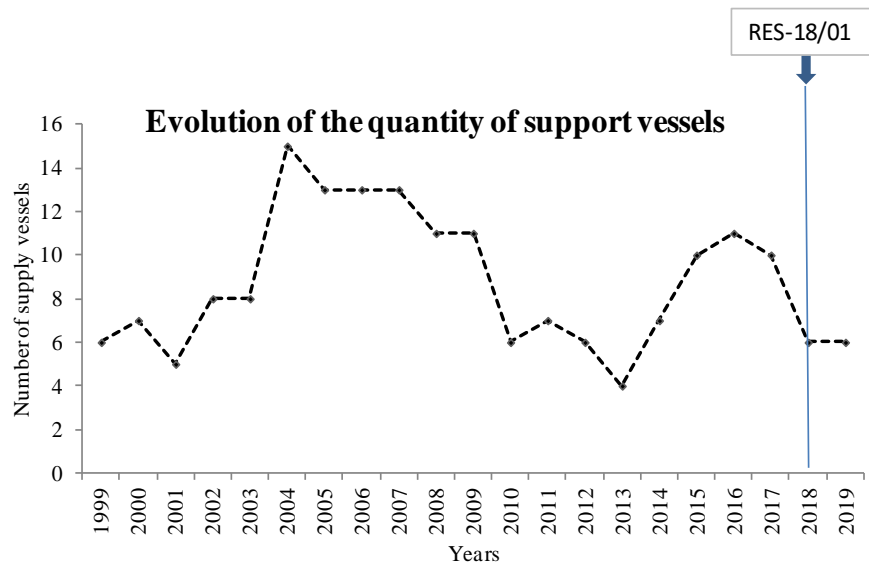
Yellowfin tuna catches 4<sup>o</sup>Quarter Free school Sets



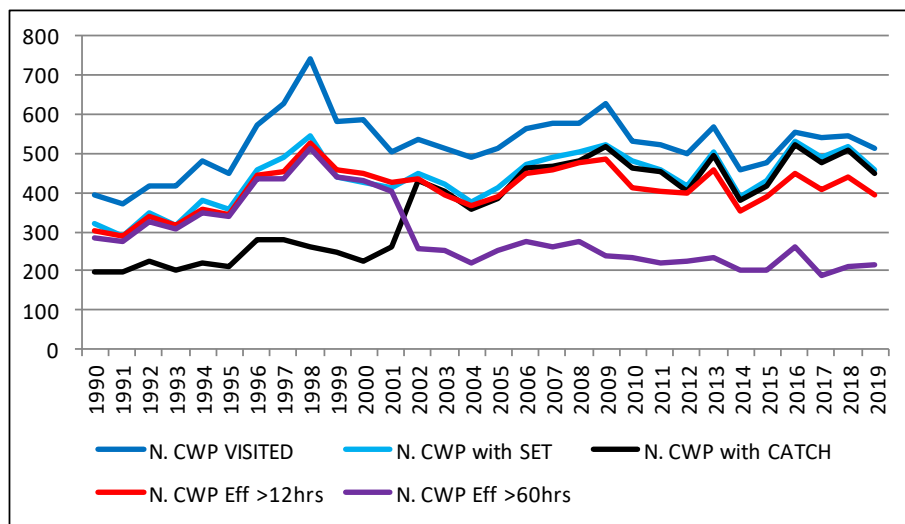
**Figure 6.** Distribution of the catches by species of de PS Spanish fleet in 2019 per quarter, species and fishing mode.



**Figure 7.** Yearly track of some parameters to quantify the Spanish purse seiners fishery effort: number of support vessels since 1999 (n supplies x1000), number of purse seiner vessels (n purse seiners x1000), fishing and searching days, carrying capacity (C.Cap) and number of sets by fishing mode (Floating objects and free schools).



**Figure 8.** Number of supply vessels associated to the Spanish purse seiner fleet



**Figure 9.** Spatial extent of EU-Spain purse seiner fishery showing the annual number of one degree squares visited with different efforts.

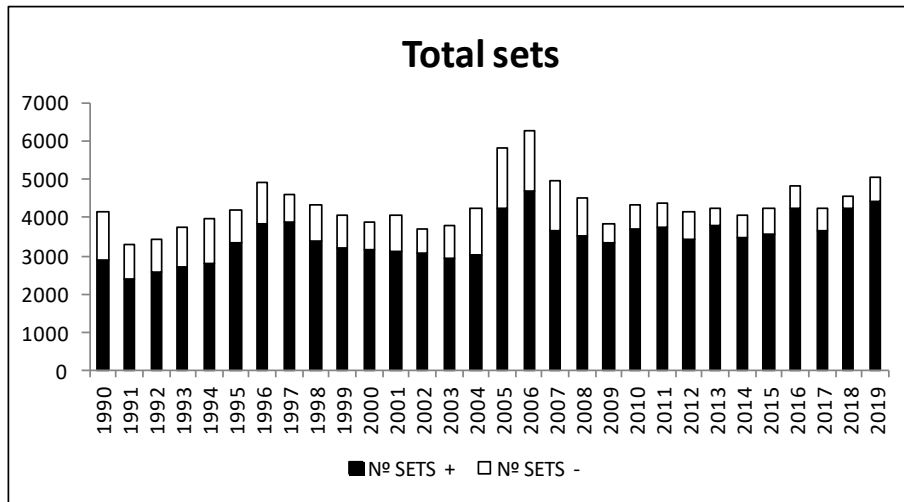


Figure 10. Number of positives and nulls sets.

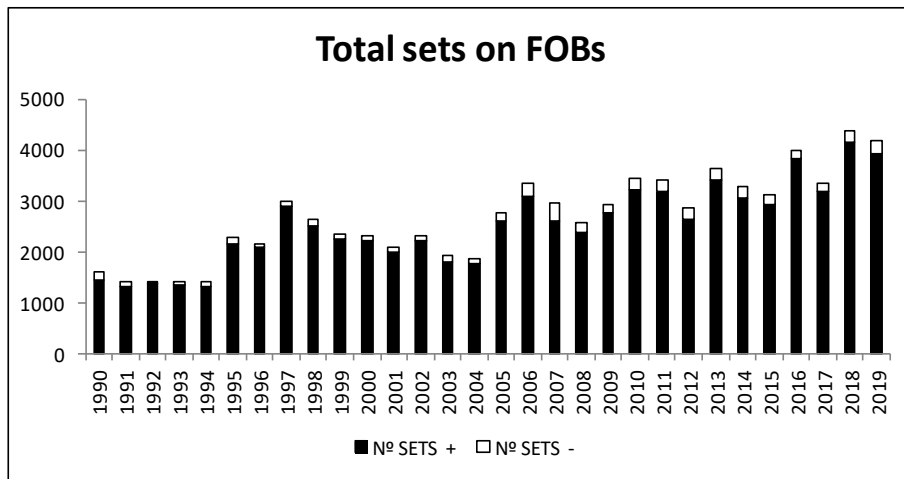


Figure 11. Number of positives and nulls sets on floating objects.

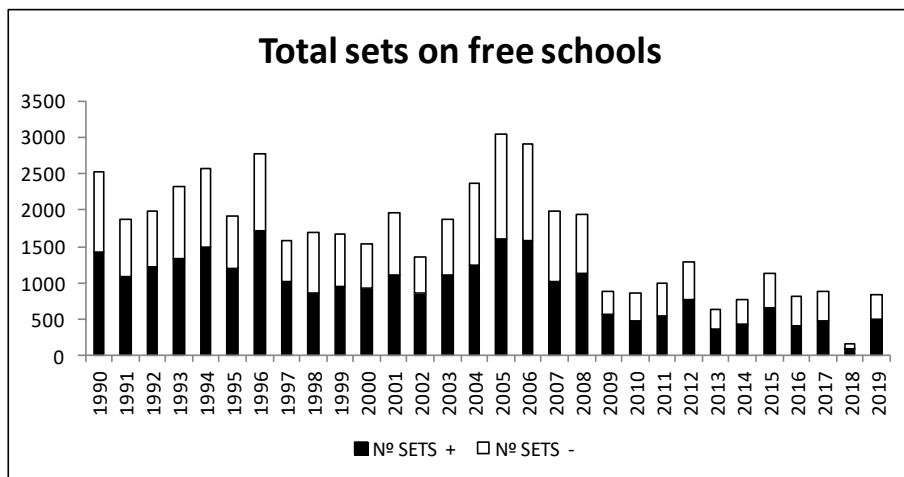
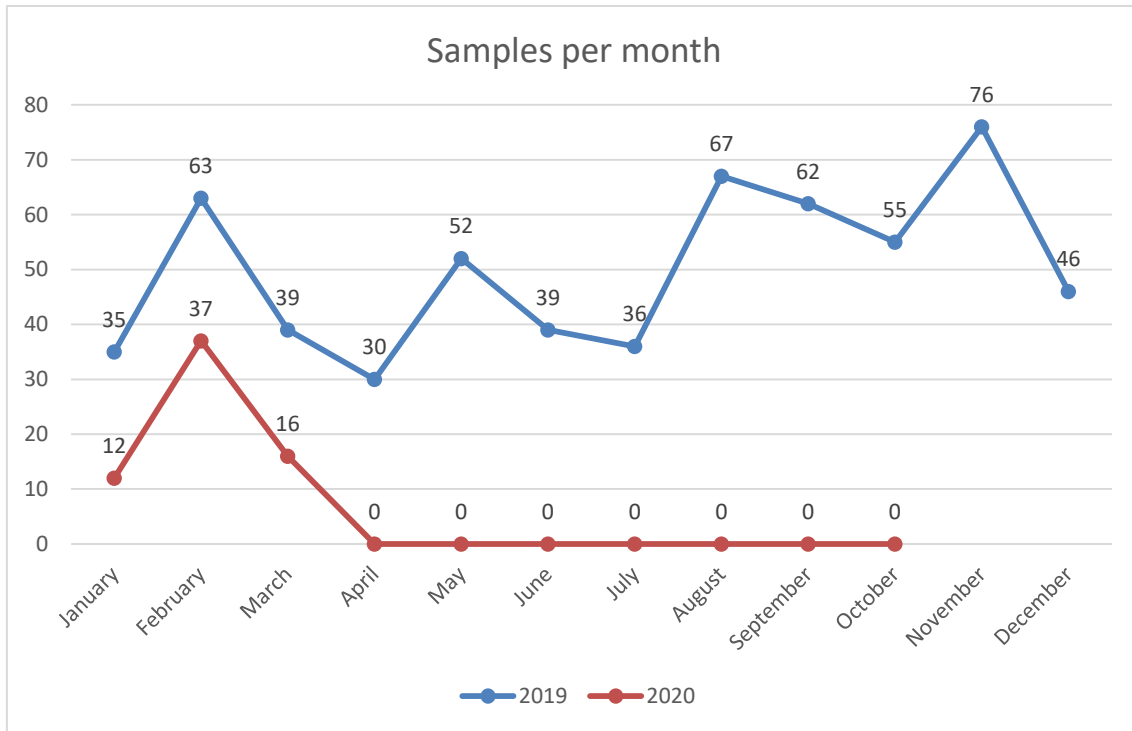
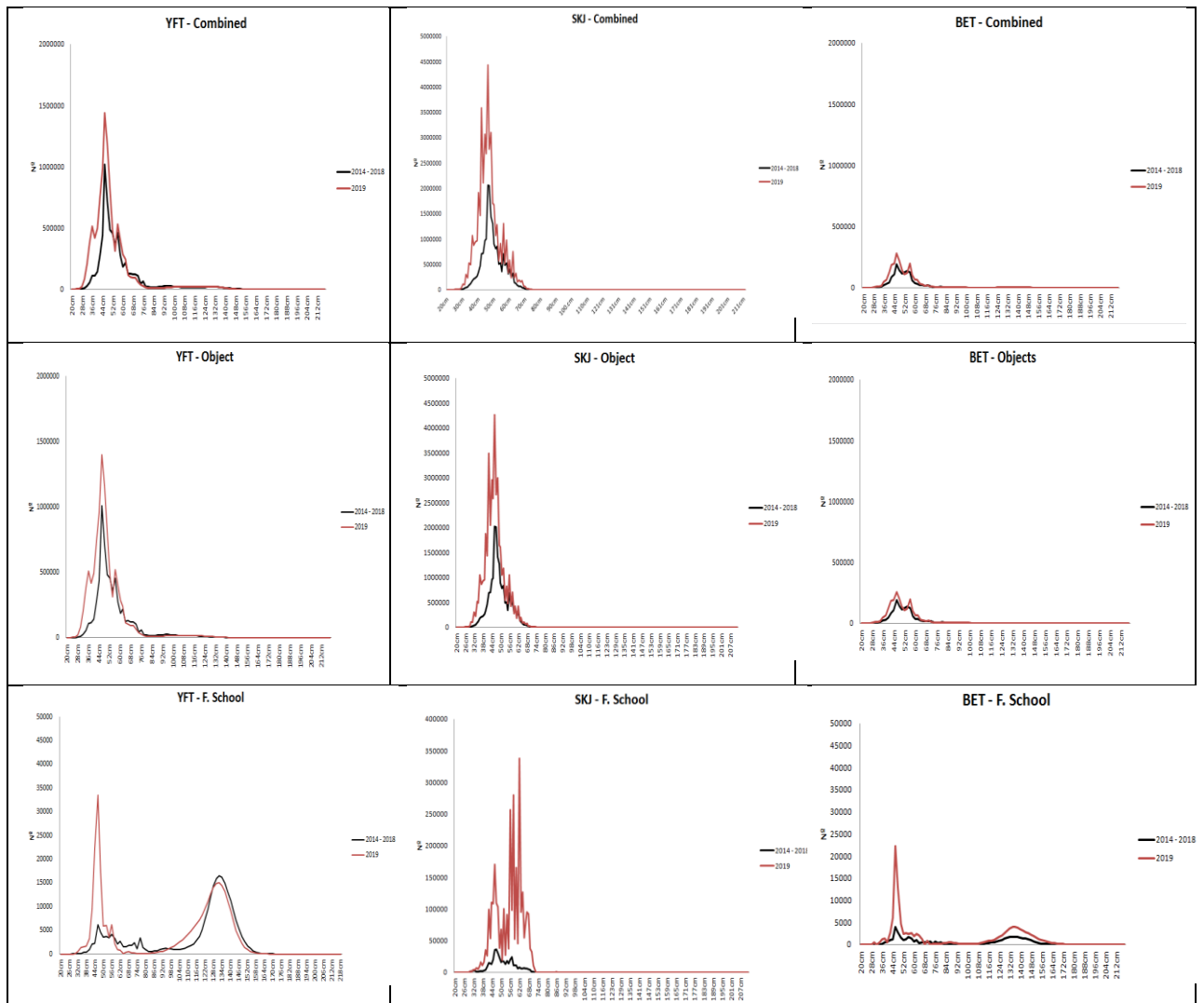


Figure 12. Number of positive and nulls sets on free schools.



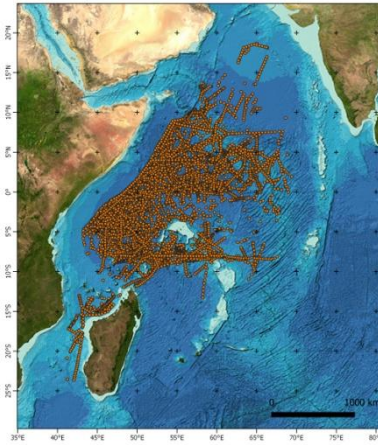
**Figure 13.** Number of samples during Spanish Purse seiners unloading in Victoria port by month during 2019-2020.



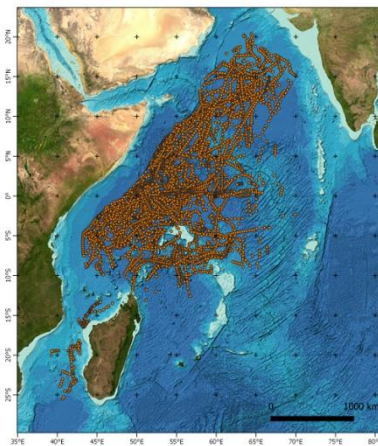


**Figure 14.** Size distribution of the catches by species (YFT, left; SKJ, middle; BET, right), by fishing mode (combined, top; Objects, middle; Free schools, bottom), in 2019 and on average over 2014 - 2018 period.

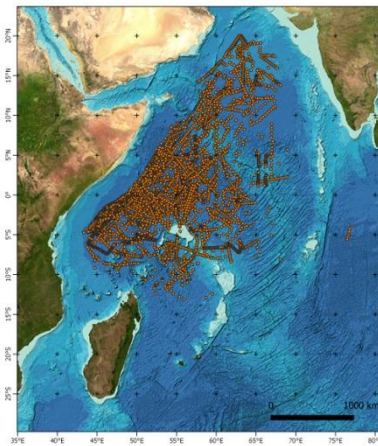
Deployed  
2017



Deployed  
2018



Deployed  
2019



**Figure 15.** Map distribution of the man-made FADs deployed during the period 2017-2019.

