IOTC-2005-SC-INF06

SEYCHELLES NATIONAL REPORT 2004

Prepared by the Industrial Fisheries Research Section

Seychelles Fishing Authority

1. INTRODUCTION

The Seychelles Fishing Authority (SFA) was incorporated in August 1984, coinciding with the immense expansion of industrial fishing activities in the Western Indian Ocean, to coordinate and manage the development of the fisheries sector. Since it was set up, the SFA has been collecting catch and effort information via a logbook system as a result of licensing requirements agreed under the various fishing agreements with foreign fishing fleets. Collection of size frequency data for purse seiners has been conducted in close collaboration with experts from the Spanish Fishing Agency through Instituto Español de Oceanografia (IEO) and French Scientists from IRD, (Institut de Recherche pour le Developement). A fisheries data collection and sampling programme for the semi-industrial longline fishery has also been in place since this fishery started in 1995.

The Seychelles National Report summarizes activities of the industrial purse seine fleet licensed to operate inside the Seychelles EEZ and the activities of the local "semi industrial'' monofilament longline fishery targeting swordfish for the past 4 years. Statistics include licenses issued, catches, effort and fishing ground exploited. The report also highlights the activities carried out to improve the processing and management of industrial longline data and reports on current research activities.

2.0 PURSE SEINE FISHERY

2-1. Licences issued and fleet composition

Table 1a shows the number of licences issued and number of individual purse seiners licensed to operate inside of the Seychelles EEZ over the past 4 years. The main fishing nations involved in purse seining in the WIO are those from European union member countries (French, Spanish) taking over 60 percent of the annual licenses. Seychelles registered purse seiners (French and Spanish origin) started to operate in 1997. There are currently 13 Seychelles flagged purse seiners (all Spanish origin) fishing in the Indian Ocean. Figure 1 shows the trend in the number of purse seiners and their corresponding carrying capacity from 2000 to 2004.
Tables 1b to 1e show the number of purse seiners according to their category (GRT) by fleet. Figures 2 and 3 show the trend in the number of purse seiners according to their GRTs for the whole fleet and the Seychelles' fleet respectively.
Overall no significant changes have been recorded in the purse seine fleet over the past 4 years. However the number of vessels and total carrying capacity of the Seychelles' fleet has increased slightly over the past 2 years.

2-2. Fishing effort

Table 2a shows the carrying capacity and the nominal fishing effort (fishing days) for the whole purse seine fleet and the Seychelles' fleet. This is also illustrated in figure 4 and figure 5. A Slight downward trend in the overall fishing effort was over the past 3 years. The Seychelles 'fleet recorded an increase in fishing effort corresponding with the increase in the fleet's carrying capacity.
Table 2b shows the number of purse seine sets according to school types. Overall the number of purse seine sets has remained stable over the past 4 years. An increase in the number of sets on free-swimming schools was recorded in 2003 and 2004 (figure 6). The Seychelles' fleet recorded increases in the number of sets made on both free-swimming schools and Fads associated schools (figure 7). The overall proportion of positive and null sets have remained relatively constant over the 4 years period.

2-3. Catch

Table 3a shows the total yearly catch by species for the entire fleet and for the Seychelles' fleet. These are also illustrated in figures 10 and 11. A slight drop in total catch was reported in 2004 compared to 2003.
Figures 12 to 15 illustrate catches by fishing mode for the entire purse seine fleet and for the Seychelles' fleet. A significant increase in yellowfin tuna catches on free-swimming schools was recorded in 2003 and 2004, whereas a drop in skipjack catches was recorded on both free-swimming schools and Fads associated schools.

Maps 1 and 2 show the distribution of catch reported by the whole purse seine fleet and the Seychelles' fleet during 2004. Maps 3 and 4 show mean catches reported from 2000 to 2003.

2-4. Yeild

Table 4a shows the different catch rates by species and table 4b and 4c show that same information by fishing mode. An increase in catch rates on yellowfin tuna was recorded in 2003 and 2004.

Table 1a. Number of purse seiners by country licensed to fish inside of the Seychelles EEZ.

Country Year	Spain	France	Seychelles	Others	Total Licenses	Number of vessels
2000	22	15	6	14	57	54
2001	18	19	11	16	64	55
2002	20	20	7	11	58	53
2003	19	16	11	9	55	50
2004	22	15	14	5	56	51

Table 1.b. Spanish purse seiners by categories (carrying capacity) licensed to fish in the Seychelles EEZ.

Class Year	50 -400	401-600	601-800	801-1200	1201-2002	>2000	Total
2000	**0**	**0**	**1**	**6**	**9**	**1**	**17**
2001	**0**	**0**	**1**	**6**	**9**	**1**	**17**
2002	**0**	**0**	**1**	**6**	**10**	**1**	**18**
2003	**0**	**0**	**1**	**6**	**9**	**2**	**18**
2004	**0**	**0**	**1**	**4**	**10**	**5**	**20**

Table 1.c. French purse seiners by categories (carrying capacity) licensed to fish in the Seychelles EEZ.

Class Year	50 -400	401-600	601-800	801-1200	1201-2002	>2000	Total
2000	**1**	**1**	**2**	**8**	**3**	**0**	**15**
2001	**1**	**1**	**2**	**10**	**5**	**0**	**19**
2002	**0**	**1**	**2**	**8**	**5**	**0**	**16**
2003	**0**	**0**	**1**	**8**	**5**	**0**	**14**
2004	**0**	**0**	**2**	**8**	**5**	**0**	**15**

Table 1.d. Seychelles purse seiners by category (carrying capacity) licensed to fish in the Seychelles EEZ.

Class Year	50 -400	401-600	601-800	801-1200	1201-2000	>2000	Total
2000	**0**	**0**	**0**	**1**	**5**	**0**	**6**
2001	**0**	**0**	**0**	**2**	**8**	**0**	**10**
2002	**0**	**0**	**0**	**2**	**5**	**0**	**7**
2003	**0**	**0**	**0**	**5**	**5**	**1**	**11**
2004	**0**	**0**	**0**	**5**	**5**	**3**	**13**

Table 1.e. NEI purse seiners by categories (carrying capacity) licensed to fish in the Seychelles EEZ.

Class Year	50 -400	401-600	601-800	801-1200	1201-2000	>2000	Total
2000	**0**	**1**	**1**	**4**	**6**	**2**	**14**
2001	**0**	**0**	**1**	**6**	**6**	**2**	**15**
2002	**0**	**0**	**1**	**6**	**2**	**2**	**11**
2003	**0**	**0**	**1**	**4**	**2**	**2**	**9**
2004	**0**	**0**	**0**	**2**	**1**	**1**	**4**

Table 2a. Purse seine fishing effort (fishing days) reported on different school type

CARRYING CAPACITY AND FISHING EFFORT (WHOLE FLEET)		
YEAR	**C.CAPACITY**	**FISHING DAYS**
2000	53494	12925
2001	57619	13826
2002	55774	13152
2003	52888	11710
2004	54173	11928
CARRYING CAPACITY AND FISHING EFFORT (SEYCHELLES' FLEET)		
YEAR	**C.CAPACITY**	**FISHING DAYS**
2000	6312	1230
2001	10409	2089
2002	8837	1791
2003	10948	2249
2004	13574	2677

Table 2b. Purse seine fishing effort (number of sets by school type)

SETS BY SCHOOLS TYPE (ALL COUNTRIES)												
	COMBINED			**LOGS**			**FREE SCHOOL**			**UNSPECIFIED**		
YEAR	**Total**	**Positives**	**Null**	**Total**	**Positives**	**Null**	**Total**	**Positives**	**Null**	**Total**	**Positives**	**Null**
2000	10357	8105	2252	5843	5271	572	3992	2542	1450	522	292	230
2001	10641	8074	2567	4995	4693	302	5284	3083	2201	362	298	64
2002	10269	8329	1940	5861	5620	241	4191	2521	1670	217	188	29
2003	10131	7515	2616	4518	4223	295	5317	3022	2295	296	270	26
2004	11042	7642	3400	4467	4177	290	6507	3407	3100	68	58	10
SETS SCHOOLS TYPE (SEYCHELLES)												
	COMBINED			**LOGS**			**FREE SCHOOL**			**UNSPECIFIED**		
YEAR	**Total**	**Positives**	**Null**	**Total**	**Positives**	**Null**	**Total**	**Positives**	**Null**	**Total**	**Positives**	**Null**
2000	986	736	250	443	385	58	440	276	164	103	75	28
2001	1352	1070	282	651	611	40	504	273	231	197	186	11
2002	1226	1020	206	655	616	39	449	288	161	122	116	6
2003	1512	1224	288	785	749	36	712	462	250	15	13	2
2004	2212	1695	517	1010	964	46	1202	731	471	0	0	0

Table 3a. Purse seine species composition of total catch

TOTAL CATCH BY SPECIES (ALL COUNTRIES)					
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
2000	113649	191424	21985	1082	330275
2001	111877	165492	18132	2157	299957
2002	128206	217847	25826	789	378027
2003	197782	189566	19026	1583	408366
2004	201727	137103	18848	242	358258
TOTAL CATCH BY SPECIES (SEYCHELLES)					
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
2000	10917	13311	1847	57	26877
2001	11286	26921	2209	829	41332
2002	15746	31583	3075	102	50522
2003	33360	36822	3364	174	73780
2004	48797	29960	4395	59	83305

Table 3b. Purse seine species composition of catch reported on free-swimming schools

CATCH ON FREE SCHOOLS BY SPECIES (ALL COUNTRIES)					
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
2000	47062	32222	3113	890	84185
2001	70636	32486	3556	1665	110226
2002	73149	24233	3774	684	105877
2003	128807	32380	7030	1541	169859
2004	155976	19813	3457	232	179483
CATCH ON FREE SCHOOL BY SPECIES (SEYCHELLES)					
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
2000	4760	2305	370	5	8093
2001	5577	4058	310	596	10540
2002	8194	2865	447	101	11607
2003	20216	7806	1015	174	29255
2004	37693	3355	654	57	41762

Table 3c. Purse seine species composition of catch reported on FADs associated schools

CATCH ON FLOATING OBJECTS BY SPECIES (ALL COUNTRIES)					
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
2000	62186	154189	18589	159	235996
2001	39266	124055	14426	475	178576
2002	53748	185639	21820	104	262636
2003	66324	144087	11805	41	222557
2004	44879	115396	15375	10	175994
CATCH ON FLOATING OBJECTS BY SPECIES (SEYCHELLES)					
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
2000	4526	10167	1389	37	16210
2001	4889	16901	1860	229	23963
2002	6648	22352	2456	1	31474
2003	12909	28628	2335	0	43889
2004	11104	26605	3741	2	41543

Table 4a. Purse seiners catch rate (tons/fishing day and tons/positive set) by species reported on all school type

	Overall CPUE, tons/fishing day (ALL COUNTRIES)					Overall CPUE, tons/positive sets (ALL COUNTRIES)				
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
2000	8.79	14.81	1.70	0.08	25.55	14.02	2.71	23.62	0.13	40.75
2001	8.09	11.97	1.31	0.16	21.70	13.86	2.25	20.50	0.27	37.15
2002	9.75	16.56	1.96	0.06	28.74	15.39	3.10	26.16	0.09	45.39
2003	16.89	16.19	1.62	0.14	34.87	26.32	2.53	25.22	0.21	54.34
2004	16.91	11.49	1.58	0.02	30.03	26.40	2.47	17.94	0.03	46.88
	Overall CPUE, tons/fishing day (SEYCHELLES)					**Overall CPUE, tons/positive sets (SEYCHELLES)**				
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
2000	8.87	10.82	1.50	0.05	21.85	14.83	2.51	18.09	0.08	36.52
2001	5.40	12.89	1.06	0.40	19.79	10.55	2.06	25.16	0.77	38.63
2002	8.79	17.64	1.72	0.06	28.21	15.44	3.01	30.96	0.10	49.53
2003	14.83	16.37	1.50	0.08	32.80	27.25	2.75	30.08	0.14	60.28
2004	18.23	11.19	1.64	0.02	31.12	28.79	2.59	17.68	0.03	49.15

Table 4b. Purse seiners catch rate (tons/fishing day and tons/positive set) by species reported on free-swimming schools

	CPUE FREE SCHOOLS, tons/fishing day (ALL COUNTRIES)					CPUE FREE SCHOOLS, tons/positive sets (ALL COUNTRIES)				
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
2000	15.83	10.84	1.05	0.30	28.31	18.51	1.22	12.68	0.35	33.12
2001	17.52	8.06	0.88	0.41	27.34	22.91	1.15	10.54	0.54	35.75
2002	24.36	8.07	1.26	0.23	35.26	29.02	1.50	9.61	0.27	42.00
2003	38.40	9.65	2.10	0.46	50.64	42.62	2.33	10.71	0.51	56.21
2004	41.45	5.27	0.92	0.06	47.70	45.78	1.01	5.82	0.07	52.68
	CPUE FREE SCHOOLS, tons/fishing day (SEYCHELLES)					**CPUE FREE SCHOOLS, tons/positive sets (SEYCHELLES)**				
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
2000	13.00	6.30	1.01	0.01	22.10	17.25	1.34	8.35	0.02	29.32
2001	13.10	9.53	0.73	1.40	24.76	20.43	1.13	14.86	2.18	38.61
2002	25.20	8.81	1.37	0.31	35.69	28.45	1.55	9.95	0.35	40.30
2003	42.21	16.30	2.12	0.36	61.09	43.76	2.20	16.90	0.38	63.32
2004	52.89	4.71	0.92	0.08	58.60	51.56	0.89	4.59	0.08	57.13

Table 4c. Purse seiners catch rate (tons/fishing day and tons/positive set) by species reported on FADs associated schools

	CPUE FADS, tons/fishing day (ALL COUNTRIES)					CPUE FADS, tons/positive sets (ALL COUNTRIES)				
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
2000	13.31	33.00	3.98	0.03	50.51	11.80	3.53	29.25	0.03	44.77
2001	9.34	29.50	3.43	0.11	42.47	8.37	3.07	26.43	0.10	38.05
2002	11.44	39.53	4.65	0.02	55.92	9.56	3.88	33.03	0.02	46.73
2003	19.40	42.14	3.45	0.01	65.09	15.71	2.80	34.12	0.01	52.70
2004	13.03	33.50	4.46	0.00	51.08	10.74	3.68	27.63	0.00	42.13
	CPUE FADS, tons/fishing day (SEYCHELLES)					**CPUE FADS, tons/positive sets (SEYCHELLES)**				
YEAR	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**	**YFT**	**SKJ**	**BET**	**ALB**	**TOTAL**
2000	12.09	27.16	3.71	0.10	43.30	11.75	3.61	26.41	0.10	42.10
2001	8.94	30.90	3.40	0.42	43.82	8.00	3.04	27.66	0.38	39.22
2002	12.55	42.19	4.64	0.00	59.40	10.79	3.99	36.29	0.00	51.09
2003	21.80	48.34	3.94	0.00	74.11	17.24	3.12	38.22	0.00	58.60
2004	15.11	36.21	5.09	0.00	56.55	11.52	3.88	27.60	0.00	43.09

Figure 1. Trend in number and carrying capacity of purse seiners licensed to operate inside of the Seychelles EEZ.

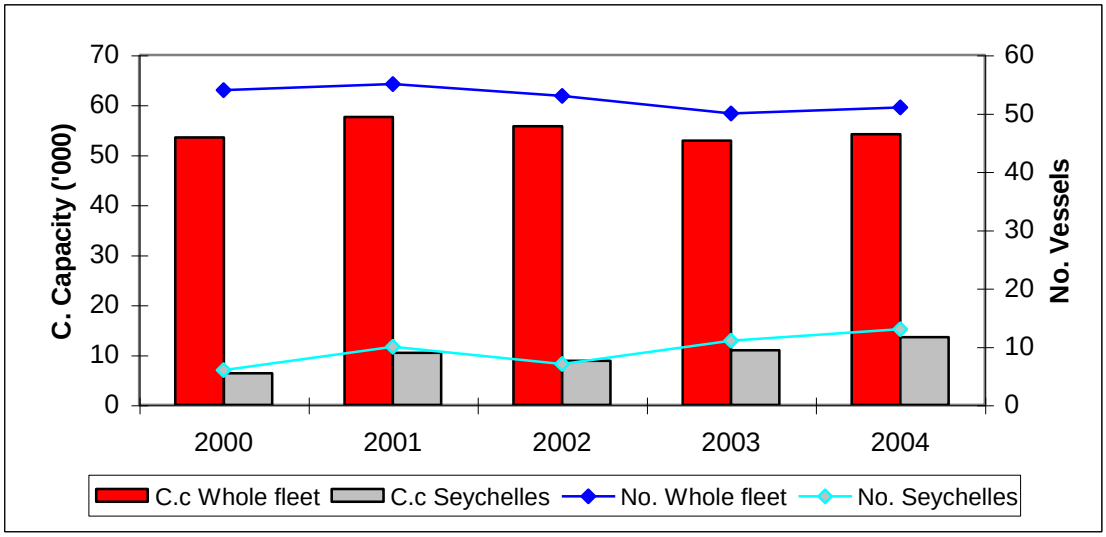


Fig 2. All purse seiners by category (GRT)

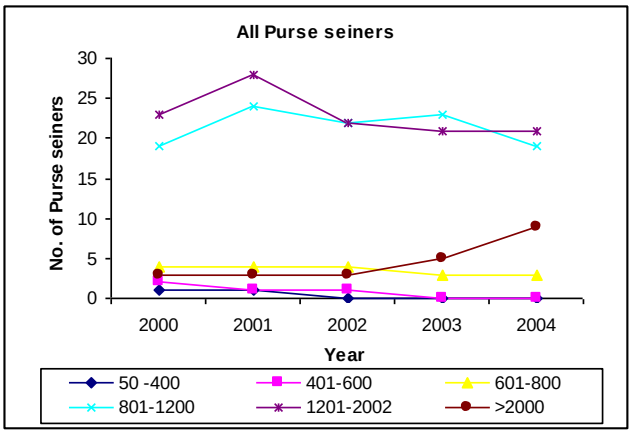


Fig 3. Seychelles purse seiners by category (GRT)

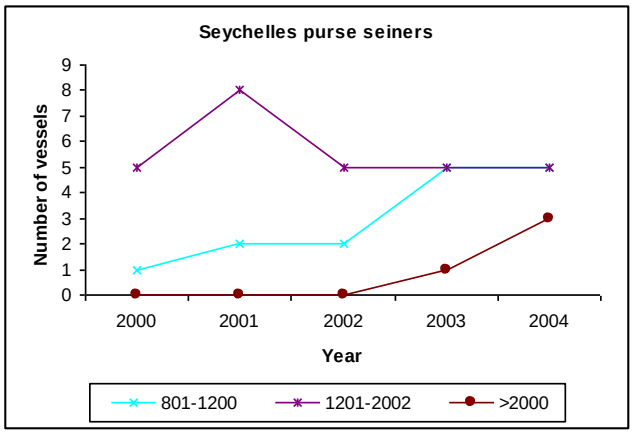


Fig 4. All purse seiners fishing effort and carrying capacity

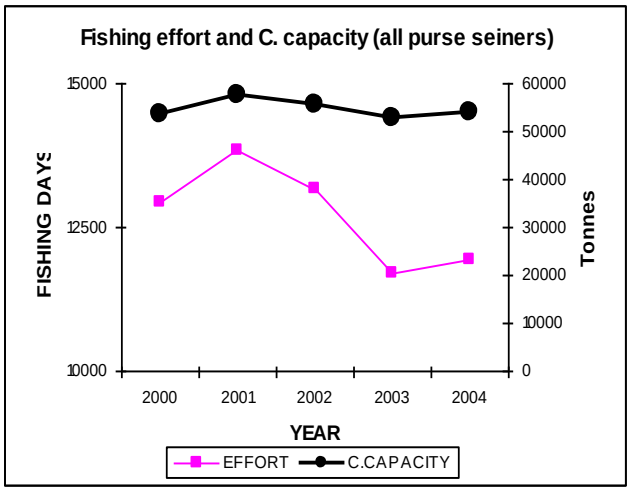


Fig 5. Seychelles purse seiners fishing effort and carrying capacity

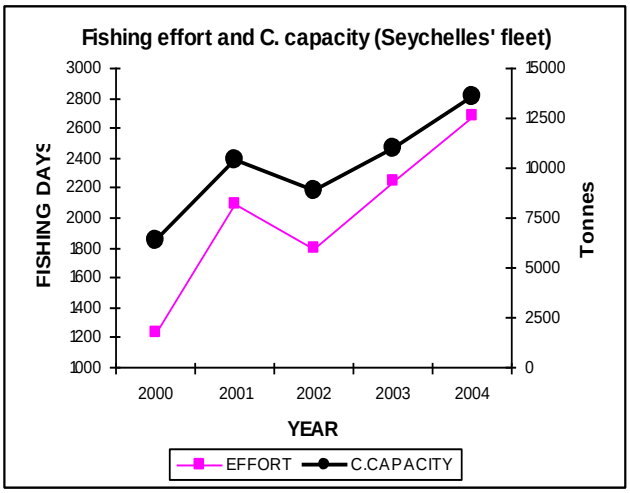


Fig 6. All purse seiners number of sets by fishing mode

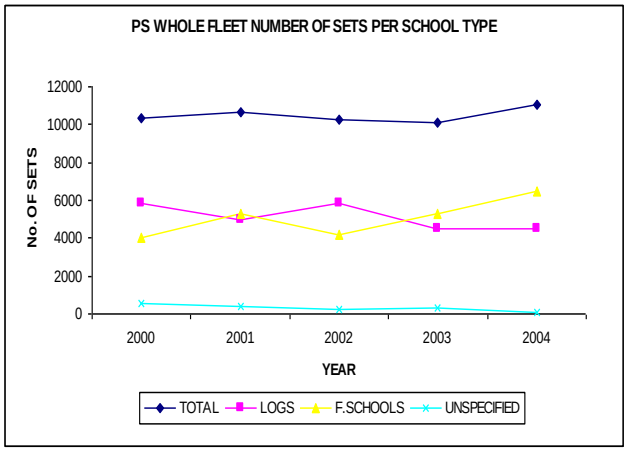


Fig 7. Seychelles purse seiners number of sets by fishing mode

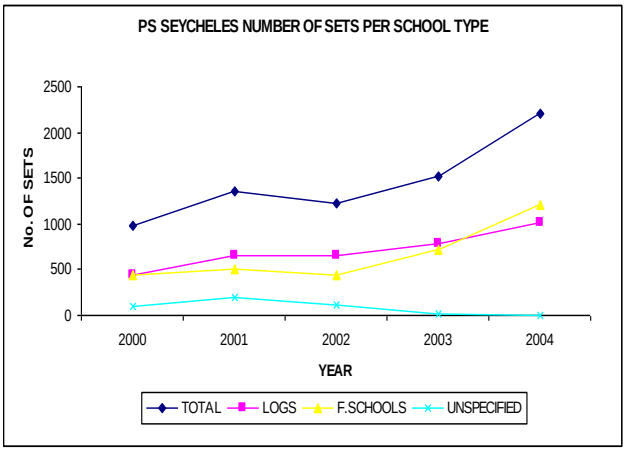


Fig 8. All purse seiners proportion of positive and null sets

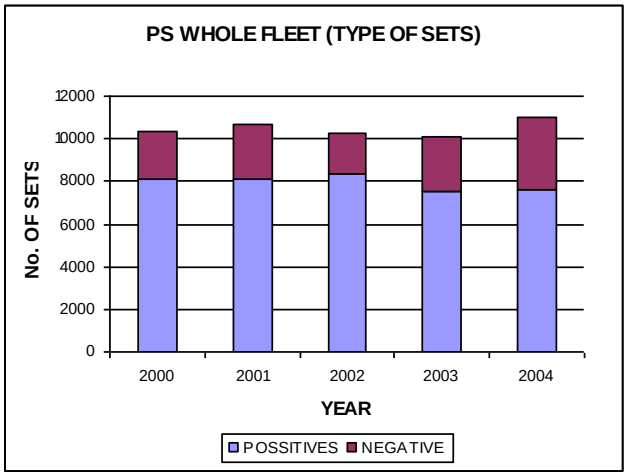


Fig 9. Seychelles purse seiners proportion of positive and null sets

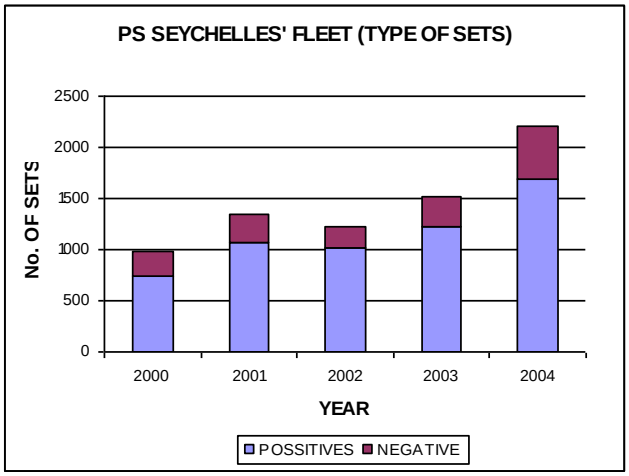


Fig 10. All purse seiners total reported catch by species

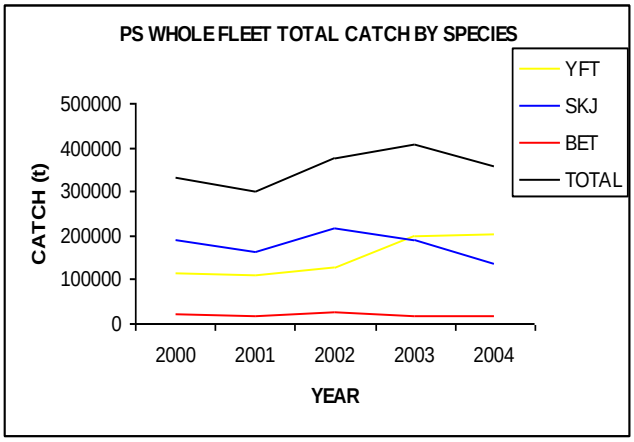


Fig 11. Seychelles purse seiners total reported catch by species

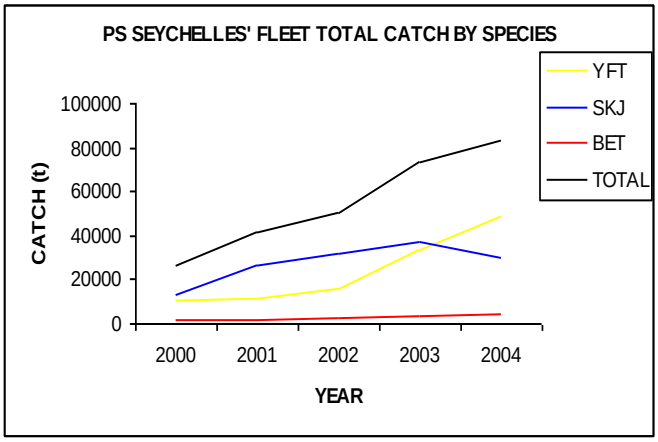


Fig 12. All purse seiners total catch by species reported on free swimming schools

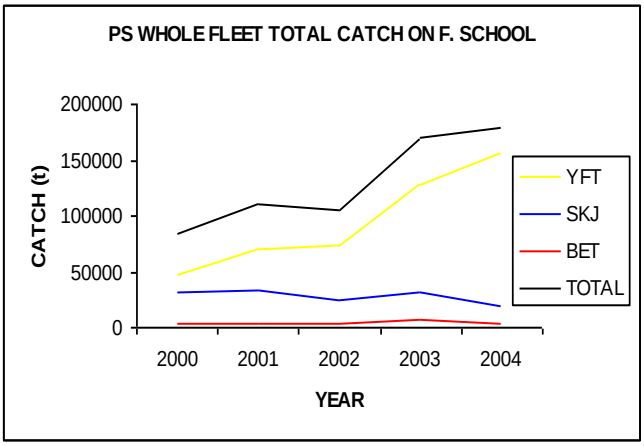


Fig 13. Seychelles purse seiners total catch by species reported on free swimming schools

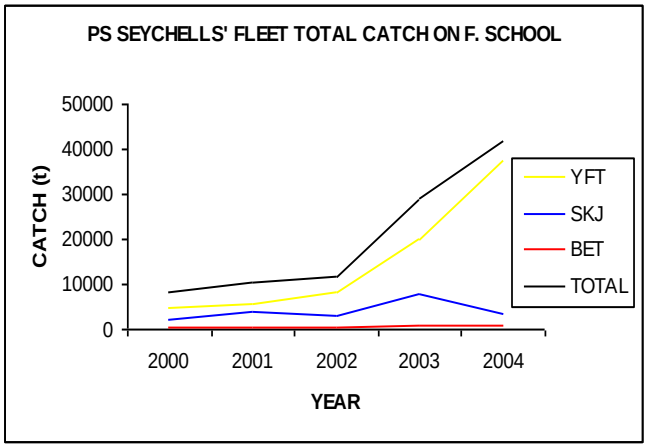


Fig 14. All purse seiners total catch by species reported on FADs associated schools

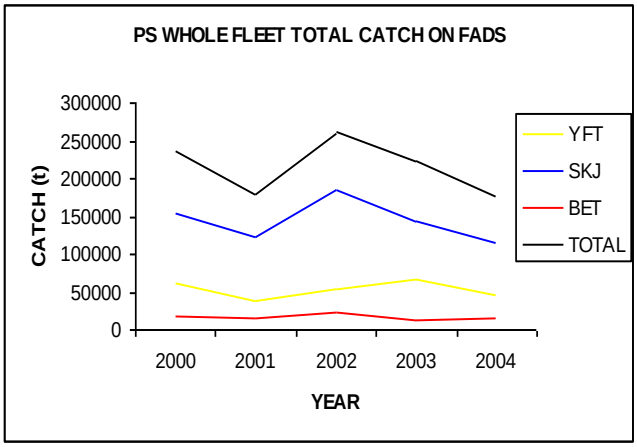


Fig 15. Seychelles purse seiners total catch by species reported on FADs associated schools

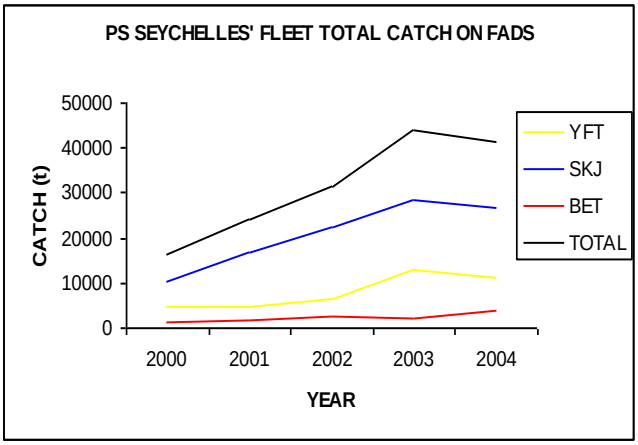


Fig 16. All purse seiners CPUE by species reported on all school type.

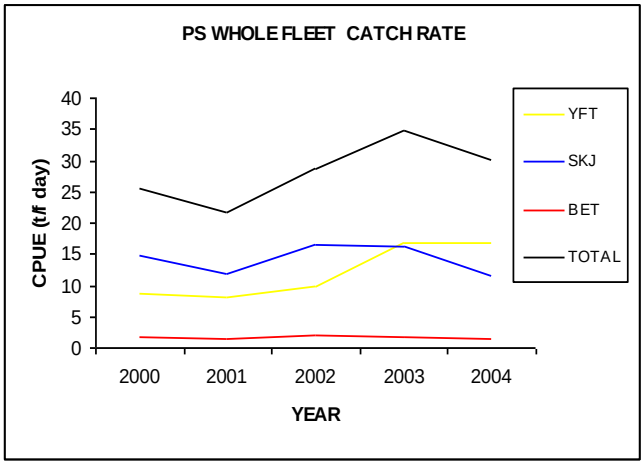
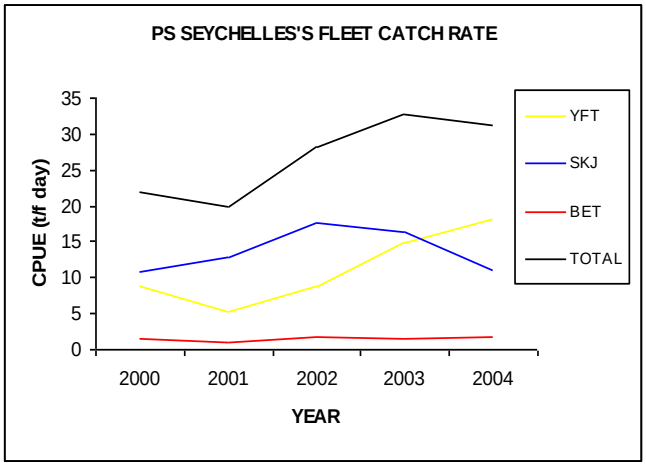
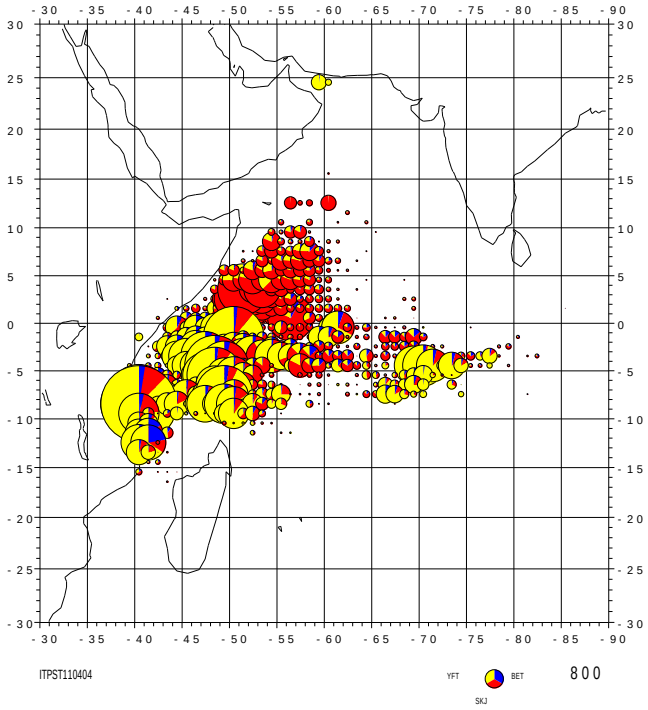


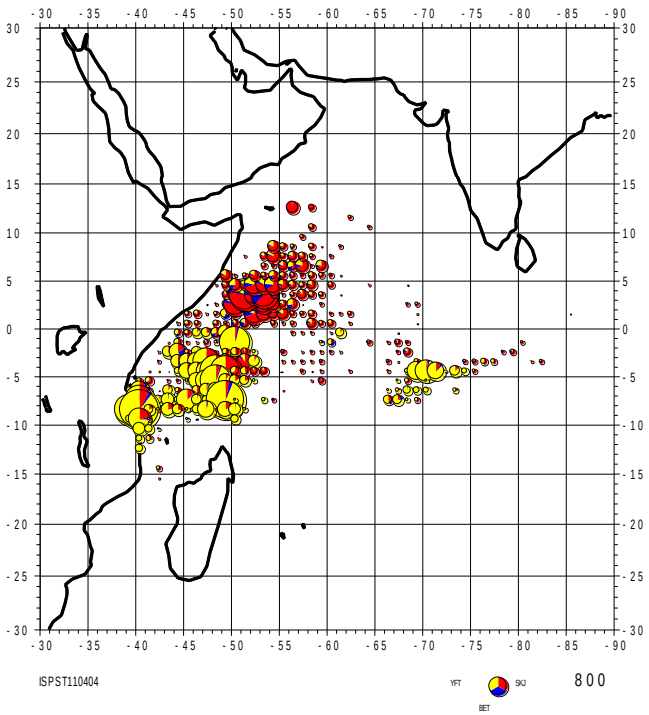
Fig 17. Seychelles purse seiners CPUE by species reported on all school type.



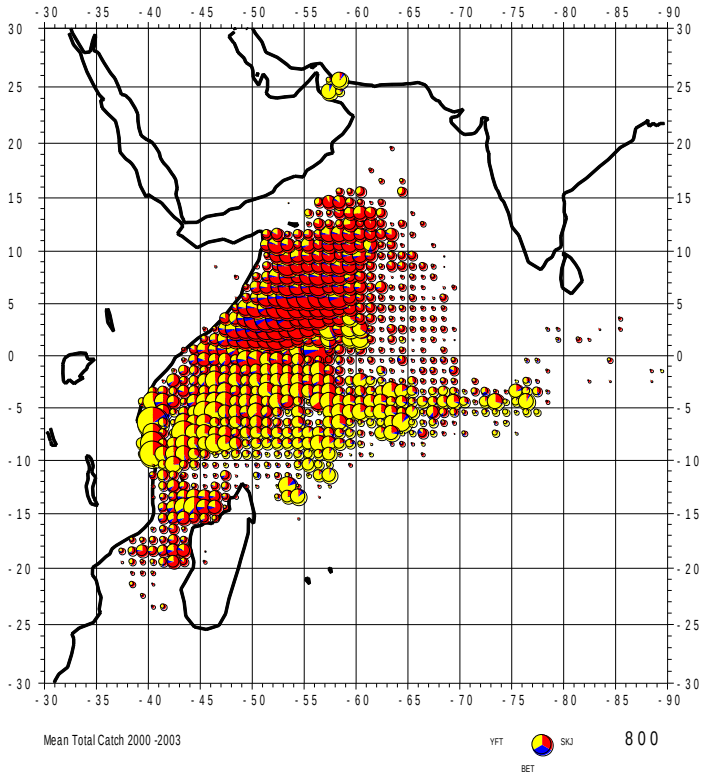
Map 1. Catch by 1° square for the year 2004 reported by the whole purse seine fleet



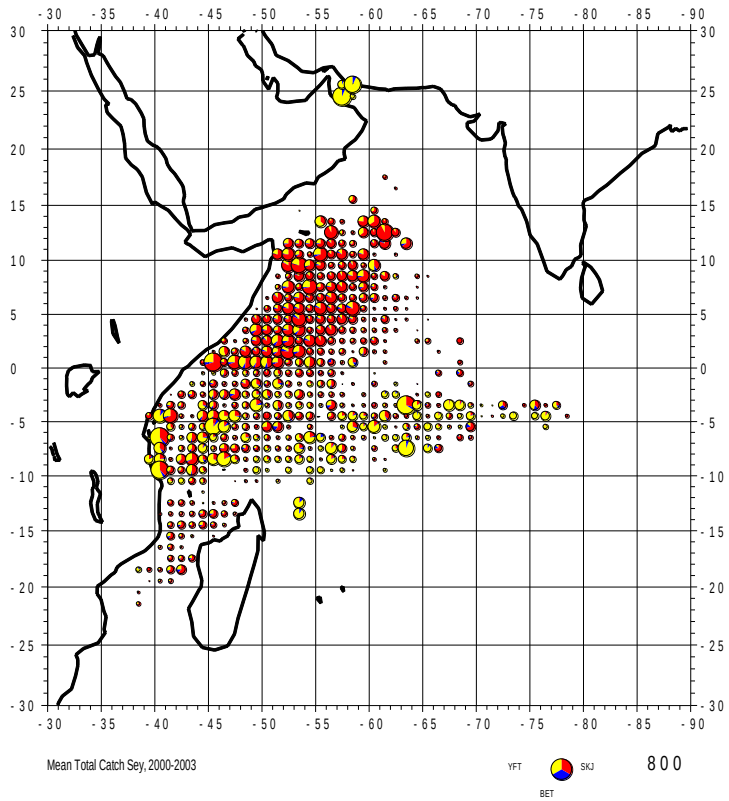
Map 2. Catch by 1° square for the year 2004 reported by the Seychelles'purse seine fleet



Map 3. Mean catch (2000 – 2003) by 1° square reported by the whole purse seine fleet.



Map 4. Mean catch (2000 – 2003) by 1° square reported by the Seychelles'purse seine fleet .



3.0 SEMI-INDUSTRIAL FISHERY

3-1. Vessels active and fishing effort

Table 5 summarises the fishing activities of the semi-industrial fleet from 2000 to September 2005. A total of 9 semi-industrial longline vessels operated during 2004. However only 4 vessels conducted longline operations for tuna and swordfish. A total of 22 tuna /swordfish fishing trips were conducted which amounted to a total of 125 fishing sets. The total landed catch for 2004 is estimated at 88.99 Mt.

In February 2005 the EU relaxed its standard on heavy metal (mercury and cadmium) for swordfish. This has permitted the resumption of export of this species and has subsequently resulted in an increase in fishing activities.
From January to September 2005, 9 semi-industrial vessels have been operating. Only 6 vessels targeted tuna and swordfish. A total of 31 tuna /swordfish fishing trips have been conducted which amounted to a total of 230 sets. The total reported catch for that period was 201 Mt. Table 6 shows the total reported catch by species from 2000 to September 2005.
The total catch reported up to September 2005 is more than doubled what was reported for the two previous years. Swordfish remain as the dominant species making up more than 60% of the total catch.

A total of 53 sharks fishing trips have been conducted between January to September 2005 compared with 60 conducted during the whole of 2004. 13,153 kg of shark meat and 11,282 kg of shark fins were landed between January and September 2005. During the same period of the previous year 28,334 kg of shark meat and 7, 757 kg of shark fins were landed.

Table 5. Summary of fishing activities of the semi-industrial fleet.

	2000	2001	2002	2003	2004	2005*
Number of vessels active	10	11	12	7	4	6
Number of Trips	155	176	111	48	22	31
Number of set	733	931	408	145	125	230
Gross Catch (Mt)	484	549	247	93	89	201
Effort (1000' Hooks)	491	545	368	120	106	126
Catch Rate (Mt/1000Hooks)	0.99	1.01	0.67	0.77	0.83	1.60

* Data only from January to September.

Table 6. Catch (Mt) reported by the semi industrial fishery from 2000 to September 2005.

SPECIES	2000	2001	2002	2003	2004	2005*
SWORDFISH	253.09	254.25	138.51	62.65	64.71	127.68
YELLOWFIN TUNA	43.59	88.21	40.47	11.49	8.01	27.03
BIGEYE TUNA	55.51	54.98	23.01	9.12	6.49	37.04
OTHER TUNA	3.97	5.24	2.01	4.17	0.00	0.00
MARLIN	5.58	1.79	3.61	0.35	0.11	0.62
BLACK MARLIN	2.09	5.25	1.83	0.00	0.00	0.42
BLUE MARLIN	3.74	2.01	0.36	0.24	0.00	0.16
STRIPED MARLIN	2.81	3.42	0.92	0.00	0.00	0.27
SHARKS	69.50	96.78	18.04	1.62	7.78	3.52
SAILFISH	33.05	27.36	11.42	1.61	1.27	3.71
OTHER SPECIES	11.54	9.79	6.62	1.70	0.61	0.28
GRAND TOTAL	**484.47**	**549.07**	**246.79**	**92.95**	**88.99**	**200.72**

The overall catch rate estimated for 2004 is 0.83 Mt/1000 hooks while the catch rate for 2003 stands at 0.77Mt/1000 hooks.

The CPUE for swordfish increased from 0.52Mt/1000 hooks in 2003 to 0.61 Mt/1000hooks reported for 2004. The CPUE on swordfish and tuna (yellowfin and bigeye) have increased significantly in 2005 (table 7)

Table 7. Catch rate (Mt/1000 hooks) by species reported by the semi industrial fishery from 2000 to September 2005.

SPECIES	2000	2001	2002	2003	2004	2005*
SWORDFISH	0.52	0.47	0.38	0.52	0.61	1.02
TUNA	0.21	0.27	0.18	0.21	0.14	0.51
OTHER SPECIES	0.26	0.27	0.12	0.05	0.09	0.07
GRAND TOTAL	0.99	1.01	0.67	0.77	0.83	1.60

4.0 Activities undertaken to improve the processing and dissemination of distant water industrial longline data.

Industrial fishing activities began in the Seychelles waters in the early 1950's with the Distant Water Fishing Nations (DWFN) longlining for tuna in the Western Indian Ocean (WIO). Over the years the SFA has developed a comprehensive database on industrial longline fishery. However the lack of coherent software to cater for all the stages of data manipulation has given rise to a backlog.
During 2005, important effort was made to implement FINSS (developed by the IOTC) as the software to manage industrial longline fishery data. Considerable work was required on the vessels specification database in order to eliminate duplicates and complete missing information. Landing and logbooks data were subsequently transferred and verified.
The backlog of logbooks for the year 2003 has now been cleared. Logbooks entries for the year 2004 are nearly complete.

Various statistical test such as; crosschecking VMS data with logbooks positions, species compositions by strata, mean weight by species, were conducted on the 2003 and 2004 data

The very preliminary results have shown various problems such as, unrealistic bigeye tuna to yellowfin tuna ratios, mismatch between logbook and VMS positions (although not a high proportion of such cases), unrealistic mean weight of individual fish.

The following steps will be undertaken to:

1. Identify all suspicious records.
2. Correct all mistakes that are due to data entry errors.
3. Flag all records that cannot be corrected.
4. Extrapolate correct data to take into consideration incorrect data.
5. Extrapolate data for the whole fleet taking into consideration missing logbooks.

It is expected that the above-mentioned activities will be completed during early 2006 and a report on the analysis and the findings will be produced. Revised data will then be submitted to the IOTC secretariat.

5.0 National Research program

5-1. CAPPES (Capturabilite des grands Pélagiques a la Palangre dans les Eaux des Seychelles)

The Seychelles Fishing Authority in collaboration with colleagues from IRD (Institut des Recherche pour le Development) and with the support from the French Ministry for Foreign Affairs has set up a research project as part of the development of the local monofilament longline fishery. The aim of this project is to improve the knowledge of the habitat of longline targeted species (swordfish, bigeye tuna and yellowfin tuna) in the Seychelles Economic Zone. Results of this research project should allow fishermen to target different species depending on the market, the fishing seasons and fishing grounds.

Research trips are conducted on board the SFA research vessel "l'Amitié" as well as on board professional longliners collaborating in this project.
The project uses instrumented long line sets (TDR's attached on the mainline) to study the behaviour of the fishing gear based on various setting scenarios. This will lead to the identification of optimum fishing depth and the best setting parameters for the targeted species.
Furthermore for each fishing station, the characteristics of the habitat is measured using a Seabird multi-parameter (depth, temperature, oxygen, conductivity) profiler.
All individuals caught are measured, weighed, and sexed. The project will continue throughout 2006. Results will be presented at the next WPTT.