

## TRENDS IN THE SEYCHELLES TUNA FISHERY

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### ABSTRACT

Distant water fishing nations (DWFN) began longlining for tuna in the Western Indian Ocean (WIO) in the early 1950s, initiated by the Japanese soon followed by the Taiwanese (1954) and Koreans (1960). Large scale industrial purse seining began in 1983 when the French and Spanish fleets moved into the Western Indian Ocean from the tropical Atlantic. By 1986 some 6 % of the world tuna catch (143,099t out of 2,400,000t) was coming from the WIO purse seiners; by 1997 this had risen to 14 %.

Virtually all the purse seiners active in the WIO are licensed to fish in the Seychelles EEZ; SFA's data therefore reflect the entire WIO purse seine catch (based upon daily catch and effort reports or logbooks which must be provided to SFA by all licensed vessels). At present about 58 vessels per year are licensed. SFA has detailed reports of over 90 % of their total transshipments used to calculate accurate catch figures by correcting estimated catch. Not all licensed longliners provide SFA with catch and effort forms and almost none of those which report catches actually tranship in the Seychelles.

In 1985 some 95 % of the WIO purse seine catch was transhipped through Port Victoria; ten years later in 1994, this changed to 60 % of the WIO purse seine catch and, for the first semester of 1998, only 35 % of the total purse seine catch was transhipped in Port Victoria.

This reflects a change in the geography of the fishery. In the early 1980s, Mahé was at the centre of the area fished all year round. Purse seiners fish predominantly in the Mozambique during the second quarter of the year and tranship in Antsiranana. Many vessels fish off the Somali coast in the third quarter and tranship in Mombassa. During the fourth quarter of the year, purse seine fishing activities tends to shift from the Somali basin to the Chagos area. By the end of 1997, most vessels moved to the eastern Indian Ocean past the Chagos Archipelago and were transhipping their catch in Phuket, Thailand.

A semi-industrial monofilament longline fishery started in Seychelles in October 1995. At present, 6 local longliners are fishing. Swordfish is the targeted species (around 60 %), followed by yellowfin and bigeye tuna. One major problem faced by this fishery is the lost of catch due to predation by marine mammals.

The major tuna and tuna like species discussed in this report are: yellowfin (Thunnus albacares), skipjack (Katsuwonus pelamis), bigeye (Thunnus obesus) and swordfish (Xiphias gladius).

### RESUME

Les flottilles étrangères ont commencé à exploiter les ressources thonnières de l'ouest de l'Océan Indien (OI) à la palangre au début des années 1950. La pêcherie fut initiée par les japonais, vite suivis par les taiwanais (1954), puis les Coréens (1960).

La pêche industrielle à la senne a commencé en 1983, avec l'arrivée des flottilles françaises et espagnoles en provenance de l'Atlantique. En 1986, près de 6 % des captures mondiales de thons (143 099 t sur 2 400 000 t) étaient réalisées dans l'ouest de l'OI, chiffre qui a atteint 14 % en 1997. Tous les thoniers senneurs en activité dans l'ouest de l'OI ayant une licence pour pêcher dans la ZEE seychelloise, les données de la SFA reflètent l'ensemble des prises de la zone. Ces données sont basées sur les déclarations de prises et d'effort de pêche des livres de bord (qui doivent être retournés par tout navire ayant une licence) et sur les relevés de débarquements et de transbordements dans les différents ports de l'OI.

Actuellement, près de 58 licences sont attribuées chaque année par les Seychelles. La SFA dispose ainsi de plus de 90 % des données de débarquements et de transbordement. Celles-ci permettent de calculer des chiffres précis de captures en corrigeant les estimations des livres de bord.

En revanche, seule une faible proportion des palangriers avec licence retourne des livres de bord à la SFA, et presque aucuns de ceux qui fournissent des données de prises et d'effort ne débarquent aux Seychelles.

En 1985, près de 95 % des prises dans l'ouest de l'OI par les senneurs ont été débarqués à Port Victoria, 60 % en 1994, et seulement 35 % pour le premier semestre 1998. Cette chute des transbordements effectués à Port Victoria est le résultat d'un éclatement et d'un déplacement de la pêcherie dans l'OI. Dans les années 80, Mahé était au centre de la zone exploitée par les senneurs. Ceux-ci sont massivement partis par la suite pêcher dans le canal du Mozambique pendant le second trimestre. Antsiranana est alors devenu le port de débarquement le plus approprié pendant cette période de l'année, au dépend de Victoria.

Au cours du quatrième trimestre de chaque année, les navires évoluent entre le bassin de Somalie et l'archipel des Chagos, mais en 1997, l'effort de pêche a été porté plus vers l'est de l'OI, au delà des Chagos, faisant de Phuket (Thaïlande), un nouveau port de débarquement des thoniers senneurs.

La palangre semi-industrielle a été commencée en octobre 1995. Elle est aujourd'hui pratiquée par six bateaux locaux, qui visent principalement l'espadon, l'albacore et le patudo. La prédation par les mammifères marins reste une contrainte majeure de cette pêcherie.

Les principales espèces de thonidés évoquées dans ce rapport sont l'albacore (Thunnus albacares), le listao (Katsuwonus pelamis), le patudo (Thunnus obesus) et l'espadon (Xiphias gladius).

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## Introduction

This paper reviews the data available at the Seychelles Fishing Authority, with the aim to show the trends in the tuna fishery based there.

Two programmes are being used at SFA to process the daily catch and effort logbooks and transshipment records collected from the industrial fishing vessels:

The NEWTUNA programme and its new version; WINTUNA.

- This software was developed by IPTP in close collaboration with SFA, with financial aid from the Association Thonière. This system is used to generate tables for SFA's monthly confidential report and Tuna quarterly bulletins. The WINTUNA programme is now being further developed to include the processing of data of the new Seychelles' semi-industrial fishery.
- The ORSTHON programme, developed by ORSTOM which permit further scientific analysis of the data.

## The purse seine fishery

Detailed records for the purse seine fishery go back to 1984 in the SFA database. Trends may therefore be clearly identified over a long period.

### The fleet composition

#### *a) Vessel categories*

Four categories of purse seiners have fished in the WIO :

Class	Carrying capacity
5	400 – 600t
6	600 – 800t
7	800 – 1,200t
8	>1,200t

In the early days of the fishery there were some class 5 vessels in the WIO; these have now moved away and larger vessels have moved in. The majority of the vessels fishing in the WIO by 1994/1997 season were class 7 or 8.

#### *b) Flags*

The fleet is in majority Spanish and French, fishing under a European Community agreement. Others are registered in Belize, Panama, Mauritius, Saint Vincent & Grenadines, Netherlands Antilles, Italy and Seychelles. In the past, the fleet has also included vessels from Liberia (owned by interests in the former USSR), United Kingdom, the Ivory Coast, India, Iran and Japan.

#### *c) The size of the Fleet*

Figure 1 shows the number of vessels licensed to fish in the Seychelles EEZ and the vessels active from 1984 to 1997. There has been steady increase in the number of vessels taking licenses to fish in the Seychelles EEZ since 1984. This reached a peak in 1993 when there was an average of 56 vessels licensed. With the departure of the Japanese fleet in late 1993 and early 1994, the average number of vessels licensed dropped to 50, and in 1997 the fleet increased to an average of 58 vessels due to the arrival of new purse seiners.

## Nominal fishing effort

Nominal fishing effort is measured in days fished. This term is defined as days spent at sea minus days on passage, days adrift due to mechanical breakdown and other work stoppage. It includes days spent in searching even if no fish were actually caught. Figure 2 illustrates the trend in the nominal fishing effort of purse seiners licensed to fish in the Seychelles since 1984 and table 1 shows the effort per month.

Between 1984 and 1994, the nominal fishing effort rose from 7,604 days fished to 14, 368, a rise of 89 % over 10 years. Total fishing effort recorded for 1997 was 15,567 days, another rise of 8 % since 1993. The increase in total fishing effort is due to an increase of the number of vessels operating in the fishery and also partly because of a tendency for individual vessels to fish more days per year.

## Total catch

Figure 3 and table 2 show that 1992, 1993 and 1994 have been record catch years in the WIO, with landings of over 270,000t each year. The highest recorded catch so far was in 1995 when 307,135t of fish were landed. In 1997, a total of 272,509t were landed even though only 52 vessels were active.

## Catch per unit of effort

Table 3 and figure 4 show the upward trend of the CPUE in the fishery between 1984 and 1994 when it reached a record level of 22.32t/fishing day. In 1997 there was a decrease in the CPUE to 17.5t/day. The increase in CPUE is likely to be due to a better fishing efficiency of the vessels, using more powerful gears and sophisticated electronic equipment than in the first years of the fishery.

## The catch composition

### *Catch composition and catch rate by species*

Figures 5 and 6 show the trend over the years for skipjack tuna to become an increasingly important part of the total catch.

### *Catch composition : variation between catch on logs and catch on free schools*

Figure 7 shows the catch composition and variation in the catches (estimated catches from logbooks) between catch made on floating objects and catch on free schools in the WIO from 1984 to 1998.

From 1984 to 1988 the proportion of catch on logs and free school was quite similar and the tendency for purse seiners to fish more on floating objects started in 1989. In 1993 more tuna was caught on free school, but from 1994 onwards more fishing took place on floating objects.

The proportion of catch coming from logs or free schools and the catch composition in species also varies depending on the geographic area of the catch.

## Fishing patterns

Maps no. 1 to 4 show the total tuna catch in one degree square from 1995 to 1998, by quarter.

During the first quarter of the year, most of the fishing effort is concentrated in the Seychelles waters. During the second quarter of the year, concentration of activity of purse seiners shifts further south to the Mozambique channel. During the third quarter the vessels move further north to fish in the Somali basin and during the fourth quarter, fishing activities tend to be shifted from the Somali basin to the Chagos area. This pattern was observed until the third quarter of 1997. During the fourth quarter of 1997, however, most of the vessels moved further to the east of the Chagos archipelago to fish in the Eastern Indian Ocean and, during the first quarter of 1998, fishing activity was still concentrated in that area (see Map no 3, 4th quarter 1997 and map no 4, 1st quarter 1998). This unusual movements of purse seiners to exploit the Eastern part of the IO during the 4th quarter and first quarter of the year may be due to the oceanographic effect of the El Niño phenomenon.

### **Transhipments**

Table 4 and figure 8 shows the trends in transhipment activity at port Victoria from 1984 to 1998.

In the early days of the industrial purse seine fishery in the WIO, up to 95 % of the catch was transhipped through Port Victoria. By 1990, the vessels started to tranship in other ports of the WIO, closer to their fishing area, and thus the transhipment in Port Victoria was reduced to some 63 % of the catch. By the end of 1997 and first semester 1998 some vessels were transhipping their catch for the first time in Phuket, Thailand.

### **The longline fishery**

#### **The fleet composition and licences issued**

The industrial longliners licensed to fish in the Seychelles EEZ are from distant water fishing nations (DWFN). The major nations taking licenses from the Seychelles government are: Japan, south Korea and Taiwan. The fleets are composed of vessels ranging from 25-58m in overall length and 200-735 GRT (Gross registered tons).

Table 5 and Figure 10 shows the total number of licenses issued by nationality from 1991 to 1997.

Other nationalities include French, Spanish and Indonesian longliners. The number of licenses issued has been increasing for the last 7 years. The Japanese licences are valid on average 2 months, the Taiwanese and South Koreans, on average 1 month, the French and Spanish 1 year.

Figures 11a and 11b shows the number of vessels licensed (vessel months). There has been an marked increase in the number of vessel licensed from 1991 to 1997, especially by the Taiwanese.

#### **Seasonality in fishing activity**

As in the past, there still exist a strong seasonality in fishing activity in and around the Seychelles waters by longliners. There is a tendency for more vessels to take out licences at the beginning and during the last four months of the year.

### **Catch rates (kg/hook)**

Figure 12a shows the catch rates reported by nationality from 1980 to 1997.

The Japanese longliners have been reporting higher catch rates compared to the other nationalities. The catch rates by species caught by the Japanese longliners is shown in figure 12b.

### **The catch composition**

Figure 13 shows the catch composition by species from 1980 to 1987, for all nationalities. Catches are comprised mainly yellowfin (47 %), bigeye (41 %) and billfish (9 %).

Monthly figures indicate yellowfin as the targeted species of the Japanese longliners, whilst the South Koreans and the Taiwanese targeted mainly bigeye. The French longliners the swordfish.

### **The semi-industrial fishery**

This monofilament longline fishery has developed with local vessels of 16 metres and foreign longliners (34 metres) licensed to fish in the Seychelles waters.

Experimental trips were undertaken by SFA's research vessel in 1994 and 1995, and provided promising results. Following this research, commercial trips were considered and the first one started in October 1995.

In 1996, a second operator started fishing with 4 vessels. In 1996, 215 tonnes were landed with an average CPUE of 0.64 kg/hook. One major problem was the lost of catch by predation presumed to be by the false killer whales (*Pseudorca crassidens*) and pilot whales (*Globicephala maelana*). In 1996 the predation rate averaged around 14 % of the catch.

In March 1997 a third fishing operator invested in this fishery bringing the number of active local longliners to 6. A total of 311 tonnes were landed, with an average CPUE of 0.60 kg/hook. Lost of catch by predation averaged around 30 % of the catch.

The main species caught by the commercial longliners are: swordfish (*Xiphias gladius*) 60 %, yellowfin tuna (*Thunnus albacares*) 19 %, bigeye tuna (*Thunnus obesus*) 13 % and other species (billfishes & common dolphin fish) 8 %. A monitoring programme has been set up by SFA to closely monitor this fishery.

### **Conclusion**

Since the beginning of the industrial longline fishery in the Western Indian Ocean in 1952 and the industrial purse seine fishery in 1983, the effort exerted by the distant water fishing nations (DWFN) has expanded considerably. The purse seiners have now become more efficient as larger vessels have been introduced in the fishery. They are now using more sophisticated electronic equipment and the tendency of fishing around FADS has reduced searching time.

The industrial purse seine fishery is very well documented and clear trends can be identified. However, close monitoring of the fishery remains important so that management action may be taken if necessary to adjust fishing pressure.

The industrial longline fishery is unfortunately not well documented due to, among other factors, the difficulty of retrieving logbooks. While virtually 100 % of licensed days are accounted for by logbook returns in the purse seine fishery, only about 18 % of licensed days are accounted for by longliners in recent years (mostly by the Japanese fleet). Better documentation of the longline fishery is an important

factor that should be considered if tuna stocks are to be monitored in an appropriate way.

In 1995 Seychelles developed a semi-industrial fishery, targeting swordfish which used to be a by-catch of the industrial longliners. Further research programmes should be developed in order to acquire further knowledge on the biology and behaviour of this new targeted species.

**Table 1. Fishing effort (days fished) per month**

MONTH	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
JAN	247	1105	944	840	938	873	1290	1025	1304	1420	941	1348	1119	1263
FEB	236	900	790	671	782	1076	1177	804	1214	1177	884	1225	1062	1182
MAR	471	1120	881	811	715	923	1326	945	1275	1333	1040	1315	1126	1349
APR	499	935	849	639	865	915	1121	874	1224	1279	956	1254	1112	1203
MAY	795	853	710	573	818	936	1031	900	1169	1111	991	1190	1016	1281
JUN	631	724	623	615	745	1017	906	934	1124	1171	867	956	923	1207
JUL	519	518	629	574	814	1010	918	994	1167	1247	1049	962	992	1337
AUG	618	567	663	654	1033	1077	1013	1095	1123	1288	1125	1105	1039	1404
SEP	756	659	808	794	861	1121	1099	1067	1017	1177	1172	1323	1058	1353
OCT	744	755	804	948	857	1088	1102	1150	1075	1151	1172	1283	1169	1353
NOV	1035	841	790	995	946	1188	888	1301	1109	1033	1079	1212	1025	1295
DEC	1053	1038	843	968	958	1218	1083	1249	923	981	1334	1264	1307	1340
<b>Total</b>	<b>7604</b>	<b>10015</b>	<b>9334</b>	<b>9082</b>	<b>10332</b>	<b>12442</b>	<b>12954</b>	<b>12338</b>	<b>13724</b>	<b>14368</b>	<b>12610</b>	<b>14437</b>	<b>12948</b>	<b>15567</b>

**Table 2. WIO purse seiners catch (1984-1997)**

MONTH	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
JAN	5560	16111	15887	12197	16826	17874	14226	18629	20472	22053	29542	24077	12290	18345
FEB	4332	6079	13032	10616	14345	23358	20270	21290	22446	21733	20913	22861	18119	26437
MAR	8271	13096	11114	11217	12324	33930	23463	21006	23168	27356	26553	27769	19391	26846
APR	5347	6864	10141	13508	13359	23194	20380	10420	27638	25026	21496	22858	17338	24353
MAY	6462	8169	7952	8883	15254	12216	10052	14281	23458	20517	25349	19475	16758	15167
JUNE	3231	8437	8813	6361	16625	13896	12309	15993	11342	15441	11358	21866	16297	11895
JULY	4191	6691	10959	16801	13987	10850	16836	17628	27217	19395	14144	30050	26374	14830
AUG	5452	7034	11381	14566	21078	13584	15063	17120	20422	24301	23048	23933	29682	23865
SEPT	11967	16603	15722	16941	26139	27694	25231	21071	29700	27975	29873	28938	24255	30974
OCT	14983	19560	17997	20320	28742	28198	25597	28255	38738	29305	37747	35059	36866	35555
NOV	20100	10357	12483	18269	19714	11891	12493	19011	21066	17113	18594	18368	26255	25784
DEC	8883	9608	7618	13164	29262	10069	25977	14400	12551	26696	21497	31881	22033	18458
<b>Total</b>	<b>98779</b>	<b>128609</b>	<b>143099</b>	<b>162843</b>	<b>227655</b>	<b>226754</b>	<b>221897</b>	<b>219104</b>	<b>278218</b>	<b>276911</b>	<b>280114</b>	<b>307135</b>	<b>265658</b>	<b>272509</b>

**Table 3. CPUE (t/fishing day)**

MONTH	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
JAN	22.5	14.6	16.8	14.5	17.9	20.5	11.0	18.2	15.7	15.5	31.4	17.9	11.0	14.5
FEB	18.4	6.8	16.5	15.8	18.3	21.7	17.2	26.5	18.5	18.5	23.7	18.7	17.1	22.4
MAR	17.6	11.7	12.6	13.8	17.2	36.8	17.7	22.2	18.2	20.5	25.5	21.1	17.2	19.9
APR	10.7	7.3	11.9	21.1	15.4	25.3	18.2	11.9	22.6	19.6	22.5	18.2	15.6	20.2
MAY	8.1	9.6	11.2	15.5	18.6	13.1	9.7	15.9	20.1	18.5	25.6	16.4	16.5	11.8
JUN	5.1	11.7	14.1	10.3	22.3	13.7	13.6	17.1	10.1	13.2	13.1	22.9	17.7	9.9
JUL	8.1	12.9	17.4	29.3	17.2	10.7	18.3	17.7	23.3	15.6	13.5	31.2	26.6	11.1
AUG	8.8	12.4	17.2	22.3	20.4	12.6	14.9	15.6	18.2	18.9	20.5	21.7	28.6	17.0
SEP	15.8	25.2	19.5	21.3	30.4	24.7	23.0	19.7	29.2	23.8	25.5	21.9	22.9	22.9
OCT	20.1	25.9	22.4	21.4	33.5	25.9	23.2	24.6	36.0	25.5	32.2	27.3	31.5	26.3
NOV	19.4	12.3	15.8	18.4	20.8	10.0	14.1	14.6	19.0	16.6	17.2	15.2	25.6	19.9
DEC	8.4	9.3	9.0	13.6	30.5	8.3	24.0	11.5	13.6	27.2	16.1	25.2	16.9	13.8
<b>MEAN</b>	<b>13.0</b>	<b>12.8</b>	<b>15.3</b>	<b>17.9</b>	<b>22.0</b>	<b>18.2</b>	<b>17.1</b>	<b>17.8</b>	<b>20.3</b>	<b>19.3</b>	<b>22.2</b>	<b>21.3</b>	<b>20.5</b>	<b>17.5</b>

**Table 4 : Transhipments at Port Victoria (1984 – 1997)**

MONTH	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
JAN	6062	17499	13894	7679	14290	24910	11739	16775	16304	18293	12822	19414	20604	28785
FEB	5389	10358	16529	15313	15193	17855	15235	20669	16744	17751	14085	13017	12349	15039
MAR	5635	5217	9986	7574	14990	29712	17827	9707	14864	14122	20902	13801	12407	20249
APR	7749	14341	7344	9597	6044	24351	9340	608	9394	11829	6403	2179	6143	7685
MAY	4085	4853	4581	1610	15369	7472	1519	5958	5920	6111	150	2771	3887	3245
JUN	4938	5976	2988	3735	10193	9029	6248	9783	4505	9554	6266	10039	6850	7255
JUL	4906	7729	4662	14864	16922	11075	15910	18770	9441	12782	10949	19777	13296	4027
AUG	3950	6784	10952	13382	11963	12888	12866	16958	10009	17701	11364	20471	14442	21707
SEP	5561	10108	15113	13878	26820	19801	17390	16358	13260	21420	23371	16848	14695	24337
OCT	14100	18708	16854	20155	25183	28818	22366	27531	25810	24224	30267	28434	21483	26177
NOV	11429	14023	14032	13059	22518	16872	22017	22123	25363	15936	20389	19337	26990	24996
DEC	13230	7101	9885	16326	21088	9398	13246	14999	10413	19234	14075	19401	11023	16777
MEAN	87034	122697	126820	137172	200573	212181	165703	180239	162027	188957	171043	185489	164169	200279

**Table 5. Licenses issued by nationality 1991- 1997**

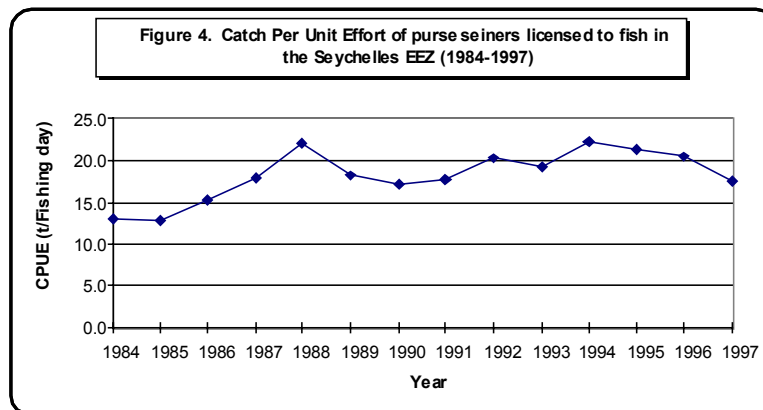
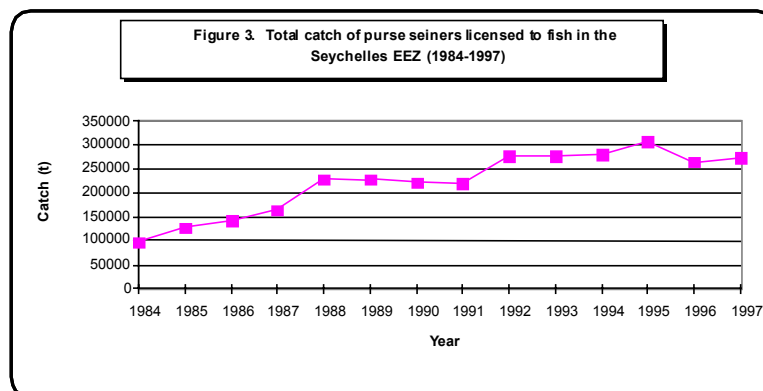
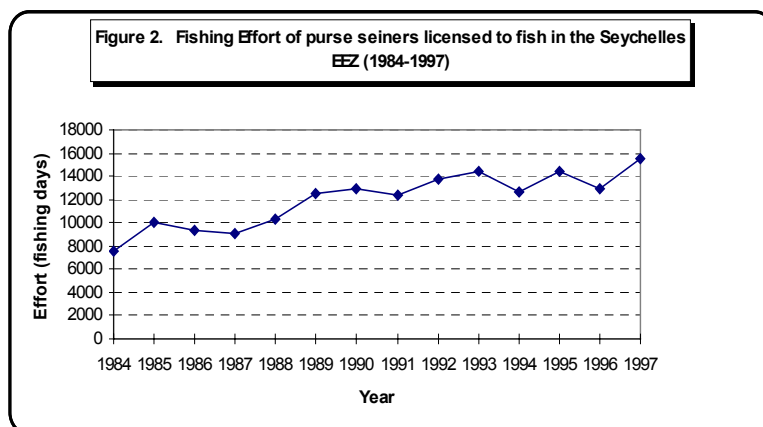
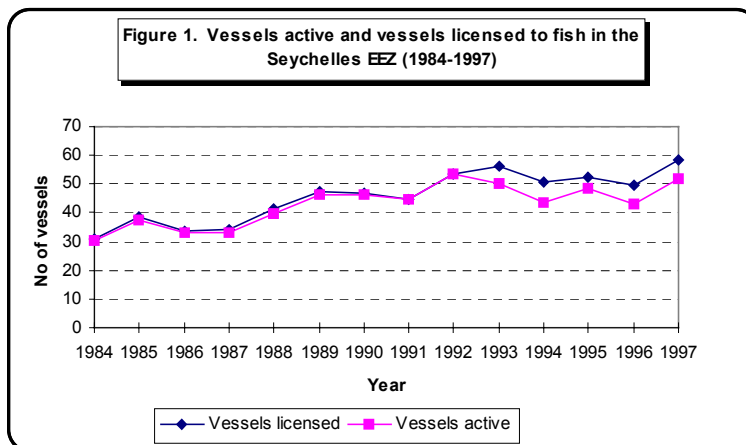
YEAR	S.Korean	Japan	Taiwan	Others	TOTAL
1991	61	12	34		107
1992	153	14	124	1	292
1993	54	20	134	2	210
1994	115	21	86		222
1995	77	22	187	6	292
1996	103	38	198	3	342
1997	75	57	208	17	357

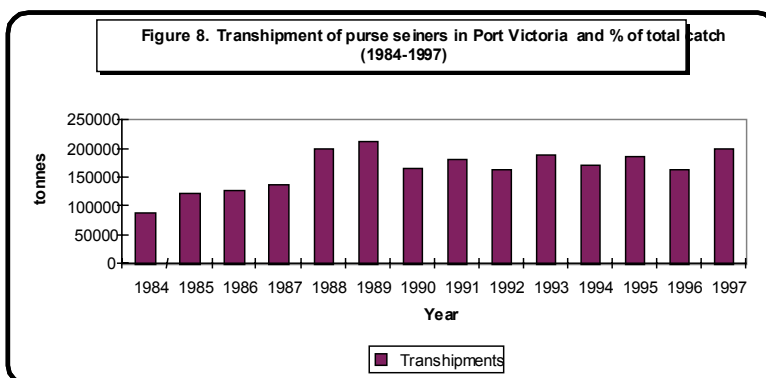
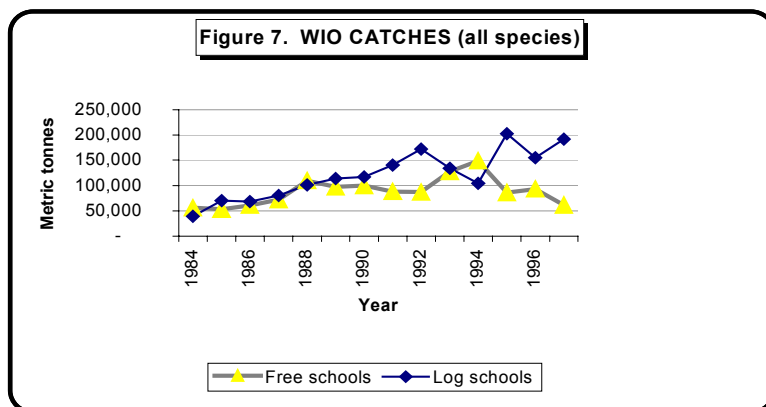
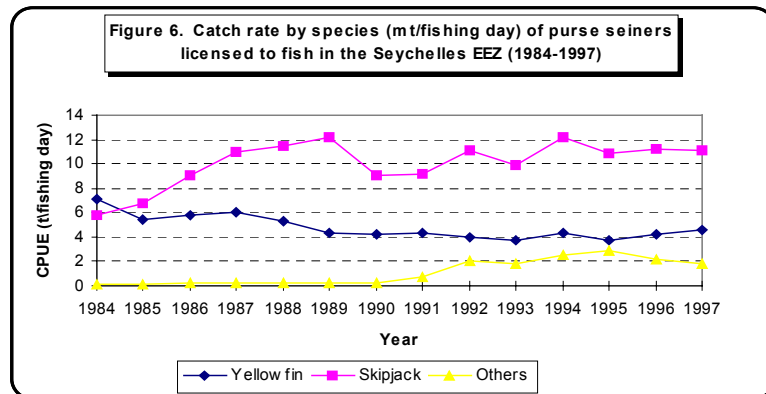
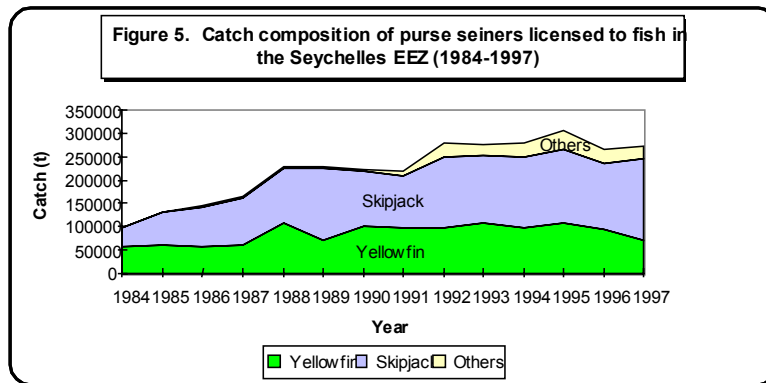
**Table 6. Catch, effort reported and catch rates per month by commercial fleets only from 1995 to 1997**

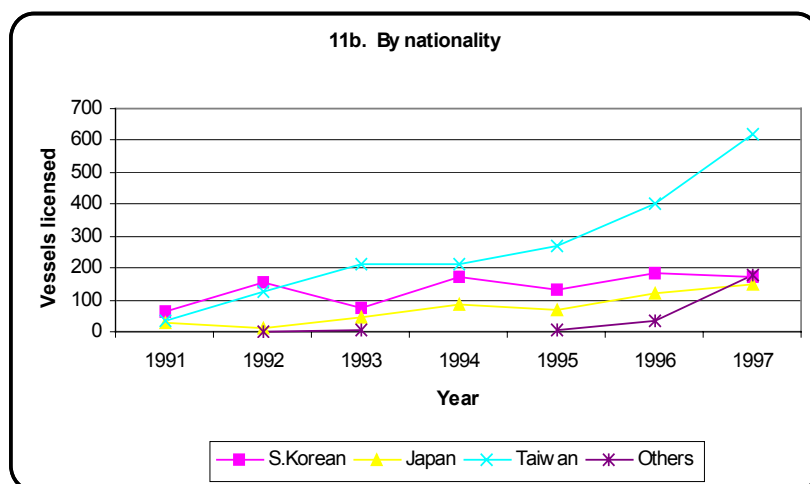
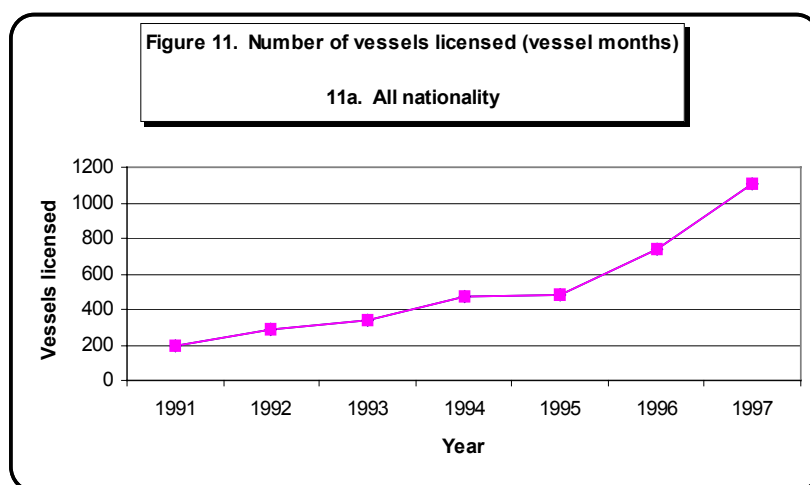
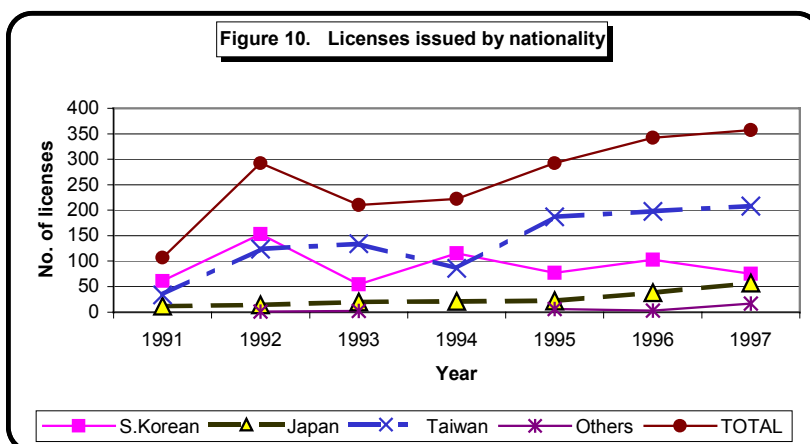
YEAR	MONTH	CATCH (kg)	EFFORT (Hooks)	Mean CPUE (kg/hook/d)	PREDATION (%)
<b>1995</b>	October	15,963	17,420	0.92	16
	November	6,668	7,450	0.90	2
	December	3,724	6,610	0.56	22
	<b>Total</b>	<b>26,355</b>	<b>31,480</b>	<b>0.84</b>	<b>14</b>
<b>1996</b>	January	10,405	14,810	0.70	26
	February	12,453	17,460	0.71	5
	March	10,986	24,260	0.45	24
	April	20,594	12,780	1.61	2
	May	40,753	28,920	1.50	14
	June	16,710	24,010	0.58	32
	July	9,706	18,370	0.45	12
	August	12,044	29,350	0.25	17
	September	9,215	21,120	0.36	4
	October	23,676	46,870	0.48	4
	November	29,096	34,760	0.57	5
	December	17,939	21,980	0.59	9
	<b>Total</b>	<b>213,811</b>	<b>294,690</b>	<b>0.65</b>	<b>13</b>
<b>1997</b>	January	32,059	28,440	0.78	2
	February	18,528	22,080	0.54	4
	March	23,064	39,090	0.54	12
	April	30,548	56,260	0.45	22
	May	43,837	51,870	0.59	37
	June	35,738	27,180	0.81	25
	July	17,682	17,060	0.59	31
	August	16,873	10,380	0.58	32
	September	15,224	12,800	0.40	42
	October	28,870	21,700	0.61	41
	November	25,897	20,900	0.73	33
	December	23,122	13,100	0.68	35
	<b>Total</b>	<b>311,442</b>	<b>320,860</b>	<b>0.60</b>	<b>27</b>

**Note** : The catch is based on landings data and is not corrected for processing losses.

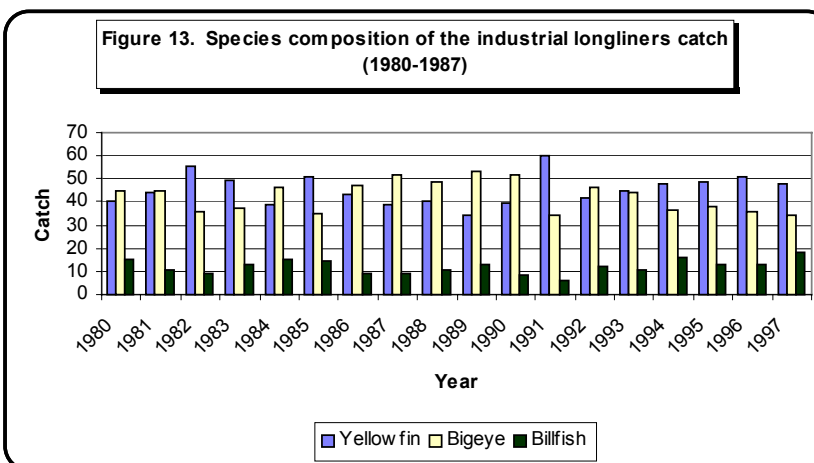
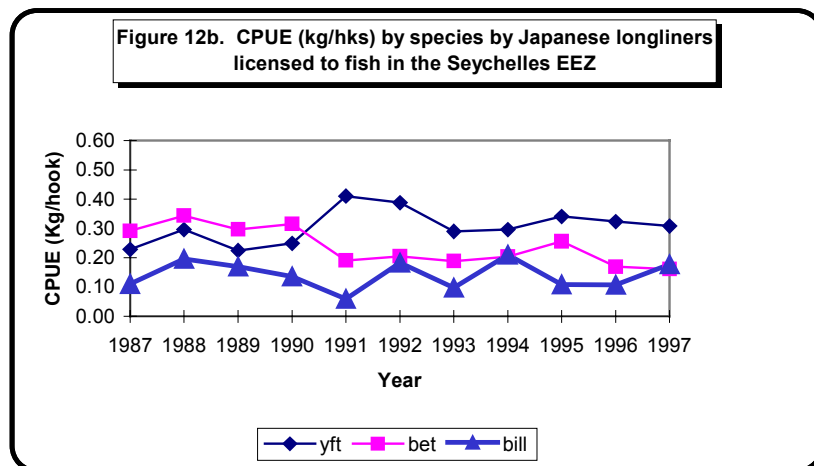
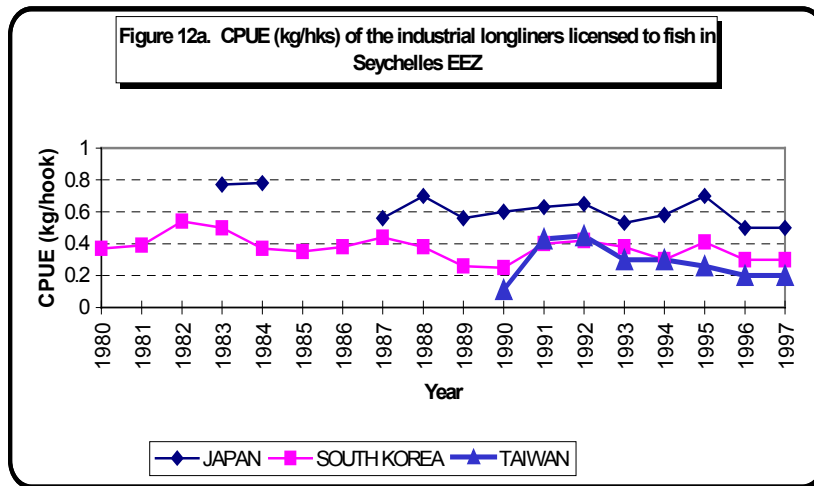
Effort: Fishing effort reported only



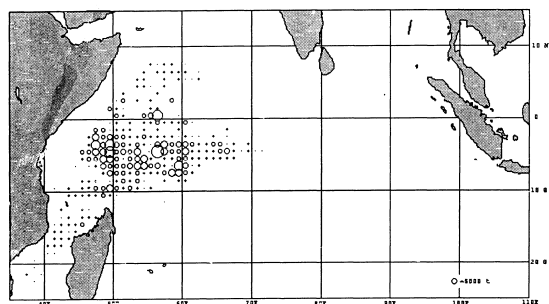




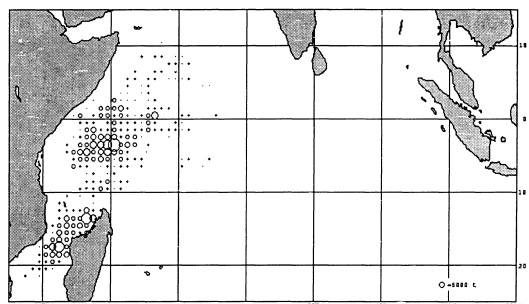




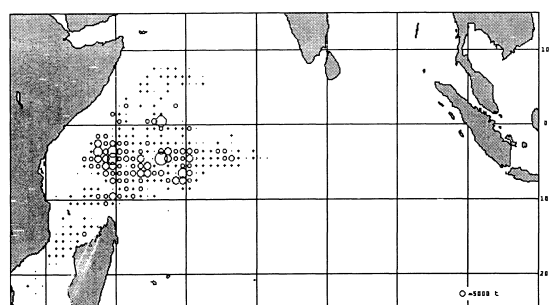
Maps



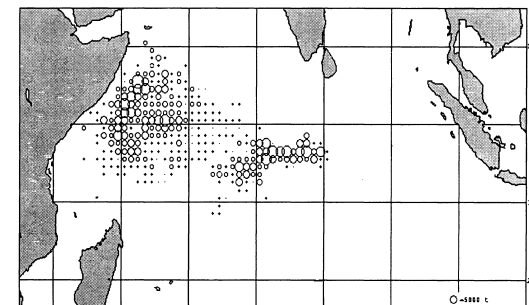
1<sup>st</sup> quarter 1995



2<sup>nd</sup> quarter 1995

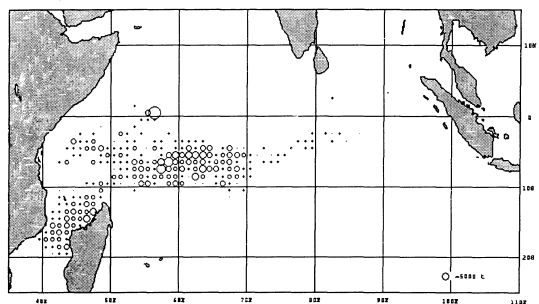


3<sup>rd</sup> quarter 1995

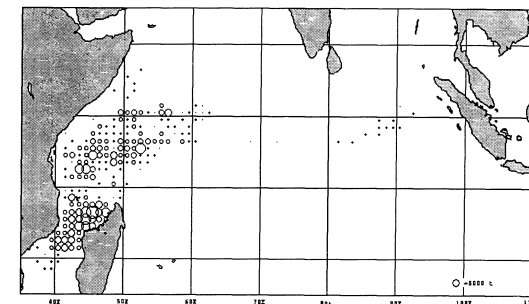


4<sup>th</sup> quarter 1995

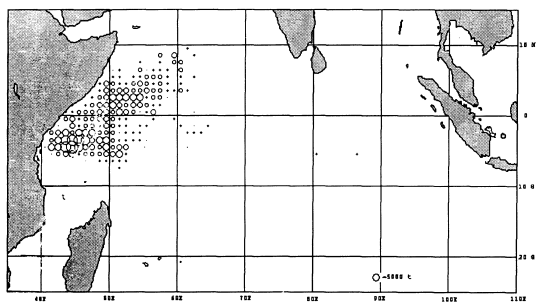
Map 1: Total catch/1° square of purse seine licensed to fish in Seychelles waters (1995)



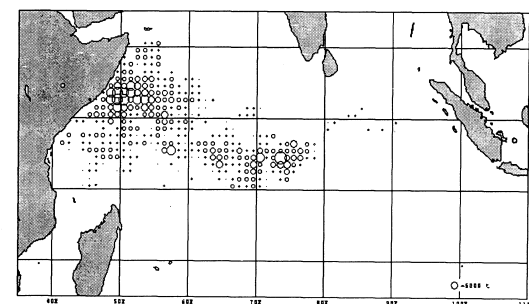
1<sup>st</sup> quarter 1996



2<sup>nd</sup> quarter 1996

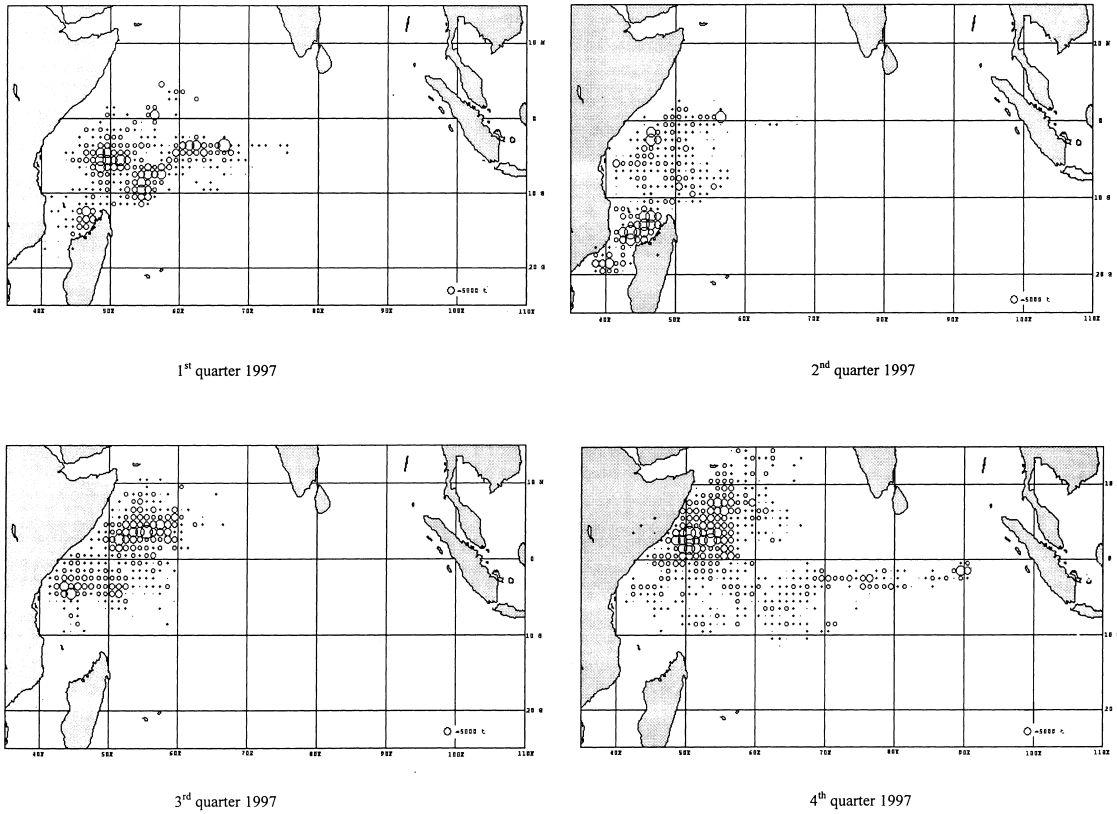


3<sup>rd</sup> quarter 1996

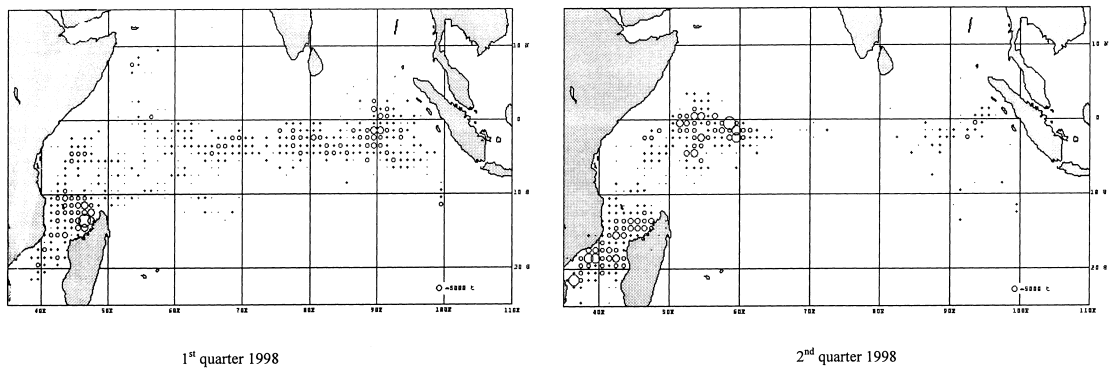


4<sup>th</sup> quarter 1996

Map 2: Total catch/1° square of purse seine licensed to fish in Seychelles waters (1996)



**Map 3: Total catch/1° square of purse seine licensed to fish in Seychelles waters (1997)**



**Map 4: Total catch/1° square of purse seine licensed to fish in Seychelles waters (1998)**