TUNA PRODUCTION IN PAKISTAN IN RECENT YEARS

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INTRODUCTION

The tuna fishery in Pakistan is still predominantly an artisanal activity, with marginal inputs from the commercial sector. As part of national policy for the judicious exploitation of fishery resources in Pakistan's Exclusive Economic Zone (EEZ), more emphasis is being placed on the development of tuna fisheries in coastal waters and on the high seas. Despite the fact that Pakistani waters contain commercially important species like yellowfin tuna (*Thunnus albacares*), tuna are among the nation's less exploited resources. The impact of modern technology has been felt mainly through the introduction of synthetic fibers for fishing gears and the mechanisation of the vessels, which enabled the traditional fishermen to expand their fishing activities. However, the pace of development of the tuna fishery, for both the internal and the export markets, is still lagging behind.

Tuna fishing is an artisanal activity carried out with locally-made wooden-hulled gillnetters, usually of 15 to 20 m keel length and gross registered tonnage (GRT) between 35 and 50 t, and fitted with 88- to 180-hp marine diesel engines. The numbers of operational gillnetters in two maritime provinces, Sindh and Baluchistan, are 291 and 714, respectively. Drift gillnets are the only gear employed for catching tuna by these wooden-hulled vessels. The nets are made of nylon twine, and are on average 2,500 m long, with stretched mesh size of 15 cm and a depth of about 80 meshes. The vessels fish up to a depth of 100 mt. There is no fishery directed at tunas in Pakistan; the pelagic gillnetters catch a variety of species other than tunas, such as mackerels and sharks. The catch is gutted and salted on board the vessels and landed in wet salted condition; most of it is exported to Sri Lanka in dry salted form, since there is no local market in Pakistan for this product (Majid and Ahmed, 1990).

In addition to this artisanal pelagic fishery, in 1990 the Government of Pakistan permitted four companies to operate commercial tuna longliners of 500 to 750 GRT in the Pakistani EEZ for experimental resource surveys of tuna and tuna-like species. These vessels operated up to August 1993, but since then few other Pakistani companies have been given permission to operate longliners under the Pakistani flag. The fleets of these companies consist mainly the vessels of Taiwanese origin, 41 to 57 mt in length and of 300 to 1,000 GRT (Majid and Imad, 1994). These vessels can set and haul 2,000 to 5,000 hooks per day. Presently there are 12 registered tuna longliners under Pakistani flags. Since 1993 the catch rates of tuna by these vessels have fallen drastically.

DATA COLLECTION AND ANALYSIS

Data is collected periodically by regular visits to the main landing centre in Karachi fish harbour and entered into the computer. The landing figures are raised to monthly figures by using the methods described in "Tuna Sampling Programme in Karachi, Pakistan" (IPTP/91/PAK/SP). Tuna form a substantial part of the marine fish landings in Pakistan, and the main species caught in Pakistani waters are :

- Longtail tuna (*Thunnus tonggol*)
- Yellowfin tuna (*Thunnus albacares*)
- Skipjack tuna (*Katsuwonus pelamis*)
- Kawakawa (*Euthynnus affinis*)
- Frigate tuna (*Auxis thazard*)

Figure 1. *Monthly catch of tuna and tuna-like species for two years.*

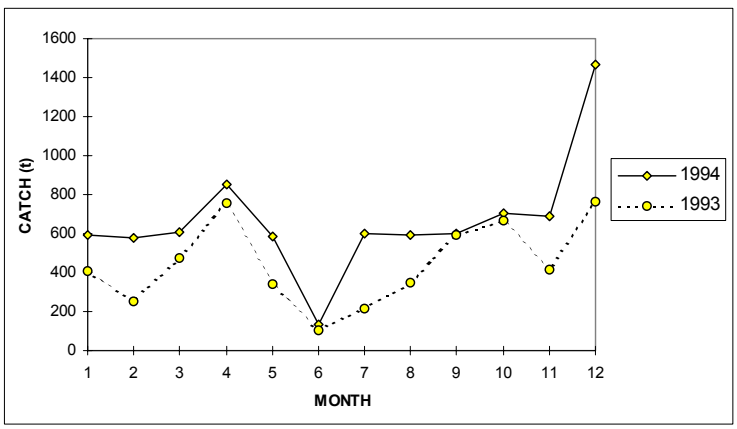


Table 1. *Estimated catch (t) by all gillnetters, 1993*

Month	*LOT*	*YFT*	*SKJ*	*KAW*	*FRI*	*COM*	*PEL*	*BIL*	*SHK*	*Total*	*IPTP SPP*
1	47	55	210	22	1	62	18	49	329	793	446
2	57	74	107	23	0	16	85	23	366	751	300
3	81	130	232	31	0	30	34	79	216	803	553
4	128	169	417	34	1	12	97	64	352	1,274	825
5	54	67	171	3	0	12	61	49	181	598	356
6	47	79	89	6	0	10	115	14	144	504	245
7	40	51	70	17	1	44	127	12	133	495	235
8	124	89	83	25	1	31	55	31	89	528	384
9	134	180	164	42	0	33	538	33	61	1,185	586
10	102	174	245	24	1	54	74	106	143	923	706
11	58	73	189	33	1	16	53	127	141	691	497
12	100	111	386	42	1	83	1,313	130	107	2,273	853
Total	972	1,252	2,363	302	7	403	2,570	687	2,262	10,818	5,986

Table 1a. *Estimated catch (t) by pelagic gillnetters (salt fishery), 1993*

Month	*LOT*	*YFT*	*SKJ*	*KAW*	*FRI*	*COM*	*PEL*	*BIL*	*SHK*	*Total*	*IPTP SPP*
1	33	391	182	11	0	39	7	43	149	503	347
2	21	*46*	73	15	0	12	38	16	192	413	183
3	44	95	195	26	0	24	22	31	164	601	415
4	1,011	127	376	28	1	5	82	59	283	1,082	697
5	291	115	153	2	0	2	36	41	119	438	283
6	6	78	79	4	0	1	1,151	12	96	391	180
7	28	51	50	14	1	23	125	10	88	371	177
8	69	63	77	22	0	6	24	16	40	317	253
9	99	140	132	25	0	9	501	21	20	947	426
10	78	131	204	11	0	8	34	32	65	563	4,841
11	38	491	122	18	1	61	23	113	49	419	347
12	67	761	319	37	0	111	12,981	1,191	14	1,941	629
Total	613	11	1,982	213	3	1,461	23,061	5,131	12,591	7,955	4,401

Table 1b. *Estimated catch (t) by pelagic gillnetters (ice fishery), 1993*

Month	*LOT*	*YFT*	*SKJ*	*KAW*	*FRI*	*COM*	*PEL*	*BIL*	*SHK*	*Total*	*IPTP SPP*
1	12	11	18	11	0	8	8	6	62	136	66
2	15	21	22	6	0	2	34	3	25	128	69
3	14	17	20	3	0	5	12	10	14	95	69
4	19	33	16	2	0	4	8	2	16	100	76
5	16	10	18	1	0	4	20	7	24	100	56
6	40	0	2	0	0	2	0	2	10	56	46
7	12	0	20	2	0	10	0	2	23	69	46
8	39	24	6	3	1	12	29	5	15	134	90
9	25	28	22	11	0	18	24	4	31	163	108
10	17	30	32	7	0	9	7	10	35	147	105
11	12	18	47	11	0	7	28	11	32	166	106
12	30	34	66	5	1	11	13	11	27	198	158
Total	251	226	289	62	2	92	183	73	314	1,492	995

RESULTS

The total estimated catch by all types of gillnetters in 1993 and 1994 is presented in Tables 1 and 2, respectively. The total annual catch is subdivided into catches by pelagic, demersal and combination gillnetters, and is presented in Tables 1a-1e and 2a-2e, respectively, for the two years. The monthly catch of tuna and tuna-like species in those two years are presented in Figure 1. Monthly catches for two maritime provinces of Pakistan during the two years are depicted in Figures 2a and 2b.

Trends in total tuna production

The total production of tuna in Pakistan in 1993-1994 is given in Tables 1 and 2. In 1993 the total landings of tuna and tuna-like species at Karachi harbour were 5986 t, and in 1994 they rose to 8192 t. These figures represent a drop in the catch when compared with landings in previous years. Figures 3a & 3b and 4a & 4b show the composition by

Table 1c. *Estimated catch (t) by pelagic gillnetters (mixed ice/salt fishery), 1993*

Month	*LOT*	*YFT*	*SKJ*	*KAW*	*FRI*	*COM*	*PEL*	*BIL*	*SHK*	*Total*	*IPTP SPP*
1	1	4	10	0	0	0	1	0	3	19	15
2	18	7	12	0	0	1	12	3	12	65	41
3	5	11	17	1	0	0	0	7	12	53	41
4	3	8	25	0	0	0	6	3	4	49	39
5	3	1	0	0	0	0	0	0	2	6	4
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	5	11	5	1	0	1	3	0	0	26	23
10	6	7	8	4	0	1	1	5	3	35	31
11	8	3	19	1	0	0	2	2	4	39	33
12	0	0	0	0	0	0	0	0	0	0	0
Total	49	52	96	7	0	3	25	20	40	292	227

Table 1d. *Estimated catch (t) by demersal gillnetters, 1993*

Month	*LOT*	*YFT*	*SKJ*	*KAW*	*FRI*	*COM*	*PEL*	*BIL*	*SHK*	*Total*	*IPTP SPP*
1	1	1	0	0	1	15	2	0	104	124	18
2	3	0	0	2	0	1	1	1	120	128	7
3	9	2	0	0	0	0	0	0	21	32	11
4	4	1	0	4	0	3	0	0	42	54	12
5	6	0	0	0	0	4	5	1	24	40	11
6	1	1	8	2	0	7	0	0	33	52	19
7	0	0	0	1	0	11	1	0	42	55	12
8	5	2	0	0	0	12	2	9	31	61	28
9	3	0	1	0	0	0	3	1	4	12	5
10	1	4	0	0	0	28	9	53	31	126	86
11	0	1	1	3	0	3	0	1	54	63	9
12	1	0	1	0	0	61	0	0	64	127	63
Total	34	12	11	12	1	145	23	66	570	874	281

Table 1e. *Estimated catch (t) by combination gillnetters, 1993*

Month	*LOT*	*YFT*	*SKJ*	*KAW*	*FRI*	*COM*	*PEL*	*BIL*	*SHK*	*Total*	*IPTP SPP*
1	0	0	0	0	0	0	0	0	11	11	0
2	0	0	0	0	0	0	0	0	17	17	0
3	9	5	0	1	0	1	0	1	5	22	17
4	1	0	0	0	0	0	1	0	7	9	1
5	0	0	0	0	0	2	0	0	12	14	2
6	0	0	0	0	0	0	0	0	5	5	0
7	0	0	0	0	0	0	0	0	0	0	0
8	11	0	0	0	0	1	0	1	3	16	13
9	2	1	4	5	0	5	7	7	6	37	24
10	0	2	1	2	1	8	23	6	9	52	20
11	0	2	0	0	0	0	0	0	2	4	2
12	2	1	0	0	0	0	2	0	2	7	3
Total	25	11	5	8	1	17	33	15	79	194	82

species, in percentage and weight, of the landings of the four predominant species of scombrids (skipjack, longtail, and yellowfin tunas, and Spanish mackerel) at Karachi harbour during 1993 and 1994 respectively. Compared to previous years a downward trend in landings of longtail tuna was observed. In 1993 it accounted for 20% of the landings of these four species, and in 1994 30%, while in previous years the figure was between 45% and 55%. In 1990 yellowfin had shown an increasing trend (Majid, 1991), and the landings of skipjack have risen to 47%.

Production by season

Seasonal variations in the catch in 1993 and 1994 can be observed in Figure 1, which shows an increasing trend in the catches during September to December but a downward trend during January to March, which is quite different from the observations of previous years. Seasonal variations in the species composition of the landings of the four major species in those two years are shown in Figures 4a and 4b, which show that skipjack tuna was the predominant species

Table 2. *Estimated catch (t) by all gillnetters, 1994.*

Month	*LOT*	*YFT*	*SKJ*	*KAW*	*FRI*	*COM*	*PEL*	*BIL*	*SHK*	*Total*	*IPTP SPP*
1	*138*	*68*	*267*	*36*	*0*	*39*	*10*	*70*	*188*	*816*	*618*
2	81	88	319	16	1	22	14	60	115	716	587
3	113	65	337	9	1	12	28	82	197	844	619
4	116	81	360	23	5	224	35	56	75	975	865
5	138	99	284	12	0	5	20	61	66	685	599
6	95	24	46	16	0	2	15	11	105	314	194
7	233	39	192	113	0	7	48	27	341	1,000	611
8	196	47	250	46	7	45	105	23	147	866	614
9	138	59	246	19	21	36	84	65	93	761	584
10	114	101	338	31	0	38	85	88	227	1,022	710
11	110	124	373	30	0	18	66	55	136	912	710
12	635	173	300	132	1	169	29	71	417	1,927	1,481
Total	2,107	968	3,312	483	36	617	539	669	2,107	10,838	8,192

Table 2a. *Estimated catch (t)by pelagic gillnetters (salt fishery), 1994*

Month	*LOT*	*YFT*	*SKJ*	*KAW*	*FRI*	*COM*	*PEL*	*BIL*	*SHK*	*Total*	*IPTP SPP*
1	83	42	183	15	0	12	4	29	48	416	364
2	69	81	280	12	1	5	9	40	47	544	488
3	76	54	275	4	1	0	15	55	37	517	465
4	25	59	261	9	2	1	16	36	9	418	393
5	58	74	215	6	0	0	7	40	47	447	393
6	26	24	35	13	0	0	12	11	94	215	109
7	115	35	192	11	0	0	38	14	286	691	367
8	55	38	241	11	6	0	57	13	43	464	364
9	58	46	223	0	13	4	33	22	21	420	366
10	30	69	253	17	0	4	48	24	82	527	397
11	89	112	326	25	0	3	53	47	78	733	602
12	63	78	201	44	0	4	14	30	95	529	420
Total	747	712	2,685	167	23	33	306	361	887	5,921	4,728

Table 2b. *Estimated catch (t) by pelagic gillnetters (ice fishery), 1994*

Month	*LOT*	*YFT*	*SKJ*	*KAW*	*FRI*	*COM*	*PEL*	*BIL*	*SHK*	*Total*	*IPTP SPP*
1	5	2	11	1	0	2	4	7	26	58	28
2	7	4	33	4	0	3	4	18	44	117	69
3	9	5	43	5	0	3	12	12	31	120	77
4	40	6	48	7	3	2	17	11	22	156	117
5	27	11	25	1	0	3	6	10	7	90	77
6	1	0	4	0	0	0	3	0	4	12	5
7	2	4	0	2	0	1	10	2	2	23	11
8	25	6	9	18	1	15	39	8	36	157	82
9	61	9	22	8	4	10	39	23	24	200	137
10	29	23	55	8	0	17	22	42	85	281	174
11	7	6	27	2	0	12	8	6	8	76	60
12	128	95	94	15	1	17	6	16	79	451	366
Total	341	171	371	71	9	85	170	155	368	1,741	1,203

in both years, a change from previous years. The reasons for this change are being studied, and it appears that the industrial tuna longlining fleet which operated in Pakistan's EEZ from 1991 to 1993 could be a factor.

Catch rates (CPUE)

Average monthly catch rates (kg/day) for 1993 and 1994 are shown in Figure 5. The rates varied from 20 to 130 kg/day in 1993 and 71 to 150 kg/day in 1994. From the figure it is evident that the catch rates were lower in 1993 and showed an increasing trend, while in 1994 they were higher and shown greater monthly variations. Total effort, in number of

Table 2c. *Estimated catch (t) by pelagic gillnetters (mixed ice/salt fishery), 1994*

Month	*LOT*	*YFT*	*SKJ*	*KAW*	*FRI*	*COM*	*PEL*	*BIL*	*SHK*	*Total*	*IPTP SPP*
1	3	5	9	3	0	2	2	5	16	45	27
2	0	3	6	0	0	0	0	2	2	13	11
3	0	4	16	0	0	0	1	2	8	31	22
4	3	12	41	7	0	0	1	9	5	78	72
5	3	14	44	1	0	1	2	10	5	80	73
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	6	3	0	0	0	0	1	0	1	11	9
9	0	3	0	0	0	0	0	0	18	21	3
10	0	0	0	0	0	0	0	0	0	0	0
11	2	6	19	0	0	0	4	2	3	36	29
12	0	0	0	0	0	0	0	0	0	0	0
Total	17	50	135	11	0	3	11	30	58	315	246

Table 2d. *Estimated catch (t) by demersal gillnetters,1994*

Month	*LOT*	*YFT*	*SKJ*	*KAW*	*FRI*	*COM*	*PEL*	*BIL*	*SHK*	*Total*	*IPTP SPP*
1	45	19	64	17	0	23	0	29	98	295	197
2	5	0	0	0	0	14	0	0	21	40	19
3	28	1	3	0	0	5	0	10	61	108	47
4	39	4	10	0	0	217	0	0	30	300	270
5	48	0	0	4	0	1	0	1	4	58	54
6	64	0	5	3	0	2	0	0	5	79	74
7	116	0	0	100	0	6	0	11	39	272	233
8	109	0	0	16	0	28	5	2	57	217	155
9	15	0	1	9	4	19	9	18	21	96	66
10	48	0	0	4	0	7	5	18	52	134	77
11	12	0	1	3	0	3	0	0	40	59	19
12	443	0	1	72	0	146	8	24	229	923	686
Total	972	24	85	228	4	471	27	113	657	2,581	1,897

Table 2e. *Estimated catch (t) by combination gillnetters, 1994*

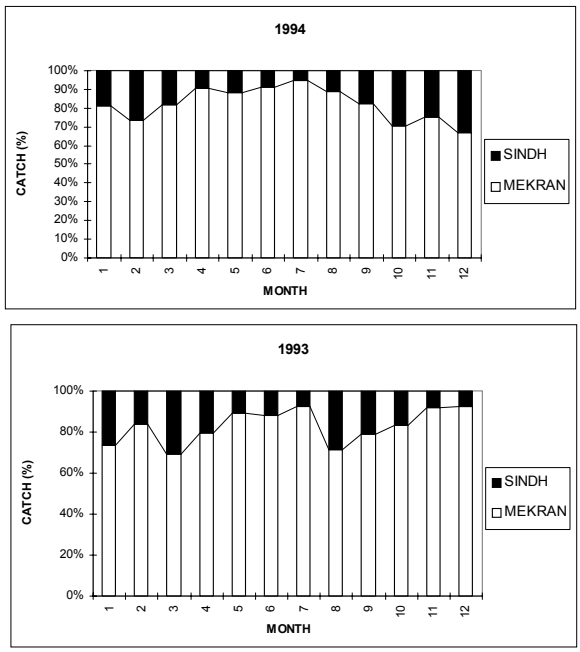
Month	*LOT*	*YFT*	*SKJ*	*KAW*	*FRI*	*COM*	*PEL*	*BIL*	*SHK*	*Total*	*IPTP SPP*
1	2	0	0	0	0	0	0	0	0	2	2
2	0	0	0	0	0	0	1	0	1	2	0
3	0	1	0	0	0	4	0	3	60	68	8
4	9	0	0	0	0	4	1	0	9	23	13
5	2	0	0	0	0	0	5	0	3	10	2
6	4	0	2	0	0	0	0	0	2	8	6
7	0	0	0	0	0	0	0	0	14	14	0
8	1	0	0	1	0	2	3	0	10	17	4
9	4	1	0	2	0	3	3	2	9	24	12
10	7	9	30	2	0	10	10	4	8	80	62
11	0	0	0	0	0	0	1	0	7	8	0
12	1	0	4	1	0	2	1	1	14	24	9
Total	30	11	36	6	0	25	25	10	137	280	118

fishing days, is shown in Figure 6, which indicates that the pattern of effort was almost same in both years. Both the catch rates and the landings of tuna were higher in 1994. This could be interpreted to mean that 1994 was more productive than 1993, since the level of effort was similar.

DISCUSSION

The estimated landings of tuna in Pakistan reached about 30650 t in 1992, as compared to 16578 t in 1993 and 19405 t in 1994. The reason for this decline may be attributed to the experimental resource survey allowed by the

***Figure 2**. Area-wise catch (%) for two maritime provinces of Pakistan.*



government from 1991 to 1993, when about 50 longliners were allowed to operate in the EEZ of Pakistan. This is substantiated by the effects of the operation of large numbers of longliners in the EEZs of neighbouring countries. Slight variations in catch were also recorded due to changes in method of collecting and compiling data. The monthly landings by species in 1993 and 1994 are given in Tables 1 and 2 and plotted in Figure 1. Landings take place year-round, with a lean period during the monsoon, June to September. During this period fishing effort is drastically curtailed due to the inclement weather conditions. Seasonal variations in 1993 and 1994 followed almost the same pattern as in previous years. From these data it is clear that there are two peak seasons for tuna fishing in Pakistan, one from March to April and the other from September to November. The production patterns of 1993 and 1994 are in close agreement with these findings.

The estimate of tuna landings for 1994 is 19405 t, and for 1993 16578 t, a decline from previous years. This trend needs verification with other data from the region. Since these species are migratory in nature the data from neighbouring countries should also be taken into account. In this way it can be revealed whether tuna production in the Indo-Pacific region is likely to increase or not.

The fluctuation in catch rates is quite clear: they were comparatively high from September to December in both years (Figure 5) The highest catch rate was recorded in May 1994, at 150 kg/day. The highest catch rate recorded in 1993 was 135 kg/day in December.

The species composition has also shown a changing pattern over the years. From 1989 to 1991 longtail tuna contributed more than 45%, but in 1992 yellowfin and skipjack tuna predominated. Longtail tuna again comes to the top with landings of 3400 t. This change may be due to the introduction of tuna longlining in those years in Pakistan. The predominance of skipjack tuna in 1993 and 1994 may be due to environmental factors such as temperature and water currents.

Since tunas are highly migratory species and constitute a shared stock, there is a need for a common strategy to be devised jointly for the Indo-Pacific tuna fishery by the countries of the region to ensure that the stocks are not overexploited in any one area, which may effect the share of the neighbouring country. Each member country of the region must take due care to avoid damage to these stocks.

REFERENCES

MAJID, A. AND AHMED, J. 1990. Production trends in tuna fishery in Pakistan. Collective volume of Working documents Vol.4. Experts consultation on Stock Assessment of Tuna in the Indian Ocean Bangkok, Thailand, 2-6 July 1990. TWS/90/35; pp. 449-461.

MAJID, A. 1991. Status of yellowfin tuna (*Thunnus albacares*) fishery in Pakistan. Report of workshop on stock assessment of yellowfin tuna in the Indian Ocean. TWS/91/34.

MAJID, A. AND IMAD, A. 1994. Present status of tuna fisheries in Pakistan. Ardill, J.D., 1949 Ed., Proceedings of the Expert Consultation on Indian Ocean Tunas, 5th Session, Mahe, Seychelles, 4-8 October 1993. 275 p.

***Figure 3**. Catch composition of four scombroid species from the coast of Pakistan.*

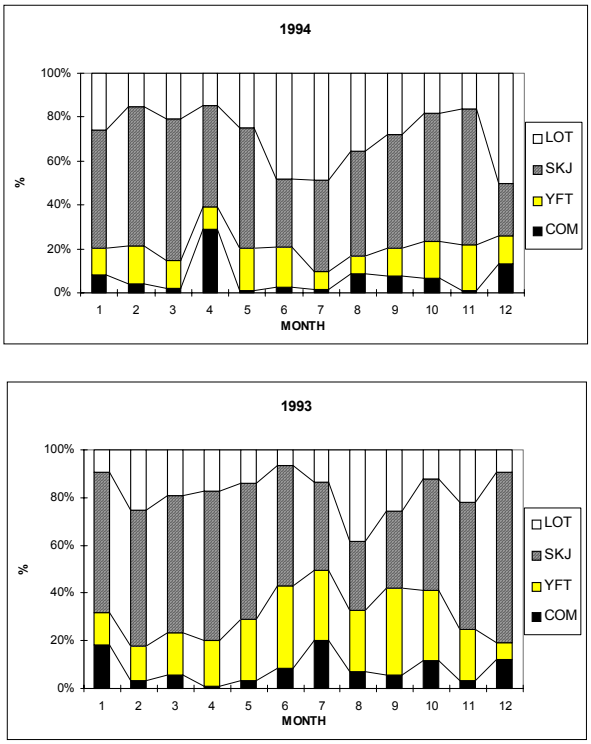


***Figure 4**. Landings of four dominating tuna species.*

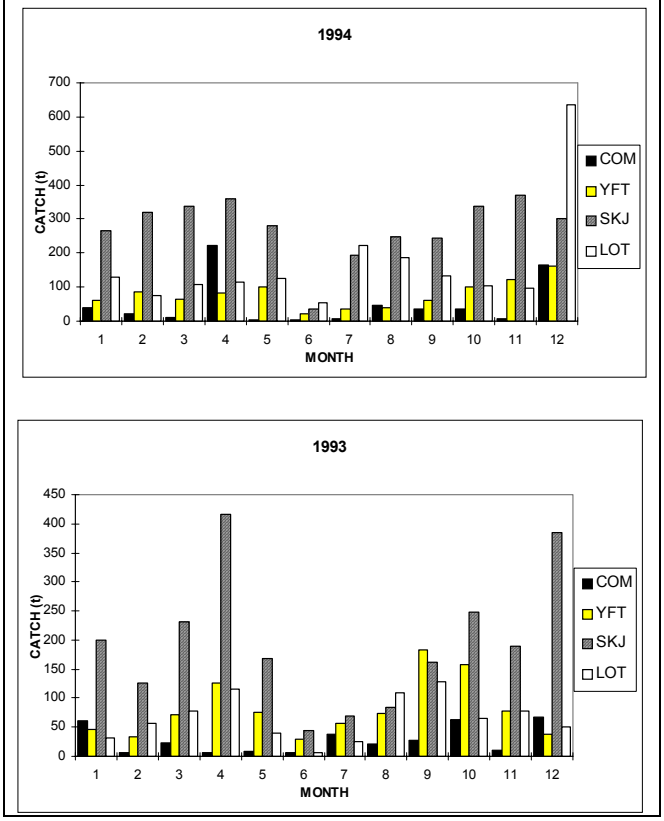


***Figure 5.** Catch per unit effort (CPUE) for 1993 and 1994.*

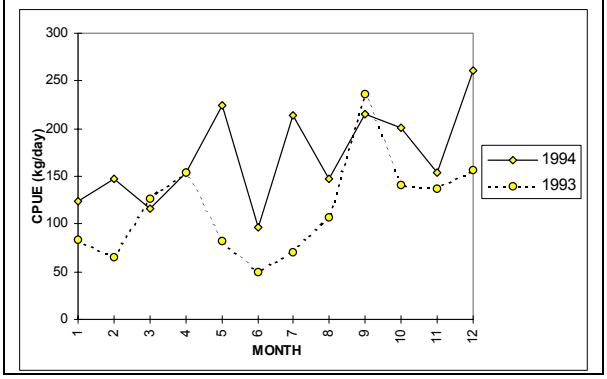


***Figure 6.** Total effort (fishing days) by all gillnetters*