TRANSHIPMENT OF TUNA IN MAURITIUS AND ANALYSIS OF THE MAURITIAN PURSE-SEINE FISHERY, 1994-1997

Norungee, D. and M. Munbodh[1]

ABSTRACT

This paper presents a review of tuna transhipment in Mauritius and of the local purse-seine fishery. Mauritian purse seiners use FADs to concentrate the fish before netting them. Information is presented on catch and effort, species composition, length frequency and spatial distribution of the purse-seine catches.

Introduction

Commercial purse seining was introduced in the Indian Ocean in 1979 by a purse seiner owned by a Mauritian and Japanese joint venture, using the same technique as the Japanese, who had traditionally fished on schools associated with logs in the Pacific Ocean. This attempt was made after successful experimental purse-seine fishing was carried out by the Japan Marine Fishery Research Centre (JAMARC) using artificial logs (*payaos,* or FADs). This fishery developed further around 1984, when French and, subsequently, Spanish vessels started operating in the Indian Ocean. The total catch of the purse-seine fishery of the Western Indian Ocean amounted to 263,624 metric tonnes (t) in 1996 (Anon., 1996).

During the past four years Mauritian purse seiners have landed an annual average of 5,279t of tuna. They operate mainly in the Western Indian Ocean.

The tuna fishery is the major industrial fishing activity of Mauritius. It accounts for about 40 % of the annual catch and supplies raw material for the local tuna canning factory. Export of canned tuna represents more than 90 % of Mauritian exports in fish and fish products, and thus reflects its important role in the Mauritian fisheries sector. Two purse seiners with a total carrying capacity of 1,500 t were operating; one was sold in October 1997, leaving one vessel of 535GRT in operation.

For more than three decades, Port Louis has served as a transhipment base for Far East Asian tuna longliners operating in the Western and Central Indian Ocean. During the past four years an annual average of 14,182 t of tuna and associated species were transhipped at Port Louis.

In this paper, we shall present a summary of the following:-

- Transhipment of tuna by longliners, 1994-1997.
- Catch and effort data of the Mauritian purse-seine fishery, 1994-1997.
- Species composition of the catches of the local purse seiners.
- Spatial distribution of the catches of the local purse seiners.
- Length-frequency analysis of the catches made during 1996 and 1997.

Transhipment of tuna by longliners in Port Louis, 1994-1997

The volume of tuna and related species transhipped by longliners of different flags in Mauritius from 1994 to 1997 is summarized in Table 1. The quantities transhipped during 1994, 1995 and 1996 were almost constant (14,946.2t, 14,772.3t and 14,715.3t, respectively). However, in 1997 the tonnage transhipped decreased to 12,295.3t, with a corresponding drop in the callings of longliners from 413 in 1996 to 376 in 1997.

The major part of the longline catches transhipped in Mauritius (about 76 %) was composed of albacore (*Thunnus alalunga)* which is the primary target of the majority of the longliners which had called at Port Louis.

Catch and effort statistics, 1994-1997

The catch and effort data for tuna caught by the Mauritian purse seiners from 1994 to 1997 are presented in Table 2. The catch data show a downward trend from 7,689t in 1994 to 2,815t in 1996, with a slight increase to 4,435t in 1997. A similar trend is observed in the fishing effort, which fell from 467 days in 1994 to 321 days in 1996, before increasing slightly again to 379 in 1997. The unit of effort used is the fishing day (fd), which corresponds to the time spent at sea for fishing and searching. It excludes days spent for mechanical problems and travelling to and from fishing grounds.

The catch per unit effort (CPUE) of the Mauritian purse seiners varied from 16.5t/fd to 8.7t/fd. The catch rate showed a considerable decrease, especially during 1996 and 1997. This can be explained by the fact that one of the two purse seiners, which had an average catch rate of 17.7t/fd, was inactive for a long period while it was undergoing major repairs. Besides, the fishing efficiency of the other purse seiner had gone down from 15.8t/fd in 1994 to 7.9t/fd in 1996, but increased to 13.2t/fd in 1997.

Species composition

The species composition of the catches of the Mauritian purse seiners over the past four years is shown in Table 2 and Figure 1. Skipjack tuna (*Katsuwonus pelamis*) dominated the catch, ranging from 61.6 % to 66.6 %. Yellowfin tuna (*Thunnus albacares*) seemed to be the second target species of the Mauritian purse seiners, contributing from 18.6 % to 26.5 % of the landings. Bigeye tuna (*Thunnus obesus*) was caught in lesser quantities and constituted only 8.4 % to 11.2 % of the total catch. A fair percentage of miscellaneous fishes was also present in the catch. The average species composition of the tuna caught by the local purse seiners fishing on artificial logs during the past four years (skipjack 66.7 %, yellowfin 23.7 %, and bigeye 9.6 %) is similar to that caught by purse seiners under natural logs (skipjack 70 %, yellowfin 25 %, and bigeye 5 %) (Hallier, 1993).

[1] Albion Fisheries Research Centre, Mauritius

Spatial distribution

During 1994 -1997, the effort of the Mauritian purse seiners was concentrated in the western part of the Indian Ocean between 45°E and 85°E and 10°N and 12°S . During 1994, the area between 5°N and 4°S and 57°E and 66°E was more productive (Figure 2). The following year, better catches were obtained from 0° to 8°N and 50°E to 69°E (Figure 3). In 1996, the productive zone shifted towards the East, from 3°S to 6°S and 73°E to 84°E (Figure 4). In 1997, better yields were obtained from the area between 2°N and 14°S and 45°E and 51°E (Figure 5).

Size structure of tuna unloaded by Mauritian purse seiners, 1996-1997

A random sample of about 800 tuna is measured from each landing of the Mauritian purse seiners for length-frequency data to assess the species composition of the catch. Under this programme, 3,000 tunas were measured in 1996 and 14,170 tunas in 1997.

Skipjack tuna

The length-frequency distributions of skipjack tuna caught by the Mauritian purse seiners during 1996 and 1997 are shown in Figures 6 and 7. During 1996, the size of the skipjack tuna ranged from 30 to 70 cm, with a mode at 47 cm. A considerable number of immature fish were noted in the catch. Fish above 60 cm were rare. During 1997, the size of the skipjack varied from 32 cm to 72 cm, the majority being between 43 cm and 53 cm, with a mode at 48 cm. During 1997 also, quite a number of immature fish were found in the catch and the size distribution was less variable.

Yellowfin tuna

Figures 8 and 9 show the annual size distribution of yellowfin tuna. During 1996 the size ranged from 37 to 118 cm, and in 1997 it varied from 40 to 129 cm. For both years, most of the yellowfin sampled were immature fish measuring less than 70 cm. Fish above 100 cm were rare. This size distribution is typical of fish caught under artificial logs, and contrasts with what is observed in free schools, where the vast majority of the yellowfin caught are over 70 cm and almost half of the catch is above 100 cm (Hallier, 1990).

Bigeye tuna

The size frequencies of the bigeye tuna sampled during 1996 and 1997 are illustrated in Figures 10 and 11, respectively. The fish sampled measured between 44 and 99 cm during 1996, and between 42 and 93 cm during 1997. The majority of the fish measured during both years were small, with lengths less than 70 cm.

Conclusions

The volume of tuna transhipped and the number of longliners which called at Port Louis during the past four years has remained fairly stable. A drop in the catch of the local purse seiners was noted, especially during the past two years, as one vessel was sold.

The species composition of the catches of the Mauritian purse seiners fishing on artificial logs is similar to those on natural logs, but differs completely from those made on free schools.

The fishing zone of the local purse seiners lies between 45º and 85ºE and 10ºN and 12ºS.

The majority of the skipjack caught by the Mauritian purse seiners are mature fish, measuring between 43 and 53 cm in length. Unlike skipjack, the majority of the yellowfin and bigeye caught are juveniles, and thus exploitation by this technique may result in a lower yield per recruit, especially for yellowfin, as more small individuals are captured.

References

Anon., 1996. Tuna Bulletin, Seychelles Fishing Authority, Seychelles, 1996.

Hallier J. P. Tuna fishing on log associated schools in the Western Indian Ocean: An aggregation behaviour. IPTP, Thailand, 1990.

Hallier J. P. Purse seine fishery on floating objects: What kind of fishing effort? What kind of abundance indices? IPTP 1993.

Norungee D., A. Venkatasami and C. Lim Shung. Catch and landings statistics of the Mauritian tuna fisheries (1987-1992) and an analysis of the skipjack tuna catch of the Mauritian purse seine fishery (1987-1992). IPTP, Seychelles.

Norungee D., and C. Lim Shung. Analysis of Purse seine Fishery of Mauritius (1990-1994) and comparison of catch rate and species composition of catches of Mauritian Purse seiners to those of the French fleet. IPTP 1995.

Table 1: Species composition of tuna transhipped in Mauritius

Year	Yellowfin	Bigeye	Albacore	Skipjack	Southern bluefin	Swordfish	Marlin	Miscella-neous	No. of port calls	Total
1994	427.2	574.9	10,044.8	4.6	4.10	788.8	224.4	2,877.4	335	14,946.2
1995	1,143.5	565.2	11350	15.8	0	668.4	496.40	533	458	14,772.3
1996	959.6	464.7	11,865.9	8.8	0	210	445.9	760.4	413	14,715.3
1997	631.6	304.5	9,972.5	7.5	0.5	398.7	331.6	648.4	376	12,295.3

Table 2: Catch, effort and species composition of Mauritian purse seiners, 1994-1997

Year	No. of landings	Effort (fishing days)	Yellowfin	Skipjack	Bigeye	Others	Total	CPUE (t/day)
1994	17	467	1,777	5125	646	141	7,689	16.50
			23.11 %	66.66 %	8.40 %	1.83 %		
1995	15	390	1636	3808	552	183	6,179	15.80
			26.47 %	61.62 %	8.94 %	2.97 %		
1996	12	221	633	1858	257	67	2,815	8.70
			22.48 %	66.00 %	9.13 %	2.39 %		
1997	11	379	826	2921.40	499.10	188.60	4,435	11.70
			18.62 %	65.87 %	11.25 %	4.26 %		

Figure 1: Species composition of Mauritian purse seiner catches, 1994-1997

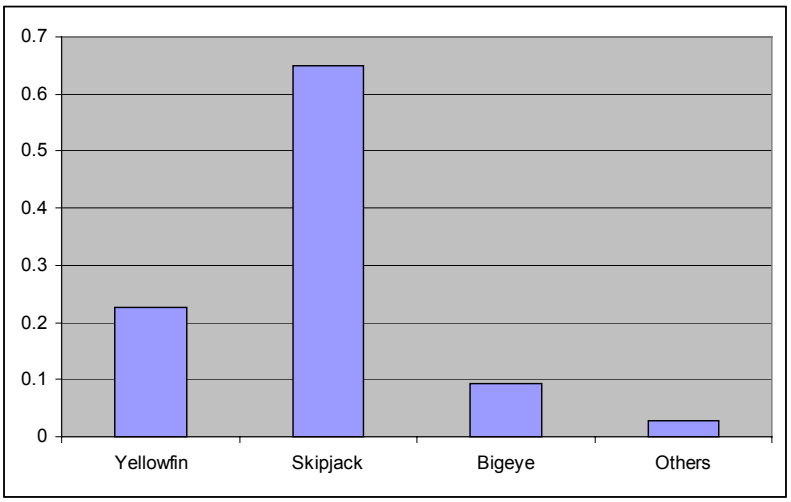

Figure 2: Purse seine catch distribution, 1994

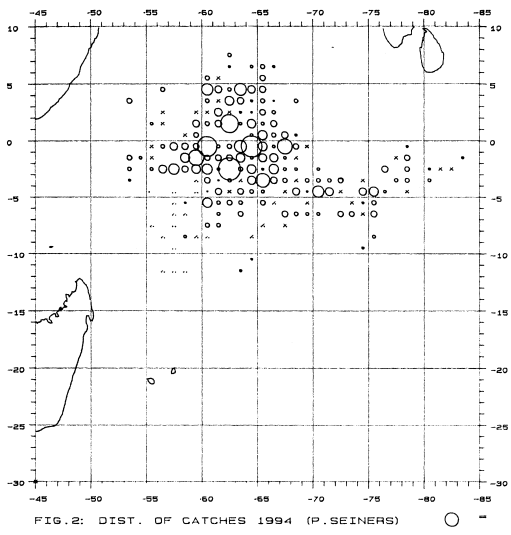

Figure 3: Purse seine catch distribution, 1995

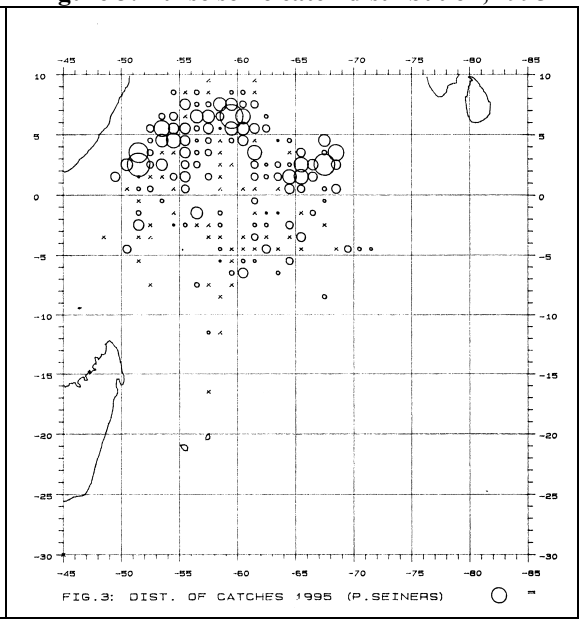

Figure 4: Purse seine catch distribution, 1996

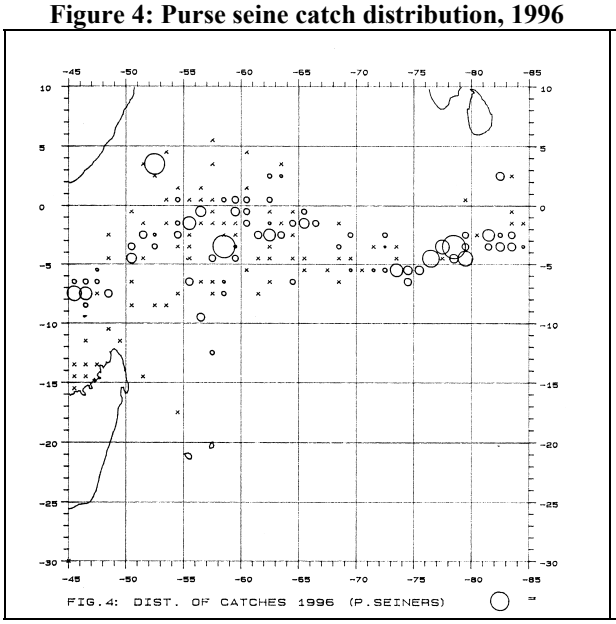

Figure 5: Purse seine catch distribution, 1997

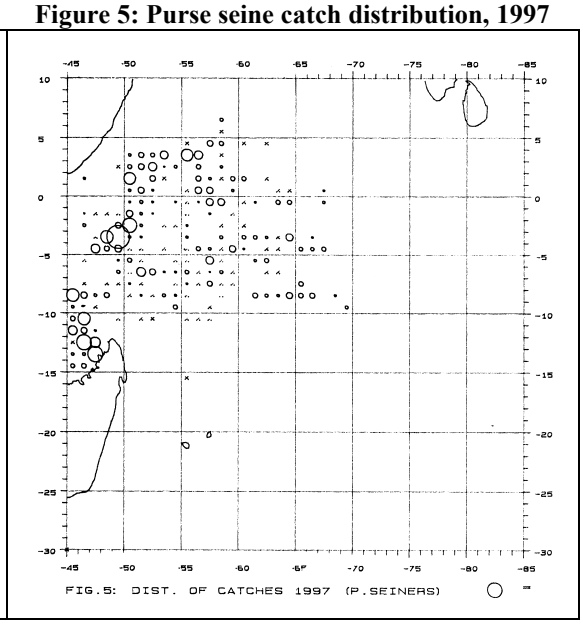

Figure 6: Size distribution, skipjack, 1996

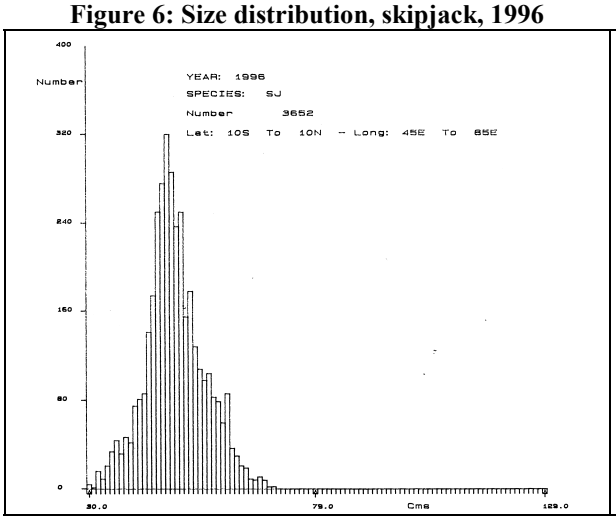

Figure 7: Size distribution, skipjack, 1997

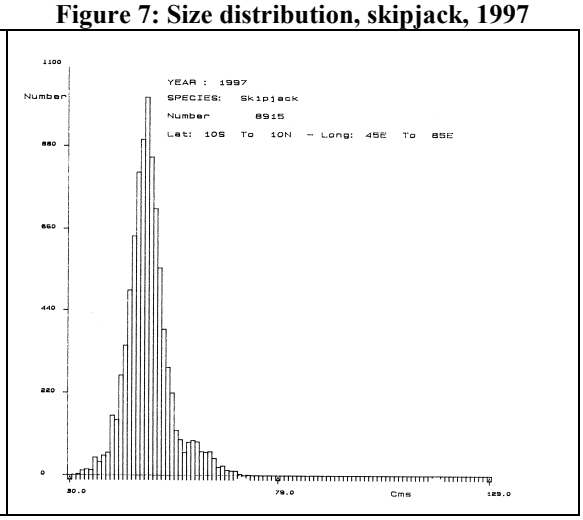

Figure 8: Size distribution, yellowfin, 1996

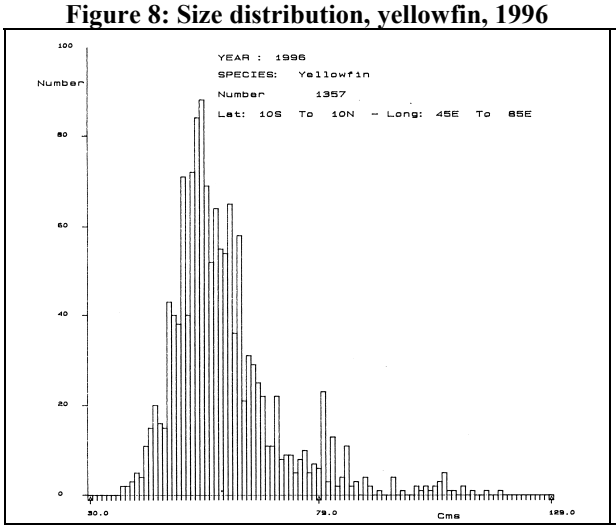

Figure 9: Size distribution, yellowfin, 1997

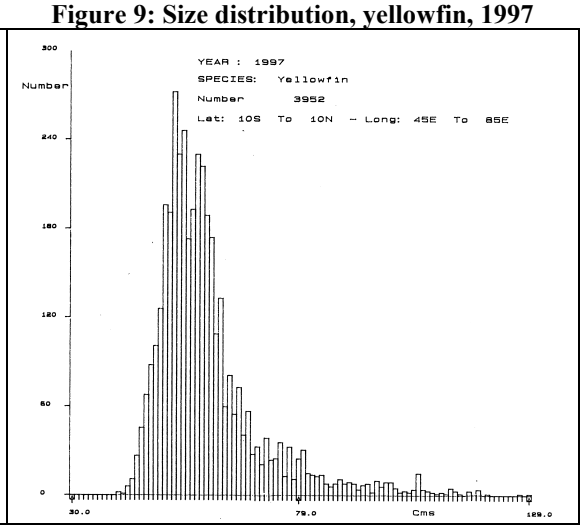

Figure 10: Size distribution, bigeye, 1996

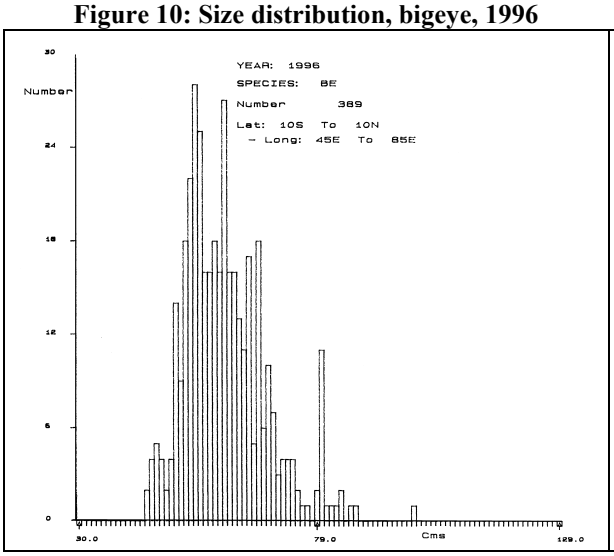

Figure 11: Size distribution, bigeye, 1997