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TUNA FISHING IN THE EXCLUSIVE ECONOMIC ZONE  
OF FRENCH POLYNESIA IN 1979

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SUMMARY

Two types of fisheries were involved with tuna exploitation in the EEZ of French Polynesia in 1979:

- The Polynesian artisanal skipjack fishery, which operates from small high-powered launches near the coast of the most populated islands with pole-and-line and no bait. Catch records are reliable for Papeete. Landings in this port totalled 805 tonnes, of which 535 tonnes were skipjack (66%), 73 tonnes yellowfin (20%), 73 tonnes dolphin (9%) and 36 tonnes other species (4.5%). Total catches for the whole of French Polynesia are not known, but may be estimated at around 1,300-1,500 tonnes, of which 900 or 1,000 tonnes would be skipjack.

- The Japanese longline fishery, which was licensed to operate from October 1979 to April 1980. During this period, 3,305 tonnes of fish were caught, the majority being big-eye tuna, with 1,593 tonnes (48%). Yellowfin with 1,170 tonnes, made up 36% of the Japanese catch. The proportion of albacore was very small: 126 tonnes, which is 4%. Other species accounted for 408 tonnes (12%).

Commercial tuna fishing in the EEZ of French Polynesia is carried out by two types of fisheries. One is the local skipjack fishery which catches surface tuna, mainly skipjack (Katsuwonus pelamis). It is an artisanal fishery established in the most populated islands and operating close to the shore. The other is the Asian longline fishery (Japanese, Korean and Taiwanese fleets) which catches deep-water tuna. In 1979 only the Japanese were authorised to operate in the French Polynesian Exclusive Economic Zone, from October 1979 for a period of six months, that is to say until April 1980.

#### 1 - THE SKIPJACK FISHERY

Skipjack fishing is practised in French Polynesia on all islands where the population is large enough to create a demand for fresh fish that cannot be met from family activity alone. It has therefore developed mainly in the more populated islands, particularly in Tahiti where 60% of the total number of skipjack boats are based, 41% in Papeete, the capital of French Polynesia. Figure 1 shows the various localities where skipjack boats are stationed.

This commercial fishery is artisanal and requires very little in the way of marketing and harbour facilities. In addition to the Papeete - based boats, skipjack fishing boats are therefore found throughout French Polynesia, the number varying in each locality with the demand for fish in the area. Because these boats are so widely scattered, skipjack fishing data for the whole of French Polynesia are impossible to collect with the means at present available. Only the catches landed in Papeete harbour are regularly recorded, with a specially designed sampling and survey system (Chabann and Marcille, 1980).

### 1.1 Fishing fleet and fishing effort

The fishing boats and methods used have been described in detail by Josse (1979). The skipjack boats ("bonitiers") are launches about 10 metres long of about 9 gross tons. The power of the engines used has been steadily increasing, and now about 90% of the boats have motors of over 200 hp. They can reach a speed of 20 knots.

Detection of skipjack schools is by sight alone. Fishing is done with pole-and-line using a spoon-shaped pearlshell lure. No bait is used to keep the school in position; it is followed with the very swift and manoeuvrable launches.

Trolling is also practised for certain species, particularly dolphins and billfishes.

Fishing trips are generally short - about 10 hours. The launches leave the port at daybreak and usually return in the course of the afternoon. Occasionally boats do stay away from their home port for several days in a row, mooring in a sheltered spot near the fishing grounds for the night.

The following definitions are used to evaluate fishing effort and catches:

Unit of effort equals one day at sea of a skipjack boat, which is generally the same thing as one fishing trip. This unit of effort does not therefore reflect actual fishing time, which may vary with the boat, time of the year and fishing locality.

Catch per unit of effort (c.p.u.e.): This is the catch made during one day at sea. It can be expressed as either the number or the weight(Kg) of fish caught.

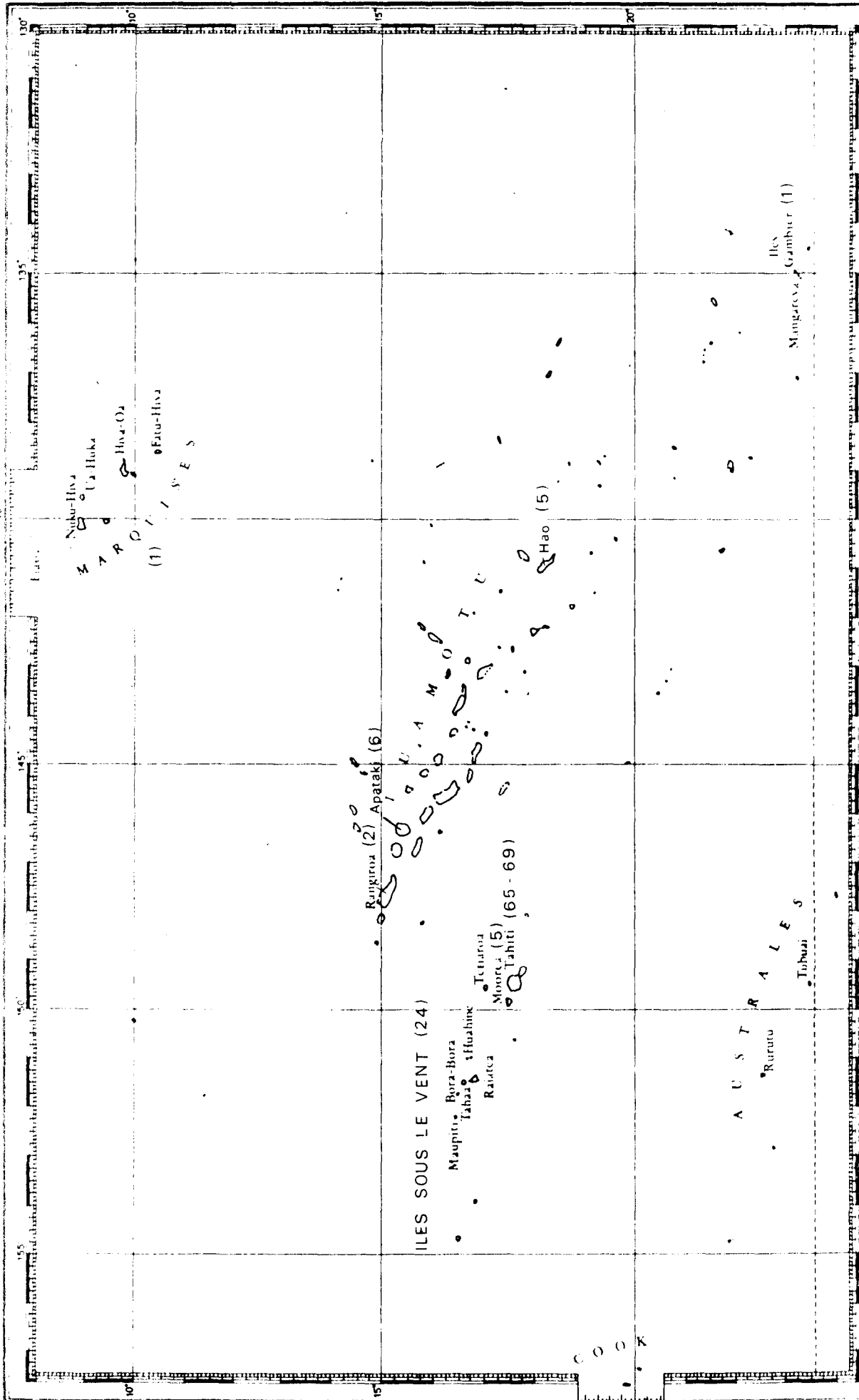


Figure 1: Map of French Polynesia  
(24) - Number of skipjack boats

## 1.2 Species caught

- Skipjack (Katsuwonus pelamis). As the name of the fishery suggests, this species predominates. It makes up 86% by number and 66% by weight of the catches landed at Papeete (Table 1).

- Yellowfin (Thunnus albacares). This species is the second most abundant in the Papeete landings.

- Dolphin (Coryphena hippurus, or Mahi-mahi) is caught by trolling. It predominates in catches made in the Leeward Islands.

- Others. Several species are found under this heading but constitute only a small percentage of the catches (Table 1); they include:

- . billfishes, especially black marlin (Istiompax indicus), which make up 83% of the "others" category in the Papeete landings.
- . the wahoo (Acanthocybium solandri)
- . the rainbow runner (Elagatis bipinnulatis)
- . the dog-tooth tuna (Gymnosarda nuda)
- . the sailfish (Istiophorus gladius).

Table 1: Percentages by number and weight of the species present in catches landed at Papeete harbour in 1979 from skipjack boats (bonitiers).

Species	Number	Weight
Skipjack	86.0	66.4
Yellowfin	11.0	20.0
Dolphin	2.4	9.1
Others	0.6	4.5

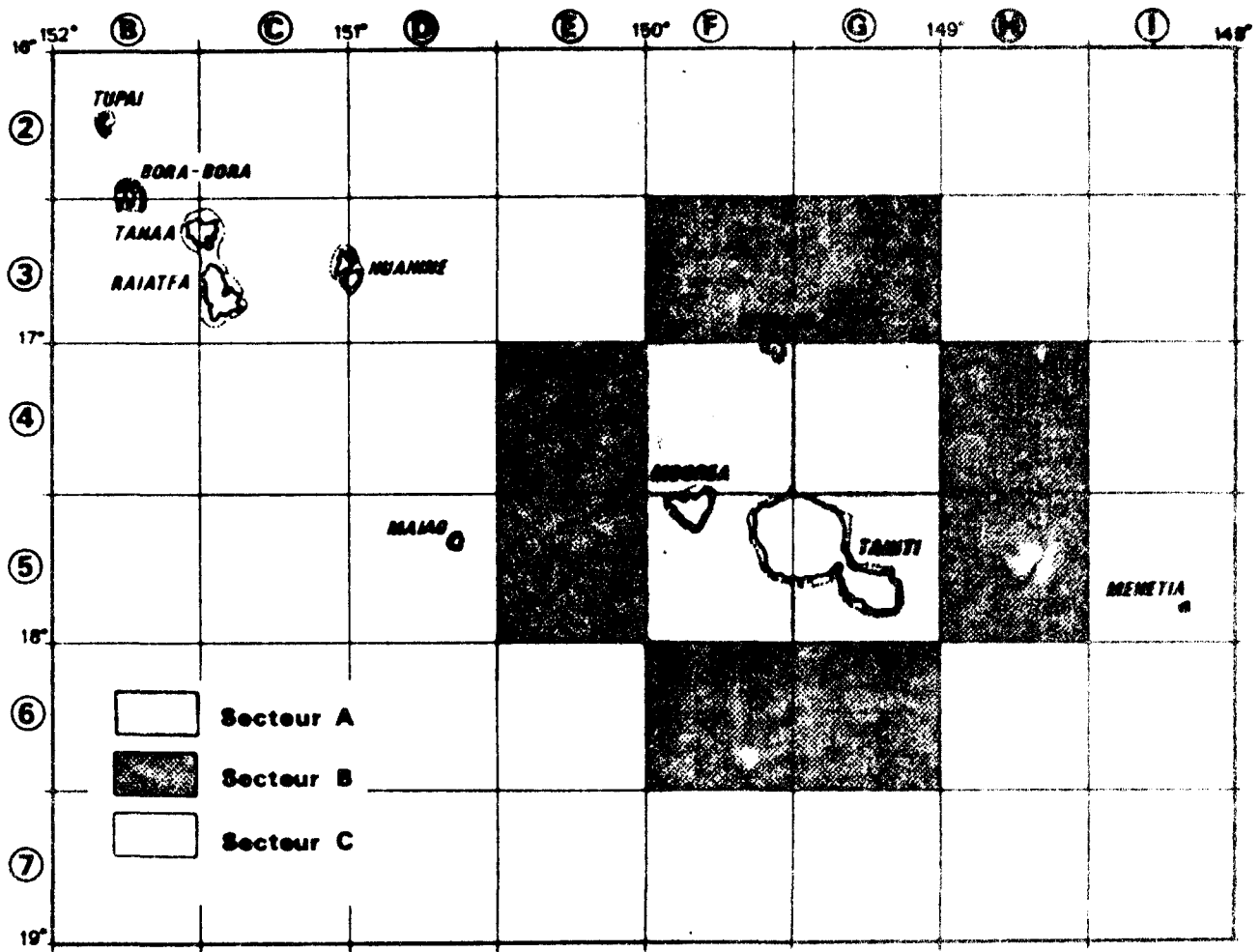


Figure 2: Fishing grounds of skipjack boats operating from Papeete. Statistical grid and A, B, C sectors used in the fisheries study.

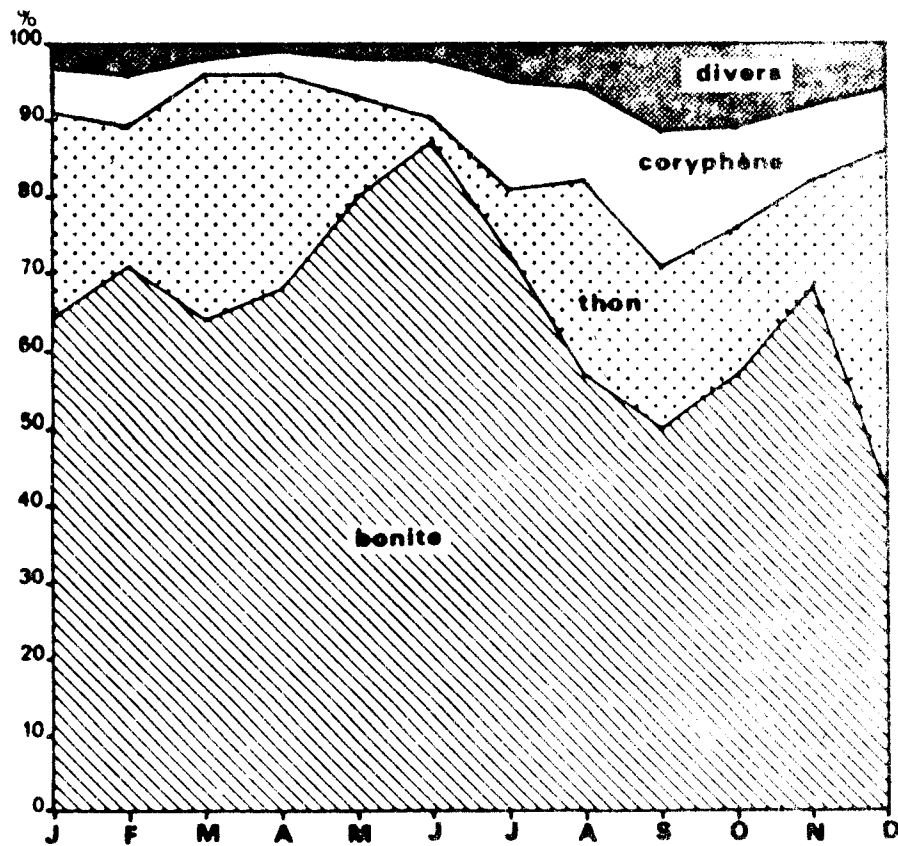


Figure 3: Monthly changes in composition of catches of skipjack boats operating from Papeete, by weight, for 1979.

### 1.3. The Papeete fishery

#### 1.3.1. Fishing effort - Fishing zone

41% of the total number of skipjack boats operating in French Polynesia are based in the port of Papeete, which is the capital and largest urban settlement. But, although it is difficult to determine, the portion of the total fishing effort to be ascribed to this fishery is certainly larger still, as the activity of the Papeete boats is more regular and more sustained. Over the year 1979, 45-49 skipjack boats were based in Papeete. They each spent an average of 17.3 days at sea per month, which represents a total effort of 9,832 fishing days. Monthly fluctuations in fishing effort are irregular and appear to be linked to outside events (weather forecasts, holidays ...) (Charbanne and Marcille, 1980).

The zone where the local skipjack boats fish is shown on Figure 2. It extends right around Tahiti, but the part south of Tahiti is rarely visited. Generally speaking, the most remote fishing grounds are located 80 or 90 miles from Papeete. Three sectors have been mapped out according to their distance from the home port (Figure 2). Sector A (around Tahiti) was the most intensely exploited, accounting for 49% of the annual fishing effort. Sector B (between 30 and 60 miles from home port) received 42% of the total effort, and sector C, (over 60 miles from home port only 9%) Distribution of fishing effort was different in 1978 (Marcille et al, 1979), where more fishing was done further from the coast. Monthly variations in the distribution of effort show that fishing is mainly coastal in April, May and June, with over 50% of activity taking place in sector A (Chabanne and Marcille, 1980).

#### 1.3.2. Study of catches

The proportions of the main species found in the catches landed are given in Tables 2 and 3 summarise monthly catches by number and weight, and Tables 4 and 5 catches per unit of effort.

Table 2: Monthly catches in 1979 for skipjack boats  
based in Papeete (in number of fish).

Month	Skipjack	Yellowfin	Dolphin	Billfish	Sailfish	Dog-tooth	Wahoo	Runner	Total catch
J	15,100	2,750	210	11	-	3	34	23	18,131
F	13,800	2,300	250	11	3	10	18	7	16,399
M	20,900	6,350	150	14	2	4	22	16	27,458
A	19,100	3,505	250	5	-	-	5	9	22,419
M	30,200	1,900	530	13	-	-	6	16	32,665
J	24,500	550	510	12	-	2	10	3	25,587
J	18,300	800	790	31	-	-	33	71	20,025
A	16,000	1,100	1,060	42	-	2	48	54	18,308
S	10,400	600	660	42	-	-	142	-	11,844
O	11,300	1,500	590	37	2	-	308	5	13,742
N	25,400	1,250	630	55	2	2	139	13	27,491
D	14,200	6,000	370	39	-	-	51	18	20,478
TOTAL	219,200	28,150	6,000	312	9	23	816	235	254,745

Table 3: Monthly catches in 1979 for skipjack boats  
based in Papeete (in weight - kg).

Month	Skipjack	Yellowfin	Dolphin	Billfish	Sailfish	Dog-tooth	Wahoo	Runner	Total catch
J	27,970	11,970	2,680	820	-	25	200	70	43,735
F	31,770	8,080	3,160	1,190	225	80	110	20	44,635
M	45,330	22,550	1,840	790	160	30	135	50	70,885
A	55,240	23,000	3,000	245	-	-	30	25	81,540
M	86,480	13,490	6,500	1,820	-	-	40	50	108,380
J	64,100	2,780	5,800	1,315	-	15	60	10	74,080
J	47,190	5,260	9,070	2,770	-	-	195	215	64,700
A	44,560	15,570	13,170	4,500	-	-	235	160	78,195
S	23,820	10,130	7,980	4,490	-	-	850	-	47,270
O	30,840	10,270	7,260	3,700	120	-	1,850	15	54,055
N	50,670	10,650	7,810	4,960	65	15	835	40	75,045
D	27,240	27,230	4,790	3,360	-	-	305	55	62,980
TOTAL	535,210	160,980	73,060	29,960	570	165	4,845	710	805,500

Table 4: Catch per unit of effort of Papeete skipjack boats (in number of fish per day).

Month	Skipjack	Yellowfin	Dolphin	Billfish	Wahoo	Total catch
J	22.1	4.0	0.3	0.02	0.05	26.5
F	17.8	3.0	0.3	0.01	0.02	21.2
M	23.1	7.0	0.2	0.02	0.02	30.2
A	24.9	4.0	0.3	0.01	0.01	29.3
M	31.4	2.0	0.6	0.01	0.01	34.0
J	31.2	0.7	0.7	0.02	0.01	32.6
J	22.0	1.0	1.0	0.04	0.04	24.1
A	16.7	1.2	1.1	0.04	0.05	19.1
S	13.8	0.8	0.9	0.06	0.2	15.6
O	13.2	1.8	0.7	0.04	0.4	16.0
N	29.4	1.5	0.7	0.06	0.2	31.7
D	20.7	8.8	0.5	0.06	0.07	29.9
TOTAL	22.6	2.9	0.6	0.03	0.08	25.9

Table 5: C.p.u.e. of Papeete skipjack boats (in kg per day).

Month	Skipjack	Yellowfin	Dolphin	Billfish	Wahoo	Total catch
J	41	18	4	1.2	0.3	64
F	41	11	4	1.5	0.1	58
M	50	25	2	0.9	0.2	78
A	72	30	4	0.3	0.04	106
M	90	14	7	1.9	0.04	113
J	82	4	7	1.7	0.08	94
J	57	6	11	3.3	0.2	78
A	47	16	14	4.7	0.9	82
S	31	13	11	5.9	1.1	62
O	36	12	9	4.3	2.2	63
N	58	12	9	5.7	1.0	87
D	40	40	7	4.9	0.4	92
TOTAL	54	16	7	3.1	0.5	82

#### 1.3.2.1 Total catch

The total catch by Papeete skipjack boats was 805 tonnes in 1979. Over the whole year, c.p.u.e. per day at sea was 26 fish, or 82 kg. The most productive months were March to June and November/December. Monthly variations in catch composition are marked through not great (see Figure 3). The proportion of tuna (skipjack plus yellowfin) was highest in the first half of the year.

#### 1.3.2.2 Skipjack

535 tonnes of skipjack were landed at Papeete in 1979. Over the whole of the year, the c.p.u.e. was 22.6 skipjack, or 54 kg, per day at sea.

These catch figures were the lowest since 1975 (Figure 4), and strikingly low compared with 1978 where total catch was estimated at between 880 and 1,100 tonnes and c.p.u.e. at 45 skipjack per day. Chabanne and Marcille (1980) did not observe substantial variations in fishing effort during this period, at the most a very slight increase of 10 to 15% in 1979. The c.p.u.e. variations are therefore not correlated with the fishing effort of the boats. This result is similar to observations made in other skipjack fisheries (Kearney, unpublished communication), and is furthermore rather predictable in the case of an undeveloped fishery such as the Polynesian one which is unlikely to have a significant impact on stocks.

Monthly c.p.u.e. variations (Figure 5) show a peak for the months of April to June and a second peak in November. The c.p.u.e. values are lowest for the months of August, September and October.

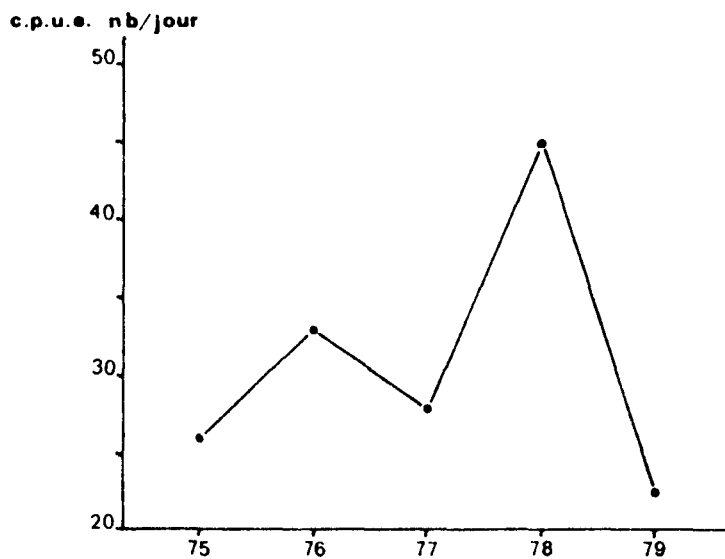


Figure 4: Annual skipjack c.p.u.e. from 1975 to 1979.

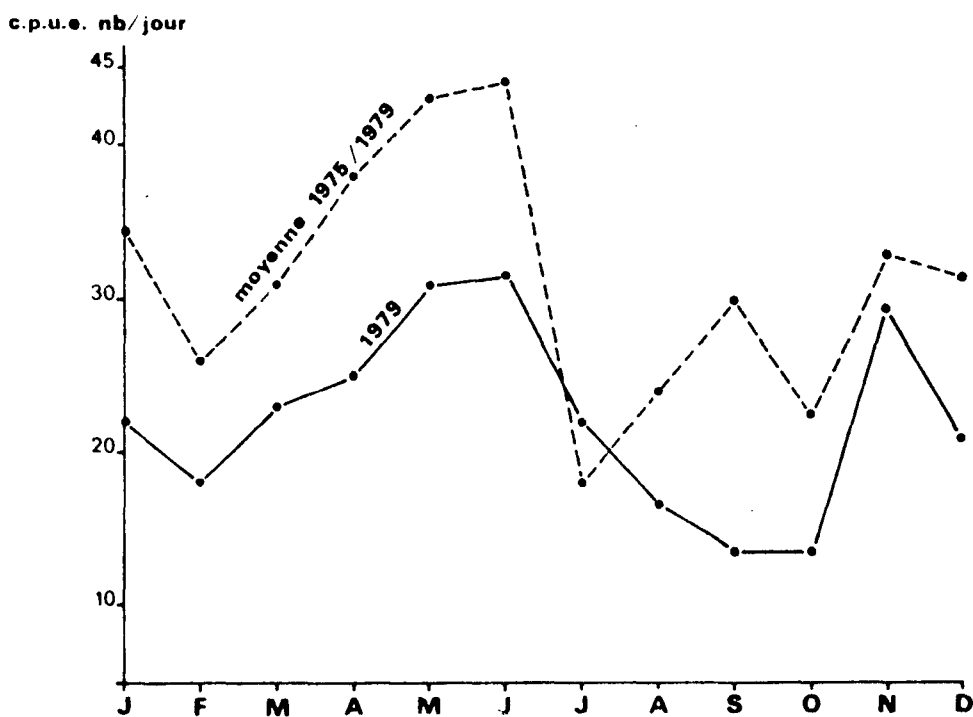


Figure 5: Monthly variations in skipjack c.p.u.e. for Papeete in 1979, and mean monthly variations from 1975 to 1979.

Catch values are higher the further away one gets from Tahiti, as observed by Marcille et al (1979) and Chabanne and Marcille (1980). In the sectors A, B and C shown on Figure 2, the ratios c.p.u.e. C/c.p.u.e. B and c.p.u.e. B/c.p.u.e. A are about 2 : 1 and 1.5 : 1 in 1979. This increase of c.p.u.e. with distance is observable throughout the year.

Skipjack sizes range from 28 cm to 93 cm (in "round" length, L, R or : 27 to 88 cm in standard fork length, F.L). However most of the catches were made up of fish in the 40 cm to 65 cm bracket. Small-size skipjack are present the whole year round, with maximum abundance in January, March-April, and November-December. Sizes over 75 cm are also regularly present, but more common from February to June with a peak in April. A more comprehensive study of skipjack length distribution in catches and monthly variations was made by Chabanne and Marcille (1980).

#### 1.3.2.3 Yellowfin

160 tonnes of yellowfin were landed at Papeete in 1979. Average c.p.u.e. over the year was 3 fish/day or 16 kg/day. Both total catch and c.p.u.e. were slightly higher than in previous years.

Two very distinct fishing seasons can be observed in the year. The first runs from December to April and is the most productive one. C.p.u.e. values are then markedly lower from May to November.

As was the case for skipjack, c.p.u.e. increase with distance from Tahiti. In sector C it was 7.3 yellowfin/day, 3.1 in sector B, and only 1.9 in sector A. The difference between sectors is thus more marked for yellowfin than for skipjack, especially between sectors C and B. In addition, c.p.u.e. values can be seen to be better the whole year round in sector C, and seasonal increases in abundance are more marked in the fishing grounds

distant from Tahiti. Yellowfin sizes range from 26 to 127 cm (R.L.), but most fish were under 70 cm long. Small-size yellowfin were more common during the first and second quarters. The proportion of very large specimens was higher from April to September.

1.4 Tuna fishing for the whole of French Polynesia

Available data on the French Polynesia skipjack fishery are summarised hereunder:

Table 6: Summary of the French Polynesia skipjack fishery in 1979

Fishing localities	Number of fishing boats	Skipjack	Yellowfin	Dolphin	Others	Total catch
PAPEETE	45 to 49	535	161	73	36	805
REST OF TAHITI	20	130	38	17	12	197
LEEWARD ISLANDS	24	160	?	?	?	?
MOOREA	5	?	?	?	?	?
RANGIROA	2	?	?	?	?	?
APATAKI	6	?	?	?	?	?
HAO	5	?	?	?	?	?
GAMBIER	1	?	?	?	?	?
MARQUESAS	1	?	?	?	?	?

Catch and effort data reliable only for Papeete. Catches made by tuna boats based elsewhere in Tahiti and by those from the Leeward Islands have been estimated by Charbanne and Marcille (1980). However, for the other fishing localities it is impossible to give any figures since neither effort, nor c.p.u.e. nor market requirements are known even approximately.

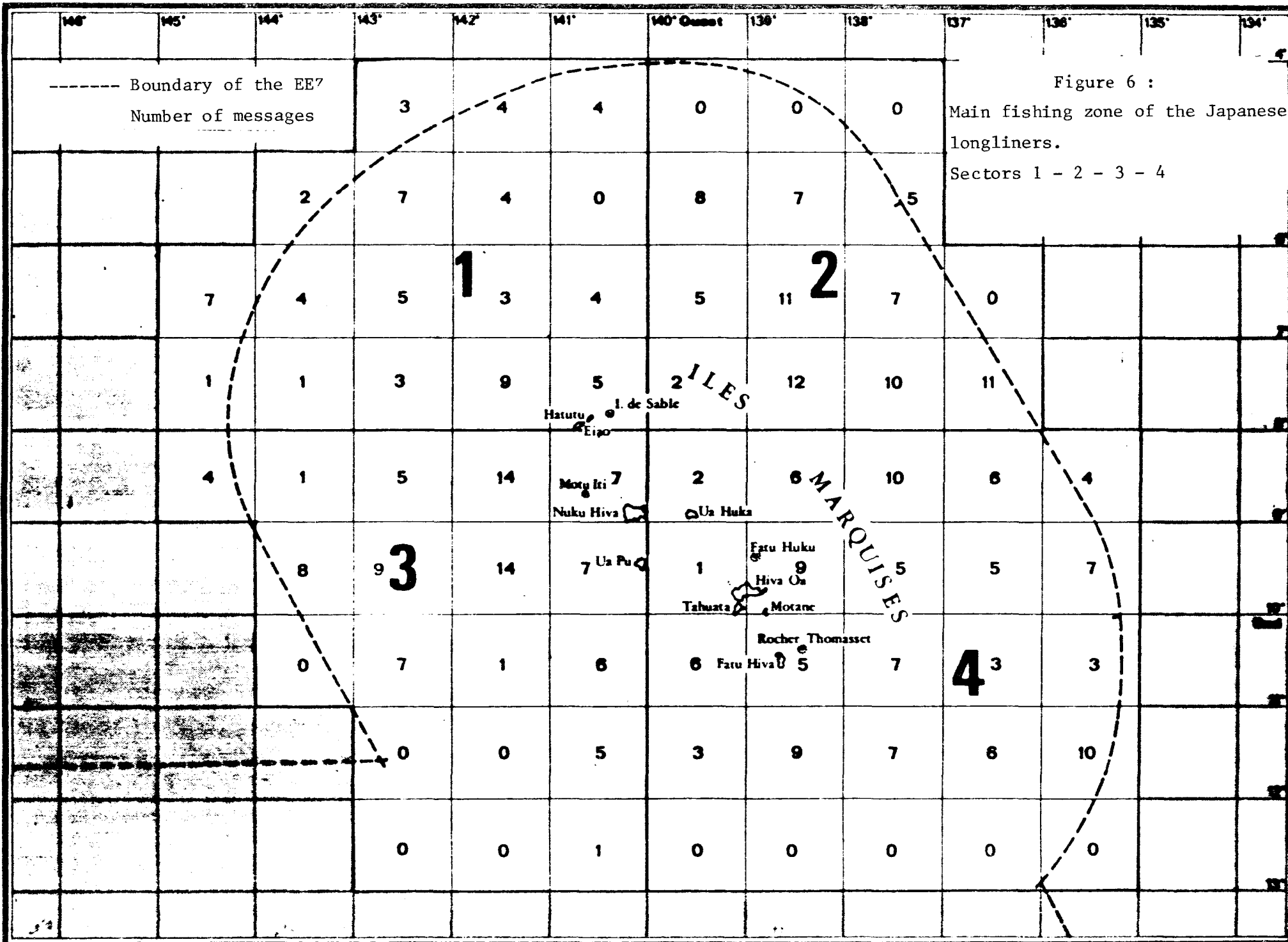
## 2 - THE LONGLINE FISHERY

Since February 1979, fishing in the Exclusive Economic Zone of French Polynesia by foreign vessels has been subject to control and licensing. Only the Japanese longliners obtained fishing rights, for a period October 1979 to April 1980. Their fishing activity is discussed hereunder:

### 2.1. Available

Fishing vessels operating in the EEZ are required to send out regular information bulletins by radio ("AVISPECHES") to the Maritime Administration. Each vessel must also report as it enters or leaves the Zone. While it is operating in the Zone it must send a radio message every seven days. An AVISPECHE radio message must include:

- the name of the vessel
- the date of the message
- vessel position at the time of the message
- tonnage of fish caught, by species or by group of species, i.e.
  - yellowfin, big-eye, albacore, skipjack, billfishes, others.
  - . tonnages in the ship's hold, for advice of entry or of exit;
  - . tonnages caught between two successive messages for the other information bulletins.



The information contained in these messages is the only data available on the Japanese longliners, since none of them ever come into Papeete harbour and no additional information is obtainable.

## 2.2. Fishing zone and fishing effort

Virtually all the Japanese longlining operations were conducted in the Marquesas Islands area. No less than 91% of the vessel positions reported were situated inside the part of the EEZ shown on Figure 6. The other position reports were from the Tuamotu archipelago area (2%) and 7% were not in the EEZ at all, but very close to the boundary (Chabanne and James, 1980).

The fishing effort was estimated by counting the number of days between the date of entry into the Zone and the date of exit. It is obviously impossible to know whether the vessel fished every day or not. Furthermore, sometimes vessels fail to advise of their entry or exit (10% of all recorded visits to the Zone). In spite of these shortcomings, the fishing time of the longliners can be regarded as fairly accurately known. On the other hand, there is no information at all on the number of hooks set per fishing operation, and for longlining this is the best measure of effort.

The unit of effort used in this study is therefore the day at sea, and the catch per unit of effort (c.p.u.e.) is the weight in kg per day.

Variations in fishing effort during the period considered are shown on Figure 7. 63% of the effort can be seen to have been applied during December and January.

## 2.3 Total catch

The total catch for the period considered was 3,305 tonnes (Table 7). November, December and January accounted for 83% of the catch, or 2,739 tonnes. Of the total catch, 74% i.e. 3,099 tonnes, were taken from the Marquesas area.

Table 7: Catches of Japanese longliners in the EEZ of French Polynesia, from October 1979 to April 1980 (in hundreds of Kg).

Month	Yellowfin		Big-eye		Albacore		Others		TOTAL	
	Weight	%	Weight	%	Weight	%	Weight	%	Weight	%
O	520	38	477	35	134	10	229	17	1,360	100
N	3,956	53	2,589	35	261	4	619	8	7,425	100
D	3,590	34	5,125	48	508	5	1,440	14	10,663	100
J	2,889	31	5,029	55	213	2	1,078	12	9,209	100
F	622	19	2,115	64	61	2	524	15	3,322	100
M	66	9	450	63	65	9	133	19	793*	100
A	55	20	145	53	20	7	54	20	274	100
TOTAL	11,698	36	15,930	48	1,262	4	4,077	4	33,046	100

\* 1 message not detailed as to species (7.9 T).

Table 8: Catch per unit of effort (kg/day) of Japanese longliners operating in the EEZ of French Polynesia, from October 1979 to April 1980.

Month	Yellowfin	Big-eye	Albacore	Others	TOTAL
O	547	502	141	241	1,432
N	909	595	60	142	1,707
D	455	650	64	183	1,351
J	390	680	29	146	1,244
F	232	789	23	196	1,240
M	87	592	86	175	1,043
A	162	426	59	159	806
TOTAL	481	654	52	167	1,356

The average c.p.u.e. for all species together was 1,356 kg/day for the whole area. This figure is quite significantly higher than the one quoted by Bour and Galenon (1979) for all the Asian longliner fleets operating in the South Pacific, which was 0.8 T/day in 1976.

Figure 8 shows c.p.u.e. values to have been highest in October–November, respectively 1,432 kg/day and 1,707 kg/day (see Table). They remained stationary for the three following months and then decreased. If these values are compared with variations in the fishing effort, it is found that the latter is not highest during the period of the best catches, but in December–January. C.p.u.e. variations for big-eye and yellowfin (Figure 8) suggest that the effort increases when the c.p.u.e. of big-eye increases. Hence a certain priority might be given to big-eye, which is commercially more valuable for the Japanese fishery. However in February the effort can be seen to drop, even though big-eye c.p.u.e. is increasing and the total catch is stable in relation to the previous months. Possible reasons for this may include unfavourable weather conditions or greater abundance of fish outside the zone considered.

#### 2.4 Yellowfin catches

The yellowfin catch was 1,170 tonnes, of which 1,100 tonnes were taken from the Marquesas area.

Yellowfin c.p.u.e. peaked in November (909 kg/day) and dropped fairly sharply from December, being at their lowest (87 kg/day) in March (Figure 8). For the whole period, average yellowfin c.p.u.e. was 481 kg/day.

The fishing zone around the Marquesa Islands was subdivided into four sectors (Figure 6). The c.p.u.e. for the various species in each sector are given in Table 9.

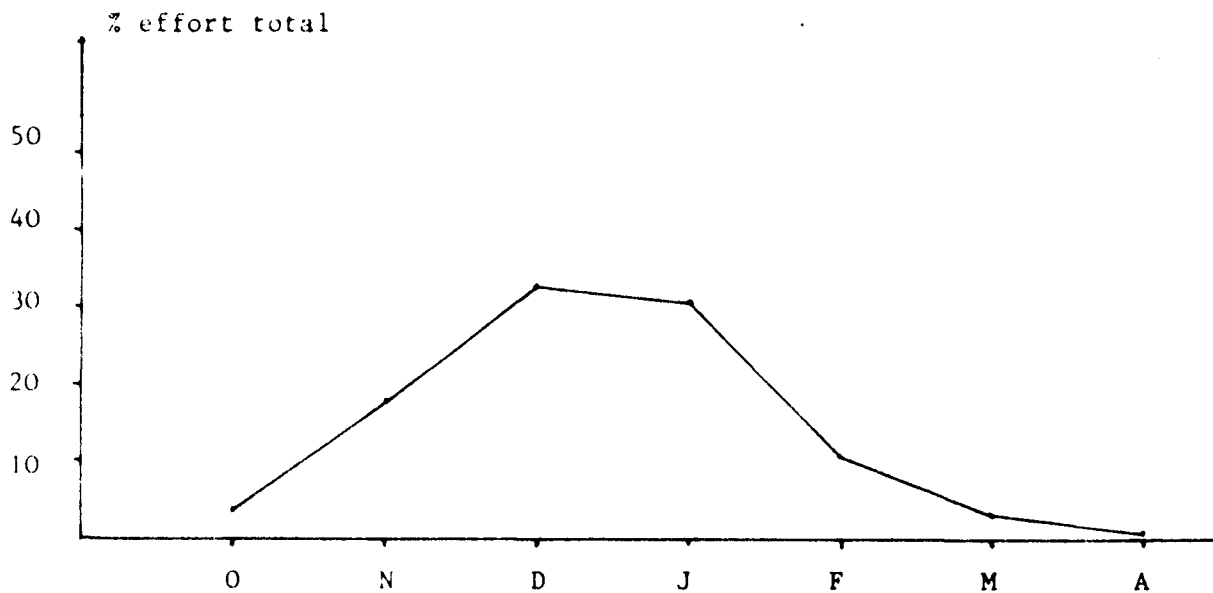


Figure 7: Variations in fishing effort of Japanese longliners from October 1979 to April 1980.

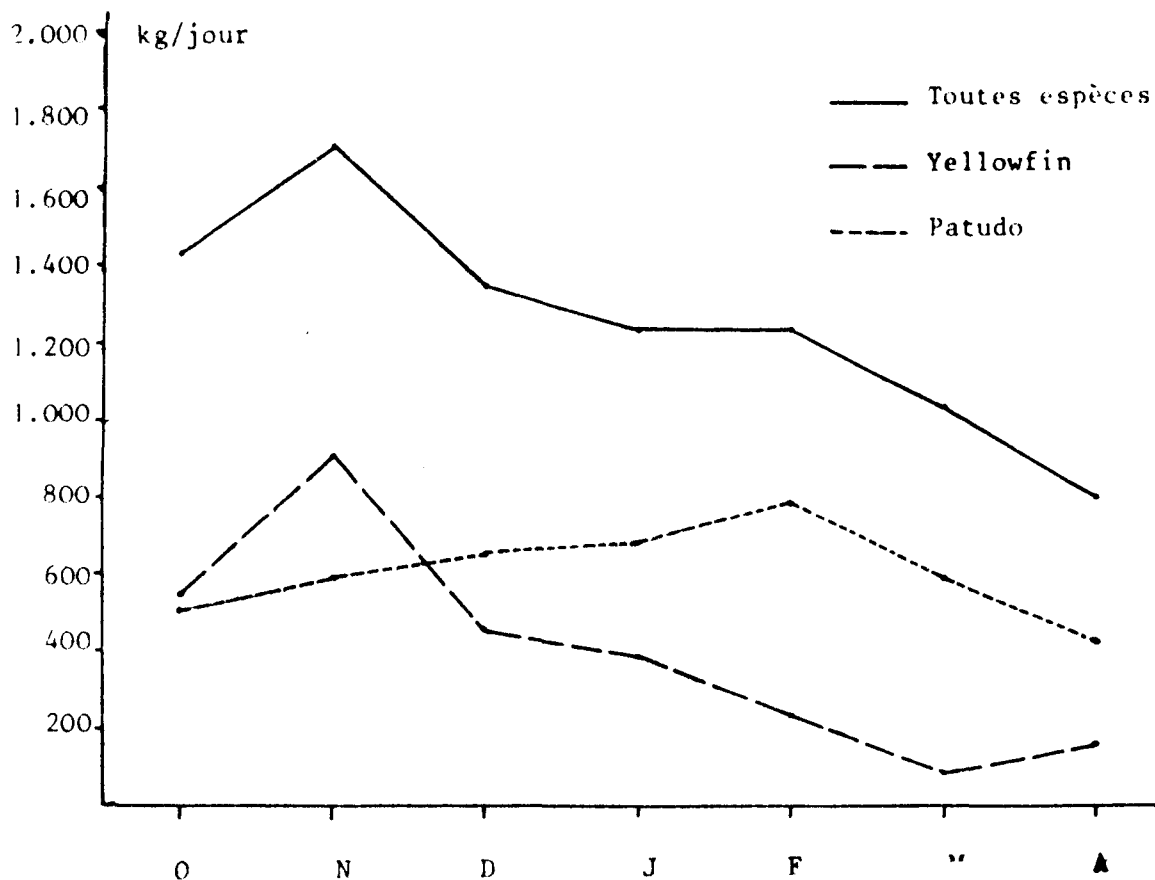


Figure 8: Catch per unit of effort of Japanese longliners from October 1979 to April 1980.

Table 9: C.p.u.e. (kg/day) of Japanese longliners for the main tuna species and for each sector of the Marquesas Islands fishing zone.

	Sector 1	Sector 2	Sector 3	Sector 4
Yellowfin	522	405	529	514
Big-eye	768	729	615	639
Albacore	18	15	58	95
Others	182	132	182	170
TOTAL	1,490	1,281	1,384	1,418

For yellowfin, c.p.u.e. values were roughly the same in sectors 1, 3 and 4, and 20% lower in sector 2.

#### 2.5 Big-eye catches

Big-eye is predominant in the catches, with 1,593 tonnes being captured over the period, which is 48% of the total catch, 1,502 tonnes were from the Marquesas area.

For the whole of the period considered, average big-eye c.p.u.e. was 654 kg/day (Table 8). Monthly variations are regular and not very sharp, the c.p.u.e. rising from 502 kg/day in October to 789 kg/day in February, and then declining to 426 kg/day in April.

The best c.p.u.e. values were recorded from sectors 1 and 2 north of the Marquesas group (Table 9).

#### 2.6 Albacore catches

Albacore is less sought after by the Japanese fleet than by the other Asian longliners. The 126 tonnes taken, of which 119 were from the Marquesas area, represent only 4% of the total catch.

C.p.u.e. are obviously much lower. They averaged 52 kg/day, with a maximum of 141 kg/day in October and a minimum of 23 and 29 kg/day in January-February (Table 8).

The most productive areas for albacore were sectors 3 and 4 south of the Marquesas Islands (Table 9).

### 2.7 Catches of other species

Other species made up 12% of the total catch, that is 408 tonnes of which 370 tonnes were from the Marquesas area.

Catches in this category were fairly regular. The c.p.u.e. did not vary greatly and there is no discernible trend in the variations (Table 8). Average c.p.u.e. was 167 kg/day. It was lower in sector 2 than in the three other sectors (Table 9).

## 3. CONCLUSION

Although potential stocks are regarded as fairly large, tuna exploitation in the Exclusive Economic Zone of French Polynesia is still very limited.

Surface tuna are exploited only by the small local fleet of skipjack boats. The total catch of this fishery is not known, but was estimated at between 1,300 and 1,500 tonnes for 1979, of which the Papeete based fishery landed 805 tonnes. Skipjack (Katsuwonus pelamis) accounted for about 70% of the landings, i.e. between 900 and 1,000 tonnes.

The exploitation of deep-water tuna was limited in 1979 by the introduction of fishing licences. Only the Japanese longliners operated in the economic zone, from October 1979 to April 1980. During this period they caught 3,305 tonnes of tuna, of which 1,170 tonnes were yellowfin, 1,593 tonnes big-eye, 126 tonnes albacore and 408 tonnes other species.

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