INDO-PACIFIC TUNA DEVELOPMENT AND MANAGEMENT PROGRAMME

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REPORT OF THE MEETING OF TUNA RESEARCH GROUPS IN THE SOUTHEAST ASIAN REGION

PHUKET, THAILAND
27 - 29 August 1986

INDO-PACIFIC TUNA DEVELOPMENT AND MANAGEMENT PROGRAMME
Colombo, Sri Lanka

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1. OPENING OF THE MEETING

Mr. Gomez Charoenpanich, Director of the Phuket Marine Biological Center opened the meeting with the welcoming address.

Mr. Somsak Chullasorn, Director of the Eastern Marine Fisheries Development Center was elected to chair the meeting.

The FAO Fisheries Resources Officer in his introduction observed that the joint Philippine/Indonesia tuna workshop which was started in 1981, had grown to include representatives from Thailand as observers in 1985 and from Thailand and Malaysia as full participants at the current workshop. Tuna fisheries in these countries, especially in Thailand, have increased dramatically in the early 1980's. This country is now a principal tuna producer and also one of the largest tuna processors in the world.

2. AGENDA Appendix 1

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4.1 INDONESIA

Tuna fisheries hold a very important role in Indonesia, which contribute about 12.53% of total marine fisheries (1976-1984). This fisheries have developed mainly in West Indonesian waters, i.e., west of Sumatra, south of Java and south of Nusa Tenggara, and East Indonesian waters bordering to Pacific Ocean including Banda Sea (Fig. 1). The average production of tuna and tuna-like fish in West and East Indonesian waters during the period of 1976-1984 are 27,304 tons and 123,672 tons annually or increasing 10.91% and 11.14% respectively.

Tuna exports are also increasing from 424 tons in 1976 to 17,925.2 tons in 1985, valued US $ 253,000 to US $ 13,770,139. The tuna fishing companies in Indonesia are still facing difficult situations, due to the low price of tuna exports and high operational cost. The price of tuna exports in 1985 was US $ 580 per metric ton or was increasing about 16.0% compared to the price in 1984. This price was still very low compared to the highest export price attained in 1981. The government has cut the price of fuel about 9.1%, so that it is hoped that this government action will help to decrease the operational cost of the fishing companies.

Fishing gears

Tuna and tuna-like fish are being exploited by using various gears. The main gears used are purse-seine, troll line, gillnet, seine net, handline, pole and line and longline. In West Indonesian waters purse-seine for skipjack has developed only in Banda Aceh, but for tuna-like fish as well as pelagic fish has developed in Bali Strait, Prigi and recently in West Sumatra. Troll fishing has developed in Padang and in Bali using sail boat or outboard motors. Gillnet fishing had developed in Pelabuhan Ratu, Prigi and Bali Strait, while seine net had developed only in Pelabuhan Ratu. In West Indonesian waters, tuna fishing is under taken mainly by small-scale sector, but in East Indonesian waters mainly by commercial fishing sector as well as small-scale sector.

There are three pole and line state companies operating in East Indonesian waters, and some joint-ventures as well as national fishing companies, i.e., PT. East Indonesian Fisheries, PT. MTI, PT. Perken and PT. Dharma Samudra. State companies mainly use 30 GT pole and line boats and some larger boats. PT. East Indonesian Fisheries, PT. MTI, PT. Perken and PT. Dharma Samudra using 200 GT, 300 GT, 10-30 GT and 10-15 GT boats, respectively. Pole and line has also developed in Maumere using 6-13 GT boats since 1982. Besides pole and line, PT. MTI is also operating three purse-seiners ranging from 623 to 765 GT.

There is one state company located in Bali using longline gear. Since January 1986, the operation has stopped due to financial problems. State company in Bitung is also operating one 100 GT long-line boat, and PT. Pertuni located in Kendari operating five long-line boats ranging from 200 to 300 GT.

Production

The production of tuna and tuna-like fish is presented in Table 1. It can be seen that the production in West and East Indonesian waters are 38,889 tons, and 175,645 tons, respectively.

The catch and effort of 30 GT, 100 GT and 300 GT pole and line boats operated by state company in Sorong are presented in Table 2,3 and 4. The catches of pole and line which were associated and not associated with payaos are presented in Table 5. In 1985, catch which was not associated with payaos contributed only about 1.4% of the total catch. The catch of 30 GT boats and their efforts operated by small-scale sector are presented in Table 6. Table 7 and 8 show the catch and effort of 30 and 100 GT pole and line boats owned by state company in Ambon, and Table 9 and 10 for 30 and 40 GT from state company in Bitung. The catch and effort of 300 GT pole and line from joint-venture company in Biak is presented in Table 11, and for its purse-seine catch is in Table 12. Table 13 presented the catch and effort of 6-13 GT pole and line boats operating in Maumere.

The catch and effort of longline boats operated by state companies in Bitung and Bali are presented in Table 14 and 15. The development of catch rates of purse-seine and troll fishing in Banda Aceh and Padang are presented in Table 16 and 17, respectively. For gillnet and seine net fishing in Pelabuhan Ratu, their catch and efforts are presented in Table 18 and 19, and in Table 20 is for gillnet fishing in Prigi.

Catch rates for pole and line fishing in Sorong, Bitung and Ambon are presented in Figure 2, 3, 4, 5, and for troll fishing in Padang is in Figure 6.

4.2 MALAYSIA

4.2.1 East coast of Peninsular Malaysia

Tuna fisheries is undoubtedly one of the most important fisheries particularly on the east coast of Peninsular Malaysia. The amount of tuna landed in Peninsular Malaysia experienced a sharp increase over the last 12 years. It increased from 5,734 metric tons in 1972 to 18,838 metric tons in 1983. The landing in 1983 was an increase of about 229% over that of 1972 or 29% of 1982 (14,603 metric tons).

The east coast contributed about 86% (16,158 metric tons) of the total tuna landings in Peninsular Malaysia in 1983 (Figure 1). The rest, 14% or 2,680 metric tons, come from the west coast side. In the same year, the landing of tuna was approximately 14% of the total pelagic fish landed in the east coast which was also the second behind chub mackerels (Rastrelliger sp.).

Tuna species available

Observations made by the staff of the Fisheries Research Institute (Trengganu Branch) showed that there are six species of tuna landed in the east coast of Peninsular Malaysia. Those are longtail tuna (Thunnus tonggol), eastern little tuna or kawakawa (Euthynnus affinis), frigate tuna (Auxis thazard), bullet tuna (Auxis rochei), skipjack tuna (Katsuwonus pelamis) and Indo-Pacific or oriental bonito (Sarda orientalis). Of these, the first four species are the most frequently caught by our local fishermen. The rest, i.e. Katsuwonus pelamis and Sarda orientalis, are sometimes found at landing sites. These species are reported caught by trolling fishermen somewhere offshore particularly around the oil rigs. For Auxis thazard and A. rochei, there could have been misidentification and probably there is only one species of Auxis.

Longtail tuna (Thunnus tonggol) which is the most dominant species landed contributing an average of 80% of the total tuna landings in Trengganu state for the year 1984. Then followed by Euthynnus affinis (19%) and Auxis thazard (1%). Table 1 shows the amount and percentage of tuna landed in Trengganu state for 1983 and 1984. Distribution of tuna species commonly caught is shown in Figure 2 and size composition in Figure 3.

Tuna landings

The landings of tuna over the year is given in Table 2, 3 and 4. It increased sharply from 3,742 metric tons in 1972 to 16,158 metric tons in 1983. The landings in 1983 was an increase of about 332% over that of 1972 or about 25% of 1982 (12,890 metric tons). However, the trends of tuna landings have shown some fluctuations (Figure 4). In early years, 1977 was the peak period where about 10,000 metric tons of tuna landed. Then the landings decreased gradually to about 6,000 metric tons in 1980. In 1981, the catch has suddenly increased to 15,000 metric tons but decreased again in the following year. The year 1983 with 16,158 metric tons of tuna landed seemed to be the second peak over the past 12 years. Of the total pelagic landings, the percentage of tuna catch on the east coast have also been found increased, that was from 8% in 1972 to 14% in 1983 (Table 3.).

Fishing gears

There are five types of fishing gear engaged in catching tuna along the east coast of Peninsular Malaysia. They are troll lines, drift gillnets, purse-seines, lift nets and anchovy purse-seines (Table 5).

The principal fishing gears are troll lines and drift gillnets. About 90% of the total tuna landings comes from these two gears. The size of trolling boats are between 10-20 tons. However, boats less than 10 tons are also found in operation, especially in inshore waters, but they are in small number. The boats with bigger size normally fishing in the waters of more then 50 nautical miles from shore. Sometimes they go as far as 150 nautical miles. Generally the boats leaving the port on Saturday, fishing 4-5 days and come back to sell their catch on Wednesday or Thursday.

For drift gillnets, the size of boats used is similar to those of trolling boats. They are fishing closer to shore compared to the troll line boats. The common species caught are T. tonggol, E. affinis, A. thazard and A. rochei. In term of quality, tuna caught by drift gillnets have a lower market price compared to those caught by troll line.

Fishing grounds

Since tunas are highly migratory species, it is a bit difficult to chart the fishing areas precisely. Anyhow, it could roughly be estimated that the fishing areas for troll lines be in the range of 15-100 nautical miles from shore. During the calm season, fishing areas would be somewhere beyound 100 n. miles offshore expecially surrounding the oil rigs. Observations showed that the further the areas of fishing, the bigger the size of tuna caught.

Areas for tuna fishing by purse-seines normally within the range of 12-40 n. miles from shore. Coconut leaves are used as lure to catch tuna and other pelagic fishes. Fishing within these areas usually land the smaller size of tuna

Areas for drift gillnetting are rather close to the shore or around the islands. Figure 5 shows the distribution of fishing grounds on the east coast of Peninsular Malaysia. It could be said that most of the tuna fishing areas located around northern part of the east coast

Fishing seasons

Based on the records from the Annual Fisheries Statistic (Department of Fisheries), it seemed to be that tuna species were caught all the year round. However, the higher catch of tuna were seen in the middle of the year i.e. from June to August in 1983. Generally speaking, this trend of catch could be related to the good weather during those months. As a result, many fishermen are able to go out for fishing thus, increased the catch.

Marketing of tuna

On the east coast of Peninsular Malaysia, particularly in the states of Trengganu and Kelantan, tuna is a quite popular food-fish. In the state of Trengganu about 20% of the tuna caught goes to local markets. The rest are exported fresh to neighbouring countries especially Thailand via land. The prices of tuna in the local markets varies depending on the size, species and season. Roughly tuna are sold with the prices between $ 1.00 - $1.60 per kilogram. Those for export are usually sold with $1.80 - $2.00/kg.

Some portions of the tuna for local market goes to a sardine factory in Trengganu. This factory can only afford to buy tuna with maximum price $1.50/kg. Another factory, i.e. tuna smokery, only buy tuna with $0.65/kg and prefer more to Auxis thazard/rochei.

The Fishery Resources Officer commented that the analysis of catch per trip by month of trollers was useful. However, in some instances, number of fishing days may increase during trips with reduced catches so that catch per days will give a better index of relative abundance and was recommended for future analyses.

4.2.2 West coast of Peninsular Malaysia

Tuna fishery in the west coast of Peninsular Malaysia is not so important compared to the tuna fishery in the eastern coast of Peninsular Malaysia. Tuna landed in the west coast only comprised of 2% of the total pelagic fish landed in 1983. The tuna landing in west coast was 2,679 mt. in 1983. The tuna landing is fairly constant ranging between 1,000-2,600 mt. from 1970 - 1983 with a peak in 1980 which landed 4,700 mt.

Fishing gears

The principal gear for catching tuna in west coast of Peninsular Malaysia is purse-seine. The other gears that catch tuna beside purse-seine are gillnet and lines. The purse-seine contributed more than 80% to the tuna landings although tuna is not the target species of purse-seine since tuna is not a lucrative species as compared to other pelagic species. Gillnet landed less that 15% of tuna and lines 5% and a negligible portion landed by trawlers. Table 1 shows landings of tuna species on the west coast by gear group.

Tuna species were caught with other pelagic species. These species are Rastrelliger kanagurta, R. brachysoma, Decapterus maruadsi, D. macrosoma which consitute the bulk of the catch. The purse-seine are the lure purse-seine and the hunting-type purse-seine. The mesh size of the net is 25 mm., length 600 meter and depth 90 meters.

Tuna species

There are three main tuna species landed in the west coast. Longtail tuna (Thunnus tonggol) which formed the major species landed of about 60% and secondly eastern little tuna (Euthynnus affinis) 30% and frigate tuna (Auxis thazard) 10% some species landed occasionally are, skipjack tuna (Katsuwonus pelamis), and bullet tuna (Auxis rochei).

Fishing grounds

Fig. 1 shows the main fishing ground of the purse-seine. The purse-seiners operate in waters 20 km. from shore at depth 30m. In the northern part of peninsular Malaysia, the main purse-seine fishing ground is in the waters at the southern part of Langkawi Island and areas near Penang Island. Another major fishing ground for these purse-seiners is in the northern part of Pangkor Island and around Jarak Island. The number of purse-seiners in operation in waters in the southern part is negligible, this may be due to limited fishing ground in the international shipping lane. The fishing ground of the gillnetter are along the coast in area less than 20 km from the shore of Perak, Selangor and Johore State.

Monthly catch

As shown in Fig 2 tuna species were caught all the year round. This figure shows the monthly catches of tuna from the landing place statistical survey for purse-seine in 1983. These data were collected from the receipt of fish transactions. It can be observed that there are two peaks in the landings, one peak February to May and another peak in July to September.

Landing by station

There are five major landing site in the west coast of Peninsular Malaysia. The State of Perlis in the north lands 435 mt. of tunas in 1983 and the main landing site is Kuala Perlis. In Kedah State, 334 mt. tuna species were landed in 1983 and the main landing site is Kuala Kedah. The landing of tunas in Penang Island in 1983 was 76 mt. and the landing site is Teluk Bahang. Down south after the State of Penang is Pulau Pangkor in the State of Perak and tuna landing was the highest in 1983 and 1,733 m.t. were landed. Further south in the State of Selangor the tuna landing is insignificant. Fig. 1 shows the major landing site of tuna.

4.3 PHILIPPINES

The new government of the Republic of the Philippines has viewed agriculture as the major sector in the country's economic recovery program. Fisheries is one of the sub-sectors which is tapped as one of the main contributors to the economic development of the country.

The fisheries resources of the Philippines are divided broadly into marine and inland. The marine waters has a total area of 2,200,000 sq km which include the 200-mile exclusive economic zone. The inland resources comprises 222,000 hectares of developed brackishwater and freshwater fishponds.

The trends in the marine fish production, both commercial and municipal, show an increase from 1981 to 1985 with a peak in 1985 of 1.3 metric tons.

The demand for tunas in the world market as well as the increasing acceptability of tunas by domestic consumers plays an important aspect in the development of the tuna fisheries can be gleaned from the phenomenal increase in production from 9,000 mt in 1971 to a peak production of 261,562 mt in 1985.

To date, tuna ranks as the number one export in terms of production of about 37,211 mt valued at 1.2 B pesos.

Tuna landings

Tuna production by species group and fishery sector for 1980-1985 is shown in Table 1. Tuna represents 20% or 261,607 mt of the marine fisheries production in 1985.

The municipal fishery sector provided 47.7% of the total tuna landings in 1985 and the commercial sector accounted for 52.3%.

From 1980 to 1983, there has been a steady increase of tuna production from 200,805 mt to 242,557 mt. In 1984, however, it declined to 225,799. Tuna catch in 1985 is 261,562 mt or an increase of 35,763 mt or 16%. This increase in tuna production may be attributed to the increase in demand for tunas in the world market as well as the operation of some of the purse-seine fleet in other areas like Papua New Guinea, Micronesia and Palau. Another reason might be the fact that previous to the promulgation of Executive Order No. 1047, fish caught by Philippine vessels in international waters were treated as imports and hence, are charged import duties. With the E.O., catches of Philippine vessels are now exempt from import quota restrictions, taxes and duties.

Catch by species in 1985, as in previous years, frigate/bullet tuna remains the major species landed by the commercial and municipal landings accounting for 39% and 33.8%, respectively. These compare with landings in 1984, where yellowfin/big-eye tuna was the major species landed by the municipal sector. The proportion of the tuna landing contributed by the various species were as follows:

Species	% of commercial landing	% of municipal landing	% of total landing
Frigate/bullet	39	33.8	36.6
Yellowfin/big-eye	16	33.7	24.6
Skipjack	31	14.5	23.0
Eastern little	14	18.0	16.0

It is apparent that misidentification of tuna species is still one of the main problem so far as reliable statistics is concerned. Based on the biological sampling being carried out since 1979, it is possible that a considerable proportion of the "frigate" tuna are small yellowfin or skipjack. This problem is being corrected at least in the Mindanao area where the tuna samplers and the statistical enumerators are working in close collaboration.

Catch by fishing gear

The fishery statistics of the Philippines is distinguished between tuna catches by fishing gear for commercial (vessel above 3.0 GT) and municipal (vessels 3.0 GT and below) sector of the industry.

Landings by fishing gear for 1985 by fishing sector are shown in Tables 2 and 3.

Tunas are captured by seven major fishing gears by the commercial sector (Table 2). The main gear catching tunas is the purse-seine with 49% contribution followed by ringnet 35%, and bagnet 13%, and the remaining 3% by hook and line, longline, trawl, gillnet, muro-ami and beach seine.

A great variety of gears is employed by the municipal sector to catch tuna (Table 3). The hook and line gear is the most productive with 61% share of the total municipal landing for tuna in 1985. Gillnet, purse-seine/ringnet, fish corral and bagnet contributed 13%, 9%, 5% and 4%, respectively. The remaining 8% is landed by longline, troll line, beach seine, etc.

The most significant feature of these landings by both the commercial and municipal sectors of the industry is the part played by "payaos" (fish aggregating device). The catch of purse-seine, ringnet and hook and line are in conjunction with payaos. Catches by these gears represents 73% of the Philippine tuna landings for 1985.

Tuna catch by fishing ground

In the fisheries statistics, tuna landings are published both by political region and by statistical fishing area. The former has no relationship to fishing grounds, seas or bays, whereas the later division are based on fishing areas. The 1985 landings by statistical fishing area is shown in Table 4. Approximately, 58% of the total tuna landings are caught in the seas surrounding Mindanao. The majority of the tunas caught in the inner archipelagic waters are frigate/bullet tuna and eastern little tuna while majority of the larger yellowfin and skipjack are caught in the seas around southern Mindanao.

Fishing season for tunas

The fishing season for tuna in the Philippines seem to be the whole year round from January to December and this is especially true in Mindanao. It varies, however, from region to region because of the monsoon season. In eastern part of the Philippines, particularly in eastern Luzon, the season is from June to October while in the western portion, it is from November to May.

The peak of tuna production is during the summer months from March to May in all landing centers.

Tuna catch disposition

The major proportion of the tuna landings in the Philippines are consumed locally.

In 1985, export of tuna represent 14% of the total landings valued at 1.2 B pesos (Table 5). It could be seen that the export of tuna reached its peak in 1981 and decreased continuously the following years. However, export increased by 1,200 MT in 1985. The reason for this is the favourable price of tuna in the world market and the operation of the tuna canneries to full capacities especially those with catcher boats. The catcher boats are now operating outside Philippine waters during lean months. The tuna canneries have been authorized to import tunas for their canning needs of about 14,000 MT. But 1985, the canneries did not import probably because of the adequate domestic supply. Another reason for the increase in the export of tuna is the incentive given to the industry with the elimination of commodity clearance and the abolition of the payment of the fishery inspection fee of 1/2 of 1% of the ad valorem. The granting of the fuel draw-back for fishing vessels converted abroad and the exemption from duties for catches from outside Philippine waters also contributed to the increase in export.

There are 10 tuna canneries operating in the Philippines at present. We have very little data on the processing capacities of the canneries due to the fact that BFAR do not license these canneries.

Tunas are exported frozen, chilled, canned or smoked. Table 6 show the destination of frozen/chilled tuna for 1980-1985. It will be noted that Japan, Thailand and Italy imported most of the frozen/chilled tuna in 1985.

Canned tuna exports by destination are shown in Table 7. The majority of the canned tuna is exported to the U.S.A. with an increase of 5,000 MT in 1985 from 1984 export figures. The Federal Republic of Germany, Canada and the United Kingdom are the other major countries which are importing canned tuna from the Philippines.

The domestic price of tuna in the Philippines have steadily increased through the years expecially that of yellowfin/big-eye tuna. This development is a big boost to small fishermen using hook and line since they are the main producers of the large yellowfin exported for the "sashimi" market (Table 8).

4.4 THAILAND

4.4.1. Gulf of Thailand

Marine pelagic fisheries in Thailand has been developed for years after the chinese purse-seines were introduced in the Gulf of Thailand in 1925. At that time the main target species were small pelagic fishes such as Indo-Pacific mackerel (R. neglectus) and Indian mackerel (R. kanagurta), but most of them were mainly utilized for domestic consumption. However, distinct development had been observed in the improvement of gears used and in the methods of operation. By the way, the exploitation of tuna resources became a significant part in the pelagic fisheries in recent year due to the demand for tuna by canning industries was steadily growing.

Development of tuna fisheries

In the Gulf of Thailand, exploitation of tuna is greater than on the west coast of Thailand. It constitutes about 90% of total landings of tuna species which is comprised of longtail tuna (Thunnus tonggol), kawakawa (Euthynnus affinis) and frigate tuna (Auxis thazard). As regards to the available catch statistics for tuna, the last two species, has been combined together and longtail tuna is separated. Therefore, tuna groups referred to deals with TUN and LOT as classified by IPTP

Taking into consideration of fishing crafts and gears used to catch tuna species, the major types of fishing gear are drift gillnet, luring purse-seine, Thai purse-seine and mackerel drift gillnet while other commercial fishing gear and traditional gears are considered the minor gears as referred to the percentage of the catch as shown in Table 1. It is seen that tuna caught by luring purse-seine and drift gillnet comprises about 33 and 34 percent, respectively. Those two gears play an important role to capture medium and large size of 30-55 cm long, which the size of 35-37 long are the most dominant. It is observed that there is tendency of change in registered fishing gears as shown in Table 2.

Prior to the development of tuna fisheries, the Chinese purse-seines were introduced in 1925 as well as the gillnetters for the purpose in capturing small pelagic species. In 1930, the Thai purse-seine were modified from mechanized Chinese purse-seine and had been developed to be luring purse-seine using the coconut leaves as fish attraction devices in 1973. Since then the number of Thai purse-seine has declined while the number of luring purse-seine has increased considerably (Fig 1). Except for 1984, the number of Thai purse-seine has increased in reverse to the luring purse-seine's. This phenomenon can be described by investigation that Thai purse-seine and luring purse-seine are actually operated homogenously. The fishermen carried out the method of capture alternately, particularly the luring purse-seine which are commonly operated in forms of Thai purse-seine searching for fish school during the sailing to the destination of luring places. Therefore, the number of luring purse-seine in the later period (except for 1984) may include some Thai purse-seine, but they still registered as luring purse-seines.

Regarding the drift gillnet, the number has varied rather steadily until 1979, the number has risen to 301 boats in 1981 and dropped down a little in the later period. Those variations surmise to be effected by the increase in demand of target species.

After 1982, the main target species for the large purse-seine was changed to tuna species due to the increasing demand of canning industries and development of gear efficiency by installation of electronics equipments such as echo-sounder, sonar and recently satellite navigation devices. However, sonar is the most popular instrument among Thai fishermen for detecting tuna school.

Tuna Production

The production of tuna fluctuated in the range from 6,519 to 82,001 tons during 1973-1984 (Table 3) with an estimated annual average of 24,458 tons. Three species of tuna, namely, longtail tuna, kawakawa and frigate tuna are found to distribute around the Gulf of Thailand about 30-60 miles offshore and exist more abundantly around islands of 20-45 meter deep.

The catch statistics of tuna have been recorded from 1970-1978 for all three species as a single group under the category of TUN. From 1979, longtail tuna was separately recorded as LOT category. Annual production of tuna showed an increasing trend year by year particularly after 1980 and reached the peak of about 82,000 tons in 1983, with an increasing rate of 106.8% (Fig 2). Such an increasing trend had been supported by the development of fishing technique of sonar purse-seine and the increase in number of the large size boats (Table 2), as well as the extension of fishing area to further offshore. The decline of catch in 1984 may be due to the heavy exploitation in previous year. However, this hypotheses is merely speculation and without sufficient evidence. Further detailed studies is needed in order to obtain a clearer picture.

From 1979 to 1984, the data of separated groups of LOT and TUN are available. Fig 3. expressed the catch composition of the two groups of tuna species. It is observed that tunas are generally made from the mixed school. The percentage contributions of LOT occur to be in the reverse direction of kawakawa and frigate tuna. General tendency showed that the percentage of LOT was higher than TUN except in 1982. This may be due to the fact that LOT distributes more abundantly in the deeper water especially in the middle Gulf than TUN and this area is the main fishing grounds for tuna purse-seines.

Seasonal variations

Tuna species were taken throughout the year as shown in Table 4. There are some differences in the peak seasons according to the Northeast and Southwest Monsoon and variations in fishing efficiency. The good catch of tuna species are usually obtained between January - April and August - October (Fig 4) but it may commence in July of some year. However, it can be stated that the higher catch will be taken during Northeast Monsoon period (October-April).

Catch and effort

Among major gears used to catch tuna, the most effective gears are luring purse-seine and drift gillnet. Fig 5 shows that tuna has been taken substantially by luring purse-seine, but it can not be stated that all luring purse-seines are the most appropriate gear in catching tuna. The catch per boat day of luring purse-seine during 1979-1984 are given in Table 5. The yearly catch rates of LOT and TUN seemed to vary a little difference with the highest total catch rate of 591.4 kg. per day was observed in 1983 (Fig 6).

The catch per day of drift gillnet fisheries during 1979 to 1984 are given in Table 6. The yearly catch rates of LOT and TUN by drift gillnet seemed to vary in the same pattern as luring purse-seine, with the highest total catch rate of total tuna about 484.3 kg per day in 1982 (Fig 7).

Fishing grounds

Tuna fisheries are developed year by year and its fishing ground have been extended to cover all area in the Gulf of Thailand due to the installation of modern electronic instruments. The important fishing areas where effective gears are commonly operated are shown in Fig. 8. Drift gillnet fishery is carried out along the coasts of the Gulf and around the islands over 20 meters deep while luring purse-seine fisheries is extended into the deeper part about 40-75 meters deep. The fishing operations seem to be concentrated off the eastern coast and lower part of the western coast of the Gulf.

Price and utilization

It is noticeable that the development of tuna canneries in Thailand has been increased rapidly. It plays a significant role in the support of tuna fisheries development and it also effected to the rise in the price of tuna. The variations of wholesales price depend on the supply, quality, species and size of fish. Fig 9 shows an increasing trend of wholesales price being correlative with the demand of tuna canneries.

The price of tuna dropped down in 1979 because of the supply of the catch was more than the demand. In 1982 and 1984, the tuna price dropped down again, this may be due to the canning industries having imported tuna such as skipjack or other oceanic tuna species instead of using domestic supply even its high productions were exposed (Table 7). In Thailand there are 14 canneries perfoming business in tuna canning. Almost all of the canned tuna productions are exported to USA and EEC market (Table 8). Recently, it was reported that the tendency in demand for canned tuna in EEC market will be increased more and more due to economic recovery. The high market demand for tuna has effected the fishermen to seek for tuna enthusiastically. It is remarked that the optimum sizes needed for canning should be about 1-1.5 kg each.

4.4.2 West coast of Thailand

Prior to 1970, tuna were caught incidentally by purse-seiners and gillnetters which were targetting on more lucrative species such as mackerel, sardines and carangids. The development of pelagic fishery together with the development of fish canning industry during the 1970's has considerably expanded market for mackerel, sardine and tuna. The development of this industry in recent years has seen a rapid increase in production, and export of canned tuna. The total catch of tuna in this coast increased from 1721 mt in 1980 to 3321 mt in 1984.

Fisheries

Thai purse-seine at size class of 14-18 m. in length was the most important gear during 1971-1978. Since then luring purse-seine has shown an important role as shown in Table 1. Since 1982, light luring purse-seiners have been equipped, with onboard generators and became the predominant fishing gear for mixed target species such as mackerels, scads, hardtails, king mackerels and tuna (Table 2 and 3).

About 10 purse-seiners have been modified as tuna purse-seiners recently. Among them 7 seiners of size class 14-18 m in length with net of 100 m. x 600 m. and 7.6 cm. mesh size operate at about 30 km. of shore. The rest are 24 m. in length with the net of 120 m. x 1400 m. and 9.4 cm. mesh size operate at 30 km. or further offshore.

Species composition

Longtail tuna, eastern little tuna and also frigate tuna are the dominant species along the west coast of Thailand. Only small production of yellowfin tuna, skipjack tuna, bigeye tuna and dogtooth tuna attributed by king mackerel gillnet, troll line and sport fishing.

Catch rate

Catch for longtail tuna in kilogram per day in the purse-seine fishery along the west coast of Thailand shows the trend since 1982. The catch rate dropped down from 125 kg/day in 1982 to 28.8 kg/day in 1983, increased to 180.4 kg/day in 1984 and decreased to 19.7 kg/day in 1985 as shown in Table 4 A. This being the case of the uncertainty of the fishing effort of purse-seine fishery. Generally the Thai, Chinese and luring purse-seine operate only one day cruise while those tuna purse-seine spend 3-14 days on cruise. Hence the effort for the former fisheries are not specific and may be considered to be equally directed on almost all pelagic species and not specifically in areas where only tunas are abundant.

The catch rate for coastal tuna which consists of the eastern little tuna and frigate tuna were decreased since 1982. However, it showed the increasing trend in 1985 as shown in Table 4 B.

Seasons

Tunas in Thai waters of the Andaman Sea have been caught incidentally all year round and seasonality is well defined probably because effort not specifically on tunas. Nevertheless, as shown in Table 5, the monthly catches of tunas during 1979-1985 were attributed to be higher during Northeast Monsoon (November to April) than the Southwest Monsoon.

Fishing grounds

Since the beginning of the pelagic fishery development in the west coast of Thailand in 1963, the annual pelagic species has been caught mainly by chinese and Thai purse-seiners in the coastal area at depths of 30 m. and about 10 - 15 km. offshore. Since 1973, the development of luring purse-seine was introduced to this coast, the major fishing grounds have been expanded further offshore. Presently, the purse-seine fisheries are operated mainly in waters of the depth ranges from 30-80 m. Fishing grounds are about 45 km wide in the north, 30 km at Phuket Island and widens to about 80 km in the south. Geographically, the major fishing grounds for tunas are off Surin Islands straight southward to off Similan Islands and off Raja Islands. The new fishing grounds for tunas in the lower part of the coast found recently, located at about 40 km westward off Adang Islands, Satul province. The king mackerel drift gillnetters are mainly operated at the depth of 20 - 50 m, with the distance not more than 20 km from shore. The map of fishing grounds for tunas in the west coast of Thailand is shown in Figure 1. These information are obtained from the interview of master fishermen during the sampling survey along the coast.

5. NATIONAL REPORT ON THE PRESENT DATA COLLECTION SYSTEM AND RELATED PROBLEMS

5.1 INDONESIA

Data collection

Data on catch and effort are collected at some designated landing places, spread over East and West Indonesian waters (Figure 1), i.e.,:

East Indonesian waters:

- Sorong
- Ambon
- Bitung
- Ternate (started again on May 1986)
- Kendari (started on May 1986)
- Maumere (will be started soon)

West Indonesian waters:

- Banda Aceh (started on April 1986)
- Padang
- Pelabuhan Ratu
- Prigi
- Bali
- Ende (started on June 1986)

The catch and effort data are collected daily with complete enumeration at every sampling site. The data collected among others are:

- Catch by species by boat
- GT/HP of the boats
- Number of hooks or piece of net used
- Number of fishermen per boat
- Fishing grounds
- Number of days per trip

Biological sampling

For biological data only length and weight are collected. Length and weight are collected for every species caught also daily by sampling some boats landing. Due to limitation of budget, other biological data, such as gonad weight, maturity and morphometric measurements are only collected from Pelabuhan Ratu and Prigi. The data for gonad weight and maturity collected are still very limited and have not yet been analyzed.

Catch, effort, species composition and length frequencies are being collected at 11 landing centers. Catch and effort statistics of state fishing companies and auction halls are reliable records. Sampling programmes for species and size composition initiated at these centers have over-extended the financial and manpower resources of the Research Institute of Marine Fisheries. These centers cannot be visited at regular intervals to check the technicians, who are sampling according to prescribed procedures, because of limited funds. Consequently, a massive amount of data is being generated some of which is of dubious quality. A suggestion was made by the IPTP Statistician to continue collecting catch and effort statistics from state fishing companies and auction halls and to decrease biological sampling effort to a few selected centers. These centers can be monitored regularly with available funding to ensure accurate information of species composition and size distributions.

5.2 MALAYSIA

Data Collection

Basically the data collection system in Malaysia can be divided into two parts: (1) data collected by States and (ii) data collected by Fisheries Research Institute.

Data collected by States

1. Each state is responsible for the collection of the fish landing data according to the types of fishing gears. Data collected would be filed in the specific forms and then sent to the Headquarters, Fisheries Department, Kuala Lumpur.

2. Headquarters will process, analyse and then publish as a bulletin namely 'Annual Fisheries Statistic'.

3. Sampling is done at landing sites in almost all fisheries districts in Peninsular Malaysia. However, sampling is more frequent at districts with a majority in certain fisheries or types of fishing gear.

4. It is normal practice for one Fisheries Assistant of each State to be assigned to carry out the works by visiting every district routinely.

5. Fish species and type of fishing gears are recorded.

6. Type of information mainly on the catch and fishing effort.

7. Usually at least 10% of the total number of boats are sampled.

Data collected by Fisheries Research Institute (Trengganu Branch)

1. In fact, no specific tuna sampling done in previous years. Only lately some biological studies such as length frequency measurement and gonad studies have been carried out. All data are collected, processed and analysed by this Institute.

2. Tuna data are collected by research personnel in all four States of the east coast of Peninsular Malaysia, namely Kelantan, Trengganu, Pahang and East Johore. However, complete tuna data including catch, effort and some biological aspects could only be collected within the state of Trengganu due to financial problems and lack of staff. Sampling sites of the east coast are shown in Figure 1.

3. At least two samplers employed to collect the tuna data. One sampler gets information on catch, effort, cost and earnings. Another one is dealing with species composition and length frequency measurements. However, it is more frequent to use three research personnel instead of two in which the third one is assigned to record the readings on data sheets.

4. Data collections are focused on three common species found in Trengganu. Those are T. tonggol, E. affinis and A. thazard. Most of them are caught by troll lines.

5. For collecting the catch, effort, cost and earnings data, normally at least 10% of the total number of boats sampled. While for length frequency measurements, a number of more than 300 specimens selected.

Problems encountered

1. Limited number of samples collected during sampling by research workers due to lack of funds. In many cases travelling from one station to another is necessary in order to have more samples. To date, there is no specific sampling officer or sampler establishment to carry out the collection of tuna data.

2. In the national statistic collection, the tuna catch is not separated into species. The same thing is also observed to the tuna related fishing gears. Normally, tuna catch are lumped together and not separated into gear categories. For instance, the catch from green or nylon drift nets, monofilament gillnets, trammel nets or other drift gillnets are lumped together.

5.3 PHILIPPINES

The Tuna Research Project in the Philipines is the continuation of the Tuna Sampling Project initiated by the South China Sea Fisheries Development and Coordinating Programme in November 1979. The purpose was to obtain basic information in catch, effort and species and size composition of landings in the tuna fishery. After its termination in December 1980, the project became an on-going research project by the Fisheries Division, Bureau of Fisheries and Aquatic Resourcs and have the following as its objectives:

1. To determine the spartial and seasonal distribution of tunas

2. To determine the size and species composition of the catch captured by type of gear.

3. To obtain biological information on length/weight relationship, sex and maturity, feeding habit of tuna.

4. To determine the unit of fishing effort for the tuna fisheries.

5. To identify stocks and migration paths of tuna in the Western Pacific to provide input in the International Tagging Programme of skipjack and other tunas.

The Tuna Research Project is being implemented in the four (4) sampling centers in Mindanao located in the following provinces:

Davao del Sur (2 sampling sites)
- Sta. Cruz (1 sampler)
- Malita (1 sampler)

Gen. Santos City (2 sampling sites)
- Calumpang (1 sampler)
- City Public landing (1 sampler)

Zamboanga City (3 sampling sites)
- Labuan (1 sampler)
- Recodo
- Baliwasan (1 sampler)

Misamis Oriental; (2 sampling sites)
- Opol (1 sampler)
- Initao

Major gear types in each sampling site are being sampled such as ringnet and handline in Sta. Cruz and Opol and handline in Malita and Initao. Ringnet, purse-seine and handline are the gears selected in Gen. Santos City.

In Labuan, ringnet, handline, troll line and multiple handline are selected while in Recodo, purse-seine, handline and fish corral are being sampled and only bagnet is selected in Baliwasan.

Skipjack, yellowfin, bigeye, frigate, bullet and eastern little tunas are studied whenever they are available in the landed catch of the different boat/gears.

Methodology

Sampling for purse-seine/ringnet

1. Sampling of ringnet and purse-seine is done every third day regardless of Saturdays, Sundays and holidays making a total of 10 sampling days per month.

2. On each sampling day, up to 5 carrier boats are sampled. The catch of all other vessels unloading that day is also recorded.

3. For each vessel sampled, the following information is taken and recorded.

   - boat name
   - gear type
   - fishing ground
   - catch composition by species
   - total weight of catch
   - no. of days fishing/net sets

   For each vessel sampled, at least 1 box/basket by each category of tuna, i.e. piret, skipjack, yellowfin is sampled.

   For each box sampled the following is done:

   Species is sorted out and all unidentified small tuna is placed in separate category

   Each species is weighed to obtain composition by weight.

   Twenty fish randomly selected for each tuna species is measured and recorded.

   All measurements is taken to the nearest cm (0.5 cm above taken to the next highest cm)

Sampling for handline

1. Sampling for handline is done every other day in Labuan and Recodo and once a week in Sta. Cruz, Gen. Santos City, Opol and Malita.

2. For each sampling day the following data are collected:

- total landings of yellowfin and bigeye tuna from handline boat

- no. of pumpboat landed

- average number of fish landed per boat

3. For one landing center, length and weight (as recorded by buyer) from 20 yellowfin and all bigeye are taken.

Information collected at each sampling site is summarized at the end of the month by fishing gear and species. These summaries include the number of total and monitored vessels, weight of total and species composition of monitored landings. Samples of frequency distribution obtained during the month for a particular fishing gear and species in each area are also summarized to give weighed length frequency percentage distribution of the total landings of the month.

Sampling of large purse-seiners at Navotas has been discontinued due to a combination of factors including difficulties in obtaining accurate information of fishing grounds and shortage of personnel and funds. The Philippine participant requested IPTP for financial assistance in reinstating a sampling programme at Navatas as the large purse-seiners generally catch a larger size range of tunas than ringnetters and small purse-seiners operating around Mindanao Island.

5.4 THAILAND

Statistical data collection are mainly conducted by the Statistics Section of the Department of Fisheries on weekly and monthly basis. 10 percent sample coverage are taken through simple random sampling technique of various types and sizes of fishing gear categories. The information on catch data by species and groups of species, by fishing areas as well as the fishing effort for each type of gear are collected. This information will be recorded in a logbook given to sampled fishermen in each categories which are requested to keep record of catch and fishing effort for each trip.

In collecting data, the importance of adequate statistics has been recognized theoretically, but practically the statistics available are rather poor and difficult to collect. The first problem is the fishermen give information of catch lower than the actual. This is partly due to the deficient knowledge in understanding of statistics importance and also partly due to the course of taxation system. The second problem encountered is the nature of fisheries. The rapid development of fisheries has influenced upon the difficulties in data collection that the designed statistics system does not coincide with that of the change in fisheries. To solve the first problem,

an attempt to be familiar with the fishermen must be done by the field enumerators to make them realize the importance of statistics. Another problem will be solved through the investigation of fisheries census and the statisticians or the scientists should visit the landing places to interview the fishermen about the new technique in fisheries that have been improved in each period.

A logbook system was introduced in Thailand to obtain information of fishing grounds and gear, catch, effort and species composition. Log books were distributed to approximately 10% of vessels in each gear class. These vessels were subsequently monitored by enumerators either for the completed log books or, if the log books were not completed, by interviews with captains for fishing trip particulars. By a process of elimination, a pool of cooperating vessels were delineated and this system has been providing reasonably reliable information. The IPTP Statistician pointed out the success of this logbook system was attributable to the deployment of 70 enumerators at commencement of this system to continously monitor the vessels furnished with logbooks.

Research programs in Thailand have not been able to keep abreast of the rapid changes occuring in fisheries, due partly to financial constraints. The Marine Fisheries Division is planning to initiate a research programme to monitor the tuna fisheries at 2 landing centers in the Gulf of Thailand and at 1 center on the west coast and have requested IPTP for financial and technical assistance. The IPTP Statistician said that the requests for assistance from Thailand and Malaysia have been forwarded to FAO Headquarters and that these countries would be notified as soon as a response had been received. He was optimistic of a positive response and hopeful of initiating these sampling programmes early in the new year.

The participant from the Far Seas Fisheries Research Laboratory stated that in Japan catch and effort statistics were provided by 17 fishermen's cooperatives from throughout the country. He suggested selecting sampling sites to cover significant landings and to concentrate on obtaining good information for 30-40% of total landings.

The observer from Imperial College stressed the importance of winning the cooperation of fishermen by ensuring confidentiality of information and providing feedback of information is an analyzed form. He remarked that the quality of data is dependent primarily on the enumerators so emphasis should be placed on recruiting good people. Also, data should be checked, for example, by comparison with data of proven quality from indicator vessels.

The BOBP participant observed the difficulty of standardizing effort when vessels change fishing gears and/or target species from year to year. He wondered if 1 sampling site on the west coast of Thailand would be adequate considering these are 2 fishing grounds on this coast. He also expressed concern of the continuation of sampling programmes after termination of assistance from international organizations. He was in agreement with promoting feedback to fishermen and suggested a newsletter with results of research projects.

6. NATIONAL REPORT ON DATA PROCESSING AND ANALYSIS

6.1 INDONESIA

There are about 400 months of data to be entered into computer storage. Programmes have been written for entering and filing length frequency distributions. Programmes for entering and filing catch and effort data have not yet been completed.

The Indonesian participant requested IPTP to provide standardized computer programmes for inputting and storing sampled data which would expedite processing of accumulated data and facilitate comparisons between sampling sites within and without countries.

The IPTP Statistician observed the need in Indonesia of comparative studies by vessels, fishing gears, areas to determine trends in catch, effort, cpue, size frequencies by time intervals.

The BOBP participant stated that his project has provided microcomputers and programmes to all participating countries. These include 8-9 programmers for various analyses and the BOBFINS statistical package for processing sampling data.

6.2 MALAYSIA

The use of computers for processing data is quite limited. To date, there is no computer at all at Fisheries Research Institute in Trengganu. All data are processed manually on paper and kept in files. It is hoped that this station will be equipped with a suitable computer soon in order to step up the data processing.

Research that have been done on tuna includes monitoring of the catch, effort, cost and earnings data for troll line fishery, size and species composition, length frequency measurements, length-weight relationship and some gonad maturity studies. Most of these data are being analysed manually and some such as the estimation of growth parameters have already been worked out.

6.3 PHILIPPINES

Type of Information collected for 1985:

The most important gears at the sampling site are still handline, ringnet and purse-seine (Table 9) in terms of the number of vessel landing. Other gears monitored are troll line, multiple handline and fish corral. In terms of landed weight, the important fishing gears were purse-seine (72% of the total landed weight) ringnet (19%) and handline (9%) (Table 10).

Ringnet and handline were the gears monitored at Sta. Cruz with total landings of 15,612 kg and 10,839 kg, respectively while in Malita only handline was monitored and have a total landing of 18,041 kg.

Three fishing gears were monitored in Gen. Santos City namely: purse-seine, ringnet and handline. In terms of landed weight, ringnet was the most important followed by handline and purse-seine.

In the three sampling sites in Zamboanga City, ringnet accounted for 87% of the landings in Labuan followed by handline 11%, then troll line 3% and multiple handline 1%.

Purse-seine accounted for 99% of the landings in Recodo and only 1% for handline and fish corral. Bagnet had total landings of 3,829 kg in Baliwasan.

Ringnet and handline were the gears monitored in Opol. Ringnet has a total landings of 98,586 kg while handline has 719 kgs. In Initao, only handline was monitored with a total landed catch of 1,787 kg.

Distribution of sampling effort by sampling site and fishing gear:

During the period from January to December 1985, a total of 26,895,499 kg of tuna was recorded at the four (4) sampling centers in Mindanao. This total comprised 55.60% skipjack, 37,77% yellowfin, 1.85% frigate, 3.7% bullet, 0.39% eastern little, 0.16% bigeye and 0.07% oriental bonito.

Catch and catch rate:

Ringnet

Ringnet landings of tunas was highest in Gen. Santos City for the 12 months sampling. The average landing of tuna for this period was 6,373 kg/boat. The highest landing was observed in April, May and June.

March was the most productive month in Sta. Cruz with a total landings of 5,591 kg and a catch rate of 1,118 kg per boat. The average landing of tuna for this period was 217 kg/boat. March, April, May and December registered a total catch of more than 1,000 kg and up to 5,000 kg.

Tuna landings in Opol was observed to be highest in March reaching a total catch of 75,930 kgs and with a catch rate of 1,245 kg/boat. It was only in January, February, March and April that observed landings reached 1,000 kgs and above. Tuna landings of ringnetters were observed to be highly seasonal in Opol.

Ringnet landings of tuna in Zamboanga City was highest in March (117,697 kg) and August (95,516 kg). For the rest of the year, the landings ranged from more than 44,000 kg to 83,000 kgs. The average tuna landings for the 12-month period was 2,597 kg/boat.

Purse-seine

Purse-seine landings of tuna was highest in Zamboanga City reaching 19,247,051 kg and a catch rate of 181,576 kg/vessel for the 12 months period. February registered a total landings of 5,017,027 kg and a catch rate of 501,703 kg/vessel. Almost the same landings of tuna was observed for the rest of the months except in December when catch went down to 355,694 kg.

April was observed to be the most productive month in Gen. Santos City (178,950 kg) followed by January (172,000 kg), March (127,720 kg) and February (123,100 kg). In September, October and November more than 100,000 kgs was observed and less during the other months. Catch rate for the monitored period was recorded to be 7,027 kg/boat.

Handline

Handline landings of tuna was highest in January (345,630 kg) at Gen. Santos City, then in June (328,600 kg). In November and December more than 200,000 kg was observed and for the rest of the months less than this amount. The catch rate for the 12 months period was 382 kg/boat.

In Opol, only in April and August that handline landings was observed with a total landings of 170 kg and 548 kg, respectively. The catch rate was 11 kg/boat in April and 23 kg/boat in August.

At Initao, only 110 handline boats were observed to have landed in 8 months. No landings was observed in April, August, November and December. The catch rate was 16 kg/boat for the whole period.

Handline landings of tuna in Labuan, was 106,500 kg and in Recodo, was 32,561 kg, with catch rates of 408 kg/boat and 2,171 kg/boat respectively. The highest landings in Recodo was in April (11,529 kg).

Landings of handline in Sta. Cruz. was 10,839 kg. The over-all catch was 70 kg/boat landing. Handline landings of tuna in Malita was 18,041 kg for the 12 months period with a catch rate of 671 kg/boat. The highest landings was observed in March (3,673 kg), then in February (2,472 kg) and October (2,165 kg).

Troll line

Troll line was observed only in Labuan, having a total landed catch of 35,004 kg and a catch rate of 172 kg/boat-landing.

Fish corral

Fish corral was monitored only in February at Recodo. The catch observed was 38,849 kg by 4 units of fish corral and a catch rate of 9,712 kg/unit.

Multiple handline was likewise observed only in Labuan. The total landed catch was 7,048 kg and a catch rate of 64 kg/boat-landing. The highest landings was observed in August reaching 1,154 kg and a catch rate of 96 kg/boat. For the rest of the months, catch landed was below 1,000 kg.

Bagnet

Bagnet was monitored in Baliwasan only from May to December. A total of 3,829 kg was observed and a catch rate of 31 kg/boat-landing during the eight month period. Catch of tunas by bagnet was almost the same during the period observed.

Size distribution of tuna:

Species composition and size distribution of tuna species caught by the different fishing gear is presented in Table 11 and 12, respectively.

Ringnet is catching almost the same sizes of skipjack and yellowfin tuna except in Sta. Cruz where the largest yellowfin was 138 cm and in Zamboanga City where the smallest was 54 cm.

For all the other gears, the size range of the different tuna species were almost the same.

The Philippine participant reiterated a request made the previous year to IPTP for a consultant to conduct a detailed analysis of data collected since late 1979. This consultant should conduct this study in close collaboration with Philippine biologist for training in stock assessment analyses. The Fishery Resources Officer explained a consultant is presently being contacted and may be available in October.

The IPTP Statistician observed that data was not on computer file in the Philippines, but was available in the IPTP data bank. The consultant contracted to do the analysis of the Philippine data should spend some time in Colombo to extract and conduct preliminary manipulations of the data. The present software in the Philippines was designed only for input of daily sampling data and deriving monthly summaries for each sampling site. IPTP systems analysts will be sent to the Philippines to introduce a new programme to input, store and calculate monthly summaries of the information from the sampling programme.

6.4 THAILAND

6.4.1 Gulf of Thailand

In Thailand some biological aspects for tuna resources have been studied, but rather fewer in the Andaman sea than those of the Gulf. However, some preliminary studies on the biology and life history include distribution, mean length in the catch, length at first capture, length at first maturity, spawning season, sex ratio, feedings, length-weight relationship, growth, mortality and recruitment have been carried out by the fisheries biologists of the Department of Fisheries. The summary of those aspects are shown in Table 9.

6.4.2 West coast of Thailand

Mean size of eastern little tuna and frigate tuna declined over the years since 1976 as shown in Figures 2 and 3, respectively. However, mean size of eastern little tuna increased abruptly in 1982. This may be due to the shifting to the new fishing ground westward of Satul Province.

Recruitment for eastern little tuna occurs around January to April and June (9-16 cm) while the fish of maximum size caught in December (45-47 cm). Around February to June (9-18 cm) for recruitment of frigate tuna and it's maximum size caught at 39-41 cm in February, August and December. Hence for longtail tuna, it's recruitment appears to be around January to July (11-18 cm), which its maximum size caught in February, April and September (47-49 cm).

The Fishery Resources Officer suggested meeting with Thai and Malaysian biologists to review in greater detail the available information for the Gulf of Thailand and east coast of Malaysia. This meeting was convened after the tuna workshop was officially closed. Topics discussed included the significance of changes in the numbers of registered luring and Thai purse-seiners and decrease in tuna landings since 1983. Suggestions included future close collaboration between Thai and Malaysia biologists and analysis of catch rates and length frequencies by fishing gears and grounds.

7. TUNA TAGGING PROGRAMME

7.1 INDONESIA

Tagging Experiment

First tagging experiments for tuna and skipjack was conducted in January 1983-December 1984 and April-May 1984. During the first experiment, there was 987 yellowfin and 5425 skipjack tagged and released. Up to the present time only 27 recoveries have been reported. The second tagging experiment was conducted in January-February 1986 in Bitung. The fish were caught and released around payaos. The number of fish tagged during the second experiment were 81 yellowfin and 1,344 skipjack. Two yellowfin and 54 skipjack have been recovered around payaos where they had been released. Figure 7 and 8 showed the movements of tagged fish as represented by straight lines. Figures 9 and 10 shows the size frequency distributions of tagged yellowfin and skipjack.

7.2 MALAYSIA

There has been no tagging programme conducted in Malaysia expecially in the South China Sea off the east coast of Peninsular Malaysia. The availability of tuna for tagging may pose certain problems. Despite these problems IPTP should investigate the possibility of conducting tagging of small tunas since their presence off the east coast contribute quite a fraction of the total commercial fish landing in Malaysia.

7.3 PHILIPPINES

Two proposals for tagging experiments to be conducted with a Japanse training vessel and a chartered commercial ringnetter were presented by the Tuna Biologist based in Jakarta. (Appendix IV)

The Philippine participant stated that foreign flag vessels would be permitted to operate in national waters if sponsored by an international organization. He suggested IPTP contact the Director of Fisheries for authorization to conduct this cooperative tagging experiment with a Japanse training vessel in Philippine waters. The funds allocated the previous year for a tagging experiment have been withdrawn because of the recent change in the government. Another proposal will have to be submitted for funds, if tagging of juvenile tunas with a ringnetter is to be attempted.

The Indonesian participant reserved comment on the cooperative tagging proposal with a Japanese training vessel until he had consulted with government officials.

7.4 THAILAND

In Thailand, the program for tuna tagging is not implemented yet. The reasons are the lack of experience and a lot of expenses must be spent, but the allocations of budget from the Department of Fisheries is insufficient to achieve such program. Realizing that tuna species are widely distributed along the coastal area of Asian countries, the cooperation in tuna tagging among these countries are very necessary in order to obtain more detailed knowledge of tuna stock in the region.

The IPTP Statistician explained that the Programme can provide assistance in planning and coordinating tagging experiments, but does not have the funds for the execution of such experiments. SEAFDEC, with its research vessels and experts, may be the most appropriate organization to conduct tuna tagging experiments in Thailand and Malaysia. The SEAFDEC participant replied that he would relay this request for a cooperative tagging experiment to the Secretary-General and Deputy Secretary-General.

8. MAPPING ON TUNA RESOURCES

The Fishery Resources Officer explained some of his ideas on mapping of small tuna fisheries. These maps were to include distribution of landing centers and fishing vessels, location of fishing grounds for different gears, seasons, distribution and relative abundance by species spawning areas and movements. He suggested biologists map the small tuna fisheries of their countries and submit these drafts to the outposted Fishery Resources Officer in Colombo for coordination of a standardized format. Furthermore, the outposted Fishery Resources Officer was requested to compile a synopsis of the longtail tuna. The last synopsis was published in 1962 and a revision was urgently needed as this species is one of the most important in terms of landings in this region.

9. OTHER MATTERS

The participant from the Far Seas Fisheries Reserach Laboratory presented information on the far-reaching effects of the El Nino phenomenon on the climates of various areas of the world. He also presented information showing correlation of El Nino to strong year classes of yellowfin tuna in the eastern and western Pacific Ocean. He was hopeful of obtaining information for small-scale fisheries in the Indo-Pacific region for evidence of similar correlation of El Nino and recruitment of yellowfin tuna.

10. RECOMMENDATIONS

Based on discussions during the meeting, it is recommended that:

1. Sampling in Navotas be resumed as soon as possible to monitor the industrial tuna purse-seine fishery in the Philippines.

2. The present sampling programme in Indonesia be reviewed in the context of available funding and manpower to obtaining more precise data for a few selected sampling sites.
3. The proposed sampling programmes in Thailand and Malaysia be implemented as soon as possible with the assistance of IPTP

4. A working paper on the tuna resources off the coasts of Sarawak and Sabah be presented at the next workshop of tuna biologists.

5. Indonesian tuna biologists collect available information of longtail tuna from the South China (Natuna Islands) and Java Seas and off north Sumatra Island for presentation at the next workshop.

6. Data entry and storage of available data in computer be expedited in Indonesia.

7. A consultant be contracted to analyze and summarize in close collaboration with Philippine biologists the data collected since late 1979.

8. Analyses and interpretations be made for data collected in all countries.

9. Explore the possibilities of implementing a tuna tagging experiment for juvenile tunas using a commercial ringnetter in the Philippines in accordance with the feasibility study made by IPTP.

10. Explore possible ways of tagging longtail tuna in Thai and Malyasian waters in cooperation with SEAFDEC and IPTP.

11. IPTP seek authorization from government officials to carry out a joint tuna tagging experiment for medium-sized tunas in the EEZ's of the Philippines and Indonesia using Japanese training vessels.

12. A standard system for data collection, processing and filing be created by IPTP to facilitate comparative studies in the region.

13. The outposted Fishery Resources Officer compile a synopsis of available information on the longtail tuna.

14. The participating countries initiate or improve mapping of small tuna, seerfish and billfish resources off their coasts and to liasion with the outposted Fishery Resources Officer for standardization of format.

15. Training courses/study tours be held/provided by IPTP for data collection, data analysis, computer operation and tagging technique.

Appendix 1

AGENDA

Meeting of Tuna Research Groups in the Southeast Asian Region
27 - 29 August, 1986
Phuket, Thailand

1. OPENING OF THE MEETING

2. NATIONAL REPORT ON THE RECENT DEVELOPMENT OF TUNA FISHERIES AND RESOURCES

   - Reviewing the recent trend of tuna fisheries and resources, information available on catches and catch rates by species, fishing gears, fishing grounds and fishing seasons especially significant changes for the above matters should be described. And also, the information on price of fish, processing capacity by type and marketing channel, etc., as a background information.

3. NATIONAL REPORT ON THE PRESENT DATA COLLECTION SYSTEM AND RELATED PROBLEMS

   - National tuna sampling system including sampling sites, number of samplers employed, species and gear selected, type of information (catch and effort and size frequency etc.), number of sample collected, forms used for data collection.

   - Problems with sampling programme and national catch statistics.

4. NATIONAL REPORT ON DATA PROCESSING AND ANALYSIS

   - Present status of data processing including type of data processing, use of computer, data available in computer or on paper.

   - Research works and data analysis which have been done in recent years.

5. TUNA TAGGING PROGRAMME

   - Result of the tuna tagging experimented in the eastern Indonesian waters in 1986 and overall review of the Indonesian tagging in the past two years.

   - Report on the feasibility study on tuna tagging in Philippine waters from the mission taken place in the Mindanao in May 1986.

6. MAPPING ON TUNA RESOURCES

- A group of scientists in each country presents the mapping of tuna resources drafted for its own country according to the manual made by Dr. Marcille, Fisheries Resources Officer, FAO Rome in his letter of 23 January 1986, which was distributed to scientists in the region directly from Dr. Marcille or through T. Sakurai.

7. OTHER MATTERS

8. RECOMMENDATIONS

- Recommendations for improving and developing the national data collection system and research works.

Appendix 2

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Mr. Dheerasak Wasuthapitak	Fishery Biologist Exploratory Fishing Division
Mr. Veera Pokhapan	Fishery Biologist Exploratory Fishing Division

Appendix 3

Proposal of Tuna Tagging Experiment in the Waters of Philippines

M. YAO, Tuna Biologist, Jakarta, Indonesia
IPTP/FAO

I would like to propose the tuna tagging experiment in the waters of Philippines. As you know, Indonesia has succeeded in its experiment. Usually the pole and line boat is used for tagging because it can provide relatively large numbers of active fish in short interval. Unfortunately, Philippines has no suitable pole and line vessel for this purpose. Therefore, I have travelled in the Philippines about 3 weeks to check the feasibility of the tagging experiment. Travel was made with Messrs Merta, Ganaden and Barat.

After my travel I reach the conclusion that it is very important for us to execute the tuna tagging experiment in the waters of Philippines. There are many species and size of tunas. Expecially, there are many small tunas some of which are smaller than 20 cm in body length. I suppose that there is no fishing ground for small tuna in the world except in this area. Probably the eggs and larva spawned in the tropical area of Pacific are transfered to westward on the current, and gather into the coast of Mindanao Islands. It means that this area is one of the important nursery grounds for the Pacific Tuna Resources. Of course there are medium/big-size of tunas, especially big yellowfin tuna.

Therefore, I need to consider two sets of tagging experiments, one for small and another for medium-sized fish. After the discussion we agreed that the priority should be on small tunas. It should be executed by the Philippines if the budget is helped by IPTP. For the medium-size fish it is very difficult because of no suitable vessel for the experiment. About this problem Dr. Yonemori recommended to charter a Japanese medium-sized boat which could keep for a long time the active live baits in its cooling tanks. It is a good idea but I am afraid of its charter cost. After travel, I found that the Japanese Tuna Tagging Project operated in EEZ of Micronesia. If we could utilize their project, we can release lot of medium-size fish in offshore areas.

I know the situation of the Japanese Project because I had been the Chief of these projects. After the declaration of EEZ by the countries, their operation fields are restricted in the open sea and its territory because of the lack of its budget. But it changed in 1985. They use two training boats belonging to the prefectual fisheries high schools. These boats are 500 GT and have the abilities to operate at distant waters with good accommmodations. The main purpose of these boats is to give the students the opportunity to study navigation, marine engineering, fishing techniques and seamanship. Income from catches is not expected by prefectual owners. The fish holds are small, probably under 10 tons. It means that when they operate in your territories, the stocks are not affected by their catch. And if we utilize their vessels, almost all the cost of the experiment is covered by the Japanese Project. We need only some funds for travel, if some of you want to participate in the experiment.

There are some problems on both sides. The big problem is that the Japanese Project needs permission to operate in EEZ from your government. They expect either to be exempt from the operation fee because of the scientific work or with a reduced fee because of the small fish hold capacity. If it is agreeable, there is the possibility that the Japanese Project will execute their experiment in your territory because this area is one of the tuna resources origins which migrates to the waters of Japan. For your country, this operation should be the cooperative one. Probably some of the scientists want to participate with the Japanese scientists on board and to get the report at least written in English after the trip as quickly as possible. There are many other conditions we should consider. It is according to the situations of both countries, scientists and others. Sometimes it is agreeable, sometimes not agreeable by each other, but we need to continue the discussion. So at first, I want to understand what conditions you need and want. I would like to adjust them and send them to the Japanese Project.

For the small tuna, as already mentioned, Filipinos should execute by themselves. They are familiar with tagging techniques using the pole and line and for medium-size fish. In this area no pole and line, and fish size is different, therefore we need to check the tuna tagging technique again. For the purpose, we need to provide the number of active fish at once. Except the pole and line, the ringnet is recommended at first, if it injures the fish released. Because some of the fish are injured, the treatment of tagging should be careful, especially to choose the active fish. The tag usually used is too big for small fish. Probably we could prepare the small tags and its applicaters in Japan which are used for small pelagic fish. But we need to check the material of tag, because some of them are broken when the recaptured fish is held at minus 30 degree C. It is expected that after release, some of them migrate to the open sea and is caught again by the distant water fisheries.

It is difficult to discover the recaptured fish because the catch is treated at once when catching and landing. And some of the released fish is eaten by predators. In fact, we saw several small skipjack in the stomach contents of large yellowfin which are caught in the same fishing ground. Therefore, we need to advertise our work not only to fishermen, but also to factory workers.

The number of fish released should be large because of the above mentioned. I suppose it should be 10,000 to 20,000 a season.

General Santos is recommended as the tagging base, because there are many ringnet boats. We can get the important fishing conditions from them.

According to the above mentioned, I made my travel report which are already checked by some of you, especially Filipino scientists. My plan is tentative, it should be discussed by the persons concerned. So at the proposal, I needed to be helped by them. Including their opinion, I would like to submit the new proposal which is somewhat different to the old one.

ATTACHED TABLES AND FIGURES

1. Indonesia

2. Malaysia
   2.1 East Coast Peninsular Malaysia
   2.2 West Coast Peninsular Malaysia

3. Philippines

4. Thailand
   4.1 Gulf Of Thailand
   4.2 West Coast Thailand

1. Indonesia

Table 1. Catch statistics of tuna and tuna-like fishes, 1976 - 1984 (tons)

A r e a	1976	1977	1978	1979	1980	1981	1982	1983	1984
Eastern Indian Ocean (Area 57)									
- Tuna	1,317	2,345	2,811	3,236	3,348	3,350	3,740	5,888	4,247
- Skipjack	5,513	4,034	4,093	6,524	7,573	6,579	11,832	12,458	10,447
- Tuna - like	10,149	15,162	9,131	8,791	15,206	17,467	22,860	23,444	24,195
Sum	16,979	21,541	16,035	18,551	26,127	27,396	38,432	41,790	38,889
Western Pacific Ocean (Area 71)									
- Tuna	8,037	10,859	10,601	14,663	17,550	21,889	24,340	20,200	26,450
- Skipjack	25,338	26,376	29,422	36,310	44,245	50,851	49,745	64,332	70,211
- Tuna - like	42,086	47,220	46,113	57,791	61,591	70,264	83,152	80,434	78,984
Sum	75,461	84,455	86,136	108,764	123,386	143,004	157,237	164,966	175,645
T o t a l	92,440	105,996	102,171	127,315	149,513	170,400	195,669	206,756	214,534

Source : - Directorate General of Fisheries, Fisheries Statistics of Indonesia 1976 - 1984.

Table 2 Monthly catch, effort and CPUE of the 30 GT pole and line boats of PT Usaha Mina (Persero) in Sorong

Year : 1985

Months	Total Catch (MT)	Effective Fishing Day	Operating Day	CPUE (Kg/EFC)	CPUE (Kg/OD)	Bait available bay day(Buckets)	Kg Tuna per bucket	Total bait available(bucketa)
Jan	80.0	-	135	-	592.6	-	23.1	3,462
Feb	393.3	153	291	2,570.6	1,351.6	62.3	41.3	9,532
Mar	489.4	273	375	1,792.7	1,305.1	44.1	40.6	12,047
Apr	619.3	273	373	2,264.8	1,657.6	48.8	46.4	13,326
May	420.6	237	360	1,774.7	1,168.3	48.4	36.6	11,477
Jun	161.5	184	248	877.7	651.2	35.7	24.5	6,599
Jul	288.4	236	320	1,222.0	901.3	42.9	28.5	10,119
Aug	278.7	162	294	1,720.4	931.3	49.5	34.8	8,017
Sep	332.2	292	354	1,137.7	938.4	33.1	34.3	9,678
Oct	287.6	298	349	965.1	824.1	30.9	31.3	9,199
Nov	384.9	321	358	1,199.1	1,075.1	35.7	33.6	11,457
Dec	390.3	254	285	1,536.6	1,369.5	37.9	40.5	9,628
Total	4,105.2	2,683	3,732					114,542
Means	342.1	243.9	311.0	1,511.0	1,068.0	42.7	34.6	9,545.2

1. Indonesia

Table 3. Monthly catch, effort and CPUE of the 100 GT pole and line boats of PT Usaha Mina (Perserc) in Sorong

Year : 1985

Months	Total Catch (MT)	Effective Fishing Day	Trip	CPUE (Kg/EFD)	CPUE (Kg/Trip)	Bait available bay day (Buckets)	Kg Tuna per Bucket	Total bait available(Buckets)
Jan	-	-	-	-	-	-	-	-
Feb	-	-	-	-	-	-	-	-
Mar	-	-	-	-	-	-	-	-
Apr	42.0	20	1	2,100.0	42,000.0	60.0	35.0	1,200
May	-	-	-	-	-	-	-	-
Jun	24.3	19	1	1,278.9	24,300.0	50.3	25.4	956
Jul	27.9	14	1	1,992.8	27,900.0	62.9	31.7	881
Aug	70.0	25	1	2,800.0	70,000.0	55.2	50.7	1,381
Sep	37.0	24	1	1,541.7	37,000.0	47.8	32.3	1,146
Oct	2.4	5	1	480.0	2,400.0	34.2	14.0	171
Nov	-	-	-	-	-	-	-	-
Dec	-	-	-	-	-	-	-	-
Total	203.6	107	6					5,735
Means	33.9	17.8	1	1,698.9	33,933.0	51.7	31.5	955.8

Table 4 Monthly catch, effort and CPUE of the 300 GT pole and line boats of PT Usaha Mina (Perserc) in Sorong

Year : 1985

Months	Total Catch (MT)	Effective Fishing Day	Trip	CPUE (Kg/EFD)	CPUE (Kg/Trip)	Bait available bay day (Buckets)	Kg Tuna per Bucket	Total bait available(Buckets)
Jan	-	-	-	-	-	-	-	-
Feb	-	-	-	-	-	-	-	-
Mar	83.7	23	1	3,639.1	83,700	58.5	62.2	1,345
Apr	80.0	20	1	4,000.0	80,000	120.0	33.3	2,400
May	88.9	23	1	3,865.2	88,900	76.0	50.8	1,749
Jun	-	-	-	-	-	-	-	-
Jul	70.0	14	1	5,000.0	70,000	92.6	54.0	1,297
Aug	198.5	37	2	5,364.9	99,250	120.4	44.6	4,455
Sep	170.4	51	2	3,341.2	85,200	74.3	45.0	3,787
Oct	71.8	24	1	2,991.7	71,800	72.5	41.2	1,741
Nov	88.5	28	2	3,160.7	44,250	86.6	36.5	2,425
Dec	138.8	41	2	3,385.4	69,400	85.5	39.6	3,505
Total	990.6	261	13					22,704
Means	110.1	29	1.4	3,860.9	76,944	87.4	45.2	2,522.7

1. Indonesia

Table 5. The catch which is associated and not associated with Payaos from PT Usaha Mina in Sorong

MONTH	1985		1986	
	Payos (MT)	No Payos (MT)	Payos (MT)	No Payos (MT)
Jan	55.8	24.2	233.7	21.6
Feb	385.9	7.4	256.6	28.9
Mar	535.2	48.8	213.9	19.9
Apr	721.9	82.5	245.5	2.0
May	317.7	215.6		
Jun	200.6	6.0		
Jul	349.4	56.7		
Aug	510.4	71.9		
Sep	590.2	31.1		
Oct	377.3	92.2		
Nov	497.0	45.3		
Dec	580.2	20.1		
T o t a l	5,121.6	706.8	949.7	72.4

Table 6. Monthly catch, effort and CPUE of the 30 GT pole and line boats (Small scale fisheries) in Sorong

Year : 1985

Months	Total catch (MT)	Effective Fishing Day	Boats	CPUE (Kg/EFD)	CPUE (Kg/Boat)	Bait available bay day(Buckets)	Kg Tuna per Bucket	Total bait available(Buckets)
Jan	-	-	-	-	-	-	-	-
Feb	-	-	-	-	-	-	-	-
Mar	11.2	5	1	2,240.0	11,200	29.2	76.7	146
Apr	64.1	30	2	2,136.7	32,050	45.2	47.3	1,355
May	44.7	42	6	1,064.3	7,450	32.9	32.3	1,382
Jun	20.7	22	4	940.9	5,175	29.6	31.8	651
Jul	19.8	22	2	900.0	9,900	23.8	37.8	524
Aug	35.1	26	2	1,350.0	17,550	24.8	54.5	644
Sep	85.7	33	4	2,597.0	21,425	33.9	76.5	1,120
Oct	107.7	61	3	1,765.6	35,900	33.8	52.3	2,060
Nov	69.2	52	3	1,330.8	23,066	32.9	40.4	1,713
Dec	71.2	62	4	1,148.4	17,800	34.4	33.4	2,133
Total	529	355	31					11,728
Means	52.9	35.5	3.1	1,547.4	18,151.6	32.1	48.3	1,172.8

1. Indonesia

Table 7.Monthly catch, effort and CPUE of the 30 GT pole and line boats of Perum Perikanan Maluku in Ambon

Year : 1985

Months	Total Catch (MT)	Effective Fishing Day	Operating Day	CPUE (Kg/EFD)	CPUE (Kg/OD)	Bait available bay day (Kg)	Kg Tuna per Kg bait	Total bait available(Kg)
Jan	50.8	80	114	635.0	445.6	20.5	31.0	1,641
Feb	47.0	74	104	635.1	451.9	18.1	35.1	1,339
Mar	117.7	116	178	1,014.7	661.2	19.6	51.8	2,274
Apr	85.1	108	189	788.0	450.3	13.7	57.6	1,478
May	46.9	83	162	565.1	298.5	11.7	48.3	972
Jun	6.1	30	90	203.3	67.8	11.3	18.0	338
Jul	74.2	83	144	894.0	515.3	17.8	50.6	1,467
Aug	93.0	111	183	837.8	508.2	11.7	71.9	1,294
Sep	79.6	98	158	812.2	503.8	15.2	53.3	1,493
Oct	87.9	120	195	732.5	450.8	13.5	54.2	1,621
Nov	209.1	165	234	1,267.3	893.6	18.8	67.9	3,081
Dec	111.7	142	217	786.6	514.7	15.6	50.5	2,214
Total	1,009.1	1,210	1,968					19,212
Means	84.1	100.8	164.0	741.6	480.1	15.6	49.2	1,601.0

Table 8. Monthly catch, effort and CPUE of the 100 GT pole and line boats of Perum Perikanan Maluku in Ambon

Year : 1995

Months	Total Catch (MT)	Effective Fishing Day	Operating Day	CPUE (Kg/EFD)	CPUE (Kg/OD)	Bait available bay day (Kg)	Kg Tuna per Kg bait	Total bait Available(Kg)
Jan	-	-	-	-	-	-	-	-
Feb	-	-	-	-	-	-	-	-
Mar	13.1	7	10	1,871.4	1,310.0	71.5	26.2	500.7
Apr	17.1	11	20	1,554.5	855.0	22.2	69.9	244.7
May	-	-	-	-	-	-	-	-
Jun	1.5	11	29	136.4	51.7	28.6	4.8	314.6
Jul	-	-	-	-	-	-	-	-
Aug	2.0	2	8	1,000.0	250.0	27.6	36.2	55.2
Sep	4.0	13	23	307.7	173.9	-	-	-
Oct	38.5	16	22	2,406.3	1,750.0	33.8	71.3	540.0
Nov	66.4	31	40	2,141.9	1,660.0	20.4	104.9	633.3
Dec	21.1	21	31	1,004.8	680.6	12.9	77.8	271.3
Total	163.7	112	183					2,073.9
Means	23.4	16	26.1	1,302.9	841.4	31.0	55.9	296.3

1. Indonesia

Table 9. Monthly catch, effort and CPUE of the 30 GT pole and line boats of PN. Perikani Sulawesi Utara/Tengah in Aertembaga-Bitung

Year : 1985

Months	Total Catch (MT)	Effective Fishing Day	Operating Day	CPUE (Kg/EFD)	CPUE (Kg/OD)	Bait available bay day (Kg)	Kg Tuna per Kg bait	Total bait available(Kg)
Jan	25.3	51	63	496.1	401.2	103.1	4.8	5,258
Feb	21.3	31	46	687.1	463.0	105.3	6.5	3,264
Mar	54.4	78	88	697.4	618.2	114.9	6.1	8,966
Apr	64.0	63	72	1,015.9	888.9	92.5	11.0	5,828
May	103.3	103	121	1,002.9	853.7	109.4	9.2	11,266
Jun	54.7	87	107	628.7	511.2	109.8	5.7	9,533
Jul	32.4	50	78	648.0	415.4	105.7	6.1	5,285
Aug	27.8	39	74	712.8	375.7	99.5	7.2	3,881
Sep	57.0	59	98	966.1	581.6	101.1	9.5	5,966
Oct	71.1	75	115	948.0	618.3	121.1	7.8	9,084
Nov	52.0	74	105	702.7	553.2	92.5	7.6	6,844
Dec	45.5	46	94	989.1	484.0	117.8	8.4	5,420
Total	609.7	756	1,061					80,612
Means	50.8	63	88.4	791.2	563.7	106.1	7.5	6,717.7

Table 10. Monthly catch, effort and CPUE of the 40 GT pole and line boats of PN. Perikani Sulawesi Utara/Tengah in Aertembaga-Bitung

Year : 1985

Months	Total Catch (MT)	Effective Fishing Day	Operating Day	CPUE (Kg/EFD)	CPUE (Kg/OD)	Bait available bay day (Kg)	Kg Tuna per Kg bait	Total bait available (Kg)
Jan	23.2	33	55	703.0	421.8	122.7	5.7	4,048
Feb	23.0	27	42	851.9	647.6	118.2	7.2	3,192
Mar	22.5	22	39	1,022.7	576.9	100.2	10.2	3,192
Apr	17.2	8	48	2,150.0	358.3	81.3	26.5	650
May	48.3	41	78	1,178.1	619.2	103.9	11.3	4,258
Jun	24.4	22	34	1,109.1	717.6	95.5	11.6	2,100
Jul	61.0	54	69	1,129.6	884.1	114.0	9.9	6,159
Aug	17.6	24	40	733.3	440.0	123.9	5.9	2,974
Sep	19.5	18	31	1,083.3	629.0	127.7	8.5	2,298
Oct	28.9	30	45	963.3	642.2	169.1	5.7	5,072
Nov	55.4	93	99	595.7	559.6	84.8	7.1	7,888
Dec	29.7	57	60	521.1	495.0	81.3	6.4	4,634
Total	370.7	429	640					45,478
Means	30.9	35.8	53.3	1,003.4	574.3	110.2	9.7	3,789.8

1. Indonesia

Table 11. The development of catch rate of 300 GT pole and line boats of PT. Multitrenspeche Indonesia 1985.

Month	Catch (kg)	Operation days	Catch/day/kg
January	68,337	58	1,178
February	310,909	72	4,318
March	205,321	84	2,444
April	382,700	94	4,071
May	228,504	97	2,356
June	283,247	106	2,672
July	289,255	105	2,755
August	177,700	107	1,661
September	217,159	98	2,216
October	239,922	101	2,375
November	302,876	102	2,969
December	290,557	82	3,543
Total	2,996,499	1,106	-

Remarks: - number of boats: 4
- Source: PT. Multitranspeche Indonesia.

Table 12. The development of catch rate of 600 GT purse-seiner of PT. Multitranspeche Indonesia in 1985.

Month	Catch (kg)	Operation days	Catch/day/kg
January	230,584	24	9,610
February	441,115	16	16,792
March	306,150	23	13,310
April	50,000	13	3,846
May	410,000	29	14,137
June	330,345	25	13,200
July	290,000	26	11,153
August	100,000	27	3,703
September	72,516	25	2,900
October	75,000	26	2,884
November	96,131	25	3,845
December	424,018	21	20,191
Total	2,825,859	280	-

Remarks: - number of boats: 1
- Source: PT. Multitranspeche Indonesia

1. Indonesia

Table 13 Catch and effort of pole and line in Maumere

Month	Total Catch (MT)	Effort (Fishing Day)	C/E (MT)
Januery	181.1	129*	1.40
February	237.7	117	2.03
March	134.8	135	1.00
April	270.3	176	1.54
May	88.1	116	0.76
June	27.9	64	0.44
July	37.7	91	0.41
August	22.0	78	0.28
September	104.2	116	0.90
October	208.0	180	1.16
November	173.4	145	1.20
December	74.3	95	0.78
Total	1,568.3	1,420	

Remark :
* = One day fishing
Size of boat 6 - 13 GT

Table14.Catch and effort of the 100 GT longlines of PN Perikani Sulawesi Utara/Tengah in Bitung.
(Banda Sea and Aru Sea)

Year	Total Catch		Bigeye		Yellowfin		Other Tuna		No of Hook	No. of Setting	Fishing Day	No of Trip	Hook Rate	Catch per Setting	Catch per Fishing Day
	No.of fish	Kg	Kg	%	KG	%	KG	%							
1982	3,013	128,589	75,035	58.6	41,405	32.2	11,879	9.2	227,069	140	220	4	1.33	918.5	584.5
1983	1,233	53,596	24,483	45.7	23,188	43.3	5,925	11.0	55,682	40	45	1	2.21	1,339.9	1,191.0
1984	4,917	198,110	107,123	54.1	69,457	35.0	21,530	10.9	289,120	184	271	5	1.70	1,076.7	731.0
1985	3134	115,035	47,211	41.1	57,234	49.7	10,590	9.2	164,472	112	138	3	1.91	1,027.1	833.6

1. Indonesia

Table 15. Monthly catch and effort of the 100 GT longliner of PT. (Persero) Perikanan Samodra Besar in Bali, 1985.

Months	Operation Days	Total Catch MT	Total Catch Tails	Sets	Hooks	Hooks Rate	Production (Tails) YF	BE	AL	BF	SM	BM	WM	MK	MR	BS	SUR
Jan	374	243.7	6,844	283	473,160	1.45	4,908	1,409	6	1	15	49	180	73	90	113	-
Feb	303	139.2	3,960	226	378,912	1.05	2,915	640	7	3	7	31	121	52	84	98	2
Mar	265	150.8	4,259	230	383,712	1.11	2,768	533	491	18	11	21	180	59	43	135	-
Apr	413	249.0	8,982	332	546,390	1.64	6,799	776	518	5	16	36	544	89	54	145	-
May	245	164.3	6,916	198	328,800	2.10	5,909	505	64	1	4	9	233	69	41	81	-
Jun	227	127.9	4,295	181	301,506	1.42	2,597	705	396	2	-	20	432	52	48	43	-
Jul	305	212.1	7,020	247	407,232	1.72	5,143	951	294	3	15	23	400	78	70	43	-
Aug	274	143.0	5,001	218	357,630	1.40	2,638	1,426	406	5	2	6	287	90	91	50	-
Sep	325	164.5	5,030	255	417,780	1.20	3,107	1,355	110	9	4	12	237	67	94	35	-
Oct	289	122.0	3,955	214	353,460	1.12	3,013	528	4	3	6	16	197	60	83	51	-
Nov	145	109.2	2,821	117	192,366	1.41	2,305	276	31	4	5	12	101	34	24	29	-
Dec	185	95.7	2,616	121	198,288	1.32	2,337	157	-	1	-	3	63	19	21	15	-
Total	3,350	1,921.4	61,699	2,622	4,339,236		44,439	9,261	2,327	55	85	232	2,975	742	743	838	2
Average	279.2	160.1	5,141.6	218.5	361,603	1.42											

Remark : Source ; PT. (Persero) Perikanan Samodra Besar
Fishing Area is only 71 (FAO)
YF = yellowfin, Thunnus albacares
BE = bigeye tuna, Thunnus obesus
AL = albacore, Thunnus alalunga
BF = bluefin, Thunnus maccoyii
SM = strip marlin, Tetrapturus audax
BM = black marlin, Makaira indica
WM = white marlin, Tetrapturus albidus
MK = sword fish, Xiphias gladius
MR = moro shark
BS = sail fish, Istiophorus platypterus
SKR = sewara, Scomberomorus spp

Table 16. Monthly catch rates of purse seine fishery in Banda Aceh (1985)

Month	No. of operation day	Catch rates (kg/day) YFT	SKJ	LTT?	FRI	Others	Total
January	445	1.0	103.8	131.7	13.0	3.1	252.6
February	384	-	108.6	88.1	96.2	14.3	307.2
March	297	0.3	45.8	28.5	33.7	97.1	205.2
April	269	-	8.8	3.7	124.9	114.8	252.2
May	136	-	7.9	6.5	421.7	58.2	494.3
June	51	-	86.4	-	43.6	29.4	159.4
July	193	-	51.7	-	114.3	26.3	192.3
August	-	-	-	-	-	-	-
September	297	-	79.5	-	158.3	122.3	360.2
October	408	-	96.0	-	257.8	188.4	542.1
November	374	-	101.3	-	121.5	337.6	560.4
December	330	-	79.1	-	147.6	246.8	473.5

Remark : - YFT : Yellowfin tuna
- SKJ : Skipjack
LTT? : Long tail tuna (not sure yet)
- FRI : Frigate tuna
- Source : Fishing Technique Development Center (FTDC), Semarang

Table 17. Monthly catch rates of troll line fishery in West Sumatra

Month	No. Trips	No. of days at sea	Catch rates (kg/day at sea) YFT	SKJ	KAW	FRI	BUL	Total
1985								
May - A	201	2,003 (10)	22.9	107.0	0.4	4.3	-	134.6
Jun - A	117	1,371 (8)	6.8	174.0	-	6.1	-	186.9
Jul - A	200	2,178 (11)	1.3	89.8	-	2.6	-	93.8
- B	11	57 (5)	-	157.8	-	-	-	157.8
Aug - A	201	838 (4)	37.2	311.9	9.5	17.0	1.0	376.7
- B	19	80 (4)	4.6	153.0	26.3	37.7	3.8	225.4
Sep - A	206	1,062 (5)	5.0	210.3	0,2	0.3	-	215.8
- B	8	37 (5)	31.4	133.0	-	0.3	-	164.7
Oct - A	195	2,388 (12)	19.5	69.1	12.9	7.5	-	88.7
- B	25	291 (12)	15.8	53.2	-	-	-	69.1
Nop - A	201	2,470 (12)	19.4	63.2	27.3	12.5	-	122.4
- B	36	405 (11)	18.0	41.9	0.4	0.04	-	60.3
Dec - A	174	2,015 (12)	23.5	75.9	0.1	0.1	-	99.5
- B	25	246 (10)	12.9	61.3	-	-	-	74.2
1986								
Jan - A	160	1,902 (12)	23.5	59.8	-	-	-	83.3
- B	13	164 (13)	13.4	33.7	5.0	4.1	-	56.1
Feb - A	128	1,622 (13)	16.2	60.9	0.03	0.02	-	77.1
- B	18	195 (11)	14.2	40.2	4.4	3.4	-	62.7
Mar - A	128	1,587 (12)	17.7	49.2	1.7	2.1	-	70.6
- B	44	278 (6)	9.3	26.5	17.2	16.9	-	69.8
Apr - A	112	1,309 (12)	26.2	65.6	0.7	0.05	-	92.6
- B	14	134 (10)	9.4	42.1	15.3	8.7	-	75.5
- A	2,023 (169)	20,745 (1,729)	(18.3)	(111.4)	(4.4)	(4.4)	(0.1)	(133.5)
- B	213	1,887	(10.8)	(61.9)	(5.7)	(5.9)	(0.3)	(84.6)

Remarks : - A : >20 GT boats
- B : <20 GT boats (locally called "kapal unyil")
- Figures in brackets are means

Table18. Monthly catch and effort of Gill Net in Pelabuhan Ratu Soth of West Java

Year : 1985

Months	Total Catch (Tons)	Operation Days	Trip	CPUE Kg/Day	Yellowfin Tons	Yellowfin %	Skipjack Tons	Skipjack %	Kaw, Fri, Blt Tons	Kaw, Fri, Blt %
Jan	11.8	588	196	20.1	1.0	8.5	10.6	89.8	0.2	1.7
Feb	6.6	141	74	46.8	0.5	7.6	5.9	89.4	0.2	3.0
Mar	42.2	789	266	52.9	5.1	12.1	37.0	87.7	0.1	0.2
Apr	33.3	813	271	41.0	1.9	5.7	31.1	93.4	0.3	0.9
May	33.9	963	321	35.2	1.9	5.6	31.8	93.8	0.2	0.6
Jun	15.4	693	231	22.2	1.6	10.4	13.1	85.1	0.7	4.5
Jul	30.4	723	241	42.0	2.0	6.6	27.8	91.4	0.6	2.0
Aug	52.1	1,002	334	52.0	2.6	5.0	33.9	65.1	15.6	29.9
Sep	54.0	1,053	351	51.3	5.2	9.6	45.2	83.7	3.6	6.7
Oct	18.9	768	256	24.6	2.0	10.6	16.6	87.8	0.3	1.6
Nov	12.7	552	184	23.0	0.4	3.2	11.8	92.9	0.5	3.9
Dec	22.3	540	180	41.3	1.0	4.5	21.1	94.6	0.2	0.9
Total	333.6	8,625	2,905		25.2		285.9		22.5	

Remarks : 1 trip = 3 days at sea
Size of boat = 3 -4 GT

1. Indonesia

Table 19. Monthly catch and effort of seine net in Pelabuhan Ratu Soth of West Java

Year : 1985

Months	Total Catch (Tons)	Operation Days	Trip	CPUE Kg/Day	Yellowfin		Skipjack		Kaw, Fri, Blt	
					Tons	%	Tons	%	Tons	%
Jan	27.2	353	353*	77.0	0.6	2.2	23.6	86.8	3.0	11.0
Feb	25.3	135	135	187.4	0.1	0.4	24.4	96.4	0.8	3.2
Mar	14.6	247	247	59.1	0.2	1.4	8.4	57.5	6.0	41.1
Apr	166.2	592	592	280.7	0.4	0.2	150.9	90.8	14.9	9.0
May	44.4	499	499	89.0	0.5	1.1	14.1	31.8	29.8	67.1
Jun	21.9	325	325	67.4	-	-	4.9	22.8	16.9	77.2
Jul	14.5	95	95	152.6	-	-	3.3	22.8	11.2	77.2
Aug	284.8	1,092	1,092	260.6	0.3	0.1	27.4	9.6	256.9	90.3
Sep	342.1	1,313	1,313	260.5	-	-	0.3	0.1	341.8	99.9
Oct	223.8	1,044	1,044	214.4	1.5	0.7	1.2	0.5	221.1	98.8
Nov	7.0	97	97	72.2	0.1	1.4	2.6	37.2	4.3	61.4
Dec	6.0	160	160	37.5	0.2	3.3	0.5	8.3	5.3	88.4
Total	1,177.5	5,952	5,952		3.9		261.5		912.0	

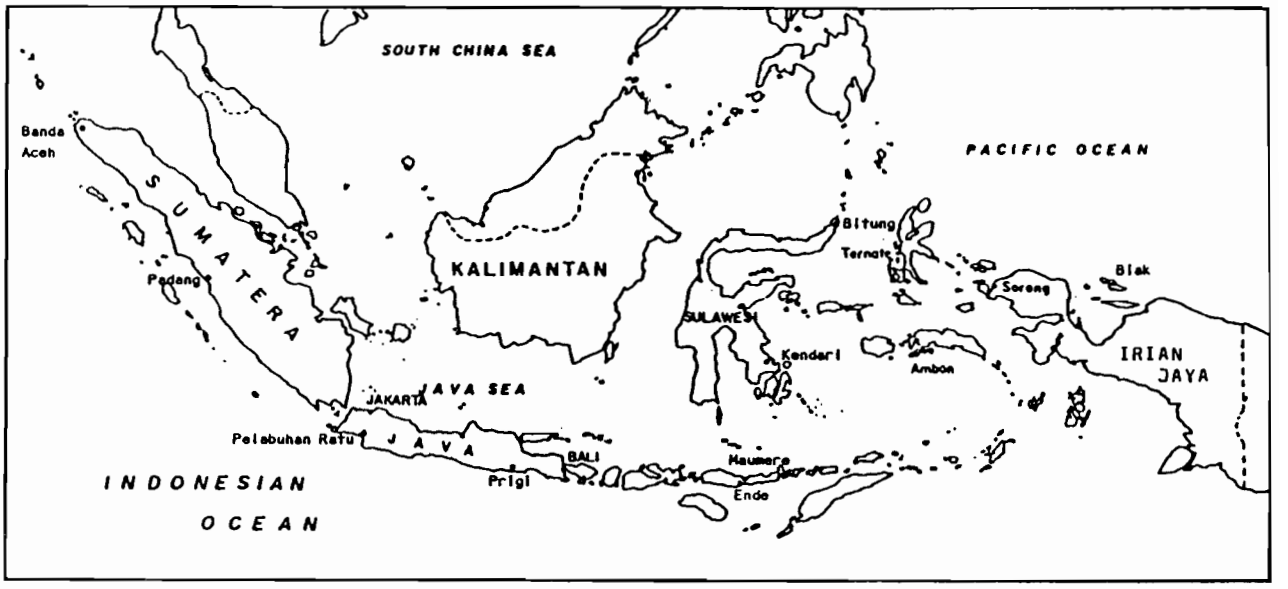
Remarks : * one day fishing
Size of boat = 3 - 5 GT

Table 20. Monthly catch and effort of the purse seine in Prigi, South of East Java.

Months	Effort (Day)	Total Catch (Kg)	C/E (Kg)	Skipjack (Kg)	Yellowfin (Kg)	Kawakawa (Kg)
1985						
Jun	227*	107,267	472.5	1,601	1,232	107,267
Jul	186	52,597	282.8	4,192	6,923	41,482
Aug	-	-	-	-	-	-
Sep	-	-	-	-	-	-
Oct	483	56,806	117,6	56,806	-	-
Nov	129	8,225	63.8	-	62	8,163
Dec	2	630	315.0	-	-	630
1986						
Jan	9	2,723	302.6	-	-	2,723
Feb	8	440	55.0			440
Mar	43	14,215	330.6			14,215
Apr	137	3,219	23.5			3,219

Remark : Size of boat = 10 GT
* one day fishing

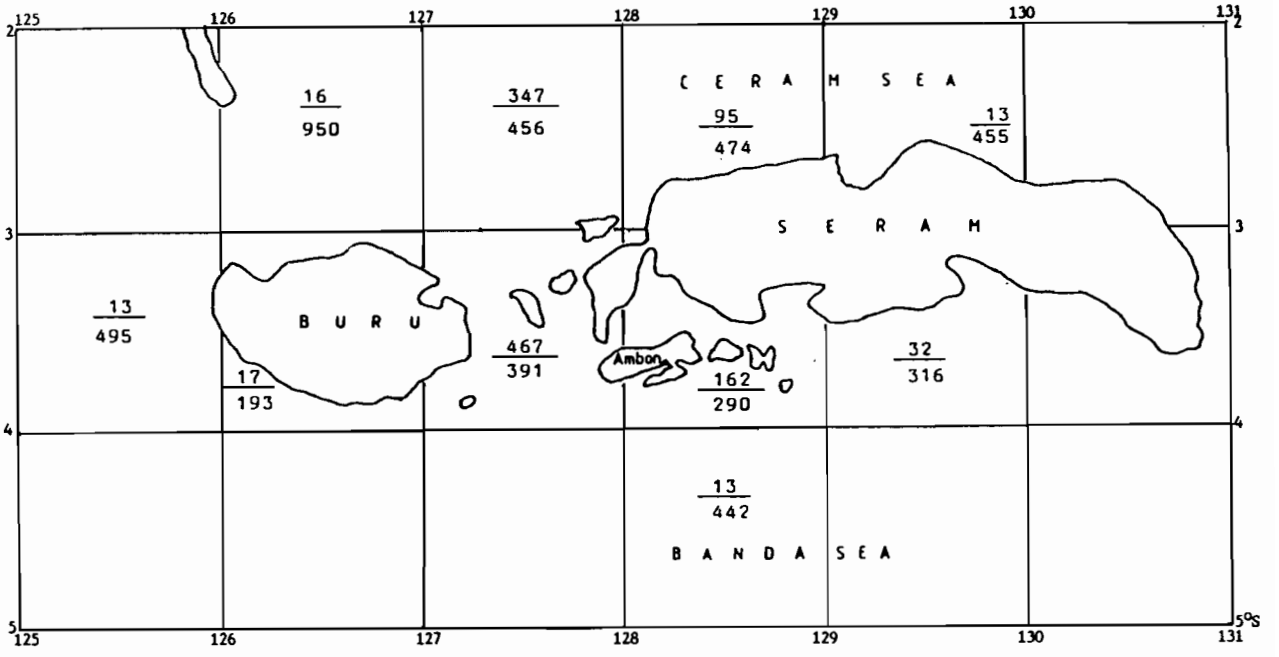
1. Indonesia



Note : Banda Aceh = Small purse seine
Padang = Trolling
Pel. Ratu = Gill net and Seine net
Ende = Trolling, Gill net and purse seine
Prigi = Small purse seine and Gill net
Benoa,Bali = Offshore longline
Maumere = The artisanal pole and line/ Coastal pole and line
Bitung, Ambon and Sorong = Coastal pole and line
Kendari = The artisanal pole and line/Coastal
Ternate = Offshore pole and line
Biak = Offshore pole and line and Large purse seine

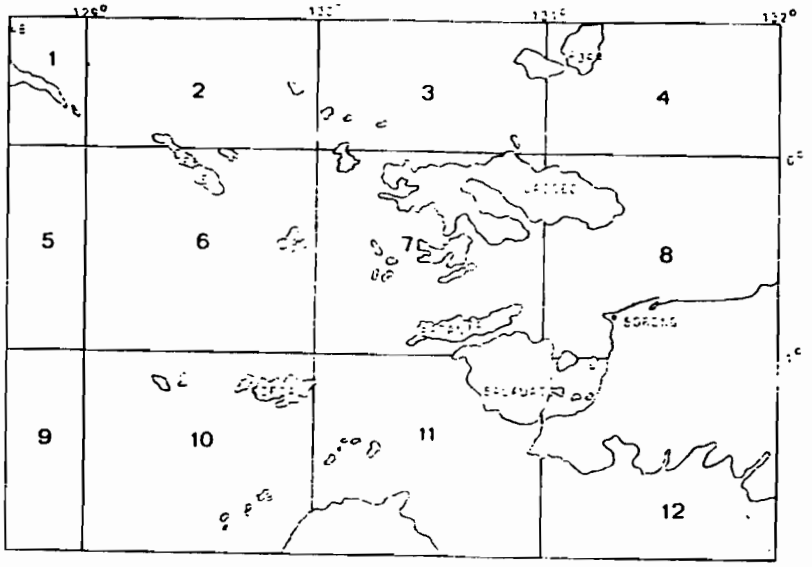
Figure 1. Map of Indonesia showing the tunas fishing based and sampling sites.

Figure 2. The map of showing total of operation days and catch per day of the 30 GT pole and line boats by one square degree of Perum Maluku Ambon in 1985.



Remarks: .... Total of operation days
.... Catch per day / teils
average weight 2,283 kg/per tail.

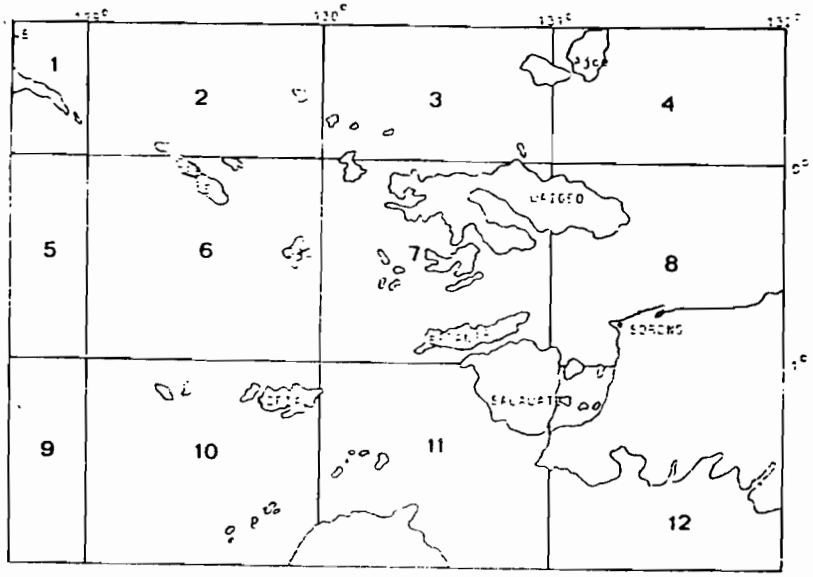
1. Indonesia



Remark :

A r e a	1	2	3	4	5	6	7	8	9	10	11	12	Total
Catch (MT)			180.0	69.0	3.4	2,837.1	776.6	188.2		9.5	41.1		4,105.2
%			4.4	1.7	0.1	69.1	18.9	4.6		0.2	1.0		100
Effective Days			128	59	4	1,725	596	130		6	35		2,683
%			4.8	2.2	0.1	64.3	22.2	4.9		0.2	1.3		100
Catch/day(MT)			1.41	1.17	0.85	1.64	1.30	1.45		1.58	1.18		

Figure 3. Catch, effort and CPUE of the 30 GT pole and line boats by area of PT Usaha Mina (Persero) in Sorong in 1985.

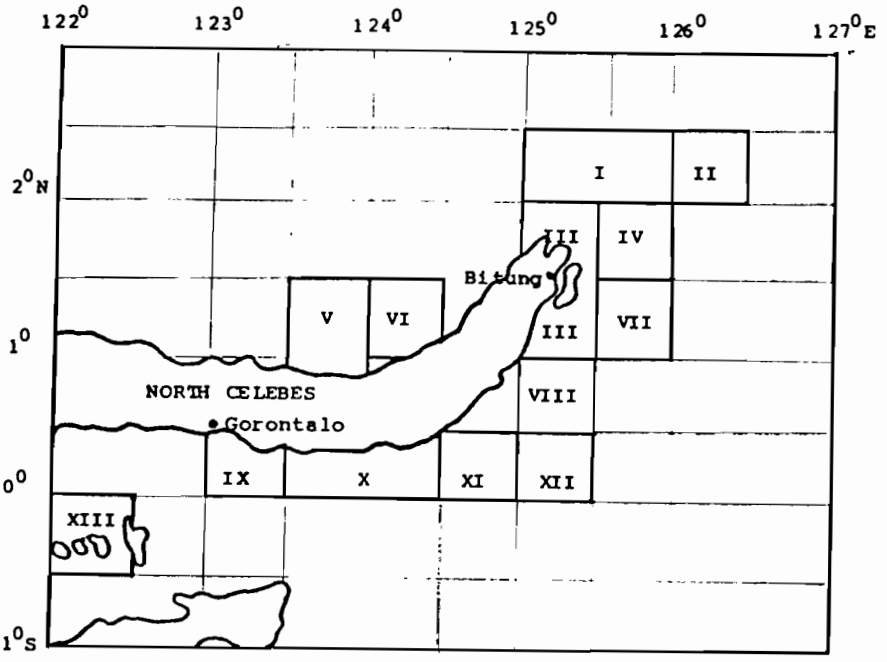


Remark :

A r e a	1	2	3	4	5	6	7	8	9	10	11	12	Total
Catch (No.of Fish)	-	-	71,407	27,363	1,350	1,125,534	307,919	74,624	-	3,775	16,415	-	1,628,057
%			4.4	1.7	0.1	69.1	18.9	4.6		0.2	1.0		100
Effective days			128	59	4	1,725	596	130		6	35		2,683
%			4.8	2.2	0.1	64.3	22.2	4.9		0.2	1.3		100
Catch/day (No.of Fish)			558	464	337	652	516	574		629	649		

Figure 4. Catch, effort and CPUE of the 30 GT pole and line boats by area of PT. Usaha Mina (Persero) in Sorong in 1985.

1. Indonesia



Remark :

Area	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	Total
Catch (MT)	29.4	16.4	71.1	0.9	25.8	10.7	2.1	2.6	33.4	692.5	15.1	5.3	73.5	978.8
%	3.00	1.68	7.26	0.10	2.64	1.09	0.21	0.27	3.41	70.75	1.54	0.54	7.51	100
Effective days	24	11	79	2	34	14	7	2	37	814	15	8	138	1,185
%	2.03	0.93	6.67	0.17	2.87	1.18	0.59	0.17	3.12	68.69	1.26	0.68	11.64	100
Catch/day (MT)	1.23	1.50	0.89	0.45	0.76	0.76	0.29	1.32	0.90	0.85	1.01	0.67	0.53	0.83

Figure 5. Catch, effort and CPUE of pole and line boats by area of State Fisheries Enterprise North-Central Sulawesi in Bitung in 1985.

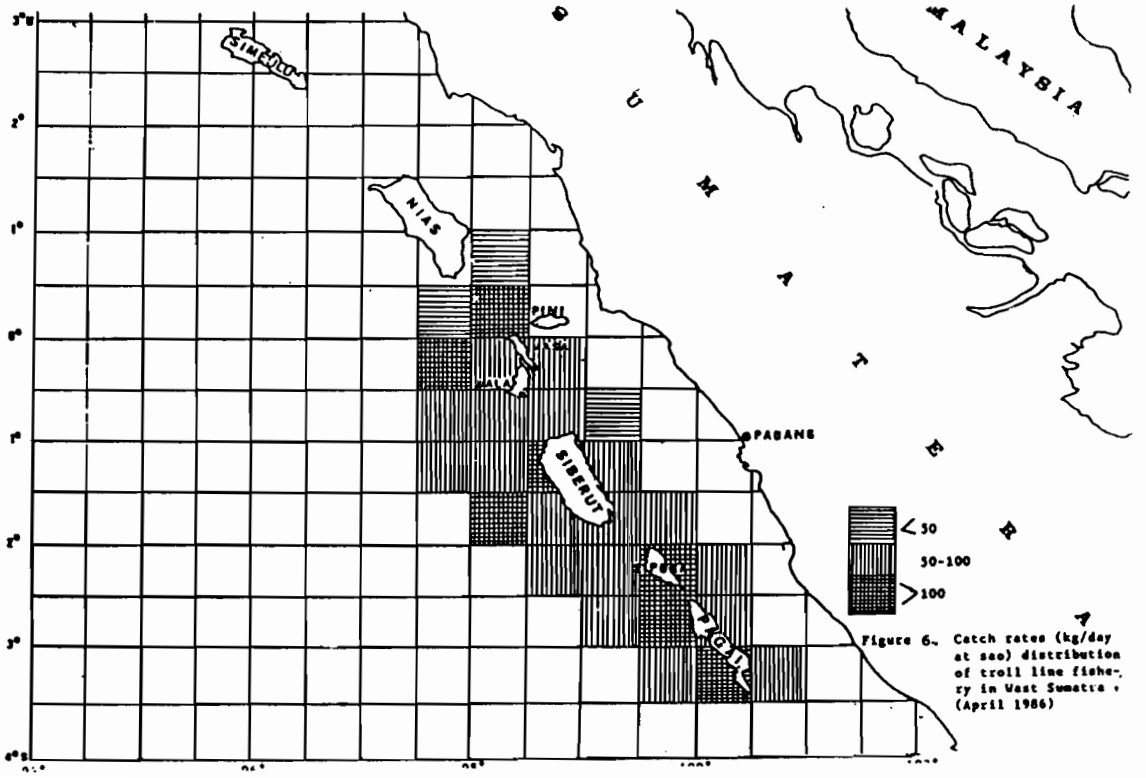


Figure 6. Catch rates (kg/day at sea) distribution of troll line fishery in West Sumatra (April 1986)

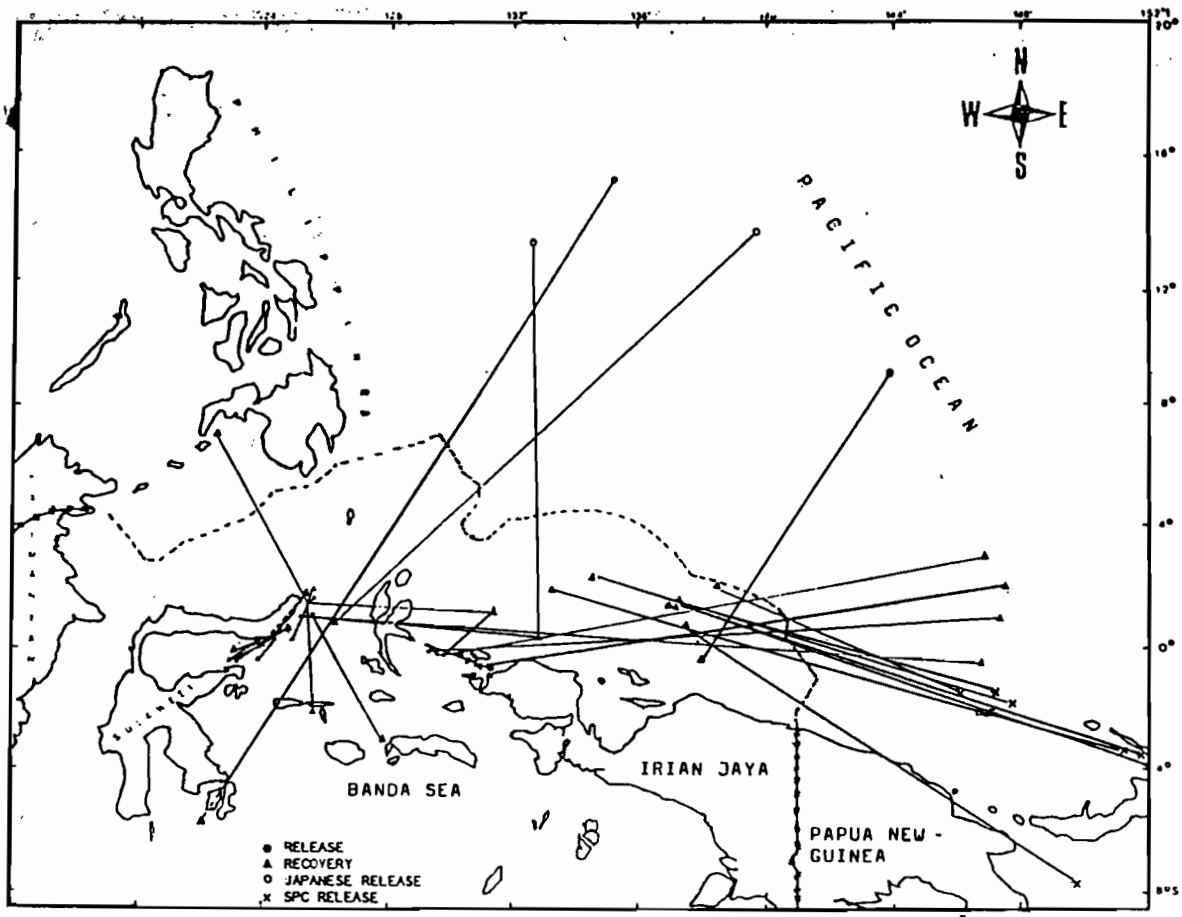


Figure 7. Straight line representations of movements of skipjack tagged.

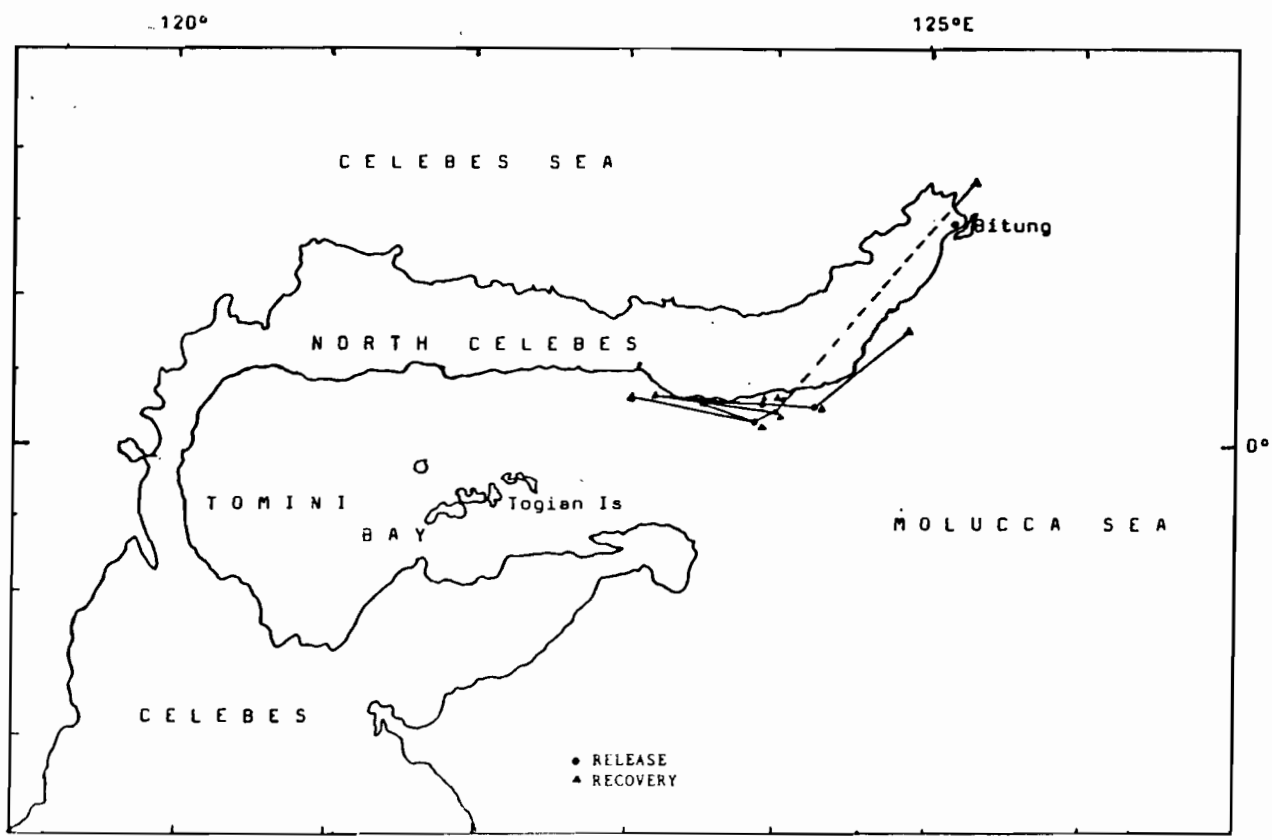


Figure 8. Straight line representations of movements of skipjack tagged (January to July 1986)

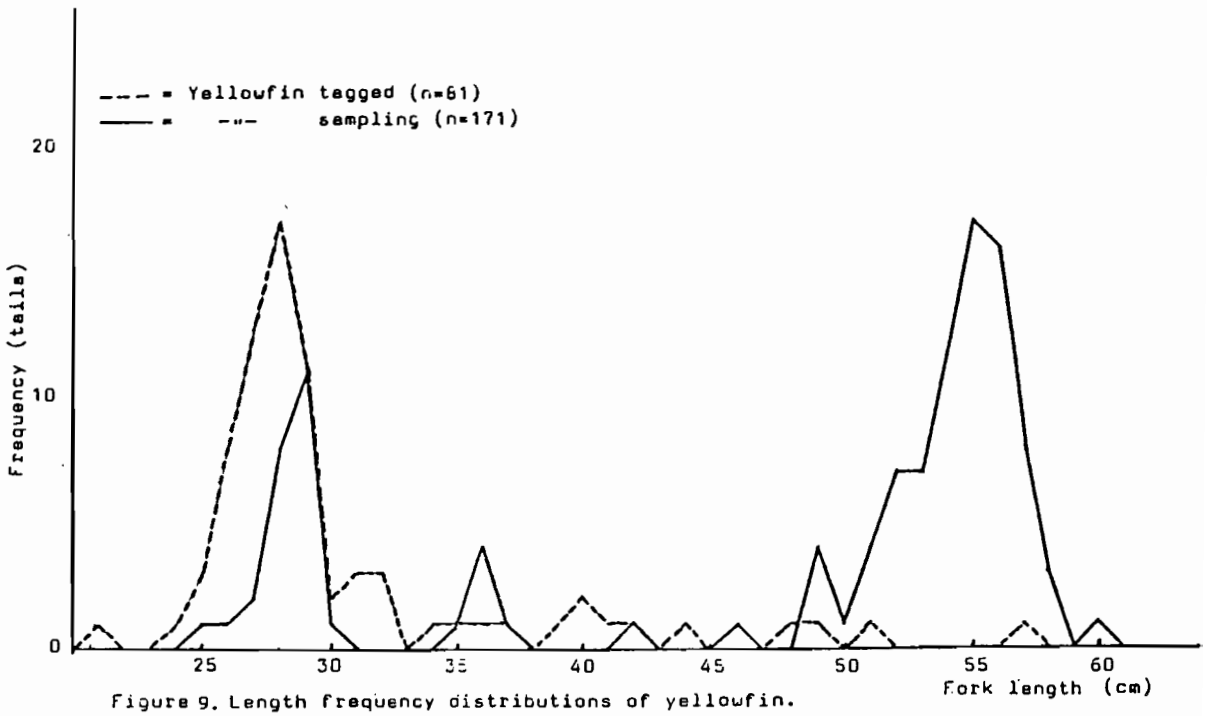


Figure 9. Length frequency distributions of yellowfin.

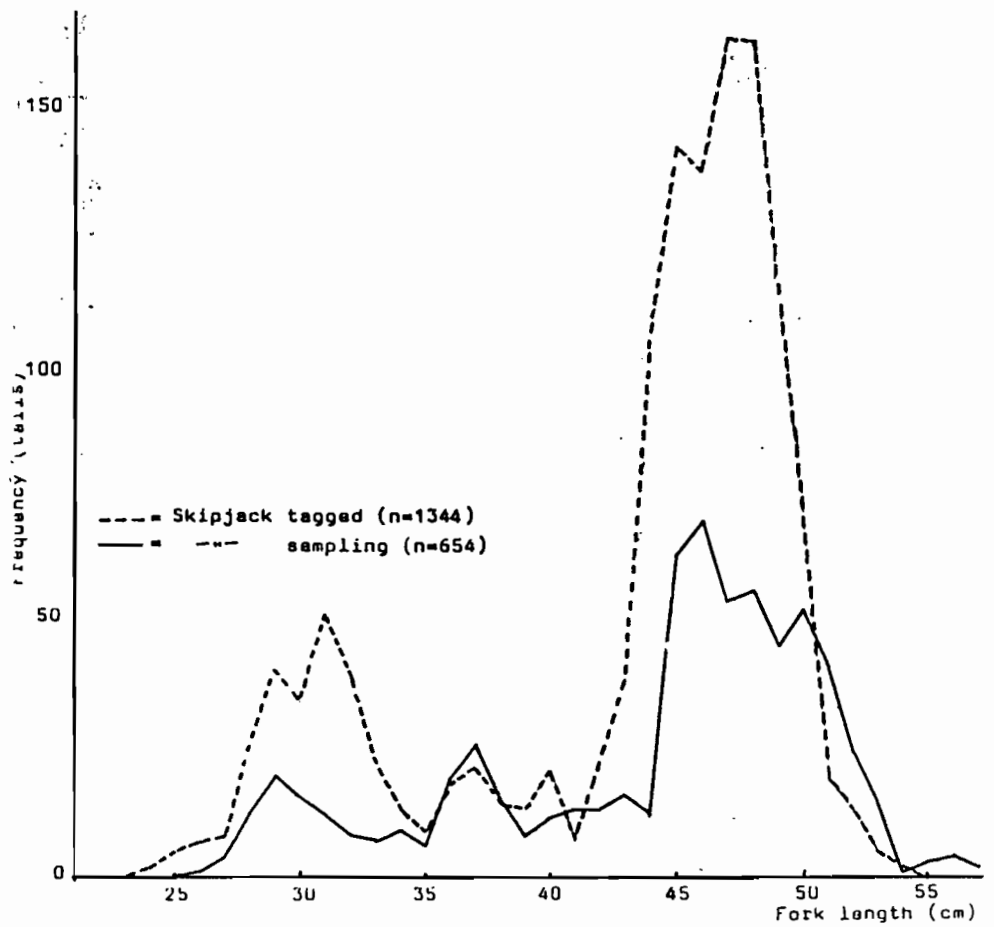


Figure 10. Length frequency distributions of skipjack

2.1 East coast Peninsular Malaysia

Table 1: Catch Statistic - Pulau Kambing 1983 - 1984

Tuna caught by trolling

Month	No. of boats		Total catch	Species composition			CPUE
	Total	Sampled	kg	LOT %	KAW %	FRI %	kg
1983							
January	175	115	33,510	56.7	39.5	3.8	291
February	151	90	25,060	58.8	36.8	4.4	278
March	182	99	37,110	63.1	33.2	3.7	374
April	135	89	29,350	58.5	38.6	2.9	329
May	163	90	48,955	54.7	42.2	3.1	543
June	242	126	57,635	54.1	43.2	2.7	457
July	173	155	57,635	70.7	25.4	3.9	345
August	229	180	71,200	85.3	12.9	1.8	395
September	187	134	41,610	65.3	31.5	3.2	310
October	346	218	114,641	56.1	42.7	1.2	525
November	184	130	42,425	37.7	61.1	1.2	326
December	-	-	-	-	-	-	-

Month	No. of boats		Total catch	Species composition			CPUE
	Total	Sampled	kg	LOT %	KAW %	FRI %	kg
1984							
January	128	78	25,832	97.5	-	2.5	331
February	220	121	27,391	82.8	15.2	2.0	224
March	125	59	19,449	74.0	22.0	4.0	329
April	323	136	37,140	78.2	21.5	0.3	273
May	155	54	28,933	82.6	16.5	0.9	535
June	305	113	41,247	81.2	18.1	0.7	365
July	318	115	36,980	76.9	23.0	0.1	321
August	424	191	77,385	78.4	20.0	1.6	405
September	227	76	30,920	-	-	-	406
October	242	106	50,161	-	-	-	473
November	290	114	38,184	-	-	-	334
December	114	47	11,383	-	-	-	242

Table 2: Tuna landings in Peninsular Malaysia, 1972 - 1983 (in metric tons)

Year	West coast	%	east coast	%	Total catch
1972	1,992	34.74	3,742	65.26	5,734
1973	1,067	22.79	3,615	77.21	4,682
1974	1,589	21.36	5,850	78.64	7,439
1975	2,590	30.52	5,896	69.48	8,486
1976	1,712	27.20	4,581	72.80	6,293
1977	2,344	18.83	10,102	81.17	12,446
1978	3,190	26.26	8,957	73.74	12,147
1979	2,024	22.74	6,878	77.26	8,902
1980	4,701	42.40	6,386	57.60	11,087
1981	2,632	14.86	15,093	85.15	17,725
1982	1,713	11.73	12,890	88.27	14,603
1983	2,680	14.23	16,158	85.77	18,838

Table 3: Tuna, pelagic and total fish landings on the east coast of Peninsular Malaysia, 1972 - 1983

Year	Tuna catch		Pelagic catch		Total fish landings (m.tons)
	m. tons	% of pelagic catch	m. tons	% of total landings	
1972	3,742	7.66	48.821	60.54	80,649
1973	3,615	8.15	44.363	48.96	90,606
1974	5,850	9.48	61,724	50.68	121,801
1975	5,896	11.15	52,894	50.58	104,570
1976	4,581	8.44	54,262	46.62	116,389
1977	10,102	14.59	69,259	57.67	120,085
1978	8,957	10.58	84,628	54.91	154,124
1979	6,878	8.68	79,247	57.19	138,558
1980	6,386	8.12	78,646	60.31	130,403
1981	15,093	10.78	139,952	64.81	215,943
1982	12,890	15.15	85,097	63.82	133,337
1983	16,158	14.44	111,906	67.061	166,883

2.1 East coast Peninsular Malaysia

Table 4: Tuna landings on the east coast of Peninsular Malaysia, 1972 - 1983

Year	Total catch by all gears (m.tons)	Catch per Trolling	Calculated effort
1972	3,742	2.30	1,623.45
1973	3,615	2.48	1,457.66
1974	5,850	3.11	1,881.03
1985	5,896	3.46	1,704.05
1976	4,581	2.68	1,709.33
1977	10,102	3.99	2,531.83
1978	8,957	2.58	3,471.71
1979	6,878	1.93	3,574.09
1980	6,386	1.58	4,041.77
1981	15,093	4.34	3,477.65
1982	12,890	5.15	2,502.91
1983	16,158	6.04	2,675.17

Table 5 Statistics from TUNA Fisheries in the Gulf of Thailand by luring purse seine, 1979 - 1984 : Catch in MT, day in fishing, and CPUE in Kg/day.

YEAR / STATISTIC	MONTH 1	2	3	4	5	6	7	8	9	10	11	12	TOTALS
1979													
Catch													
LOT	249	155	393	136	370	206	465	166	1 079	1 080	689	201	5 189
TUN	193	267	336	148	34	77	27	-	51	66	25	477	1 701
Days	10 179	9 715	8 831	7 679	6 843	8 353	8 069	7 546	9 102	6 833	7 357	8 594	99 101
CPUE LOT	24.46	15.95	44.50	17.71	54.07	24.66	57.63	22.00	118.55	158.06	93.65	23.39	52.36
CPUE TUN	18.96	27.48	38.05	19.27	4.97	9.22	3.35	-	5.60	9.66	3.40	55.50	17.16
CPUE TOTAL	43.42	43.44	82.55	36.98	59.04	33.88	60.98	22.00	124.15	167.72	97.05	78.89	69.53
1980													
Catch													
LOT	233	194	815	147	225	170	217	495	97	174	64	70	2 901
TUN	102	189	36	45	136	62	52	48	162	97	72	173	1 174
Days	9 182	8 415	10 163	7 290	7 724	9 642	7 468	9 506	6 454	5 766	5 890	6 685	93 985
CPUE LOT	25.38	23.05	80.19	20.73	29.13	17.63	29.06	52.07	15.03	30.18	10.87	10.47	30.87
CPUE TUN	11.11	22.46	3.54	6.35	17.61	6.43	6.96	5.05	25.10	16.82	12.22	25.88	12.49
CPUE TOTAL	36.49	45.51	83.74	27.08	46.74	24.06	36.02	57.12	40.13	47.00	23.09	36.35	43.36
1981													
Catch													
LOT	86	215	609	763	515	12	179	185	175	250	337	313	3 639
TUN	335	251	145	46	445	55	88	1 824	561	64	156	50	4 020
Days	8 273	10 736	18 612	6 315	7 522	5 875	11 680	12 862	11 901	11 626	5 863	7 868	119 133
CPUE LOT	10.40	20.03	32.72	120.82	68.47	2.04	15.33	14.38	14.70	21.50	57.48	39.78	30.55
CPUE TUN	40.49	23.38	7.79	7.28	59.16	9.36	7.53	141.81	47.14	5.50	26.61	6.35	33.74
CPUE TOTAL	50.89	43.41	40.51	128.11	127.62	11.40	22.86	156.19	61.84	27.01	84.09	46.13	64.29

2.1 East coast Peninsular Malaysia

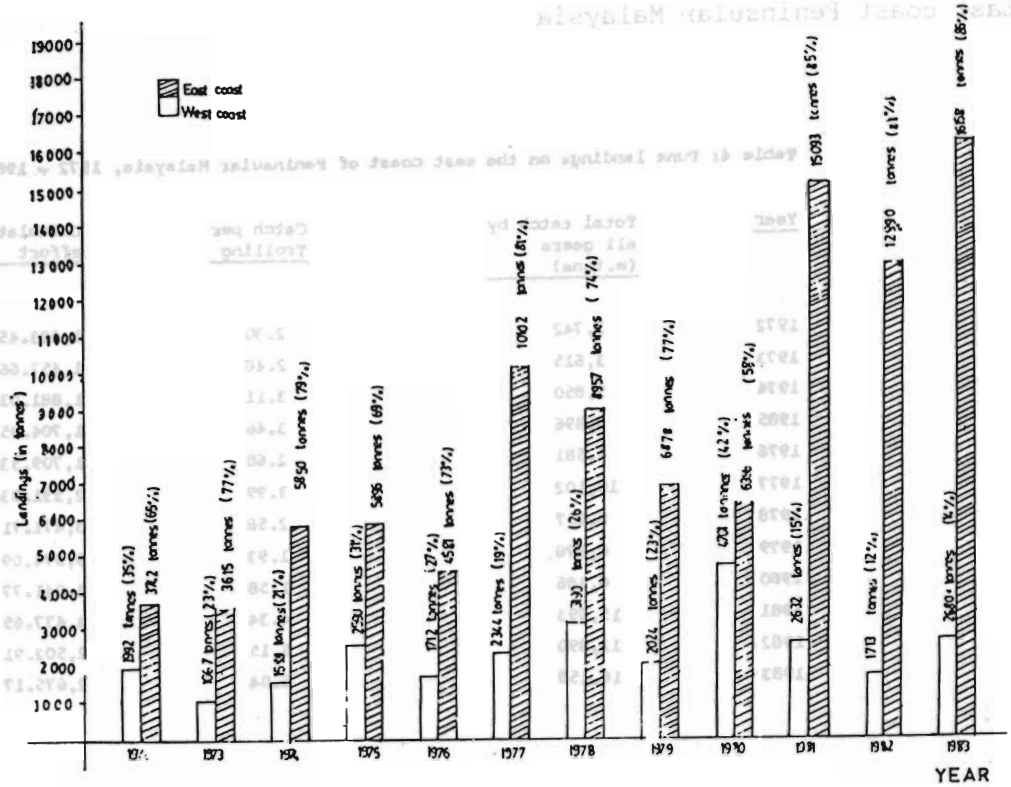


Figure 1: Tuna landings in peninsular Malaysia, 1972 - 1983 (in tonnes)

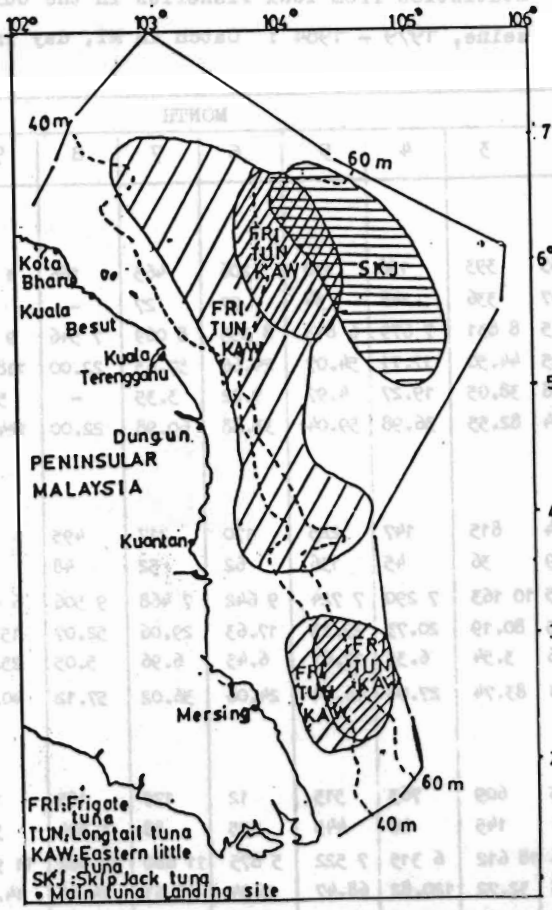


FIG 2: Distribution Map of Tuna Spp. and Main Landing sites of the East Coast of Peninsular Malaysia.

2.1 East coast Peninsular Malaysia

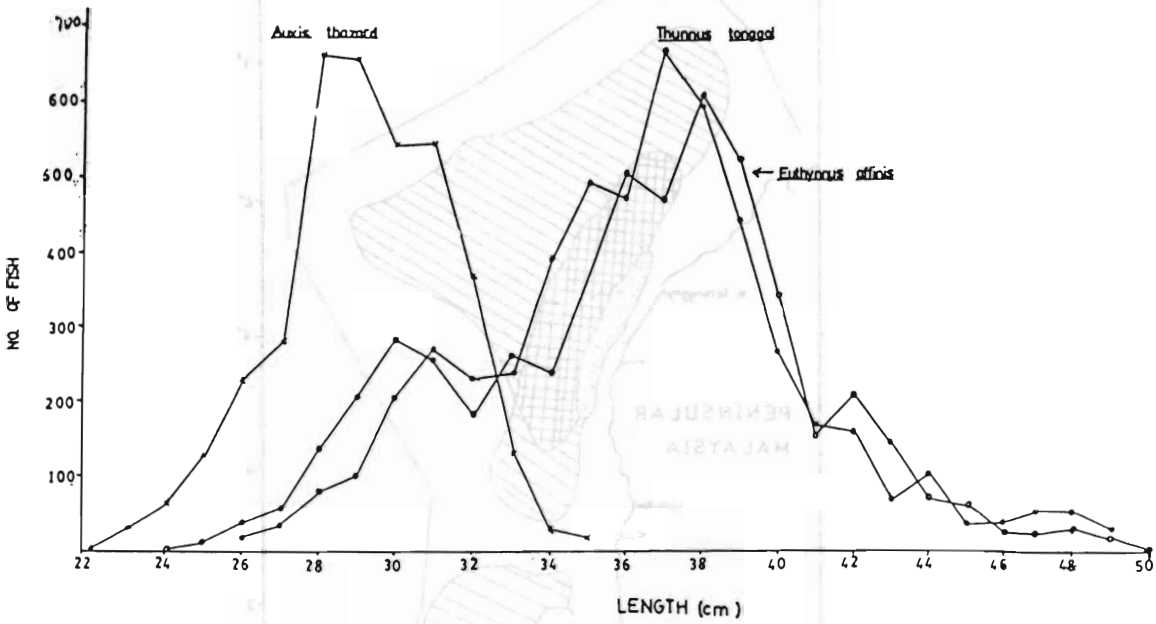


Figure 3 : SIZE COMPOSITION OF TUNA LANDED IN TRENGGANU 1983

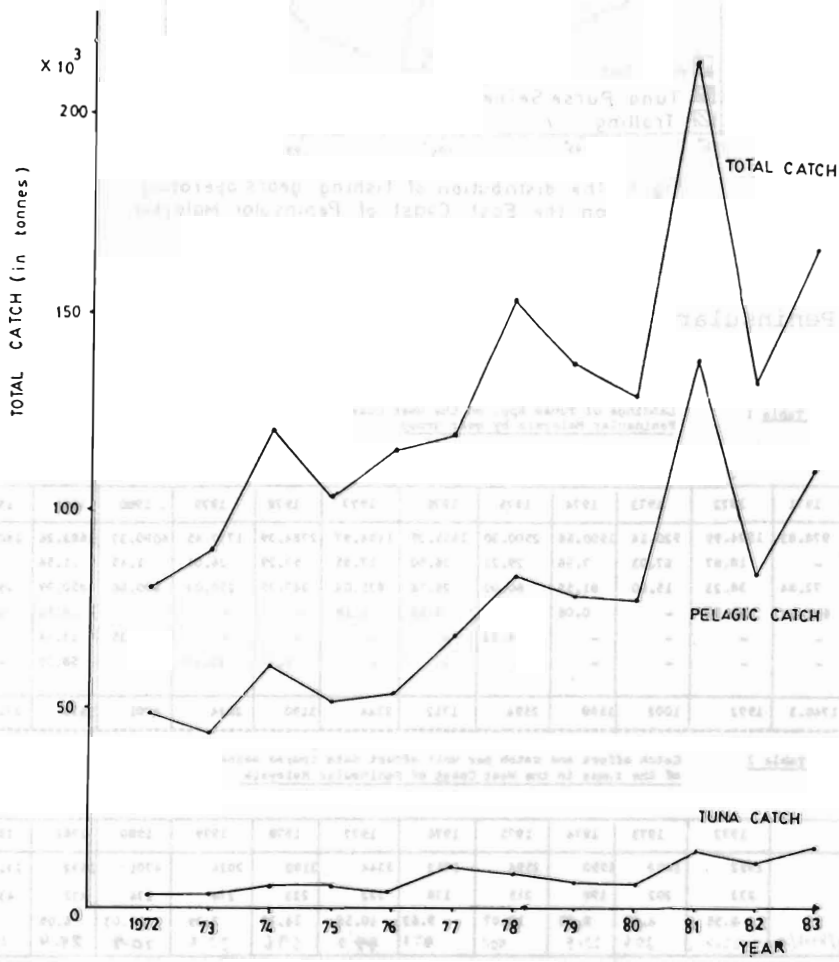


Figure 4 : Trends in marine fish landings on the east coast of Peninsular Malaysia , 1972 - 1983

2.1 East coast Peninsular Malaysia

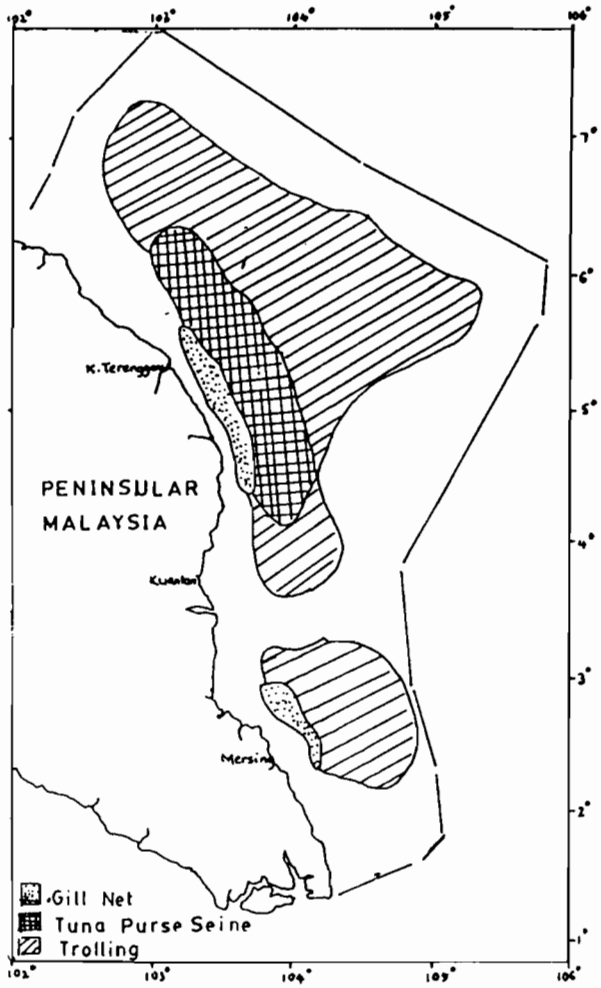


Fig. 5 The distribution of fishing gears operating on the East Coast of Peninsular Malaysia.

2.2 West coast Peninsular Malaysia

Table 1 Landings of Tunas Spp. on the West Coast of Peninsular Malaysia by gear group

Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Purse seine	1012.58	978.83	1524.99	920.14	1500.66	2500.30	1655.29	1494.97	2784.39	1737.45	4090.37	1683.26	1403.40	2477.91
Trawl	-	-	18.87	67.03	7.56	29.22	26.80	17.85	57.29	26.01	1.45	11.56	2.14	4.30
Gill net	105.44	72.84	38.23	15.00	81.55	60.00	26.56	831.04	347.25	250.04	600.66	850.99	292.44	183.42
Lines	1373.50	688.63	409.80	-	0.06	-	3.51	0.18	-	-	-	14.51	13.70	14.03
Lift net	-	-	-	-	-	4.53	-	-	-	-	8.35	13.56	1.00	-
Others	-	-	-	-	-	-	-	-	1.27	10.47	-	58.08	-	-
Total	2491.52	1740.3	1992	1002	1590	2594	1712	2344	3190	2024	4701	2632	1713	2679

Table 2 Catch effort and catch per unit effort data (purse seine) of the tunas in the West Coast of Peninsular Malaysia

Year	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Total catch (tons)	1992	1002	1590	2594	1712	2344	3190	2024	4701	2632	1713	2679
Effort (boats)	233	202	198	215	178	222	223	274	276	432	438	351
Cpue	8.55	4.96	8.03	12.07	9.62	10.56	14.30	7.39	17.03	6.09	3.91	7.63
Kg/boat/day	33.9	20.6	33.5	50.1	40.1	44.0	59.6	30.8	70.9	25.4	16.3	31.8

2.2 West coast Peninsular Malaysia

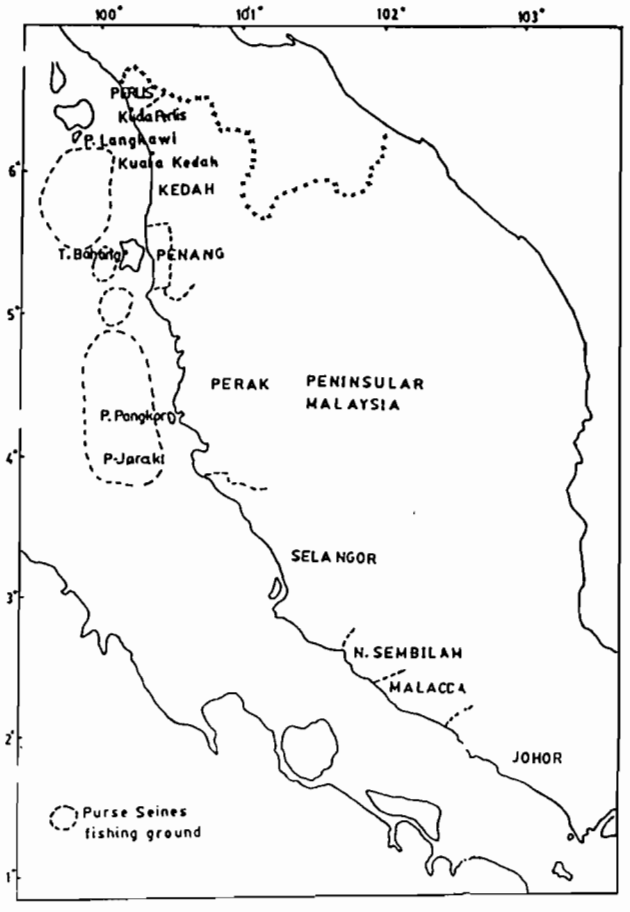


Fig 1 Purse Seine fishing ground for tunas and major landing sites

FIG. 2 PURSE SEINES LANDINGS. W. COAST
BY MONTH IN METRIC TONS FOR 1983

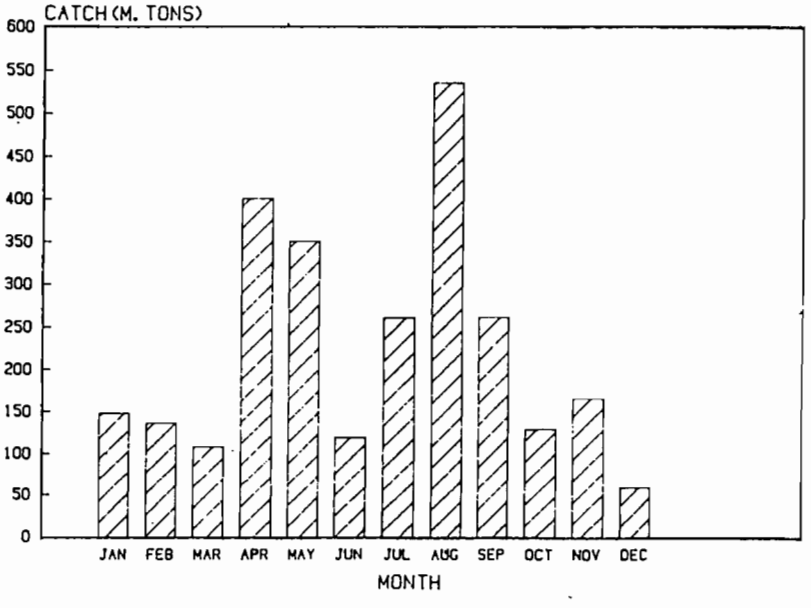


Table 1. Philippine tuna production, 1980-1985
(in Metric Tons)

SPECIES	COMMERCIAL						MUNICIPAL						TOTAL					
	1980	1981	1982	1983	1984	1985	1980	1981	1982	1983	1984	1985	1980	1981	1982	1983	1984	1985
Frigate/Bullet Tuna	53310	47141	39862	34097	47360	53478	43564	31107	27501	40236	32945	42240	96874	78248	67363	74333	80305	95718
Yellowfin/Big eye Tuna	11496	20073	19787	20507	22254	22185	36527	36105	32135	41585	36670	42108	48023	56176	51922	62092	58924	64293
Skipjack	12486	17706	31188	39813	28871	42433	18692	20733	19612	17455	15800	18103	31178	38439	50735	57068	44671	60536
Eastern Little Tuna	9958	13071	14442	12339	18832	18673	14772	17820	32002	36605	23067	22387	24730	30891	46524	49064	41899	41060
TOTAL	87250	97991	105274	107676	117317	136769	113555	105765	111330	135881	108482	124838	200805	203754	216604	242557	225799	261607

Table 2. Philippine Commercial Tuna landings for 1985 by type of gear (MT)

SPECIES	TOTAL	DAG NET	GILL NET	MURO-AMI	TRAWL	BEACH SEINE	PURSE SEINE	HOOK & LINE	LONG LINE	RING
Frigate Tuna/Bullet tuna	53478	9681	52	18	1978	5	17153	19	36	24536
Yellowfin/Big eye tuna	22185	1311	-	-	8	-	15381	488	159	4838
Eastern liitle tuna	18673	7067	-	-	163	-	7016	81	-	4346
Skipjack	42433	11	-	-	-	-	28054	65	-	14305
TOTAL	136769	18070	52	18	2149	5	67604	653	195	48023

3. Philippines

Table 3, Philippines Municipal tuna landings for 1985 by type of gear (MT)

Species/Gear	Total	Bagnet	Gill Net	Fish Corral	Beach Seine	Purse Seine/ Ring net	Hook & Line	Troll Line	Pole & Line	Long Line	Others
Frigate/Bullet tuna	42240	1368	8128	3066	318	6520	18893	2363	174	1268	142
Yellow fin/ Big eye tuna	42103	22	2040	403	680	1372	35017	820	52	1660	42
Eastern Little tuna	22387	1244	3545	1497	267	2680	12178	98	197	535	146
Skipjack	18103	1780	2185	1697	211	423	10244	699		735	13
TOTAL	124838	4414	15896	6663	1476	10995	76332	3980	541	4198	343

Table 4 Tuna Landing by Statistical Fishing Area (M.t.)

Statistical Fishing Area	1984	1985
1. Lingayen Gulf	7185	7771
2. Manila Bay	6797	8460
3. Batangas Coast	6546	8675
4. Tayabas Bay	4153	9483
5. West Palawan Waters	999	414
6. Cuyo Pass	17882	12240
7. West Sulu Sea	6031	8009
8. South Sulu Sea	26445	24690
9. East Sulu Sea	14560	14900
10. Moro Gulf	59769	84429
11. Davao Gulf	6603	4790
12. Bohol Sea	18117	21483
13. Leyte Gulf	2898	2491
14. Camotes Sea	3720	2502
15. Visayas Sea	9648	12081
16. Guimaras Strait	8943	11188
17. Sibuyan Sea	3907	3142
18. Ragay Gulf	10837	6041
19. Samar Sea	3078	6908
20. Lagonoy Gulf	2393	2513
21. Lamon Bay	3670	4752
22. Casiguran Sound	982	1954
23. North Eastern Mindanao Side	-	2078
24. Babuyan Channel	638	815
Total	225799	261607

3. Philippines

Table 5. Export of tuna by kind, 1980-1985 (in MT)

	1980	1981	1982	1983	1984	1985
	Volume	Volume	Volume	Volume	Volume	Volume
Frozen/chilled tuna	47290	35830	17731	18533	13387	11899
Smoked	551	341	193	88	-	-
Canned	71	18033	19411	23537	22599	25312
Dried	-	-	-	-	44	-
TOTAL	47912	54204	37335	42158	36030	37211

Table 6. Export of frozen/chilled tuna by destination, 1985 (MT)

	1980	1981	1982	1983	1984	1985
Denmark	-	24	63	22	-	45
Hawaii	1115	325	1018	-	3	1
Israel	66	73	85	-	45	111
Italy	9480	5661	4545	8310	6238	1669
Japan	1923	3710	5128	4812	6998	6191
Korea	2067	-	-	-	-	-
Panama	100	-	-	-	-	-
Puerto Rico	1280	-	-	-	-	-
Singapore	4139	1696	-	593	-	29
Spain	-	200	-	-	-	-
Switzerland	350	533	-	-	-	-
Taiwan	-	-	-	-	-	40
Thailand	-	-	360	-	-	3746
United Kingdom	-	-	20	-	-	-
U.S.A.	26770	23616	6509	4796	103	58
Others	-	2	3	-	-	6
TOTAL	47290	35830	17731	18533	13387	11899

3. Philippines

Table 7. Export of canned tuna by destination, 1985 in (MT)

	1980	1981	1982	1983	1984	1985
Australia	-	294	14	385	585	137
Austria	-	-	-	-	46	24
Belgium	-	95	51	78	69	136
Canada	-	1687	1268	1791	2056	2526
Denmark	-	145	40	15	56	-
Finland	-	243	67	165	48	46
France	-	141	42	143	140	103
Federal Rep. of Germany	71	2990	2717	3312	4763	3936
Israel	-	88	122	13	28	-
Japan	-	-	-	151	-	19
Kuwait	-	-	-	29	-	19
Lebanon	-	-	72	14	257	71
Malta-Gozo	-	-	-	-	173	101
Mozambique	-	-	-	-	-	106
Netherlands	-	45	79	64	198	192
Puerto Rico	-	-	-	15	-	45
Sweden	-	69	164	463	553	327
South Africa	-	-	-	-	-	27
Switzerland	-	140	126	168	214	99
Saudi Arabia	-	-	-	29	-	-
United Kingdom	-	1337	1368	3049	3050	2543
U.S.A.	-	10699	13252	13610	10224	15046
Others	-	70	29	43	139	4
TOTAL	71	18033	19411	23537	22599	25312

Table 8 Average producers price of tuna, 1980-1985 (in Pesos)

SPECIES	1980	1981	1982	1983	1984	1985
Spanish mackerel	14.06	15.06	16.00	18.00	19.94	-
Frigate Tuna	6.30	6.30	7.36	8.02	12.54	12.75
Yellowfin/Big eye tuna	13.31	13.31	12.00	13.16	15.60	17.46
Eastern little tuna	8.23	9.41	9.43	9.68	12.28	10.75
Sailfish	8.40	8.97	8.99	9.00	12.79	17.44
Sword fish	6.50	9.05	9.12	8.71	10.50	15.29
Marlin	-	8.98	12.01	13.16	13.40	-
Skipjack	8.05	9.29	9.30	10.00	11.53	13.74

3. Philippines

TABLE 9 NO. OF VESSELS MONITORED AND TOTAL NO. OF TUNA LANDED AND SAMPLED (1985)

SAMPLING CENTER	FISHING GEAR	VESSELS			LANDINGS (KG)		
		TOTAL NO.	NO. MONITORED	% MONITORED	TOTAL NO.	NO. SAMPLED	% SAMPLED
Davao del Sur	Ringnet	72	72	100	14,911	3,979	27
Sta. Cruz	Handline	154	144	94	10,840	8,520	79
Malita	Handline	269	269	100	18,041	16,065	89
Misamis Oriental	Ringnet	176	176	100	98,585	2,666	3
Opol	Handline	39	34	87	718	718	100
Initao	Handline	110	109	99	1,788	1,788	100
Gen. Santos City	Ringnet	668	121	18	4,257,278	2,556,627	60
	Handline	5,670	613	11	2,168,167	785,576	36
Zamboanga City	Ringnet	329	329	100	854,338	11,581	1
Labuan	Handline	261	261	100	106,500	25,068	24
	Trollline	205	205	100	35,004	13,197	37
	Multiple handline	110	110	100	7,048	659	9
Recodo	Purse seine	106	102	96	19,247,042	395,774	2
	Handline	15	15	100	32,561	20,783	64
	Fish Corral	4	4	100	38,849	5,590	14
Baliwasan	Bagnet	124	124	100	3,829	3,335	87

Table 10 Catch and Catch Rate of Tunas Caught by different fishing gear per area (1985)

SAMPLING CENTER	FISHING GEAR	TOTAL NO. OF VESSELS	TOTAL CATCH (KG)	CATCH RATE
Davao del Sur	Ringnet	72	14,911	207
Sta. Cruz	Handline	154	10,840	70
Malita	Handline	269	18,041	67
Misamis Oriental	Ringnet	176	98,585	560
Opol	Handline	39	718	18
Initao	Handline	110	1,788	16
Gen. Santos City	Ringnet	668	4,257,278	6,373
	Handline	5,670	2,168,167	382
Zamboanga City	Ringnet	329	854,338	2,597
Labuan	Handline	261	106,500	408
	Troll line	205	35,004	172
	Multiple handline	110	7,048	64
Recodo	Handline	15	32,561	2,171
	Purse seine	106	19,247,042	181,576
	Fish Corral	4	38,849	9,712
Baliwasan	Bagnet	124	3,829	31

3. Philippines

Table 11 Percentage Species Composition by site and fishing gear (1985)

SAMPLING CENTER	FISHING GEAR	SPECIES						
		SJ	YF	BET	FT	BT	ELT	OB
Davao del Sur								
Sta. Cruz	Ringnet	66.85	18.74		7.36	7.05		
	Handline	3.65	96.35					
Malita	Handline	0.26	99-74					
Misamis Oriental								
Opol	Ringnet	2.24	2.28		0.47	95.00		
	Handline	8.35	91.65					
Initao	Handline	21.34	76.37		1.47	0.82		
Gen. Santos City	Ringnet	64.71	20.73	0.25	8.03	5.86	0.41	
	Handline		98.25	1.75				
Zamboanga City								
Labuan	Ringnet	73.06	3.62		4.17	9.69	7.50	1.96
	Handline	36.61	61.63	1.76				
	Troll line	76.67	20.59	0.18		2.33	0.24	
	Multiple hand-line				2.10	43.00	36.86	18.05
Recodo	Handline		70.78	29.22				
	Purse seine	48.61	47.52	0.70		3.17		
	Fish corral	63.29	36.71					
Baliwasan	Bagnet		2.53		27.24	25.25	44.97	

TABLE 12. SIZE DISTRIBUTION OF TUNAS CAUGHT BY DIFFERENT FISHING GEAR PER AREA (1985)

SAMPLING CENTERS	FISHING GEARS	SIZE RANGES (cm)						
		SJ	YF	BET	FT	BT	ELT	OB
Davao del Sur								
Sta. Cruz	Ringnet	21-71	18-138		20-43	17-29		
	Handline	35-66	32-166					
Malita	Handline	32-77	83-157					
Misamis Oriental								
Opol	Ringnet	17-54	17-50		14-29	15-29		
	Handline	26-61	19-168					
Initao	Handline	18-67	18-143			17-25		
Gen. Santos City	Ringnet	17-55	15-63	20-47	18-37	17-28	16-31	
	Handline		11-165	39-175				
Zamboanga City								
Labuan	Ringnet	29-63	54-61	44-74	21-39	11-39	21-49	24-38
	Handline	38-62	37-167	42-132				
	Troll line	38-68	39-170	128	29-35			
	Multiple handline				26-39	22-37	24-42	21-49
Recodo	Handline		62-162	85-163				
	Purse seine	42-69	32-165	69-171	29-53	24-59		
	Fish corral	54-66	56-75					
Baliwasan	Bagnet		16-29		12-28	12-33	12-23	

Table 1 Percentage of Tuna catch by major fishing gears in the Gulf of Thailand, 1973 - 1984

year	Total catch		Drift gill net	Thai Purse seine	Luring Purse seine	Mackerel encircling gill net	others
	MT	%					
1973	6,519	100	44.2	33.6	7.8	3.7	10.7
1974	8,715	100	20.4	44.9	4.6	7.2	22.9
1975	11,172	100	23.6	36.9	8.8	2.0	28.7
1976	8,890	100	26.8	37.4	10.9	7.9	17.0
1977	11,296	100	41.5	21.4	31.2	4.9	1.0
1978	8,258	100	34.8	28.5	17.5	5.1	14.1
1979	14,713	100	29.4	4.2	47.1	9.8	9.5
1980	12,895	100	44.4	16.7	31.6	4.4	2.9
1981	20,198	100	55.5	5.1	37.9	0.1	1.4
1982	39,661	100	48.9	3.1	42.6	4.7	0.7
1983	82,001	100	16.0	0.3	81.8	1.7	0.2
1984	69,213	100	26.4	70.3*		3.1	0.2

* Combinded percentage of catch by LPS and TPS.

Table 2 Number of fishing vessels registered by types of gear and sizes of boat in the Gulf of Thailand. 1975 - 1984.

Size of boat (m)	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Drift gill net	134	135	206	115	203	272	301	250	234	243
- 14	40	49	111	34	62	86	53	47	40	50
14 - 18	84	78	77	62	112	142	166	148	134	116
18 - 25	10	8	18	19	29	44	82	55	60	76
25 -	-	-	-	-	-	-	-	-	-	-
Thai purse seine	289	262	138	82	64	103	40	42	40	363
- 14	42	82	105	66	36	40	9	21	20	26
14 - 18	127	121	33	15	28	51	28	19	17	116
18 - 25	120	59	-	1	-	12	3	2	3	218
25 -	-	-	-	-	-	-	-	-	-	3
Luring purse seine	193	300	410	510	480	506	603	589	556	265
- 14	17	27	2	40	67	59	75	59	42	25
14 - 18	56	89	153	158	138	150	189	154	124	34
18 - 25	120	183	254	311	275	294	331	369	377	200
25 -	-	1	1	1	-	3	8	7	13	6
Mackerel encircling gill net	187	226	314	358	355	305	257	227	141	167
- 14	155	180	239	285	217	174	125	103	36	87
14 - 18	32	41	65	60	101	73	76	70	57	40
18 - 25	-	5	10	13	37	58	56	54	48	40
25 -	-	-	-	-	-	-	-	-	-	-

Source : Fisheries record of Thailand, 1975 - 1984, Department of Fisheries

4.1 Gulf of Thailand

Table 3 Annual catch of TUNA of Thailand and in the Gulf of Thailand 1973 - 1984.

year	Catch (MT)			increasing rate %
	Total	Gulf of Thailand	% of total catch	
1973	7,914	6,519	82.4	
1974	9,925	8.715	87.8	33.7
1975	12,044	11,172	92.8	28.2
1976	9,719	8,890	91.5	- 20.4
1977	12,932	11,296	87.3	27.1
1978	10,353	8,258	79.8	- 26.9
1979	16,850	14,713	87.3	78.2
1980	13,683	12,895	94.2	- 12.4
1981	22,273	20,198	90.7	56.6
1982	49,307	39,661	80.4	96.4
1983	85,820	82,001	95.5	106.8
1984	80,669	69,182	85.76	- 15.6

Table 4 Monthly catch of TUNA by major fishing gears in the Gulf of Thailand 1979 - 1984

Month / year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1979	1500	1340	1020	1140	786	802	915	623	1699	1573	1034	927	13359
1980	1232	1431	1564	789	998	913	931	1238	855	883	700	968	12502
1981	1546	1594	1779	1832	1916	1115	1627	3219	1874	869	1322	1204	19897
1982	3801	3194	3207	2425	1960	2977	4052	3736	3894	3652	3053	2852	38808
1983	7910	8243	8788	5567	6278	5994	6816	5756	7565	6079	6467	6327	81790
1984	4503	5320	6028	4773	3931	6132	4756	6299	7560	7118	4564	8044	69088

Sources : Fisheries record of Thailand (Department of Fisheries)

4.1 Gulf of Thailand

Table 5 Statistics from TUNA Fisheries in the Gulf of Thailand by luring purse seine, 1979 - 1984 : Catch in MT, day in fishing, and CPUE in Kg/day.

YEAR / STATISTIC	MONTH 1	2	3	4	5	6	7	8	9	10	11	12	TOTALS
1979													
Catch													
LOT	249	155	393	136	370	206	465	166	1 079	1 080	689	201	5 189
TUN	193	267	336	148	34	77	27	-	51	66	25	477	1 701
Days	10 179	9 715	8 831	7 679	6 843	8 353	8 069	7 546	9 102	6 833	7 357	8 594	99 101
CPUE LOT	24.46	15.95	44.50	17.71	54.07	24.66	57.63	22.00	118.55	158.06	93.65	23.39	52.36
CPUE TUN	18.96	27.48	38.05	19.27	4.97	9.22	3.35	-	5.60	9.66	3.40	55.50	17.16
CPUE TOTAL	43.42	43.44	82.55	36.98	59.04	33.88	60.98	22.00	124.15	167.72	97.05	78.89	69.53
1980													
Catch													
LOT	233	194	815	147	225	170	217	495	97	174	64	70	2 901
TUN	102	189	36	45	136	62	52	48	162	97	72	173	1 174
Days	9 182	8 415	10 163	7 290	7 724	9 642	7 468	9 506	6 454	5 266	5 890	6 685	93 985
CPUE LOT	25.38	23.05	80.19	20.73	29.13	17.63	29.06	52.07	15.03	30.18	10.87	10.47	30.87
CPUE TUN	11.11	22.46	3.54	6.35	17.61	6.43	6.96	5.05	25.10	16.82	12.22	25.88	12.49
CPUE TOTAL	36.49	45.51	83.74	27.08	46.74	24.06	36.02	57.12	40.13	47.00	23.09	36.35	43.36
1981													
Catch													
LOT	86	215	609	763	515	12	179	185	175	250	337	313	3 639
TUN	335	251	145	46	445	55	88	1 824	561	64	156	50	4 020
Days	8 273	10 736	18 612	6 315	7 522	5 875	11 680	12 862	11 901	11 626	5 863	7 868	119 133
CPUE LOT	10.40	20.03	32.72	120.82	68.47	2.04	15.33	14.38	14.70	21.50	57.48	39.78	30.55
CPUE TUN	40.49	23.38	7.79	7.28	59.16	9.36	7.53	141.81	47.14	5.50	26.61	6.35	33.74
CPUE TOTAL	50.89	43.41	40.51	128.11	127.62	11.40	22.86	156.19	61.84	27.01	84.09	46.13	64.29
1982													
Catch													
LOT	485	257	467	19	345	106	217	611	512	396	546	213	4 174
TUN	844	91	313	146	255	1 001	1 862	1 625	1 857	1 845	1 360	1 540	12 739
Days	7 300	6 428	11 019	5 475	8 916	6 744	10 238	10 787	9 929	11 585	8 979	7 811	105 211
CPUE LOT	66.44	39.98	42.38	3.47	38.69	15.72	21.20	56.64	51.57	34.18	60.81	27.27	39.67
CPUE TUN	115.62	14.16	28.41	26.67	28.60	148.43	181.87	150.64	187.03	159.26	151.46	197.16	121.08
CPUE TOTAL	182.06	40.38	70.79	30.14	67.29	164.15	203.07	207.28	238.60	193.44	212.27	224.43	160.75
1983													
Catch													
LOT	2 364	2 486	4 759	3 868	3 539	3 589	4 084	2 981	4 903	3 010	4 035	4 148	43 766
TUN	4 346	4 363	2 410	845	1 503	1 138	1 320	1 451	1 216	1 760	1 357	1 558	23 267
Days	10 668	11 202	10 318	9 388	10 259	9 068	10 125	9 533	9 525	8 871	6 990	7 388	113 335
CPUE LOT	221.60	221.92	461.02	412.02	344.97	395.79	403.36	312.70	514.75	339.31	577.25	561.45	386.16
CPUE TUN	407.39	389.48	233.57	90.01	146.51	125.50	130.37	152.21	127.66	198.40	194.13	210.88	205.29
CPUE TOTAL	628.99	611.40	694.80	502.03	491.48	521.28	533.73	464.91	642.41	537.71	771.38	772.33	591.46
1984													
Catch													
LOT	2 098	1 998	2 829	1 978	1 123	3 187	1 824	3 083	2 870	3 001	1 669	4 795	30 455
TUN	911	1 691	1 187	961	706	1 010	1 306	1 449	2 696	2 396	1 891	1 999	18 203
Days	7 131	9 165	9 758	12 603	13 286	13 821	16 639	13 039	19 578	12 663	9 989	5 567	143 239
CPUE LOT	294.21	218.00	289.92	156.95	84.53	230.59	109.62	236.44	146.59	236.99	167.08	861.33	212.62
CPUE TUN	127.75	184.51	121.64	76.25	53.14	73.08	78.49	111.13	137.71	189.21	189.31	359.08	127.08
CPUE TOTAL	421.96	402.51	411.56	233.20	137.67	330.67	188.11	347.57	284.30	426.20	356.30	1220.41	339.70

4.1 Gulf of Thailand

Table 6 Statistics from TUNA Fisheries in the Gulf of Thailand by drift gill net, 1979 - 1984 : Catch in MT, Days in Fishing, CPUE in Kg/day

YEAR / STATISTIC	MONTH 1	2	3	4	5	6	7	8	9	10	11	12	TOTALS
1979													
Catch													
LOT	272	122	119	116	207	242	213	234	266	209	186	150	2 336
TUN	188	293	106	253	117	192	163	112	196	165	106	97	1 988
Days	3 238	3 031	2 372	3 092	2 600	2 713	2 610	2 640	3 276	2 781	2 259	2 314	32 926
CPUE LOT	84.00	40.25	50.17	38.30	79.62	89.20	81.61	88.64	81.42	75.15	82.34	64.82	70.95
CPUE TUN	58.06	96.67	44.69	83.53	45.00	70.77	62.45	42.42	59.99	59.33	46.92	41.92	60.38
CPUE TOTAL	142.06	136.92	94.86	119.34	124.62	159.97	144.06	131.06	114.03	134.48	129.26	106.74	131.32
1980													
Catch													
LOT	243	301	289	243	303	272	303	273	249	214	214	204	3 108
TUN	229	221	230	228	159	229	252	310	263	216	146	132	2 615
Days	3 037	2 844	3 158	2 102	2 832	3 578	3 255	3 496	2 857	2 620	2 678	2 058	35 515
CPUE LOT	80.01	105.84	91.51	78.34	106.99	76.02	93.09	78.09	87.15	81.68	79.91	99.13	87.51
CPUE TUN	75.40	77.71	72.83	73.50	56.14	64.00	77.42	72.08	92.05	82.44	54.52	64.14	73.63
CPUE TOTAL	155.41	183.55	164.34	151.84	163.13	140.02	170.51	150.17	179.20	164.12	134.43	163.27	161.14
1981													
Catch													
LOT	471	498	482	470	461	569	641	521	430	83	571	443	5 640
TUN	477	452	468	496	480	449	672	625	664	332	147	316	5 578
Days	3 254	3 565	3 597	3 924	3 782	3 889	4 313	3 768	3 702	2 818	1 738	2 894	41 244
CPUE LOT	128.15	139.69	134.00	119.98	121.89	146.31	148.62	138.27	116.15	29.45	328.54	153.08	136.75
CPUE TUN	146.59	126.79	130.11	126.40	126.92	115.45	155.81	165.87	179.36	117.81	84.58	109.09	135.24
CPUE TOTAL	275.10	266.48	264.11	246.18	248.78	261.76	304.43	304.14	295.51	147.26	413.12	262.17	271.99
1982													
Catch													
LOT	867	1 036	945	1 054	860	1 078	889	648	590	879	646	516	10 008
TUN	1 270	1 383	1 032	1 001	341	744	752	632	691	420	442	494	9 202
Days	3 624	3 747	3 803	3 147	3 189	3 327	3 531	3 282	3 382	3 172	2 417	3 048	39 669
CPUE LOT	239.24	276.49	248.49	334.92	269.68	324.02	251.77	197.44	174.45	277.11	267.27	169.29	252.29
CPUE TUN	350.44	369.10	271.36	318.08	106.93	223.62	212.97	192.57	204.32	132.41	182.87	162.07	231.97
CPUE TOTAL	589.68	645.59	519.85	653.00	376.61	547.64	464.74	390.011	378.77	409.52	450.14	331.36	484.26
1983													
Catch													
LOT	539	531	681	388	460	529	545	507	489	402	376	264	5 711
TUN	417	676	484	359	738	701	808	749	858	707	610	287	7 394
Days	2 873	3 859	4 302	3 994	3 899	3 963	3 909	4 311	3 870	3 475	3 196	3 600	45 251
CPUE LOT	187.61	137.60	158.30	97.15	117.98	133.48	139.42	117.61	126.36	115.68	117.65	73.33	126.21
CPUE TUN	145.14	175.17	112.51	89.88	189.28	176.89	206.70	173.74	221.71	203.45	190.86	79.72	163.40
CPUE TOTAL	332.75	312.77	270.81	187.03	307.26	310.37	346.12	291.35	348.07	319.13	308.51	153.05	289.61
1984													
Catch													
LOT	403	410	555	696	814	699	606	645	656	724	429	332	6 965
TUN	944	719	1 017	1 020	1 090	1 201	998	1 069	1 314	926	465	537	11 300
Days	4 535	4 155	4 135	3 898	4 155	3 600	3 293	3 970	4 206	4 391	3 334	3 785	47 457
CPUE LOT	88.86	98.68	134.22	178.55	195.91	194.17	184.03	162.47	155.97	164.88	127.47	87.71	146.76
CPUE TUN	208.16	173.04	245.95	261.67	262.33	333.61	303.07	269.27	312.41	210.89	139.47	141.88	238.11
CPUE TOTAL	297.02	271.72	380.17	440.22	458.24	527.78	487.10	431.74	468.38	375.77	266.94	229.59	384.87

4.1 Gulf of Thailand

Table 7 Price variations of tuna in Thailand, 1976-1984

Year	Price baht/kg	Currency baht/us$	Domestic catch MT.	TUNA demanded for canning	Imported tuna
1976	6.14	20.45	9719	.....	.....
1977	8.18	20.45	12932	.....	.....
1978	12.27	20.45	10353	.....	.....
1979	8.18	20.45	16845	10463	.....
1980	14.36	20.51	13683	13835	.....
1981	14.87	21.87	22273	22281	.....
1982	11.99	23.05	49307	40321	12598
1983	18.21	23.06	85820	82844	46021
1984	14.50	23.69	80669	113811	80000

Sources: Fishery Statistical Bulletin (SEAFDEC)

Table 8 Utilization, Export and Import in quantity of TUNA of Thailand, 1979-1985.

year	Domestic catch(MT)	Canned Tuna Exported(MT)	Export to USA.	Tuna used for smoked Products	Tuna demanded for cannery (MT)	Tmported tuna fish
1979	16,845	3,662	2,197.2	.....	10,463	.....
1980	13,683	4,842	2,905.3	.....	13,835	.....
1981	22,273	7,798	4,678.9	.....	22,281	.....
1982	49,307	14,112	8,467.3	785.7	40,321	12,598
1983	85,820	28,996	17,397.3	440.7	82,844	46,021
1984	80,669	39,862	27,692	.....	113,811 2/	80,000 1/
1985	.....	87,134	59,249	.....	59,049 2/	110,000 1/

Sources : Fisheries Economic Subdivision

1/ Data from Fish Canning Association

2/ Estimated (35 % of tuna meat can be used for canning)

4.1 Gulf of Thailand

Table 9 Summary of biological information studies of coastal tunas in the Gulf of Thailand

Species	Distribution	Size composition	Recruitment	Spawning	Length at maturity	Fecundity sex ratio	Growth rate	Life span	Lt - Wt Relation	Parasite
Gulf of Thailand										
Thunnus tonggol	Adults Throughout Thai water of > 20 m depth Larvae off Chumporn-Nakorn-Srithammarat 15-30 m. depth (Not abundance)	22-25 cm LF Modes in the catch : East 35.0-47.0, 51.0 cm. West (upper): 31.0, 35.0, 47.0 cm. West (lower): 26.0, 37.0, 47.0, 50.0 cm.	East : all year round peak : Jan-Feb., Sept.-Dec. Length 22.0 cm. West (upper) Jan.-Feb. Apr.-June Sept.-Dec. Length: 23.0 cm West (lower) Apr.-May Sept.-Dec.	Area: edge of the basin of the Gulf Season: Mar.-May Jul.-Dec.	♀ 39.6 cm (LF.)	Average 1,400,000 (Lt. 43.8-49.1 cm.), sex ratio 1 : 1	1.4 cm/Mo	4 year	$W=0.000021L^{2.979}$	External and Internal inhibited : such as Copepod, Acanthocephala Nematode and Trematode:
Euthynnus affinis	same as T.tonggol	21-60 cm LF Modes : East : 21.0,35.0 51.0 cm. West (Upper): 26.0,47.0 cm. West (lower): 25.0,32.0,34.0, 42.0 cm.	East : 11-21 cm. Feb.-Mar. Aug.-Dec. West (upper): length : 26.0 cm Mar.-Apr. Jun.-Aug. West (lower) Length-25 cm. Mar.-Apr. Aug.-Sept.	Season : Jan.-Mar. Jun.-Aug. Ground : Not clear	♀ 37.5 cm. (LF)	Average : 1,730,000 (Length 39.5 -51.0 cm LF) Sex ratio: 1 : 1	1.2 cm/Mo K=0.63	-	$W=0.000015L^{3.0223}$	same as T. tonggol specific species : Aphanurus sp and Unidentified cestode
Auxis thazard	same as T. tonggol	19-49 cm.LF Modes: East: 27.0,45.0 cm. West (upper): 35.0 cm. West (lower) 35.0 cm.	East Length 27.0 cm. Feb.and Sept. West (upper) All year round length; 19-27cm. Apr.-May. Aug.-Dec. West (lower) Length: 19-27cm. Apr.-May Oct.-Nov.	Area Not clear Season Apr.-Jun. Aug.-Sept.	♀ 34.1 cm (LF)	Sex ratio 1 : 1	-	3 - 4 year	$W=0.000002L^{2.990}$	same as T. tonggol
The Andaman Sea										
T.tonggol	-	Mean : 43.5 Max : 56	Sept-Dec.	Season: Feb-Apr. Aug-Sept.	♀ 44 cm.	-	1.4 Cm/Mo	4 year	$W=0.000022L^{2.947}$	—
E.affinis	20 m.	Mean : 37.2 Max : 64	-	Season : Feb-Apr. Sept-Nov.	♀ 46 cm	Sex ratio 1 : 1.3	1.2 Cm/Mo K=0.63	4 year	$W=0.000015L^{2.034}$	—
A. thar	20 m	Mean : 33.5 Max : 44	—	Season : Feb-Mar Oct-Dec.	♀ 38 cm	Sex ratio 1:1.25	1.4 Cm/Mo	3-4 year	$W=0.000011L^{3.119}$	—

SOURCES : Klingmuang (1978,1981)
Cheunpan (1984)
Pramkij (1986)
Yesaki (1982)

4.1 Gulf of Thailand

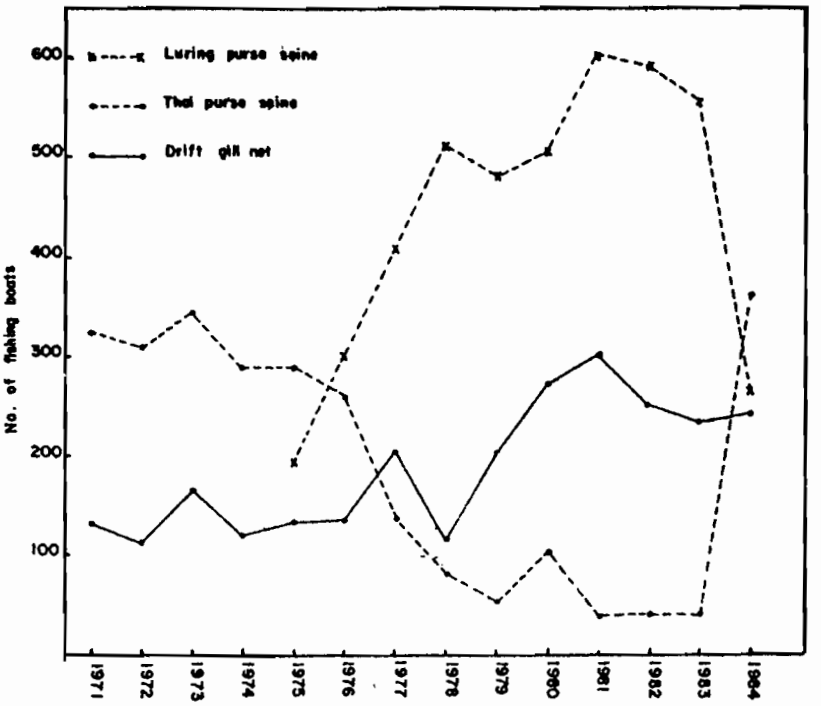


Fig. 1. Annual variations of fishing boats registered in the Gulf of Thailand, 1971-1984.

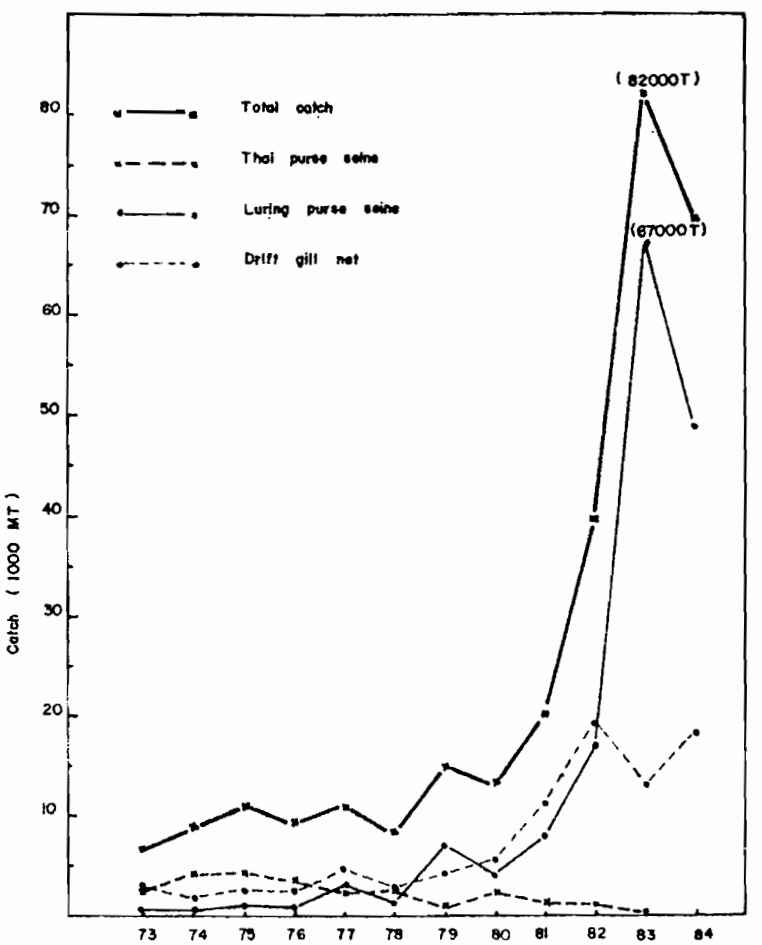


Fig.2. Annual catch of tunas by major type of fishing gears in the Gulf of Thailand, 1973-1984

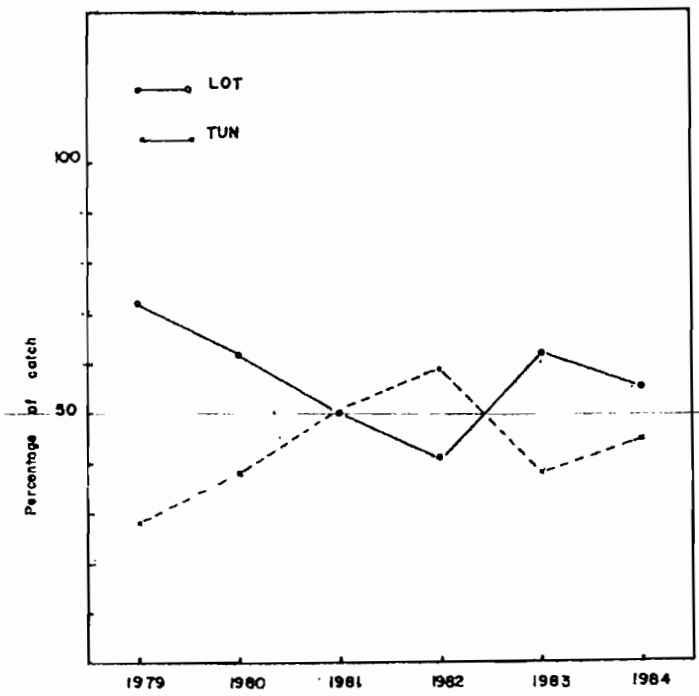


Fig.3 Percentage contributions of LOT and TUN to total tuna production. 1979 — 1984.

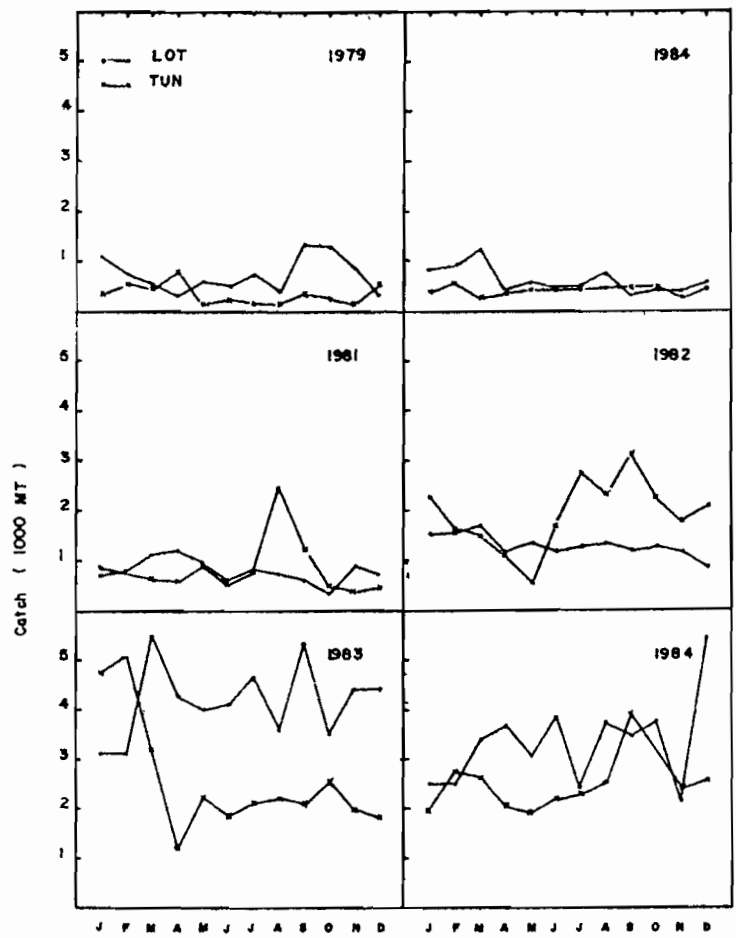


Fig.4 Seasonal variations of LOT and TUN by major types of fishing gear operated in the Gulf of Thailand. 1979 - 1984.

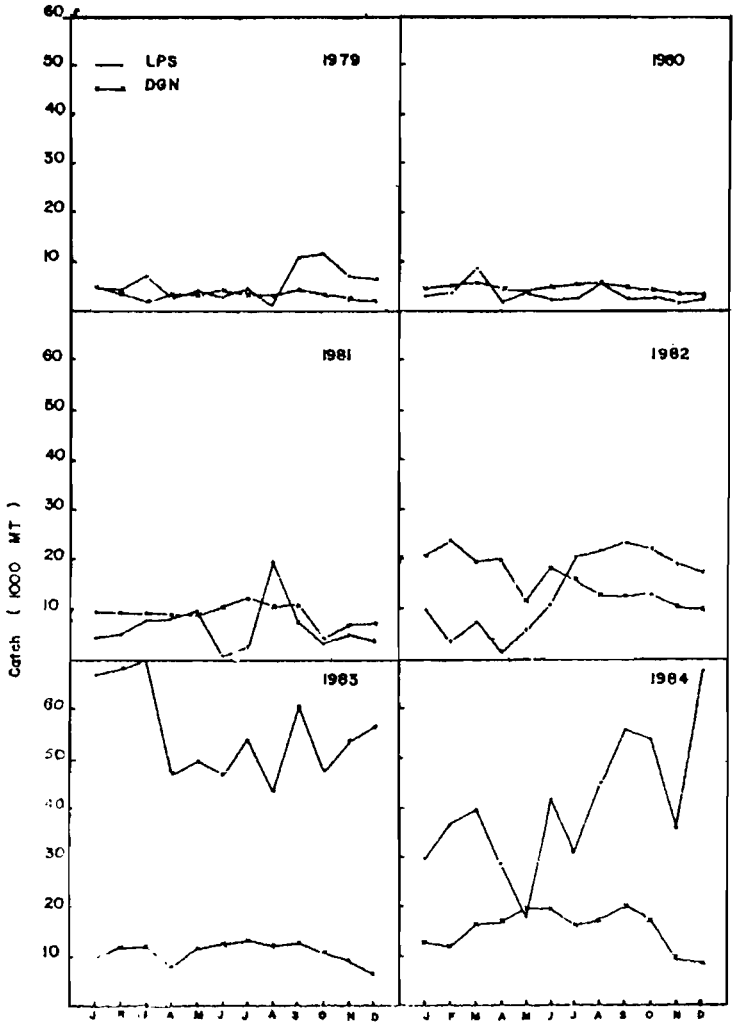


Fig. 5 Seasonal variations in catch of TUNA by types of gear in the Gulf of Thailand 1979- 1984.

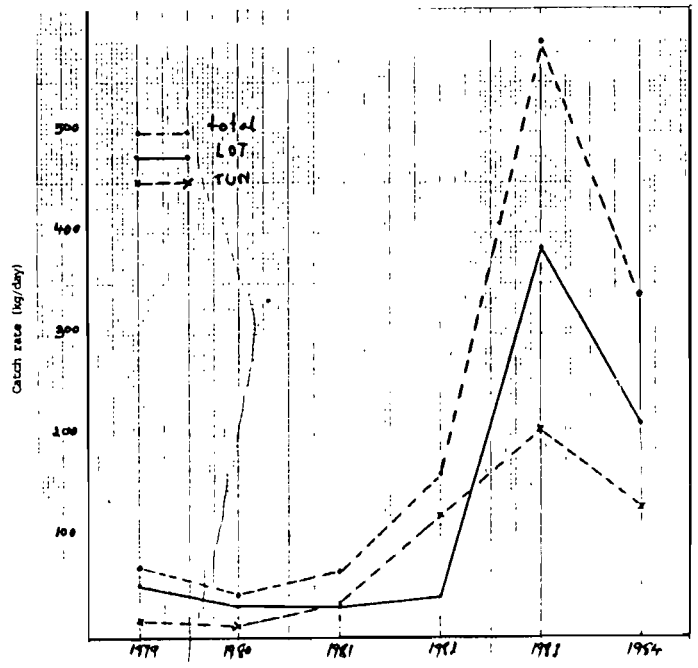


Fig. 6 Annual trends for tuna catch rate by luring purse seine 1979-1984.

4.1 Gulf of Thailand

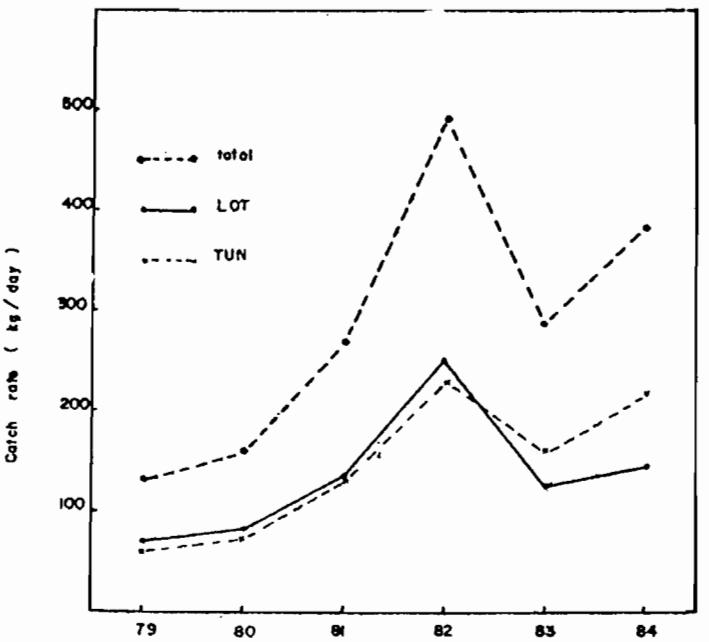


Fig. 7 Annual trends for tuna catch rate by Drift gill net. 1979 - 1984.

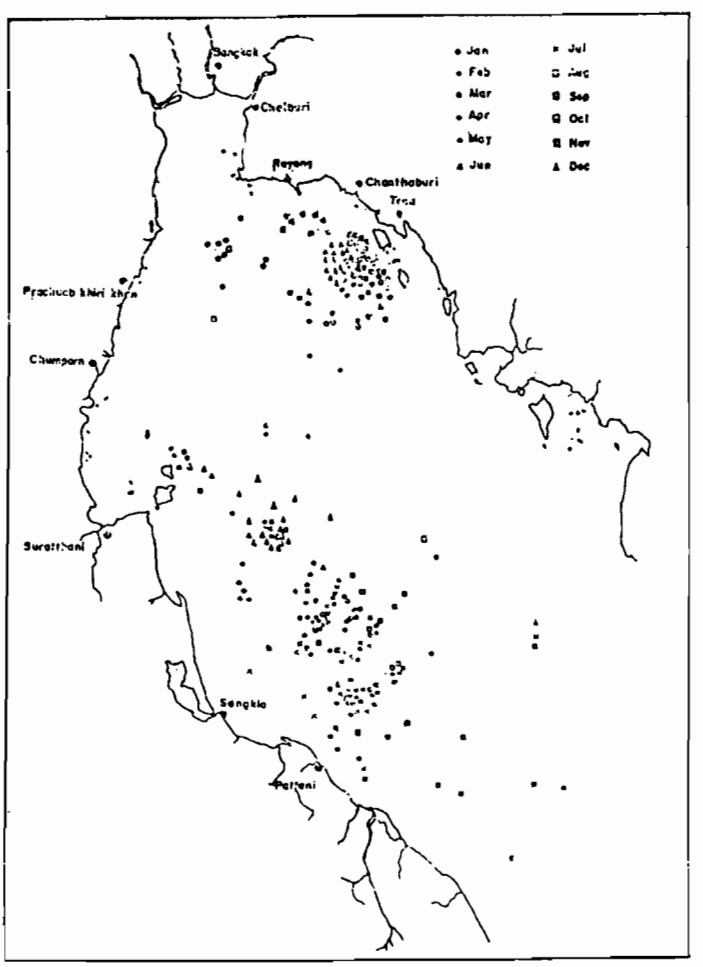


Fig.8 Fishing season and fishing ground of coastal tunas

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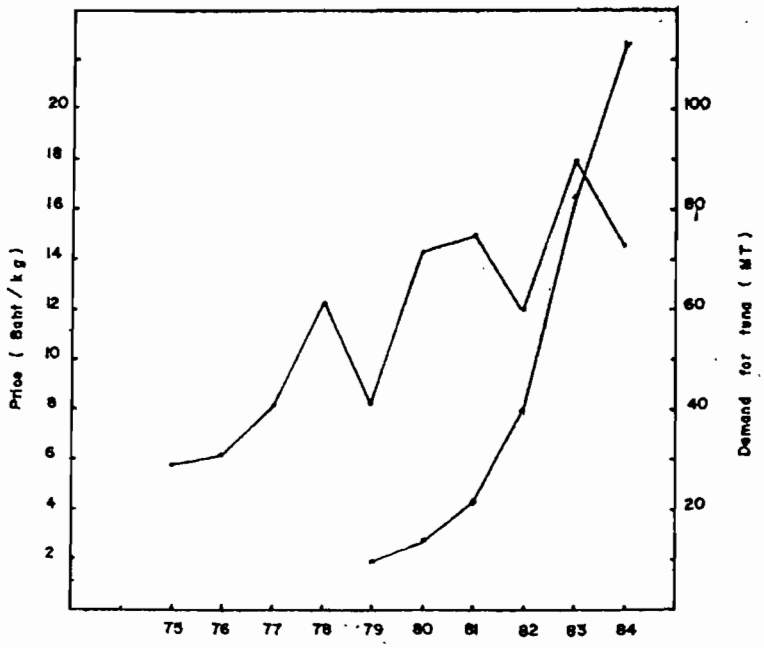

Fig.9 The wholesales price and demand for tuna in Thailand. 1975 — 1984

4.2 West coast Thailand

Table 1 The pelagic fishing fleet registered by type of gears and by size of boats along the west coast of Thailand, 1975-1983.

Fishing gears	Size of boat (meters)	year								
		1975	1976	1977	1978	1979	1980	1981	1982	1983
Thai purse seine	< 14	13	6	12	16	1	7	5	1	-
	14 -18	35	41	10	31	3	4	9	-	-
	> 18	37	42	-	-	-	1	3	-	-
	Total	85	89	22	47	4	12	17	1	-
Chinese purse seine	< 14	-	-	-	1	-	-	-	-	-
	14-18	10	7	9	6	7	9	7	9	10
	> 18	7	8	13	8	8	3	7	4	8
	Total	17	15	22	15	15	12	14	13	18
Luring purse seine	< 14	-	-	-	1	3	9	13	16	7
	14-18	-	-	56	37	38	54	46	42	41
	> 18	-	-	39	30	28	51	68	81	87
	Total	-	-	95	68	69	114	127	139	135
King mackeral gill net	< 14	23	7	17	14	9	7	7	14	19
	14-18	15	15	21	22	15	17	19	17	11
	> 18	5	-	-	-	-	-	-	-	-
	Total	43	22	38	36	24	24	26	31	30

Source: Thai Fisheries vessels statistics, Department of Fisheries, Thailand.

4.2 West coast Thailand

Table 2 Total catch of pelagic fish and species composition by major fishing ports along the west coast of Thailand, 1979-1985

Year	Total catch (tons)	Species composition										
		1	2	3	4	5	6	7	8	9	10	11
1979	30696	28.16	13.18	2.6	1.97	5.29	.58	4.65	7.89	3.90	29.58	2.2
1980	33996	38.51	9.06	2.42	2.63	4.55	0.51	5.21	4.98	4.64	25.25	2.24
1981	44423	34.17	7.13	1.83	1.72	7.18	2.10	5.40	4.18	3.87	31.31	1.11
1982	36837	26.37	5.13	2.42	1.88	5.45	4.33	6.01	3.46	2.47	41.47	1.01
1983	65374	17.45	6.06	1.48	0.86	2.14	2.27	21.32	8.90	14.6	24.21	0.71
1984	56868	28.36	6.30	1.01	0.94	3.54	2.30	20.61	6.44	3.55	26.37	0.58
1985	58007	38.21	10.36	1.96	1.67	1.28	5.83	14.14	1.31	6.76	13.19	5.29

Source: 1979 - 1984 The landing place survey, Department of Fisheries, Thailand.
1985 From the sampling survey conducted by Phuket Marine Fisheries Station.

Note: 1. Indo-Pacific mackerel
2. Indian mackerel
3. Spanish mackerel
4. Wolf herring
5. Longtail tuna
6. Coastal tuna
7. Round scad
8. Hardtail scad
9. Jack, Trevallies
10. Sardines
11. Others

Table 3 Landings of coastal tunas by major fishing port (in mt and %) on the west coast of Thailand, 1979 - 1985

Year / Landing port	1979		1980		1981		1982		1983		1984		1985	
	catch	%	catch	%	catch	%	catch	%	catch	%	catch	%	catch	%
Ranong	12	0.7	22	1.3	209	5.1	6	0.2	235	8.2	84	2.5	194	4.7
Takuepa	138	7.6	84	4.9	264	6.4	113	3.1	80	2.8	112	3.4	858	20.8
Taimuang	34	1.9	69	4.0	475	15.5	309	8.6	949	32.9	655	19.7	780	18.9
Phuket	8	0.4	6	0.3	30	0.7	17	0.5	524	18.2	666	20.1	825	20.0
Krabi	324	18.0	129	7.5	555	13.5	480	11.9	19	0.7	1525	45.9	317	7.7
Trang	569	31.5	463	26.9	589	14.3	478	13.3	548	19.0	279	8.4	33	0.8
Satul	718	39.8	948	55.1	1997	48.5	2251	62.4	525	18.2	-	-	1118	27.1
Total catch	1803		1721		4119		3604		2880		3320		4125	

Sources: 1979 - 1984 The landing place survey, Department of Fisheries, Thailand.
1985 From the sampling survey conducted by Phuket Marine Fisheries Station.

4.2 West coast Thailand

Table 4 Catch, effort and catch per unit of effort data (Purse seine as standard gear) of tunas in the west coast of Thailand, 1979 - 1985

A: Longtail tuna

Year	1979	1980	1981	1982	1983	1984	1985
Total catch (tons)	1624	1548	3188	2007	1397	2014	745
Total effort (days)	27377	42692	37916	16056	48507	11165	37760
CPUE (kg/day)	59.32	36.26	84.08	125	28.8	180.38	19.73

B: Coastal tuna

Year	1979	1980	1981	1982	1983	1984	1985
Total catch (tons)	179	173	931	1597	1483	1307	3380
Total effort (days)	9521	12098	2804	10541	26964	29298	44200
CPUE (kg/day)	18.8	14.3	332.0	151.5	55.0	44.61	76.47

Source: 1979 - 1984 Total catch from the landing place survey, Department of Fisheries, Thailand

1985 Total catch from the sampling survey conducted by Phuket Marine Fisheries Station

1979 - 1985 CPUE from the sampling survey conducted by Phuket Marine Fisheries Station

Table 5 Monthly catch of coastal tuna in the west coast of Thailand. 1979 - 1985.

Year / Month	1979	1980	1981	1982	1983	1984	1985
January	460	32	63	552	406	75	42
February	320	61	36	264	418	134	142
March	112	159	87	648	461	360	378
April	303	196	452	352	580	337	923
May	149	33	315	277	482	244	675
June	19	63	660	150	105	343	20
July	26	74	514	130	85	331	606
August	50	31	832	480	50	267	428
September	26	37	216	262	104	275	52
October	125	291	601	148	1	347	270
November	52	491	110	166	14	337	489
December	161	253	233	175	174	271	100
Total	1803	1721	4119	3604	2880	3321	4125

Soures : 1979 - 1984 The landing place survey, Department of Fisheries, Thailand.

1985 From the sampling survey conducted by Phuket Marine Fisheries Station.

4.2 West coast Thailand

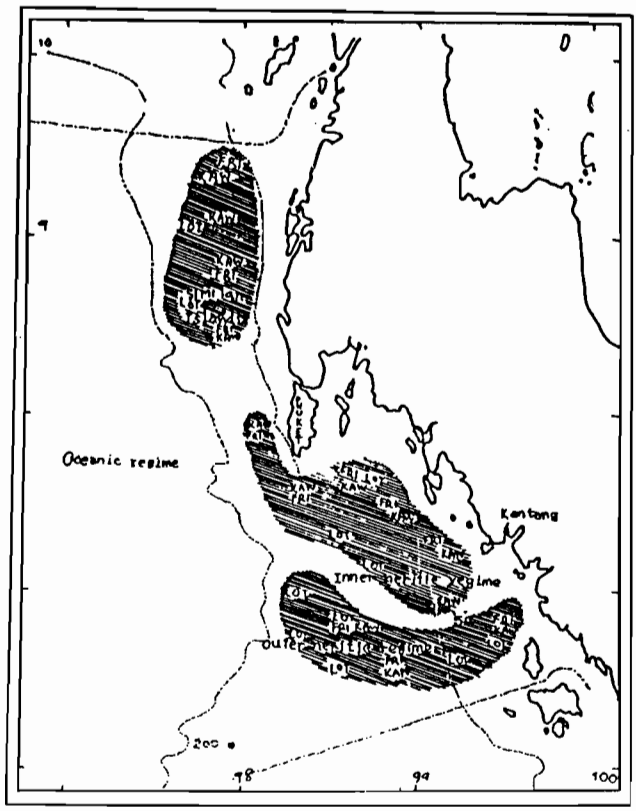

Fig.1 The major fishing grounds for tunas in the westcoast of Thailand,
Note : FRI = Frigate mackerel, K/N = Kawakawa, eastern little tuna
LOT = Longtail tuna

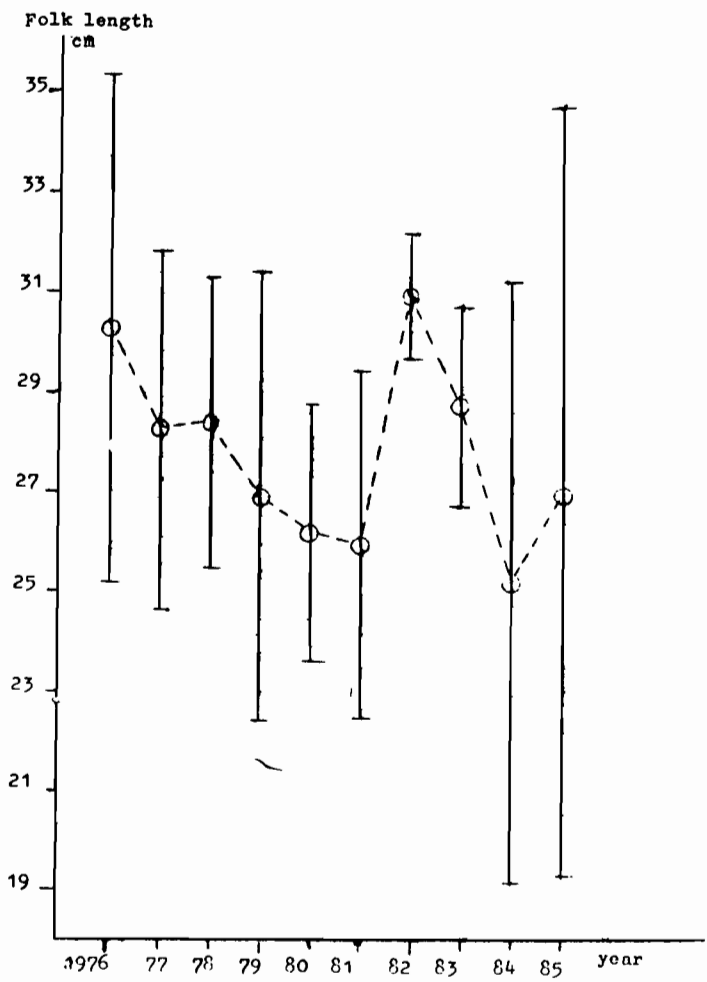

Fig. 2 The annual mean length of Euthynnus affinis landed along the west coast of Thailand, 1976 - 1985.

4.2 West coast Thailand

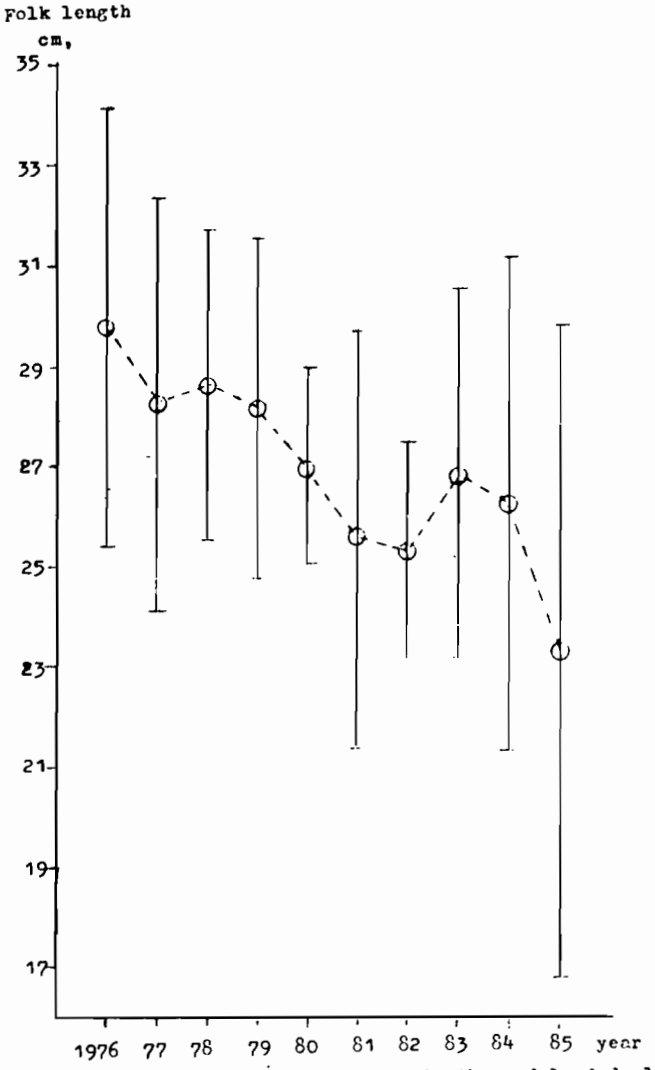

Fig. 3 The annual mean length of Auxis thazard landed along the west coast of Thailand, 1976 - 1985.

PUBLICATIONS OF THE
INDO-PACIFIC TUNA DEVELOPMENT AND MANAGEMENT PROGRAMME

WORKING PAPERS

IPTP/82/WP/1
SCS/80/WP/90
SKILLMAN, R.A. Tuna fishery statistics for the Indian Ocean and the Indo-Pacific. Colombo, Indo-Pacific Tuna Development and Management Programme. June, 1982. 86p.

IPTP/82/WP/2
SCS/82/WP/111
DE JESUS, A.S. Tuna fishing gears of the Philippines. Colombo, Indo-Pacific Tuna Development and Management Programme. June, 1982. 47p.

IPTP/82/WP/3
SCS/82/WP/112
WHITE, T.F. and YESAKI, M. The status of tuna fisheries in Indonesia and the Philippines. Colombo, Indo-Pacific Tuna Development and Management Programme. September, 1982. 62p.

IPTP/82/WP/4
SCS/82/WP/113
YESAKI, M. Illustrated key to small and/or immature species of tuna and bonitos of the Southeast Asian region. Colombo, Indo-Pacific Tuna Development and Management Programme. October, 1982. 16p.

IPTP/82/WP/5
SCS/82/WP/114
WHITE, T. F. The Philippine tuna fishery and aspects of the population dynamic of tunas in Philippines waters. Colombo, Indo-Pacific Tuna Develpment and Management Programme. December, 1982. 64p.

IPTP/83/WP/6
SCS/83/WP/6
YESAKI, M. The Pelagic Fisheries of the Philippines. Colombo, Indo-Pacific Tuna Development and Management Programme. March, 1983. 15p.

IPTP/82/WP/7
SCS/82/WP/119
YESAKI, M. Observations on the biology of yellowfin (Thunnus albacares) and skipjack (Katsuwonus pelamis) tunas in the Philippine waters. Colombo, Indo-Pacific Tuna Development and Management Programme. July, 1983. 66p.

IPTP/83/WP/8
WHITE, T.F. and MERTA G.S. The Balinese Tuna Fishery. Colombo, Indo- Pacific Tuna Development and Management Programme. October, 1983. 15p.

IPTP/83/WP/9
WHITE, T.F. and UKTOLSEJA J.C.B.. The West Java Tuna Fishery. Colombo, Indo-Pacific Tuna Development and Management Programme. 1983. 25p.

IPTP/84/WP/10
JOSEPH, B.D.L. Review of tuna fishery in Sri Lanka. Colombo, Indo-Pacific Tuna Development and Management Programme. July, 1984. 29p.

IPTP/84/WP/11
SAKURAI, T. Major Findings from the Indo-Pacific historical tuna fisheries data summary. Colombo, Indo-Pacific Tuna Development and Management Programme. September, 1984. 11p.

IPTP/85/WP/12
YONEMORI, T., UKTOLSEJA J.C.B. and MERTA G.S. Tuna tagging in Eastern Indonesian waters. Colombo, Indo-Pacific Tuna Development and Management Programme. February, 1985. 33p.

IPTP/85/WP/13
HONMA, M. and YONEMORI, T. Manual for storing tuna tagging data in computer readable form. Colombo, Indo-Pacific Tuna Development and Management Programme. February, 1985. 19p.

IPTP/86/WP/14 **ANDERSON, C.** Republic of Maldives Tuna catch and effort data 1970-1983. Indo-Pacific Tuna Development and Management Programme. April 1986. 19p.

IPTP/86/WP/15 **LAWSON, T., LABLACHE, G., SIMOES, F. and ALI, FARAH A.** The Western Indian Ocean tuna fishery from 1980 to 1985: A summary of data collected by Coastal States. Indo-Pacific Tuna Development and Management Programme. October, 1986. 30p.

GENERAL REPORTS

IPTP/82/GEN/1
SCS/GEN/79/24 Report of the consultation meeting on management of tuna resources of the Indian and Pacific Oceans. Manila, Philippines. 26-29 June 1979. Colombo, Indo-Pacific Tuna Development and Management Programme. September, 1982. 155p.

IPTP/82/GEN/2
SCS/GEN/82/32 A selected bibliography of tuna fisheries in the South China Sea region. Colombo, Indo-Pacific Tuna Development and Management Programme. September, 1982. 24p

IPTP/82/GEN/3
SCS/GEN/82/42 Report of the consultation meeting of the joint Indonesian/ Philippine tuna working group. Manila, Philippines. 21-23 October 1981. Manila, South China Sea Fisheries Development and Coordinating Programme. December, 1982. 64p.

IPTP/83/GEN/4 Report of the workshop on Philippine and Indonesian research activities Manila, Philippines. 3 - 8 February, 1983. Colombo, Indo-Pacific Tuna Development and Management Programme. February, 1983. 16p.

IPTP/84/GEN/5 Report on the expert consultation on establishing and maintaining a regional data base for tuna fisheries in the Pacific and Indian Oceans. Colombo, Indo-Pacific Tuna Development and Management Programme. March, 1984. 27p.

IPTP/84/GEN/6 Report on the ad hoc workshop on the stock assessment of tuna in the Indo-Pacific region. Colombo, Indo-Pacific Tuna Development and Management Programme. September, 1984.

IPTP/85/GEN/7 Report on the preparatory expert meeting on tuna longline data for stock assessment in the Indian Ocean. Colombo, Indo-Pacific Tuna Development and Management Programme. April, 1985. 12P.

IPTP/85/GEN/8 Report on the joint tuna research group meeting of Philippines and Indonesia. 21 - 23 October 1985. Colombo, Indo-Pacific Tuna Development and Management Programme. November, 1985. 85P.

IPTP/85/GEN/9 Report on the expert consultation on the stock assessment of tunas in the Indian Ocean. 28 November - 2 December 1985. Colombo, Indo-Pacific Tuna Development and Management Programme. December, 1985. 78P.

DATA SUMMARIES

IPTP Data Summary No. 1 — Indo-Pacific Tuna Fisheries Data Summary (Draft). Colombo, Indo-Pacific Tuna Development and Management Programme. September 1983. 184p.

IPTP Data Summary No. 2 (Revised Edition) — Indo-Pacific Historical Tuna Fisheries Data Summary. Colombo, Indo-Pacific Tuna Development and Management Programme. September 1984. 142p.

IPTP Data Summary No. 3 — Indian Ocean Tuna Fisheries Data Summary. Colombo, Indo-Pacific Tuna Development and Management Programme. March 1985. 62p.

IPTP Data Summary No. 4 — Western Pacific Ocean Tuna Fisheries Data Summary. Colombo, Indo-Pacific Tuna Development and Management Programme. May 1985. 73p.

IPTP Data Summary No. 5 — Indian Ocean Tuna Fisheries Data Summary for 1984. Colombo, Indo-Pacific Tuna Development and Management Programme. April 1986. 67p.

IPTP Data Summary No. 6 — Western Pacific Ocean Tuna Fisheries Data Summary. Colombo, Indo-Pacific Tuna Development and Management Programme. April 1986. 88p.

DATA CATALOGUES

IPTP/85/CAT/1 — IPTP Data Catalogue, November 1985. 29p.

IPTP/86/CAT/2 — IPTP Data Catalogue, November 1986. 49p.

MANUALS

IPTP Manual No.1
SCS Manual No. 2 — Manual for the collection of historical statistical data on tuna and tuna-like species in the Indo-Pacific region. Colombo, Indo-Pacific Tuna Development and Management Programme. January, 1983.

IPTP Manual No.2 — Manual for statistical data collection on tuna and tuna-like species in the Indo-Pacific Region, (Draft). Colombo, Indo-Pacific Tuna Development and Management Programme. February, 1984. 44P.