

IPTP/85/GEN/8

Work Plan Implementation

Indo-Pacific Tuna Development & Management Programme
(INT/81/034)

This document forms part of publications of the Investigation on Indian Ocean and Western Pacific Small Tuna Resources Project, GCP/RAS/099/JPN which is sponsored and funded by the Government of Japan.

IPTP/85/GEN/8

November, 1985

REPORT ON THE JOINT TUNA RESEARCH GROUP MEETING OF
PHILIPPINES AND INDONESIA

Jakarta, Indonesia
21 - 23 October 1985

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

NOTICE OF COPYRIGHT

The copyright in this publication is vested in the Food and Agriculture Organization of the United Nations. This publication may not be produced, in whole or in part, by any method or process, without written permission from the copyright holder. Applications for such permission with a statement of the purpose and extent of the production desired, should be made through and addressed to the Programme Director Indo-Pacific Tuna Development and Management Programme, P.O. Box 2004, Colombo, Sri Lanka.

TABLE OF CONTENTS

Page

1.	Opening of the Meeting	1
2.	Adoption of Agenda and Arrangement for the Meeting	1
3.	National Report on the Recent Development of Tuna Fisheries and Resources	1
3.1	Indonesia	5
3.2	Philippines	7
3.3	Thailand	
4.	National Report on the Tuna Data Collection System and General Catch Data Collection System	9
4.1	Indonesia	10
4.2	Philippines	11
4.3	Thailand	
5.	National Report on the Summary of Tuna Data Collected and Research Works	14
5.1	Indonesia	15
5.2	Philippines	18
5.3	Thailand	
6.	Tuna Tagging Programme	21
7.	Other Matters	22
7.1	IPTP Data Collection Forms	23
7.2	Mapping of Tuna Resources	
8.	Recommendations	23
	Appendix 1 Welcome Address	25
	Appendix 2 List of Participants	26
	Appendix 3 Agenda	28
	Attached Tables and Figures	29
1.	Indonesia	48
2.	Philippines	58
3.	Thailand	

1. OPENING OF THE MEETING

Mr. A. Dwiponggo, Chief of the Research Programming of the Research Coordinating Centre for Fisheries, on behalf of the Director General of the Agency for Agriculture Research and Development declared the opening of the meeting with his welcoming address at 10:00 hours on 21 October, 1985 at the office of the Research Coordinating Center for Fisheries (RCCF) in Jakarta, Indonesia. The welcoming address is attached as Appendix 1.

Mr. T. Sakurai, Programme Director a.i., of Indo-Pacific Tuna Development and Management Programme (IPTP) welcomed the participants and proceeded to outline the historical background of the tuna research projects in the region. A tuna sampling programme was started in 1979 in both countries with technical assistance from FAO on a recommendation made at a workshop on the tuna resources of Indonesia and Philippines waters held in Jakarta, Indonesia under the South China Sea Fisheries Development and Coordinating Programme. He emphasized that the sampling programme is one of the useful mechanism for monitoring fisheries resources and should maintain to maximum extent possible as long as fisheries activities are continued. He proposed that the objectives of the meeting be to exchange the information on the present situation of tuna fisheries, tuna data collection and research works in order to enhance the future activities of the tuna research group for both countries. He mentioned the reason for an invitation extended to a Scientist from Thailand to attend this meeting, that the tuna fishery in Thailand is increasingly becoming important in capturing and processing fields. The total catch of tuna has been increased from 11,000 MT in 1977 to 82,000 MT in 1983 in the Gulf of Thailand. Thailand has become one of the biggest tuna canning countries in the world. He expressed his idea that Thailand would join into such a tuna research group meetings in the future too.

The meeting was attended by 12 participants and 11 observers. A list of participants and observers to the meeting is attached as Appendix 2.

2. ADOPTION OF AGENDA AND ARRANGEMENT FOR THE MEETING

Dr. Purwito Martosubroto, Director, Research Institute for Marine Fisheries (RIMF), Jakarta and Dr. Jacques Marcille, Fisheries Resources Officer, FAO Rome chaired the meeting on the 1st and 3rd days and for 2nd day respectively.

The meeting was proceeded with the agenda prepared by IPTP Secretariat. The agenda is attached as Appendix 3.

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

3.1 Indonesia

The Indonesian delegates reported tuna fishing methods and production in Indonesia as follows:-

Fishing methods: Tuna resources in Indonesian waters are being exploited by using various kinds of gears, i.e., pole and line, long line, troll line, hand line, purse seine, gill net and seine nets.

Pole and line has been developed only in the eastern Indonesian waters, since the government established pole and line companies in Bitung, Sorong and Ambon in 1972, 1973 and 1974 respectively. The size of boats used by those state companies are mainly 30 GT and some 100 to 300 GT. But local fishermen in Ternate and Ambon use rowed proas for this method, which locally called 'funai' and 'rorehe' respectively (Unar, 1981). The proas are somewhere around 10-12 meters in length with a crew of 6 to 8. For artisanal pole and lines, the size of boats used are mainly less than 30 GT. A private company, PT. East Indonesian Fisheries in Ternate used 100 to 200 GT boats. In Kendari (southeast Sulawesi), pole and line started in 1976, with 12 GT boats for training the fishermen. Since the government gave Small Investment Credit (KIK) to the fishermen, the number of pole and line boats increased to 20 in 1978. A private company, PT. Perken, established in 1981, uses pole and line boats of 30 GT and a boat modified from a shrimp trawl boat to a pole and line boat. In 1982, a joint venture, PT. Multitranspeche Indonesia was established in Biak, with four pole and line boats of 300 GT. In the western Indonesian waters and waters off South of Nusa Tenggara Islands, although pole and line trials have ever been made, but there has been no progress at all. The development of tuna fishing companies during the third Five Years Development Plan (REPELITA III) is presented in Table 1.

Long line fishery started in 1972, since the government established a long line company located in Benoa (Bali) and Sabang (Aceh province). They fully operated in 1975 with 100 GT boats and then later two of 250 GT boats and one 134 GT boat were added. In 1982, there were 9 companies which were using long line gears (Table 2).

Troll line was the first method introduced for catching tuna in the eastern Indonesia waters, using a sailing boat with one crew and artificial lures of coloured goat feathers (Unar, 1981). In the eastern Indonesian waters mainly in Makassar Straits, fishermen used troll lines around deep sea FAD (locally called 'rompong'). In the western Indonesian waters, trolling fishery developed in two places, i.e., Benoa (Bali) and Padang (West Sumatra). In Benoa, since the beginning fishermen used sail boat but in 1980, some of them started to use outboard motors of 7 to 12 HP for their additional power. They operate the fishing on daily basis because the fishing ground is about 20 miles offshore. In Padang, fishermen use larger boats of 16 to 55 HP or 4.43 to 28.89 GT. More than 80% of the boats are using 33 HP. They operate the fishing from 4 to 15 days per trip, because their fishing ground is very far, from the shores. The fishing operation consist of 4 to 5 fishermen using 5 to 15 lines.

Hand lines are usually to catch large tunas. They use fresh fish as bait (mainly mackerel, scad and small tunas) around deep sea FAD. This method is very popular in Sulawesi, i.e. South Sulawesi and Tomini Bay. Fishermen use a small canoes and one sailing boat as a 'mothership'. There is another type of hand line in Ende Bay (Flores Island). These lines use live fish as bait (mainly indian mackerel, Rastrelliger kanagurta). Every line is hung on a pole of bamboo (20 to 30 cm long) as float. Every fisherman has some lines spread over the bay and keeps watching the lines by a small canoe moving slowly among the lines.

There are two large purse seine boats of 600GT operating in the eastern Indonesian waters. One is owned by PT. East Indonesian Fisheries and the other by PT. Multitranspeche Indonesia. Since 1984 only one large purse seine

is still in operation. Artisanal purse seines for catching tuna and skipjack developed in Banda Aceh and Lhok Seumawe. The size of boats used in Banda Aceh is ranging from 33 to 105 HP or 19 to 26 GT. The net is 700 to 1200 meters long and 20 to 40 meters deep. They use 20 to 23 fishermen in a boat. Their operation is on daily basis. The boats used in Lhok Seumawe are of from 33 to 37 HP (17 x 4 x 2 meters). The net is about 800 to 1000 meters long and about 55 meters deep. They use 15 to 25 fishermen. Artisanal purse seines for catching small tunas and pelagic fish are mainly operated in Prigi (South of East Java) using boats of 4 to 5 GT, with the nets of 400 to 500 meters long and 40 to 60 meters deep. They employ 12 to 13 crews.

Gill nets for catching tunas have developed since long years ago in Pelabuhan Ratu (South of West Java) and recently in Prigi (South of East Java) and in Muncar (East Java). In Pelabuhan Ratu, the boats used for gill netting, ranged from 2.5 to 4 GT, with 3 to 4 fishermen. They use about 20 pieces of nets of 60-65 meters long per piece and 20 meters deep. The mesh size is 5 to 6.5 inches. The size of boats used in Prigi are about 3 to 4 GT, with 3 to 4 fishermen. The size of nets are about 20 pieces long and 20 meters deep with mesh size ranging from 3.5 to 4.5 inches. In Muncar, the boats used are about 13 x 1.75 x 0.75 meters in size with 15 to 25 outboards motor, 3 crews and 15 to 19 pieces of nets. The boats which are obtained from a package of Mass Supervision Credit (BIMAS), is equipped with a 18 HP inboard motor with 7 HP auxiliary. They operate fishing with 4 fishermen and 3.5 to 4 inches mesh size nets. Their operation takes about 3 days per trip.

Production: The production of tuna and tuna-like fishes contributed 10.5% to the total production of marine fisheries during the period of 1976 to 1983 (Table 3). It had increased remarkably during the same period 12.2% annually in the whole area, 13.7% in the western Indonesian waters and 11.8% in the eastern Indonesian waters respectively (Table 4).

The production of artisanal pole and lines in Bitung for the period from 1979 - 1984 was about 2,450 tons in average while the production of a state company there during the same period was about 2,729 tons. But the catch rate of artisanal pole and line was higher than those of state company (1,005 to 744 kg/day) as shown in Table 5. The average catch rate of 30 GT was lower than that of 40 GT. They were about 820 and 674.5 kg/day respectively (Table 6 and 7). The catch rate of 30 GT pole and line boats of PT. Usaha Mina (Persero) was stable since 1976 until 1984, but it has increased about twice in 1985. This sudden change may be due to the success of this company's deep sea FAD which have been deployed recently (Table 8). The catch of 100 GT pole and line PT. Usaha Mina increased in 1985 after a steep drop in 1984 (about 81.4% decreased compared to 1983) as shown in Table 9. The catch rate of 300 GT pole and line boat of PT. Usaha Mina decreased since 1983 (Table 10). The catch rates of 30 GT pole and line of a state company in Ambon showed a slight decrease, except for 1983 (Table 11). The average catch rates for artisanal pole and lines in Kendari was stable (Table 12). In Ternate, the catch rates of artisanal pole and lines also decreased since 1983, particularly in 1984 by 65.6% (Table 13). The catch rates of 200 GT pole and lines in Ternate shows a fluctuation (Table 14). The catch rates of 300 GT pole and lines in Biak shows 10.6 kg/kg of bait which is the lowest among various landing centres. (Table 15).

The production of a tuna long line state company in Bali is presented in Table 16, and the catch by area in 1984 shows in Table 17. The percentage

composition of bigeye tuna caught in Banda and Aru Seas (Table 18) obtained by a state company in Bitung is higher than yellowfin tuna, i.e., 51.9% to 37.2%. However, the catch of 100 GT longline boats owned by PT. Perikanan Samodra Besar at Benoa Bali (Table 16) shows that the percentage composition of yellowfin tuna and bigeye tuna were 67.4% and 15.2% respectively during the period 1978-1984. The PT. Pertuni in Ujung Pandang caught 2,631 mt of tuna during January 1983 to August 1984. The catch statistics for other long line companies are at present not available yet,

The production of trolling in Bali is presented in Table 19. It increased about 9.1% annually during the period of 1979 to 1984. This increase may be due to the use of outboard motor. The catch rates of trolling fishery in Padang (West Sumatra) is presented in Table 20. In the table, the catch rates for yellowfin tuna shows decreasing, and no significant changes for skipjack and tuna-like fishes. The catch rates by species for smaller (8 to 16 HP) and larger (20 to 33 HP) boats show in Table 21 not so much different to each other.

The catch statistics for hand lines operating around deep sea FAD in Sulawesi are at present not available yet. The result of a sampling for handline which was done in November 1983 in Ujung Pandang South Sulawesi, in collaboration with PT. Perikanan Samodra Besar (Persero) revealed that the catch consisted of 99.3% for yellowfin and 0.3% for bigeye tuna. About 23.4% of yellowfin sampled were matured. The yellowfin tuna caught were ranging between 78 to 148 cm FL and 7 to 57 kg, in weight with the average of 33.0 kg (Merta, 1984).

The production of industrial purse seine in Ternate is presented in Table 22. The catch rate of the purse seine decreased since 1981. The statistics for production of industrial purse seine in Biak is not available yet. The catch rates of artisanal purse seines in Banda Aceh is presented in Table 23 and the catch rates by species which were obtained from sampling are shown in Table 24. The catch rates which obtained from the sampling are lower than those obtained from an auction centre. The production for small purse seines in Prigi, major species, of which are tuna-like fishes, is presented in Table 25. The total production of these small purse seines decreased since 1983.

The production of gill nets in Pelabuhan Ratu, Prigi and Muncar are presented in Table 26, 27 and 28 respectively. The dominant species of gill nets in Pelabuhan Ratu is skipjack, while in Prigi is tuna-like fishes. In Muncar, the catch is likely to decrease during the West Monsoon.

The catch rates of seine nets in Pelabuhan Ratu since 1981 is presented in Table 29. The catch rates decreased about 46.3% per annum. The dominant species were frigate/bullet tunas (*Auxis* spp.), which contributed about 66.4% of the catch.

3.2 Philippines

The Philippines delegates reported tuna production and marketing situation in the Philippines as follows:-

Status of the Philippine Tuna Fisheries: The Philippine tuna fisheries has shown remarkable development during the last decade as can be gleaned from

the phenomenal increase in production from 9,000 MT in 1971 to a peak production of 242,000 MT in 1983. The tuna fisheries has not only filled the demand for additional protein for the increasing population but has benefitted the country in terms of dollar earnings due to the demand for tuna in the world market. To date, tuna has become the most important fishery export in terms of volume and value.

Tuna Landings: The Philippines Fisheries Statistics differentiate between the commercial and municipal sector of the industry which is based on the tonnage of the vessel used. Vessels below 3.0 GT are classified as 'municipal' and above 3.0 GT are 'commercial'.

Tuna production by species group and fishery sector for 1980-1984 is shown in Table 1. The municipal fishery sector provided 48% of the total tuna landings in 1984 and the commercial sector 52%. These compare with 85% and 15%, respectively in 1976. The major reason for the increase in the contribution from the commercial sector has been the development of the purse seine and ringnet fleets.

These published statistics show frigate/bullet tuna to be the major tuna species landed by the commercial fishery sector and yellowfin/bigeye is the major species caught by the municipal sector. In 1984, the proportion of the tuna landing contributed by the various species are shown below:

SPECIES	! % of !Commercial ! Landings	! % of !Commercial ! Landings	! % of !Commercial ! Landings
Frigate/Bullet	! 40	! 31	! 36
Yellowfin/bigeye	! 19	! 33	! 26
Skipjack	! 25	! 15	! 20
Eastern Little Tuna	! 16	! 21	! 18

One of the major problems with the published tuna landings statistics is the misidentification of tuna species. According to the result of the tuna sampling programme started in late 1979, it shows that a considerable proportion of the 'frigate' tuna are included in small skipjack or even yellowfin tuna. The percentages shown above for 1984 is the result of close collaboration between statistical enumerators and the tuna samplers under the Tuna Research Project in the identification of species in the sampling site in Mindanao where the bulk of the landings are recorded.

Landings by fishing gear: The fishery statistics of the Philippines 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 1984 by fishing sector are shown in Tables 2 and 3.

Tunas are captured with seven major fishing gear for the commercial sector (Table 2). In 1984, 56% of the commercial landings were made by purse seine, 32% by ringnet, 11% by bagnets and the remining 1% by various other gears.

A great variety of gears is employed by the municipal sector to catch tuna (Table 3). The hook and line fishery is the most productive, accounting for 60% of the total municipal landings in 1984, followed by gill net and purse seine/ringnet with around 15% and 11% respectively. A variety of other gears accounts for the remainder (14%) of the catch. Note that nearly 65% of the municipal yellowfin and skipjack catch is landed by hook and line.

The significant features of these landings by both commercial and municipal sectors of the industry is the part played by payaos. The major proportion of the purse seine, ringnet and hook and line catch of tunas made by both sectors of the industry are in conjunction with payaos. Catches by these gears represented 80% of the total Philippine tuna landings in 1984.

Tuna landings by area: Tuna landing statistics are published both by political region and by Statistical Fishing Area. The former has no relationship to fishing grounds, seas, or bays, whereas the latter division are based on fishing areas. The 1984 landings by statistical fishing area are shown in Table 4. Approximately, 49% of the total tuna landings are caught in the seas surrounding Mindanao. The majority of the tuna caught from the inner Archipelagic waters are frigate and eastern little tuna while majority of the larger yellowfin tuna are caught in the seas around Southern Mindanao.

Disposition of the Catch: The major stimulus for the development of the Philippine tuna fisheries, particularly the expansion of the ringnet/purse seine fleets, has been the export markets. Only skipjacks, yellowfin and bigeye tuna are exported, principally to Japan, Italy, USA, Germany and United Kingdom.

Table 5 shows the export of tuna from 1980 to 1984. It could be seen that export of tuna reached its peak in 1981 with 54,024 MT and since then it decreased continuously to 36,030 MT in 1984. The dramatic decrease in 1982 may be due to the glut of tunas in the World market which considerably lessen the export price. This has affected the tuna industry in the country which resulted in the non-operation of quite a number of tuna purse seiners from 81 in 1981 to only about 50 in 1982.

Tunas are exported frozen, chilled, canned or smoked. In Table 6, the destinations of the frozen/chilled tuna for 1980 to 1984 are shown. It will be noted that majority of the tuna in 1980, 1981 and 1982 were exported to U.S.A. (35% to 67%), followed by Italy and Japan. However, in 1983 and 1984, Italy and Japan were the main countries where fresh/frozen tuna were exported.

Canned tuna exports by destination are shown in Table 7. The majority of the canned tuna is exported to America. Although the volume exported to the USA has increased annually, however, in 1984 it declined, due to the aggressive market expansion by the exporting companies principally in Europe.

Figures are not available on the production of canned tuna for domestic consumption, but industry sources suggest that the amount is less than 10% of that produce for export.

In 1984, there were 9 existing canneries. The tuna requirements of these canneries are not met by the current production of tunas and sometimes the canneries have to import from other countries to fill their needs.

Table 8 shows the average producers price of tuna from 1980-1984. The prices has steadily increase through the years.

3.3 Thailand

The Thai delegate reported the recent development of tuna fisheries and resources in Thailand as follows:-

* Recent development of tuna fisheries and resources: Thailand's marine fisheries developed rapidly after the introduction of trawl fisheries during the early 1960's. Concurrently, the marine capture fisheries also developed for pelagic fish both in the Gulf of Thailand and in the Andaman Sea. A distinct development of pelagic fisheries has been observed since 1973 when modified luring techniques which used drifting or anchored coconut fronds by day or light at night were introduced. This type of lure is known as 'payao' or fish attraction device in the Philippines. Additionally, the decline in demersal fish stock provided more incentive for Thai fishermen to enter the pelagic fisheries, and new fishing grounds for small pelagic fish as well as for tunas were discovered. As a result the pelagic fish production became a significant part of the total catch.

The principal trends over the 14-year period (1970-1983) showed that the total marine catch exceeded 2 million metric tons in 1977 and declined until 1980, then again rose to over 2 million metric tons in 1982 and 1983. Pelagic fisheries also showed a similar trend, with maxima in 1977 and minima in 1974/1975 and 1980, then it increased again in 1982 and 1983.

It is a fact that market demand plays an important role in pelagic fisheries. The development of the fish canning industry during the 1970s has considerably expanded the market for mackerel, scad, sardines and especially tunas. The development of this industry in recent years has resulted in an increase in production and export of canned tunas.

In the early period, tunas were a relative minor fisheries in Thailand and catch statistics classed tunas collectively as 'bonito' with no breakdown into specific tuna species. Since 1979, separate statistics for longtail tuna have been available. The total catch of tunas during 1971 to 1983 varied from 5,185 to 85,820 metric tons. It showed an increasing trend year by year and reached the peak of 85,820 metric tons in 1983 (Table 1, Fig. 1).

The annual catch of longtail tuna (LOT) in the Gulf of Thailand increased from 10,583 metric tons in 1979 to 50,449 metric tons in 1983, about 3.1 times the previous year's catch (Fig. 2 and Table 2).

This rapid raise of LOT catch was produced by purse seiners equipped with well developed detecting devices such as SONAR.

The annual catch of other tuna species (Kawakawa and Auxis sp.) also showed an increasing trend from 1981 to 1983.

Types of fishing gear used: There are several types of fishing gear used in tuna fisheries. These include 4 types of purse seines (Thai, Chinese, luring and anchovy purse seines), 3 types of gill nets (king mackerel drift gill net, mackerel encircling gill net and other gill nets) and troll line. The principal fishing methods used for capturing tunas are purse seines

(particularly luring purse seiners) and gill nets. Purse seine fishery has developed a unique style of seining appropriate to conditions in Thai waters. This development is based mainly on capturing small pelagic fish species other than tunas. Recently, especially since in 1982, tunas have been considered as a target species due to the demand of the canning industry and purse seines have been found the most efficient gear. At present, purse seine fisheries have been developed and sophisticated electronic equipments such as depth recorder, sonar, transceiver as well as satellite navigation instruments have been installed on board to increase the efficiency of the gear for catching tunas.

In Thai tuna fisheries, purse seine and drift gill net contribute substantially to the total tuna catch. In 1983, about 83 and 15 per cent of tuna landings came from purse seines and drift gill net respectively (Table 3, Fig. 3).

Tuna fisheries in Thailand are multispecies and multigears. Throughout the fishing area, mechanized craft exist. The number of registered fishing boats by major fishing gears are shown in Table 4, and Fig. 4.

The installation of modern equipments on board purse seiners since 1981 has resulted in a rapid increase in the catch per unit of effort as well as in the total catch of tunas in Thailand. In all areas of the country, the catch rate of tunas is considerably higher on the east coast (Gulf) than on the west coast (Andaman Sea).

Fishing grounds and fishing seasons: There are four important landing ports in the Gulf and the Andaman Sea, namely Rayong, Songkhla, Pattani and Satun. Except for Rayong, the other three ports are located in the Southern region of Thailand, which shows that the main fishing grounds are distributed in the southern parts of Thai waters. However, it should be noted that the location of the landing ports do not always reflect the proximity of the fishing grounds.

The fishing season in Thailand seems to cover the whole year, January - December, with a small annual variation. This variation may be caused mainly by the annual change of the two monsoon seasons (northeast monsoon season and southeast monsoon season).

Marketing: In Thailand, total exports of canned seafood in 1983 amounted to 71,600 MT, an increase of 76 per cent from the 1981 level of 41,000 MT. It is reported that there are 23 canneries, with 14 canneries concentrating on tuna canning. The most notable feature of this industry in recent years has been the rapid increase in the production and export of canned tuna, making Thailand a significant contributor to world trade in canned tuna. Domestic catch of tuna is inadequate to meet the industry's needs and is estimated to supply less than half of the total raw materials required. It is estimated that about 46,000 MT were imported in 1983 and that it increased to 150,000 MT in 1985 (Table 5).

The development of the canneries in Thailand has resulted in Thai canned products penetrating the US and EEC markets. This has been achieved because production costs in Thailand are appreciably lower than those of other countries. The price of tunas in the country during 1979-1983 ranged from 14-18 Baht/kg.

As a consequence of the heavy exploitation in tuna resources, the Thai delegate explained that tuna catch in Thailand might be recorded as on a decrease tendency in 1984 and 1985 respectively.

4. NATIONAL REPORT ON THE TUNA DATA COLLECTION SYSTEM AND GENERAL CATCH DATA COLLECTION SYSTEM

4.1 Indonesia

The Indonesian delegate reported the present tuna data collection system as follows:

Sampling on tuna fisheries is done routinely at some designated sampling sites (Figure 1), i.e.:

West Indonesian waters -

- Banda Aceh (will be started soon)
- Padang, West Sumatra
- Pelabuhan Ratu, South of West Java
- Prigi, South of East Java
- Denpasar, Bali

East Indonesian waters -

- Sorong
- Ambon
- Bitung, North Sulawesi
- Majene, South Sulawesi (will be started soon)
- Kendari, South-east Sulawesi

Sampling is done in collaboration with the state companies in Sorong, Ambon and Bitung, Sumatra Fisheries Development Project (Padang) and fisheries offices at the other sites. Sampling activities are mainly for collecting data on -

- catch by species by boat
- number of days per trip
- fishing grounds
- number of boats landing
- biological data, such as length and weight of fish

Other biological data, such as gonad maturity, food habits, fecundity and morphometric measurements are collected incidentally by the staff of Research Institute for Marine Fisheries (RIMF) during their visit to the fields. Particularly for Pelabuhan Ratu, some funds have been allocated for monthly biological sampling (1985/1986 fiscal year). Data on catch and effort are collected everyday by complete enumeration, while length and weight data are collected daily by sampling. These sampling activities are currently assisted by IPTP by providing a technical expert and a complete set of HP 87 microcomputer in data processing and analyses. Catch and effort data collected at three sampling sites (Sorong, Ambon and Pelabuhan Ratu) are presented in Table 30, 31 and 32, and the data for troll lines in Padang in Table 21. Data on length frequency distributions for yellowfin and skipjack are presented in Table 33, 34, 35, 36, 37, 38 and 39. Figures on fishing grounds for pole and lines in the eastern Indonesian waters are presented in Figures 2, 3 and 4 and figures for trolling fishery in West Sumatra as shown

in Figure 5. Data on gonad maturity as indicated by the development of their Gonad Index is presented in Figure 6.

4.2 Philippines

The Philippines delegate reported the tuna data collection in the Philippines under the research project as follows:-

The project deals with the collection of basic information on the Philippine resources of tuna and tuna like species necessary for resource assessment studies. The project will also provide information on the impact resulted from the catches of juveniles by non-selective gears in the tuna resources of the Philippines.

The Tuna Research Project is being implemented in Navotas, Metro Manila and in the four (4) sampling centres located in Mindanao areas:

1. Davao del sur (2 sampling sites)
 - 1.1 Sta. Cruz (1 sampler)
 - 1.2 Malita (1 sampler)
 2. Gen. Santos City (2 sampling sites)
 - 2.1 Calumpang (1 sampler)
 - 2.2 City Public Landing (1 sampler)
 3. Zamboanga City (2 sampling sites)
 - 3.1 Labuan (1 sampler)
 - 3.2 Recodo (1 sampler)
 4. Misamis Oriental (2 sampling sites)
 - 4.1 Opol
(1 sampler)
 - 4.2 Initao
- A. Sampling procedure for purse seine/ringnet.
1. Sampling of ringnet and purse seine is done every other 2 days regardless of Saturdays, Sundays and holidays making a total of 10 sampling days per month.
 2. On each sampling day, up to 5 carriers boats are sampled. The catch of all other vessels unloading that day is also recorded.
 3. For each vessel sampled, the following information is recorded in Form A.
 - boat name
 - gear type
 - fishing ground
 - catch composition by species
 - total weight of catch
 - no. of days fishing; net sets
 4. For each vessel sampled, at least 1 box/basket by each category of tuna, i.e., pirit, skipjack, yellowfin is sampled.

5. For each box sampled the following is done:

- a. Species is sorted out and all unidentified small tuna is placed in separate category.
- b. each species is weighed to obtain composition by weight.
- c. twenty fish randomly selected for each tuna species is measured and recorded in Form B.
- d. all measurement is taken to the nearest cm (0.5 cm above taken to the highest cm).

B. Sampling procedure for handline

1. Sampling for handline is done once a week
2. For each sampling day the following data is collected:
 - a. total landings of yellowfin and big-eye tuna from handline boats
 - b. no. of pumpboats landed
 - c. average no. of fish landed per boat
3. For one landing center, length and weight (as recorded by buyer) from 20 yellowfin and all big-eye is recorded.
4. Biological information from the above fish is also collected, e.g., sex, stage of maturity, gonad weight, stomach content weight.

Information collected at the 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 weighted length frequency percentage distribution of the total landings of the month.

4.3 Thailand

The Thai delegate reported the general fishing production survey in which data collection on catch and effort statistics is included and biological sampling system, in which data collection on size frequency is included.

The general data collection system in Thailand is based mainly on the new marine fisheries production surveys which were initiated in 1969. The objectives of the surveys are to secure data necessary for fisheries administration and for fish stock assessment by providing catch data by species and group of species and the associated fishing effort for each type of fishing gear.

The surveys are conducted through the field set-up of the Department of Fisheries. Six supervisors and 70 enumerators have been assigned to carry out these surveys. Samples are selected by random sampling by type of fishing. The survey is applied to major types of fishing methods and gears (since 1973, the number of fishing methods covered by the surveys are 11) and if information is required on fishing gear by particular areas, then the random sampling technique is also applied in each area.

Statistical data is collected on a weekly/monthly basis. Field enumerators visit selected landing ports regularly to record all related information. This information is usually recorded in a log book provided by the Department of Fisheries. If the information is not available from the log book, then the field enumerators will interview the person concerned himself. All information is forwarded to the statistics headquarters in Bangkok for evaluation and dissemination.

The catch and effort statistics of the 11 major fishing gears are also included in the marine fisheries statistical collection programme. Information on fishing effort and production per fishing unit (by fishing gear, fishing areas and month) have been collected. The unit of fishing effort collected includes the number of trips, number of fishing days, number of hauls and number of fishing hours.

Apart from the general statistics collection system as mentioned above, routine sampling for tunas at identified landing sites have also been carried out since 1977. Eight sampling sites in the Gulf of Thailand and 6 sampling sites off the Andaman Sea coast have been selected for these technical sampling surveys using 4-8 samplers to collect both catch/effort and biological information. Frequency of sampling was monthly or every two months. Timing of sampling was generally between new moon and full moon.

The composition of the tuna catch during the sampling surveys was determined by species, by size and by types of fishing gear. The size of the fish in fork length of 0.5 cm interval (lower limit) was measured at the sampling site. The data was collected separately by species.

Regarding the catch and effort data of tuna and tuna-like species involved in the general catch statistics, it is noted that there are two shortcomings, as follows: (i) there is no catch statistics breakdown into species, only catch data for longtail tuna has been available since 1979; (ii) the fishing gear classification used in the national statistics collection system is not precise.

It is noted that the incomplete information on the type of fishing gear was due to the fact that the national fishing gear classification had been established a long time ago and had not been adjusted in relation to the change in the pattern of fishing. This shortcoming in gear classification occurs in particular for purse seines that have been rapidly developed in recent years.

Catch distribution of coastal tunas among the countries: Dr. Hayase (SEAFDEC) explained the catch distribution of coastal tunas among three countries; Indonesia, Philippines and Thailand with reference to statistics in ITP Data Summary No. 2.

The catches in the three countries by various kinds of gear comprise six groups of tunas i.e., Yellowfin (YFT), Skipjack tuna (SKJ), Longtail tuna (LOT), Kawakawa (KAW), Frigate and bullet tuna (FRZ) and Tunas NEI (TUN). Among them, Yellowfin and Skipjack tuna were found only in Indonesian and Philippines waters. Skipjack tuna was caught occasionally (by-catch?) in the Andaman Sea off the coast of Thailand, but recently, there has been no record of this fish being comprised in any catch. According to ITP Data Summary No. 2 (see next page in Table 1), the catch production of yellowfin in 1982 was

about 19,500 metric tons in Indonesia and about 51,900 metric tons in the Philippines.

Thus, the Philippines accounts for the largest share of the yellowfin catch which is equivalent to 24% of the total tuna catch among the three countries (Table 2).

Skipjack catch in 1982 accounted for about 47,100 metric tons in Indonesian and about 50,800 metric tons in the Philippines. This is equivalent to 11.5% and to 12.4% of the total tuna catch, respectively (Table 2).

Longtail tuna, (Thunnus tonggol) was recorded separately only in Thailand (23,400 metric tons). In Indonesia and the Philippines however, it seems that this fish has been recorded as 'other tunas' such as Tunas NEI (TUN). In the three countries there seems to be a common misunderstanding or confusion in the catch records where some species may have been included in another group.

In Thailand, for example, Longtail tuna is called pla-o-dum (dum means black) and species identification is based on the black body colour. This classification is not precise and furthermore at the market auction, Thai fishermen have classed tuna as 'bonito' with no break down of specific tuna species. The same problem seems to be common both to Indonesia and the Philippines.

Anyway the sampling surveys that have been conducted by the Statistics Section, Department of Fisheries, Thailand, revealed that the tuna resources comprised three main species, namely longtail tuna, (Thunnus tonggol), Kawakawa, (Euthynnus affinis) and frigate tuna, (Auxis thazard). And among them, Kawakawa and frigate tuna were categorized into the Tunas NEI (TUN) group (Tables 1 and 2).

Table 1. Tuna catch (in metric tons) and composition (in percentage) in three countries, 1982.

Country	Thailand	Indonesia	Philippines	Total
Species				
YFT	-	19,530 (13.5)	51,922 (24.0)	71,452
SKJ	-	47,140 (32.5)	50,795 (23.4)	97,935
* LOT	23,416 (47.5)	-	-	23,416
* TUN	25,891 (52.5)	78,190 (54.0)	-	104,081
* KAW	-	-	46,524 (21.5)	46,524
* FRZ	-	-	67,363 (31.7)	67,363
TOTAL	49,307	144,860	216,604	410,771

Source: IPTP Data Summary No. 2, 1984

YFT : Yellowfin; SKJ: Skipjack tuna; LOT: Longtail tuna

TUN : Tunas NEI; KAW: Kawakawa; FRZ: Frigate & bullet tuna

* : Classification of these tuna groups is unclear

Table 2. Catch composition (in percentage) of major species of tunas in three countries, 1982.

Country	Thailand	Indonesia	Philippines	Total
Species				
YFT	-	4.8	12.6	17.4
SKJ	-	11.5	12.4	23.9
* LOT	5.7	?	?	5.7

* TUN	6.3	19.0	27.7	53.0
* KAW	?	?	(11.3)	(11.3)
* FRZ	?	?	(16.4)	(16.4)
TOTAL	12.0	35.3	52.7	100

Note: In the Philippines TUN are identified as KAW and FRZ

IPTP Statistician pointed out that the present national statistical classification on tunas for three countries in the region, is likely reasonable in light of that, the important tuna species have already been classified in the list for each country. Further division of species, if necessary, should be taken place in the tuna sampling programme. There are many difficulties in classifying the minor species in the data collection of national statistics which covers all species of production.

5. NATIONAL REPORT ON THE SUMMARY OF TUNA DATA COLLECTED AND RESEARCH WORK

5.1 Indonesia

The Indonesian delegate reported data collected by the Research Institute for Marine Fisheries on catch and effort and size frequency from various landing sites. These data are represented in tables i.e., Tables 5 - 32 for catch, effort and CPUE and Tables 33 - 38 for size frequency.

No research work for stock analysis using data collected were reported.

There was a request by a participant from Indonesia that an appropriate survey system or data compilation method be adopted to be able to show clear understanding of effectiveness on payao, vessels size and state company viz private enterprise etc. At present, most data on catch, effort and c.p.u.e. are collected in Indonesia based on complete enumeration from state companies and auction centres. In order to obtain the required information, it would be necessary to improve the present system in introducing additional data collection or data compilation which will fit in the data analysis.

5.2 Philippines

The Philippines delegate reported the findings and achievements of the present research project in 1984, as follows:

A. Distribution of monitored effort by sampling sites and fishing gear. The most important fishing gear at the sampling site are still purse seine, ringnet and handline (Table I) in terms of the number of vessels landing, other gears monitored are troll line, multiple handline, fish corral and tuna long line. In terms of landed weight, the important fishing gears were purse seine (80% of the total landed weight) ringnet (15%) and handline (5%).

Purse seine and tuna longline were the gears monitored at Navotas Fish Port with a total landings of 4,677,885 kgs and 5,000 kg respectively.

Ringnet and handline were the gears monitored at Sta. Cruz with a total landings of 57,350 kg and 31,885 kg respectively.

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 (Table 1).

Purse seine, ringnet, handline, troll line, multiple handline and fish corral are the gears being monitored in Zamboanga City. Purse seine accounted for 93% of the landings followed by ringnet 5% and handline troll line, fish corral and multiple handline 2%.

Ringnet and handline were the gears monitored in Misamis Oriental with a total landings of 245,545 kg and 1,649 kg respectively.

B. Catch and catch rate

1. Ringnet

Ringnet landings of tuna was the highest in Gen. Santos City for the 12 monitored period. The average landing of tuna for this period was 5,012 kg/boat. The highest landing was observed in May, then in April, December and February (Table 4).

January was the most productive month in Sta. Cruz with a total tuna landings of 11,116 kgs and a catch rate of 618 kg per boat. The average landing of tuna for this period was 312/kg boat. Tuna catch per vessel during this period ranged from 1,790 kg to 11,116 kg. October and February registered a total catch of more than 8,000 kg while a total catch of 1,000 kg to 4,000 kg was observed during the rest of the month.

Tuna landings in Opol was observed to be the highest in February reaching a total catch of 127,270 kgs with a catch rate of 1,989 kg per boat. Tuna landings of ringnetters were observed to be highly seasonal.

Ringnet landings of tuna in Zamboanga City was highest in March (132,537 kg) and July (103,407 kg). For the rest of the year, the landings ranged from more than 37,000 kg to only 67,000 kg. The average tuna landings for the 12 month period was 2,233 kg/boat.

2. Purse Seine

Purse seine landings of tuna was the highest in Zamboanga City totalling 13,304,650 kg. May and June registered a total landings of more than 2,000 kg and a catch rate of 174,330 kg and 176,180 respectively and in April and October, more than 1,000 kg and catch rate of 190,682 kg and 154,342 kg respectively. The average tuna landings was 109,054 kg/vessel.

Purse seine landings of tuna observed in Navotas was 4,677,886 kgs and a catch rate of 49,241 kg/vessel for the 12 month period. An almost the same landings of tuna was observed for the whole period with only a slight increase in May and March as compared to the other sampling centres.

April was observed to be the most productive month in Gen. Santos City followed by February and January. Catch rate for the monitored period was observed to be 3,598 kg/vessel.

3. Handline

Handline tuna landings was the highest in January (182,679 kgs) at Gen. Santos City. The catch rate for the month was 494 kg/vessel. Landings in excess of 100,000 kg was observed also in July, August, September, October and December. Catch rate for the 12 month period was 331 kg/vessel.

Handline landings of tuna in Zamboanga City was 66,253 kg. Catch rate per vessel ranged from 97 to 194 kg with an over-all catch rate of 175 kg/vessel landings. A very high landings was observed in May (12,837 kg) as compared to February (6,924 kg).

Landings of handline in Sta. Cruz ranged from 465 kg to 4,955 kg and a total catch of 31,885 kg. The over-all catch rate was 58 kg/vessel landing.

Landings of handline in Misamis Oriental was low as compared to the other sampling centres. The total catch for the year was only 1,648 kg and a catch rate of only 14 kg/vessel landing.

4. Troll line

Troll line was observed only in Zamboanga City having a total catch of 19,001 kg for the 12 month period and a catch rate of 112 kg/vessel landings.

5. Multiple handline

Multiple handline was likewise observed only in Zamboanga City with a total landed catch of 5,171 kg and a catch rate of 671 kg/vessel landing.

6. Fish Corral

Fish corral was monitored only in January and February at Zamboanga City. The catch observed was 4,822 kg and 7,643 kg respectively and a total catch rate of 1,385 kg/vessel landing.

C. Percentage of Juveniles

The number and weight of juvenile tunas caught by different gears is presented in Table 5. Ringnet was observed to be catching 100% juveniles bigeye tuna. A high percentage of juvenile yellowfin tunas (94%) was found in the catch of ringnet in terms of number and about 76% in terms of weight. A high percentage of juvenile frigate tuna both in terms of number and weight was observed in the catch of ringnet and purse seine. 67% of juvenile skipjack tuna in terms of number was observed in the catch of ringnet and only 37% in terms of weight.

D. Size distribution of tuna

Size distribution of tuna species caught by different fishing gear per area is presented in Table 7.

Ringnet is catching almost the same sizes of skipjack and yellowfin tuna except in Zamboanga City where the smallest caught by 37 cm and 51 cm respectively. For all other gears size ranges of the different tuna species were almost the same except also in Zamboanga City (Table 7).

E. Sex, maturity and Stomach Analysis

Analysis of the result are still being made for the sex, maturity and stomach content.

F. Distribution of effort by sampling sites and fishing gear

During the period from January to December 1984, a total of 23,033,349 kg of tuna was monitored at the five (5) landing centres. This total comprised 52% skipjack, 37% yellowfin, 3% frigate, 5% bullet tuna, 0.6% eastern little tuna, 2% bigeye tuna and 0.4% oriental bonito.

Seven tuna species were captured by ringnet which include skipjack, yellowfin, bigeye, frigate, bullet tuna, eastern little tuna and oriental bonito (Table 2). The proportion of skipjack was the highest at Sta. Cruz then in Zamboanga City, followed by Gen. Santos City and Opol, Misamis Oriental. The proportion of yellowfin in the landings was the highest in Gen. Santos City and decreased in Sta. Cruz, Opol and Zamboanga City. Bigeye tuna was landed only in Gen. Santos City. Frigate tuna was landed proportionately in Sta. Cruz, Opol, Zamboanga City and Gen. Santos City. Bullet tuna was the highest in Opol, followed in Zamboanga City, then Gen. Santos City and Sta. Cruz. Eastern little tuna was observed in Gen. Santos City, Sta. Cruz and Zamboanga City while oriental bonito was landed in Zamboanga City only.

Six tuna species were captured on purse seine. Skipjack accounted for the highest percentage of purse seine landings in Zamboanga City, Navotas and Gen. Santos City. Yellowfin followed the highest percentage of purse seine in Zamboanga City, Navotas and Gen. Santos City. Bigeye tuna, frigate, bullet and eastern little tuna are landed proportionately in the three landing centres mentioned above.

Yellowfin accounted for almost all the landings at Gen. Santos City and Sta. Cruz and the same proportion in Opol and Zamboanga City with skipjack contributing also to the handline landings in Opol, Zamboanga and Sta. Cruz.

Longline landings was monitored at Navoata with yellowfin, bigeye and skipjack as catch in almost the same proportion.

Troll line, multiple handline and fish corral landings were monitored only in Zamboanga City with skipjack, bullet tuna and yellowfin tuna respectively as the highest percentage landings. Troll line and fish corral landings include also yellowfin and bigeye tuna while multiple handline landings include frigate eastern little tuna and oriental bonito.

The delegate from the Philippines also reported to the meeting that the present research project started from 1979 will be terminated at the end of this year. They expect that the sampling programme currently conducting in the Mindanao region will be no more beyond 1985 although they have done every effort for the continuation of the project. Instead of the sampling programme, they reported that, there was a plan of tagging programme in the Philippine waters starting from 1986 - 1990.

There were no analytical works on catch and effort statistics since 1981/1982. ITPP was requested to provide technical assistance in data processing and analysis and to make a report on tuna resources study in the Philippine waters as a terminal report of the present research project.

Many participants express their views that the present sampling programme be continued as a fundamental monitoring programme on tuna fisheries, at least major landing sites i.e. General Santos, Zamboanga and Navotas. ITPP was requested to support the continuation of the sampling programme in the Philippines.

The Philippines delegate also reported that the length frequency data were processed by a computer, but no analysis has been made since Dr. White, FAO Biologist, left in 1982.

5.3 Thailand

The participant from SEAFDEC and the Thai delegate reported the tuna data collected and research works carried out in Thailand in recent years as follows:

Catch and effort

1. Purse seines

The catch and effort data for coastal tunas in the Gulf of Thailand, 1971 - 1983, is summarized in Table 1. The data were based on the sample surveys, and purse seines are used as the standard gear.

In the Gulf of Thailand the catch of tunas by purse seines during 1971 - 1978 was about 2,600 to 5,900 metric tons which was equivalent to about 42 to 52 percent of the total tuna catch by all gears. Later it increased abruptly. We can say, therefore, that purse seine fishing for tunas in the Gulf of Thailand was initiated in 1979.

During 1971 - 1979 in the Andaman Sea, the catch of tunas by purse seines sustained a stable level of 1,500 - 2,000 metric tons, which was equivalent to about 92 to 100 percent of the total tuna catch by all gears. But recently the catch has been changing year by year with a very wide fluctuation (Table 2)

1.1 Thai purse seine and Chinese purse seine

Thai purse seine which evolved from the Chinese purse seine, is operated in the coastal areas of the Thai waters where the depth of waters ranged from 10 to 50 meters. The favourite time for operation is during moonless nights.

Originally, Thai purse seine was mainly employed for catching such small pelagic fishes as Indo-Pacific mackerel, Indian mackerel, scads and sardines. Coastal tuna was not regarded as a target fish. In 1979 - 1981, therefore the proportion of tuna catch or catch rate of tunas (catch per day) by Thai purse seine was not very high and sustained the lower level of 60 - 70 kg/day in the Gulf. In 1982 however, it increased to a level of 125 kg/day although there was a slight decrease in total fishing days. This suggests that after 1982 Thai purse seine became one of the most important fishing gears for catching tunas in the Gulf of Thailand.

Chinese purse seine has been used only in the Andaman Sea off Thailand. This gear, seems to play an important role for catching longtail tuna (Attached Tables and Figures).

1.2 Luring purse seine

This gear plays the most important role for catching coastal tunas because recently purse seiners have developed and used sophisticated electronic devices for detecting tuna fish schools. In 1983, a very great volume of tunas (85,820 metric tons) was caught by all gears, luring purse seine, accounted for about 83 per cent of the total tuna catch by all gears (Table 1 - A, B).

The fishing grounds of tunas tend to shift year by year toward the southern and off-shore waters (Attached Tables and Figures).

2. King mackerel drift gill net

King mackerel drift gill net is usually operated around islands or along the slightly rough bottom area in waters 29 - 60 meters deep.

The net is usually set against the current as a barrier, in the evening, and it is hauled early the following morning. The operation is done from one or two power boats during the moonless period.

This type of gear is needed mainly for catching king mackerels (Scomberomorus spp.) and coastal tunas. Therefore, during 1972 - 1982 the catch per unit effort (kg/day) of tunas by this gear was rather higher about 2.4 times on the average in the Gulf of Thailand, than that by purse seines (Table 2 - A). The catch rate of tunas by this gear in the Andaman Sea, however, was very low except for the last two years i.e. 1981 and 1982 (Table 2-B).

Good fishing grounds for coastal tunas were found both in north-western and south-eastern waters in the Gulf (Attached Figures)

Dr. Hayase (SEAFDEC) mentioned his view that 1980/1981 was a turning point of changing fishermen's target species focussing on tunas in purse seine fishing in the Gulf of Thailand. The data indicated that there was an interaction between purse seine and gill net. Especially in 1983 as the catch of purse seine fishery increased, the catch of gill net fishery decreased accordingly. In the Gulf of Thailand the gill netting fishermen complained about it and some of them changed their gear to squid lift net and shrimp trawl.

He commented, in his analysis on the relationship between fishing efforts and C.P.U.E., that the number of days fishing seems to be the most suitable unit to apply in stock analysis for purse seine and gill net. (Table 3, Fig. 3)

Monthly catch statistics reveals that longtail tuna (LOT) was caught plentifully during the northeast monsoon season (November to April) by purse seines and gill nets in the Gulf. For tunas NEI (TUN), their catch by purse seines was concentrated rather in the southeast monsoon season (July to October), while the catch by gill nets was higher during the northwest monsoon season especially from January to April both in the Gulf and in the Andaman Sea off Thailand. (Fig.1)

The information derived from the studies on fishing grounds and fishing season for coastal tunas in the Gulf of Thailand is summarized in Figure 2. Generally, during November to February, tuna fishing operations are concentrated in north-western waters. After that, the fishing grounds of tunas tend to shift towards the southern and off-shore waters.

Biological data

1. Species composition

Tuna species mainly contributing to the fisheries of Thailand are longtail tuna (Thunnus tonggol), frigate tuna (Auxis thazard) and kawakawa (Euthynnus affinis). skipjack tuna (Katsuwonus pelamis),

yellowfin tuna (Thunnus albacares), bigeye tuna (Thunnus obesus), dogtooth tuna (Gymnosarda unicolour) and oriental bonito (Sarda orientalis) are also caught in small numbers.

In the Gulf of Thailand, longtail tuna contributes the bulk of the catch as also off the Andaman Sea coast. In 1983, percentage composition indicated that longtail tuna, kawakawa and frigate tuna contribute 56.6, 26.2 and 16.0 per cent respectively of the total catch.

From the sampling surveys, there is a likelihood of the catch composition showing differences among fishing methods, depending on the selectivity of the gear and behaviour of the fish.

Analysis of incidental catch of tuna in the Gulf and in the Andaman Sea showed that tunas are widely distributed in the areas under discussion and the relative density appears to be greater in the oceanic range. This trend may support the hypothesis that coastal tuna stock in Thai waters may be from common stock or from intermingling of stocks of other neighbouring countries (see Table 2 on page 14).

2. Size composition

Length frequency sampling is at present carried out in the Gulf and in the Andaman Sea (Table 1, Fig. 1). Data showing size composition in table and figure do not indicate the samples caught by a specific gear for respective species. It was explained at the meeting that the data of 1979 were mostly from drift gill net and the data of 1984 were from purse seine. The number of fish measured for length frequency were 300 - 500 for each specie per month. With the available data being collected in the Gulf, a monthly modal shift of the size composition can be obtained (Fig. 2). Owing to insufficient sampling in the Andaman Sea, the modes are not clearly defined. However, it was possible to include two or even three age groups.

The information derived from the biological studies for coastal tunas (Thunnus tonggol, Euthynnus affinis and Auxis thazard) is summarized in Table 2.

6. TUNA TAGGING PROGRAMME

The Indonesian delegate reported the tuna tagging programme in the eastern Indonesian waters which was carried out in 1984 and will be carried out in November 1985, as follows:

Tagging for yellowfin and skipjack was conducted in 1984 in Sorong, Ambon and Bitung waters, in collaboration with PT. Usaha Mina (Sorong), Perum Perikani Maluku and PN. Perikani Sulawesi Utara-Tengah respectively. Number of fish released and recovered in those areas are presented in Table 40. The recoveries are still very low (0.42%), far below the expected recoveries (Table 41). The recoveries are only those fish which were released in Sorong and Bitung, but none from Ambon waters. One recovery was reported from Zamboanga (Philippines), four from North of Manus Island (West Pacific) and the others from eastern Indonesian waters (Figure 7). The fishermen also reported three Japanese tagged fish which were released East of the Philippines.

Tagging programme will be continued in November 1985 in Bitung waters, for about 1,600 more fish. The implementation of the first and second legs of this programme have been reported by Yonemori et al (1984).

The participants exchanged their views with each other on the tuna tagging programme in the region. The major points discussed at the meeting were as follows:

One reason for the low recovery rate of the Indonesian tagging in 1984, which was 0.42%, might be due to the high mortality in the initial stage after the tagged fish were released.

A 30 GT commercial fishing vessel, which was used in the Indonesian tagging experiments in the eastern Indonesian waters was suitable in size of boat. There were no problems in the performance of tagging exercise on board vessel.

The Philippine delegate reported a plan of tuna tagging programme in the Philippines waters starting from 1986 through 1990 for 5 years. The plan is now being progressed by requesting a budget amounting 50,000 US\$ per year for government approval. Technical assistance from IPTP was requested for the planning and implementation, since there were no experience in such tagging exercise for scientists in the Philippines. There is a question on the type of gear/boat suitable to carry out tuna tagging in the Philippine waters. There is no pole and line fishing/vessel, which is said to be the most suitable type of gear/boat, in the Philippines. Ringnet is a type of gear suggested by Dr. Yonemori, FAO biologist, to use in tagging in the Philippines. There were however, opinions among the participants that it should be carefully designed and implemented for the tagging programme planned in the Philippines waters.

The Thai delegate also expressed his interest in the tagging on tuna in the Gulf of Thailand. There is a plan to carry out a tagging programme for small pelagic fish. There is, however, the same problem existing in the Philippines where there is no pole and line fishing in the Gulf of Thailand.

There was a view mentioned by IPTP Statistician that SEAFDEC might be in a better position to coordinate and implement the tuna tagging programme with countries in the region with its training vessels which might be suitable for the tagging experiments.

7. OTHER MATTERS

7.1 IPTP Data Collection Forms

IPTP Statistician explained the background of "IPTP DATA COLLECTION FORMS WITH EXPLANATORY NOTES" which will be presented at the Expert Consultation on Stock Assessment of Tuna to be held in Colombo, from 28 November to 2 December 1985. He also described the present situation on IPTP data collection, historical and current data collected, and emphasized that in order to establish a functional data centre, more active international cooperation in data submission was required. He further proceeded to explain the data requirements and data collection forms in detail.

During discussion among participants on the data collection forms, many of them expressed insufficiency of their national data collection systems and the inavailability of timely data submission to IPTP.

7.2 Mapping of Tuna Resources

The proposed programme on mapping of tuna resources in the region including Malaysia was discussed on its procedure and concluded as follows:

- (1) Dr. J. Marcille, Fisheries Resources Officer, will draft a manual describing whole aspects of the programme in early next year and FAO will send it to the respective governments for correction and approval.
- (2) According to the manual corrected and approved by the governments, research staff in a country will carry out an investigation to draft the mapping in their own country.
- (3) A meeting, where the drafted mapping will be presented by the research staff from countries, will be held for steering the mapping to make it more comprehensive and in harmony as a whole in the region.
- (4) A consultant (may be one among scientists in the region) will deal with the mapping for the final stage for its completion in coordination and collaboration with the research staff in the countries.

8. RECOMMENDATIONS

Taking into account the discussion which arised during the meeting, it is recommended that:

1. a mapping of tuna and tuna-like fish resources including seerfishes be conducted for the whole area in the region. This mapping will have to focus the present status of exploitation of different species and the distribution of fishing effort by various gears and fisheries.
2. the present sampling programme be continued in the Philippines after the end of the present project, particularly in the major landing site i.e., in General Santos, Zamboanga and Navotas.
3. effort be made to process and analyse the present available data collected in the Philippines; this include catch and effort data by categories of vessels as well as size frequency data by species gear and areas. Also, in Indonesia activities for data processing and analysis for stock assessment should be strengthened.
4. collection of catch and effort data by species and gear be initiated in North Java and South Kalimantan on the tuna and tuna-like fish and seerfish fisheries.
5. In Indonesia, additional data collection and compilation be implemented for comparative studies on effectiveness between different types and size classes of vessel and different types of gear.

Studies be developed on the effect of recently introduced payaos on the CPUE and size composition of skipjack caught by pole and liners.

6. particular attention to be taken on the state of exploitation of longtail tuna stock in the Gulf of Thailand and on the trends of CPUE by both gillnet and purse seine fisheries.

7. studies on length frequency analysis be initiated to assess the stock of longtail tuna in Thailand.

8. the tuna tagging programme in the Philippines be carefully planned and conducted.

WELCOMING ADDRESS

by

DIRECTOR GENERAL OF THE AGENCY
FOR AGRICULTURE RESEARCH AND DEVELOPMENT

Participants, ladies and gentlemen,

I am very happy to be with you on this joint tuna research group meeting of the Philippines and Indonesia organized by Indo-Pacific Tuna Program, which is also attended by observers from Thailand and Southeast Asian Fisheries Development Center (SEAFDEC).

The first meeting of this kind was held 6 years ago here in Jakarta. If we look back to that year the production of tuna fisheries in Indonesia was only 66,0000 tons. Nowadays the production reached to 124,000 tons which is almost double of that production in 1979.

The Indonesian tuna fisheries has undoubtedly developed in great extent. Problem faced now is different from that 6 years ago. Considering that tuna is a migratory species, information exchange among scientists in the region is quite necessary to be able to know the overall regional movement of this resource, upon which rational management should be based. It is in this context that meeting like this now becomes important.

I express my sincere welcome here in Jakarta and since your stay in Jakarta is quite short, I advice you to visit the New Jakarta Fishing Port and Indonesia Miniature" Taman Mini Indonesia Indah" where you can see the culture of various parts of Indonesia with their special characteristics only in one day.

I hereby declare the meeting open. Have a successful meeting.

Gunawan Satari
Director General of AARD

LIST OF PARTICIPANTSPhilippines

Mr. Reuben Ganaden	Chief, Tuna Research Group, Senior Scientist, Bureau of Fisheries and Aquatic Resources, Manila
Mr. C. Noel Barut	Scientist, Bureau of Fisheries and Aquatic Resources, Manila

Indonesia

Dr. Purwito Martosubroto	Director, Research Institute for Marine Fisheries, Jakarta
Mr. Gede Sedana Merta	Chief, Tuna Research Group, Senior Scientist, Research Institute for Marine Fisheries, Jakarta
Mr. Bachtiar Gafa	Scientist, Research Institute for Marine Fisheries, Jakarta
Mr. Tota Suhendrata	Scientist, Research Institute for Marine Fisheries, Jakarta
Mr. Sofri Bahar	Scientist, Research Institute for Marine Fisheries, Jakarta
(Observers)	
Mr. Priyanto Raharjo	Scientist, Research Institute for Marine Fisheries, Jakarta
Mr. Dikdik Sodikin	Director General of Fisheries (DFG), Jakarta
Mr. A. Rawung	(DFG), Jakarta
Mr. Bambang E. Priyono	(DFG), Jakarta
Mr. Ali Supardan	(DFG), Jakarta
Mr. M. Sihite	(DFG), Jakarta
Mr. A. Dwiponggo	Research Coordinating Centre for Fisheries (RCCF), Jakarta
Mr. Jasin Soetrisno	State Fishing Enterprise, PT. Perikanan Samodra Besar, Jakarta

Mr. Soekaryo

East Indonesian Fisheries Company,
Jakarta

Mr. Sanusi

State Fishing Enterprise, PT. Usaha
Mina, Jakarta

Mr. Awal Marwiji

Second Irian Jaya Fisheries
Development Project, Jakarta

Thailand

Mr. Somsak Chullasorn

Senior Scientist, Marine Fisheries
Division, Dept. of Fisheries,
Bangkok, Thailand

SEAFDEC

Dr. S. Hayase

Research Officer, Training Dept.,
Southeast Asian Fisheries
Development Centre, Bangkok, Thailand

FAO

Dr. J. Marcille

Fisheries Resources Officer, FAO Rome

IPTP

Mr. T. Sakurai

Statistician/Programme Director a.i.,
Indo-Pacific Tuna Development &
Management Programme (IPTP) Colombo,
Sri Lanka

Dr. M. Yao

Tuna Biologist, IPTP-GCP/RAS/099/JPN,
Jakarta Indonesia

A G E N D A

Joint Tuna Research Group Meeting of the Philippines and Indonesia
21 - 23 October, 1985
Jakarta, Indonesia

1. OPENING OF THE MEETING
2. NATIONAL REPORT ON THE RECENT DEVELOPMENT OF TUNA FISHERIES AND RESOURCES
 - Catches and catch rates (by species), fishing gears (both industrial and small-scale fisheries), fishing grounds, fishing seasons, price of fish, processing, marketing etc., in reviewing the recent trends of tuna fisheries.
3. NATIONAL REPORT ON THE TUNA DATA COLLECTION SYSTEM (CATCH/EFFORT, SIZE FREQUENCY, BIOLOGICAL DATA SUCH AS GONAD WEIGHT) AND GENERAL CATCH DATA COLLECTION SYSTEM.
 - Sampling sites, sampling days, number of samplers, number of samples, data collection forms and reporting forms, species and gears selected.
 - Main problems on tuna and tuna-like species involved in the general catch statistics.
4. NATIONAL REPORT ON THE SUMMARY OF TUNA DATA COLLECTED AND RESEARCH WORK.
5. TUNA TAGGING PROGRAMME
 - Tuna tagging experimented in the eastern Indonesian waters and a plan for 1985. A plan of tuna tagging programme in the Philippines waters.
6. OTHER MATTERS
7. RECOMMENDATIONS
 - In conclusion, recommendations for improving and developing the tuna data collection system and research works.

Attached Tables and Figures

- 1) Indonesia
- 2) Philippines
- 3) Thailand

Table 1. The development of tuna fishing companies in Indonesia during the third five years Development Plan (REPELITA III)

Year	State company		Foreign invest		National inv.		Private company	
	Number of company	Number of boat	Number of company	Number of boat	Number of company	Number of boat	Number of company	Number of boat
1979	4	73	1	5	-	-	1	2
1980	4	83	1	3	-	-	1	2
1981	4	93	1	3	2	2	4	13
1982	4	97	2	7	2	2	5	21
1983	4	92	2	8	4	9	5	22
1984	4	92	-	-	-	-	-	-

Source : Tambunan (1985)

Table 2. Companies which were using tuna long line gears in Indonesia

No.	Name of company	No. of boat
1	PT. Perikanan Samodra Besar	20
2	PT. Subur Mina	6
3	Daya Guba Samudra	6
4	Kartika Mina Samodra	2
5	Cipta Samodra	1
6	Bina Mina Musantara	1
7	Sarunta Waja	1
8	PM. Perikani Sulawesi Utara	1
9	Perum Perikani Maluku	1
Total		39

Source : Simorangkir (1982)

Table 3. Total production of marine fisheries, and tuna and tuna-like fishes, 1976 - 1984 (tons)

Commodity	1976	1977	1978	1979	1980	1981	1982	1983
Total production	1,081,589	1,137,691	1,227,386	1,317,744	1,394,810	1,408,272	1,490,719	1,682,019
Tuna and tuna-like	92,440	105,996	102,171	127,315	149,513	170,400	195,669	204,733
As % of total	8.5	9.2	8.3	9.7	10.7	12.1	13.1	12.3

Source : - Directorate General of Fisheries (1976 - 1983). Fisheries Statistics of Indonesia 1976 - 1983.

Table 4. Catch statistics of tuna and tuna-like fishes, 1976 - 1983 (tons)

Area	1976	1977	1978	1979	1980	1981	1982	1983
Eastern Indian Ocean (Area 57)								
- Tuna	1,317	2,345	2,811	3,236	3,368	3,350	3,740	5,888
- Skipjack	5,513	4,034	4,093	6,524	7,573	6,579	11,832	12,658
- Tuna-like	10,149	15,162	9,131	8,791	15,206	17,467	22,860	23,444
Sum	16,979	21,541	16,035	18,551	26,127	27,396	38,432	41,790
Western Pacific Ocean (Area 71)								
- Tuna	6,037	10,859	10,401	14,463	17,550	21,889	24,340	20,200
- Skipjack	25,338	26,376	29,422	36,310	44,245	50,851	49,745	64,332
- Tuna-like	42,086	47,220	46,113	57,791	61,591	70,264	83,152	80,434
Sum	73,461	84,455	86,126	108,564	123,386	143,004	157,237	164,966
Total	92,440	105,996	102,171	127,315	149,513	170,400	195,669	204,733

Source : - Directorate General of Fisheries (1976 - 1983). Fisheries Statistics of Indonesia 1976 - 1983.

Indonesia

Table 5. Catch and effort of the pole and line fishery
in Aertembaga - Mitung

Small Scale Fisheries				PN. Perikani Sulawesi Utara/Tengah				
Year	Total Catch (MT)	Operating Day	CPUE (Kg/OD)	Total Catch (MT)	Effective Fishing day	Operating Day	CPUE (Kg/EFD)	CPUE (Kg/OD)
1979	2,225	2,119	952	2,215	1,845	-	1,200	-
1980	3,851	3,270	1,178	3,737	2,896	4,049	1,290	923
1981	1,963	2,996	655	2,925	3,260	5,276	897	554
1982	2,479	2,411	1,028	3,389	3,120	4,106	1,086	760
1983	2,515	2,370	1,061	2,648	2,497	3,618	1,060	732
1984	1,664	1,435	1,160	1,461	1,409	1,943	1,037	752
1985	-	-	-	622 ¹⁾	743	1,066	837	584

1) January to Augustus

Table 6. Catch and effort of the 30 GT pole and line boats of
PN. Perikani Sulawesi Utara/Tengah in Aertembaga-Bitung

Year	Total Catch (MT)	Effective Fishing day	Operating Day	CPUE		Bait available by day (buckets)	Kg tuna per bucket	Total bait available (buckets)
				(Kg/EFD)	(Kg/OD)			
1979	1,270.5	1,051	-	1,148	-	-	-	-
1980	2,421.8	1,854	-	1,306	-	-	-	-
1981	2,133.9	2,400	3,840	889	556	178.4	13.5	158,618
1982	2,270.8	2,388	3,114	951	729	163.7	14.6	155,720
1983	1,973.9	1,953	2,815	1,011	701	58.3	17.3	113,870
1984	1,017.6	1,053	1,429	944	712	76.2	13.8	73,585
1985	426.5 ¹⁾	514	742	830	575	52.3	15.9	26,891

1) January to Augustus

Table 7. Catch and effort of the 40 GT pole and line boats of
PN. Perikani Sulawesi Utara/Tengah in Aertembaga-Bitung

Year	Total Catch (MT)	Effective Fishing day	Operating Day	CPUE		Bait available by day (buckets)	Kg tuna per bucket	Total bait available (buckets)
				(Kg/EFD)	(Kg/OD)			
1979	944.5	794	-	1,261	-	-	-	-
1980	1,315.4	1,042	-	1,262	-	-	-	-
1981	790.9	860	1,436	920	551	61.8	14.9	53,152
1982	1,017.9	732	992	1,391	1,026	74.8	18.6	54,771
1983	674.5	544	803	1,240	840	64.5	19.2	35,093
1984	443.3	356	514	1,245	863	67.4	18.5	23,985
1985	195.2 ¹⁾	229	324	852	603	55.3	15.4	12,658

1) January to Augustus

Table 8. Catch and effort of the 30 GT pole and line boats of
PT. Usaha Mina (Persero) in Sorong

Year	Total catch (MT)	Fishing Day	CPUE (Kg/ D)	Bait available by day (buckets)	Kg tuna per bucket	Purchased (buckets)	Catch (buckets)	Total bait (buckets)
1976	879.0	1,626	541	17.1	35.5	10,668	17,197	27,865
1977	1,765.1	3,881	455	25.6	17.8	57,832	41,351	99,183
1978	4,834.8	6,106	792	27.2	29.1	83,836	82,329	166,225
1979	4,131.6	5,658	730	21.3	34.2	26,385	94,343	120,728
1980	3,696.6	5,378	687	23.9	28.7	41,685	86,929	128,614
1981	3,575.8	5,179	690	23.5	29.3	23,832	98,109	121,941
1982	2,462.0	4,192	587	22.3	26.3	11,165	82,288	93,463
1983	3,843.6	4,161	924	36.7	25.2	72,356	80,379	152,735
1984	2,057.6	3,021 ¹⁾	574	27.2	21.1	32,660	49,449	82,109
1985	2,710.2 ²⁾	2,400	1,129	31.0	36.7	17,997	56,481	74,486

1) January to October

2) January to Augustus

Table 9. Catch and effort of the 100 GT pole and line boats of PT. Usaha Mina (Persero) in Sorong

Year	Total catch (MT)	Fishing Day	CPUE (Kg/ D)	Bait available by day (buckets)	Kg tuna per bucket	Purchased (buckets)	Catch (buckets)	Total bait (buckets)
1981	217.0	172	1,262	45.5	26.5	1,318	6,858	8,176
1982	326.6	269	1,214	35.4	34.3	466	9,047	9,513
1983	234.1	162	1,443	42.6	34.0	2,676	4,219	6,895
1984	43.6	47	929	34.3	27.1	180	1,431	1,611
1985	159.2 ¹⁾							

1) January to Augustus

Table 10. Catch and effort of the 300 GT pole and line boats of PT. Usaha Mina (Persero) in Sorong

Year	Total catch (MT)	Fishing Day	CPUE (Kg/ D)	Bait available by day (buckets)	Kg tuna per bucket	Purchased (buckets)	Catch (buckets)	Total Bait (buckets)
1980	507.3	148	3,428	83.3	41.1	929	11,402	12,331
1981	742.5	195	3,808	82.5	46.1	7,584	8,511	16,095
1982	591.8	288	2,055	43.5	47.3	1,701	10,813	12,514
1983	624.8	254	2,459	62.4	39.4	10,273	5,586	15,859
1984	259.3	205	1,265	50.0	25.3	3,162	7,093	10,255
1985	591.8 ¹⁾							

1) January to Augustus

Table 11. Catch and effort of the 30 GT pole and line boats of Perum Perikani Maluku in Ambon

Year	Total catch (MT)	Effective Fishing day	Operating Day	CPUE (Kg/EFD) (Kg/OD)		Bait available by day (buckets)	Kg tuna per bucket	Total bait available (buckets)
1979	1,069.5	1,490	1,577	717	678	-	-	-
1980	994.2	1,409	1,487	706	669	-	-	-
1981	1,204.9	1,427	1,437	843	839	-	-	-
1982	915.6	1,128	-	812	-	-	-	-
1983	1,337.3	1,265	-	1,057	-	-	-	-
1984	620.2	1,107	1,878	560	330	14.8	37.8	16,398
1985	518.6 ¹⁾	833	1,196	623	434	13.0	47.9	10,834

1) January to Augustus

Table 13. Catch and effort of the 5 - 30 GT pole and line boats (small scale fisheries) in Ternate

Year	Total catch (MT)	Operation day	CPUE (Kg/OD)	Bait available per day (buckets)	Kg tuna per bucket	Total bait available (buckets)
1976	1,295.2	1,956	662	17.0	38.9	33,276
1977	1,154.3	1,646	701	15.7	44.5	25,918
1978	1,244.5	1,667	747	13.2	56.6	21,993
1979	1,340.4	2,019	664	19.4	34.2	39,147
1980	1,145.8	1,831	626	16.8	37.2	30,807
1981	1,317.2	1,556	847	49.4	17.1	76,930
1982	1,049.4	1,119	938	16.8	55.8	18,794
1983	539.8	927	582	-	-	-
1984	178.7	895	200	-	-	-

Table 12. Monthly catch, effort and catch per unit effort of the 5 - 30 GT pole and line boats (small scale fisheries) in Kendari

Month	1983					1984				
	No. Of Boat (B)	Fishing Day (F)	Catch (C)	C/B	C/F	No. Of Boat (B)	Fishing Day (F)	Catch (C)	C/B	C/F
Jan	28	390	295.7	10.56	0.76	26	238	180.9	6.96	0.76
Feb	25	222	201.7	8.07	0.91	20	126	79.1	3.96	0.63
Mar	20	229	157.8	7.89	0.67	23	204	134.3	5.84	0.66
Apr	19	200	102.3	5.38	0.51	25	207	129.6	5.18	0.63
May	21	260	237.8	11.32	0.91	22	132	73.4	3.34	0.56
Jun	19	147	77.8	4.09	0.53	6	11	1.9	0.32	0.17
Jul	17	33	9.3	0.55	0.28	3	17	13.5	4.50	0.79
Ag	18	117	55.0	3.06	0.47	16	122	87.8	5.49	0.72
Sep	20	227	138.2	6.91	0.61	17	209	251.0	14.76	1.20
Oct	21	301	298.7	14.22	0.99	19	216	226.4	11.92	1.05
Nov	22	301	278.4	12.65	0.93	17	221	223.5	13.15	1.01
Dec	25	267	253.6	10.14	0.95	20	154	78.5	3.93	0.51
Total	255	2,694	2,106.3	94.84	8.52	214	1,857	1,479.9	79.35	8.69
Rata-rata	21	225	175.5	7.90	0.71	18	155	123.3	6.61	0.72

Table 14. Catch and effort of the 200 GT pole and line of Joint Venture Company in Ternate

Year	Total catch (MT)	Effective Fishing Day	CPUE (kg/EFD)	Bait available b y day (Kg)	Kg tuna per kg bait	Total bait available (Kg)
1976	1,209.9	279	4,337	79.2	54.7	22,108
1977	1,020.5	308	3,313	53.4	62.1	16,440
1978	1,653.1	418	3,955	103.0	38.4	43,036
1979	1,731.0	402	4,306	167.3	25.7	67,268
1980	1,193.0	308	3,873	192.5	20.1	59,284
1981	1,487.0	317	4,691	182.7	27.6	57,920
1982	1,365.0	365	3,742	103.9	35.5	37,936
1983	1,226.1	282	4,348	70.0	62.1	19,744

Remarks : - Source : PT. East Indonesian Fisheries, Ternate

Table 15. The development of catch rates of 300 GT pole and line boats of PT. Multitranspeche Indonesia, 1984

Month	Catch (mt)	Bait	Catch/kg bait
January	79.4	1,510* (10,570)	7.5
February	136.2	1,671 (11,697)	11.6
March	211.0	2,557 (17,899)	11.8
April	242.9	3,595 (25,165)	9.7
May	349.7	3,830 (26,810)	13.0
June	350.0	3,629 (25,403)	9.8
July	105.3	2,532 (17,724)	5.9
August	234.7	3,505 (24,535)	9.6

Remarks : - * : in buckets

- in brackets : kgs

- number of boats : 4

- Source : PT. Multitranspeche Indonesia

Table 18. Catch and effort of the 100 GT longliner 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	75,305	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	3,666	149,014	76,784	51.5	53,890	36.2	18,340	12.3	231,711	144	190	4	1.58	1,034.8	784.3

Table 19. Catch of tuna and tuna-like fishes by trolling lines in Bali

Year	Number of gears	Catch (tons)			
		Yellowfin	Skipjack	Tuna-like	Total
1979	5,155	106.6	227.2	3,033.2	3,337.0
1980	5,160	56.2	456.9	2,567.5	3,080.6
1981	5,591	106.7	566.3	3,957.3	4,630.3
1982	7,005	196.9	372.8	3,813.9	4,383.6
1983	7,416	181.0	550.7	4,477.3	5,209.0
1984	6,822	12.5	629.2	4,516.9	5,158.6
Average	6,192	110.0	467.2	3,727.7	4,299.9

Remarks : - Source : Provincial Fisheries Office, Bali

Table 20. Catch rates of trolling gears in
Padang, West Sumatra, 1980-1984

	1980*	1981	1982	1983	1984
Total efforts (f)	2,964	4,448	4,132	3,878	3,357
Catch (C) :					
- Tuna	340,979	572,732	397,101	346,547	282,576
- Skipjack	667,878	1,754,876	1,590,044	1,594,207	1,139,245
- Tuna-like	89,765	688,330	152,050	313,669	no data
C.P.U.E. (C/f):					
- Tuna	115	129	96	89	84
- Skipjack	225	395	385	411	339
- Tuna-like	30	155	37	81	-

Remarks : - Catch : in number of fish (pieces)

- Efforts : in number of boats or trips

- * : May to December

- Source : Bungus landing place, Padang, West

Sumatra

Table 21. Catch rates of trolling gears in Bungus and Pariaman (West Sumatra) landing places (kg/boat/day), 1985

	No. of boat/trip	No. of days	Thunnus albacares	Katsuwonus pelamis	Euthynnus affinis	Auxis thazard	Auxis rochei	Total
Bungus landing place :								
- May :	201	2,003	45,802.2	214,366.8	806.3	8,596.4	-	269,571.7
- Large boats (20 - 33 HP)		(10)						
- Catch/boat/day			22.9	107.0	0.4	4.3	-	134.6
- June :	177	1,371	9,372.7	238,488.8	-	8,346.6	-	256,208.1
- Large boats (20 - 33 HP)		(8)						
- Catch/boat/day			6.8	174.0	-	6.1	-	186.9
- July :	200	2,178	2,908.7	195,621.5	-	5,764.0	-	204,294.2
- Large boats (20 - 33 HP)		(11)						
- Catch/boat/day			1.3	89.8	-	2.6	-	93.8
- Small boats (8 - 16 HP)	11	57	-	8,995.9	-	-	-	8,995.9
- Catch/boat/day		(5)	-	157.8	-	-	-	157.8
- August :	201	838	31,211.0	261,413.0	7,956.0	14,253.0	801.0	315,634.0
- Large boats (20 - 33 HP)		(4)						
- Catch/boat/day			37.2	311.9	9.5	17.0	1.0	376.7
- Small boats (8 - 16 HP)	19	80	366.0	12,241.0	2,102.0	3,019.0	300.0	18,028.0
- Catch/boat/day		(4)	4.6	153.0	26.3	37.7	3.8	225.4
Pariaman landing place :								
- August :	9	50	1,385.0	1,978.0	-	569.0	947.0	4,879.0
- Small boats (8 - 16 HP)		(6)						
- Catch/boat/day			27.7	39.6	-	11.4	18.9	97.6

Remarks : - Source : - Research Institute for Marine Fisheries
- Figure in brackets is number of days per trip

Table 22. Catch and efforts of 600 GT type purse seine boats of joint venture company in Ternate

Year	Catch* (tons)	E.F.D.	O.D.	C.P.U.E.	
				Catch/E.F.D. (ton/day)	Catch/O.D. (ton/day)
1980	1,610	46	191	35	8
1981	2,275	92	206	24	11
1982	2,009	83	223	24	9
1983**	1,204	57	156	21	7

Remarks : - E.F.D. = Effective Fishing Day
- O.D. = Operation Day
- * = about 95% skipjack
- ** = January to July
- Source : PT. East Indonesian Fisheries, Ternate

Table 23. The development of catch rates for skipjack and tuna like fishes of artisanal purse seine in Banda Aceh (kg/boat/day)

Month	1981		1982		1983		1984	
	1	2	1	2	1	2	1	2
Jan.	142	3,558	38	327	137	367	41	337
Feb.	-	3,603	28	1,054	80	675	166	544
Mar.	-	4,419	48	647	130	407	117	739
Apr.	-	677	97	825	350	940	178	765
May	-	326	194	254	290	1,087	331	710
June	-	206	25	1,232	110	193	236	366
July	-	203	141	90	203	223	219	352
Aug.	-	213	208	125	51	92	96	232
Sept.	134	149	63	134	13	169	153	239
Oct.	228	112	65	83	43	45	151	728
Nov.	110	82	40	885	33	109	204	285
Dec.	83	347	1	1,527	94	551	251	185
Average		1,158	79	599	136	405	179	457

Remarks : - Source : Lampulo (Banda Aceh) landing place

1 : Skipjack Tuna

2 : Tuna-like fish

Table 24. Catch rates of artisanal purse seine in Banda Aceh as obtained from sampling (kg/boat/day)

Month	Number of boats	Yellowfin	Skipjack	Auxis spp.
<u>1984</u>				
- May	9	2.2	94.6	40.6
- June	38	2.8	64.0	39.8
- July	50	6.8	39.8	69.7
- August	31	16.1	221.0	196.8
- September	20	6.8	188.0	208.5
- October	174	1.4	58.0	312.7
- November	497	12.6	160.1	55.5
- December	409	4.0	157.5	121.9
<u>1985</u>				
- January	417	0.6	113.7	149.8
- February	404	-	97.7	194.3
- March	314	0.3	47.0	55.7
- April	279	-	7.2	142.7
- May	139	-	12.3	451.7
- June	45	4.9	99.9	51.7
- July	219	-	83.2	104.1

Remarks : - Source : Fishing Technique Development Center, DGF

Table 25. Catch and efforts of purse seine gears in Prigi, South of East Java (tons).

Year	Number of gears	Yellowfin	Skipjack	Tuna-like	Total
1981	47	1.1	8.4	515.6	525.1
1982	40	15.6	6.3	604.2	626.1
1983	41	9.6	16.2	380.9	406.7
1984	40	15.7	67.7	360.9	444.3

Remarks : - Size of boats = 4 to 5 GT

- Coastal Fisheries Landing Center, Prigi

Table 26. Catch and efforts of gill nets in Pelabuhan Ratu, Soth of West Java.

Year	Catch (tons)	Operation days	CPUE kg/day	Percentage			
				Yellowfin	Skipjack	Kawakawa	Frig./Bull.
1981	573.4	8,883	64.6	7.3	88.1	1.2	2.4
1982	844.7	7,717	109.5	30.7	60.0	8.3	1.0
1983	933.9	5,368	174.0	31.7	66.7	4.4	0.2
1984*	190.3	6,321	30.1	9.7	85.8	3.1	1.4

Remarks : - Size of boat = 2.5 to 4 GT
 - No. of boats in 1983 = 169
 - * = January to September
 - Source : Research Institute for Marine Fisheries

Table 27. Catch and efforts of gill nets in Prigi, South of East Java (tons).

Year	Number of gears	Yellowfin	Skipjack	Tuna-like	Total
1981	51	1.1	5.0	49.6	55.7
1982	52	6.1	5.6	29.1	41.8
1983	47	0.6	0	11.0	11.6
1984	47	1.1	12.7	17.9	31.7

Remarks : - Size of boats = 3 to 4 GT
 - Source : Coastal Fisheries Landing Center, Prigi

Table 28. Catch and efforts of gill nets from Muncar, East Java.

Month	Number of boats/trips	Number of days at sea	Catch* (kg)	Remarks
<u>1983</u>				
June	338	1,014	41,768	
July	331	993	86,610	
August	224	672	30,154	
September	264	792	38,405	
October	75	225	14,450	
November	22	66	5,030	} Dominant sharks
December	90	270	14,980	
<u>1984</u>				
January	61	183	16,695	,,
February				
March				
April	123	369	17,430	
May	25	75	3,000	
June	187	561	18,495	
July	119	357	9,545	
August	86	258	14,410	
September	11	33	4,480	
October	9	27	735	Tuna-like
November	1	3	300	Others
December				

Remarks : - * = yellowfin, skipjack and tuna-like combined (dominant skipjack and yellow fin tuna)

- Source : Muncar landing place.

Indonesia

Table 29. Catch and efforts of seine nets (payang) in Pelabuhan Ratu, South of West Java

Year	Catch (tons)	Operation days	CPUE (kg/day)	Percentage			
				Yellowfin	Skipjack	Kawakawa	Frig./Bull.
1981	642.0	1,992	322.3	5.9	5.1	8.0	81.0
1982	2,736.4	9,682	282.6	0.7	6.3	10.0	83.0
1983	912.6	5,638	161.9	10.7	20.4	10.4	58.5
1984	537.7	4,192	128.3	5.9	39.8	----	54.3 -----

Remarks : - Size of boats : 3 to 5 GT

- No. boats in 1983 : 107

-Source : Fisheries sector of Pelabuhan Ratu

Research Institute for Marine Fisheries

Table 30. Monthly catch and efforts of 30 GT pole and line boats, collected in Sorong in 1984

Month	No. of boats	Operating days	No. of trips	Salt (buckets)	Catch (mt)		
					YFT	SKJ	ELT
Jan	24	266	33	8,786	-----	162.2	-----
Feb	24	336	51	10,441	-----	312.2	-----
Mar	24	356	42	10,551	-----	210.1	-----
Apr	24	281	26	9,143	0.1	191.1	22.5
May	23	309	57	9,380	6.4	148.2	-
Jun	21	298	30	6,673	1.0	140.7	-
Jul	19	234	14	6,466	2.5	67.8	-
Aug	23	229	6	4,834	6.9	39.0	-
Sep	23	347	45	8,307	8.7	212.6	-
Oct	23	356	20	7,555	7.1	194.2	-
Nov					43.0	187.5	-
Dec					-	94.0	-

Remarks : - Source : PT. Usaha Mina (Persero), Sorong

- YFT : yellowfin tuna, Thunnus albacares- SKJ : skipjack, Katsuwonus pelamis- ELT : eastern little tuna, Euthynnus affinis

Table 31. Catch and efforts of 30 GT pole and line boats, collected in Ambon in 1984.

Month	No. of boats	Operating days	E.F.D.	Bait (kg)	Catch (kg)	
					YFT	SKJ
Jan	8	146	75	886	3,936.3	25,906.7
Feb	10	177	118	1,928	10,159.2	67,155.8
Mar	10	227	136	1,726	2,957.7	115,350.3
Apr	10	180	99	1,045	1,570.3	46,450.7
May	8	130	74	856	305.8	16,683.2
Jun	6	69	30	462	767.9	5,390.1
Jul	6	93	39	465	-----	10,127 -----
Aug	6	92	43	621	-----	6,528 -----
Sep	8	140	87	1,285	-----	50,178 -----
Oct	10	234	158	2,875	-----	109,953 -----
Nov	10	202	132	2,265	-----	45,239 -----
Dec	10	188	116	1,984	-----	20,697 -----

Remarks : - YFT : yellowfin tuna, Thunnus albacares- SKJ : skipjack, Katsuwonus pelamis

- Source : - Research Institute for Marine Fisheries

- Perum Perikani Maluku, Ambon

Table 32. Catch and efforts data of gill net gears collected in Pelabuhan Ratu in 1984

Month	No. of boats/trips	Operation days	Catch			
			YFT	SKJ	ELT	AUX
Jan	110	330	642 (1,981.2)	2,374 (7,300.0)	165 (115.7)	72*
Feb	161	483	440 (1,234.2)	2,853 (13,665.9)	84 (92.7)	361
Mar	169	507	1,402 (4,459.8)	2,472 (8,822.6)	700 (2,004.1)	359
Apr	209	627	879 (2,767.1)	3,852 (12,295.6)	639 (619.8)	239 (211.5)
May	263	789	1,520 (4,781.9)	7,185 (45,050.0)	445 (727.1)	90 (73.6)
Jun	314	942	791 (2,652.2)	19,756 (61,144.8)	350 (378.4)	599 (506.8)
Jul	331	993	745 (2,369.1)	9,173 (28,977.5)	1,245 (1,709.1)	207 (189.6)
Aug	419	1,257	1,032 (4,434.5)	17,600 (72,723.2)	370 (817.0)	544 (76.0)
Sep	219	657	168 (1,000.1)	6,120 (29,088.4)	113 (165.5)	300 (342.7)
Oct	140	420	242 (1,399.2)	2,757 (13,007.5)	14	5 (5.2)
Nov						
Dec						

nm Remarks : - * : in pieces

- in brackets : kg

Indonesia

Table 33. Length frequency distributions of yellowfin tuna sampled from pole and lines in Sorong, 1984.

LENGTH	1984											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Okt	Nop	Dec
28 - 31												
32 - 35									1			
36 - 39												
40 - 43							1			5	9	
44 - 47	1		1	3	7					16	22	
48 - 51	10	1	11	5	10	2	9		7	11	10	
52 - 55	17	12	26	7	12	3	8	1	11	14	9	
56 - 59	39	20	55	15	16	9	14	2	9	1	4	
60 - 63	15	21	30		24	16	9	2	10	2	1	
64 - 67	2	2	5		7	1	6	2	5	1		
68 - 71	1	1	2		3	2	1	3	4	3	1	
72 - 75	4	2		1			1					
76 - 79												
N	89	59	130	31	79	33	49	10	47	53	56	

Table 34. Length frequency distributions of skipjack sampled from pole and lines in Sorong, 1984.

LENGTH	1984											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Okt	Nop	Dec
28 - 31										6		
32 - 35								1		3		
36 - 39				1	4				1	14		
40 - 43		5	26	35	40	4	3	1	14	80	42	12
44 - 47	6	34	107	97	75	8	18	1	31	68	56	12
48 - 51	53	73	62	20	74	79	72	15	160	106	100	28
52 - 55	122	152	103	51	115	132	116	46	114	57	74	22
56 - 59	54	92	21	14	32	40	26	30	45	16	23	4
60 - 63	5	4	1		12	2		4	6		5	1
64 - 67					2	1		1	1			
68 - 71												
N	240	360	320	238	354	266	235	99	372	350	300	79

Table 35. Length frequency distributions of yellowfin tuna sampled from pole and lines in Ambon, 1984.

LENGTH	1984			
	Jan	Feb	Mar	Jun
28 - 31				
32 - 35				
36 - 39				
40 - 43	5	1		
44 - 47	4	7	4	3
48 - 51	1	1		3
52 - 55				1
56 - 59			1	7
60 - 63			2	11
64 - 67			1	3
68 - 71				2
N	10	9	8	30

Table 36. Length frequency distributions of skipjack
sampled from pole and lines in Ambon, 1984

LENGTH	1984					
	Jan	Feb	Mar	Apr	May	Jun
28 - 31	3	1				
32 - 35	1		1			
36 - 39	3	1	3			1
40 - 43	18	17	22	24	8	
44 - 47	32	35	50	27	10	16
48 - 51	19	15	26	10	25	56
52 - 55	8		20	2	24	18
56 - 59	3		12	5	9	9
60 - 63		1	1			
N	87	70	135	65	76	99

Table 37. Length frequency distributions of yellowfin
tuna sampled from gill nets in Pelabuhan
Ratu, South of West Java, 1984.

LENGTH	1984									
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
28 - 31										
32 - 35			2			3				
36 - 39	1	1	6			3	1			4
40 - 43	1	2	1		2	6	1			1
44 - 47	7	2	1	2	7	5	4	7	2	5
48 - 51	26	10	29	5	10	14	25	33		4
52 - 55	46	22	51	83	69	92	36	65	1	9
56 - 59	24	22	54	30	24	23	38	39	4	6
60 - 63		4		1	2	8	1	15		3
64 - 67	1	2	3			6		6	3	11
68 - 71	1	1	3			10	1	6	23	25
72 - 75	1	2	2			1		7	9	9
76 - 79	5	5	1	1				4	3	6
80 - 83		1	2			1		1	2	2
84 - 87		6	2	2	1			1	2	
88 - 91	1	3	3							
92 - 95		1	1							
96 - 99										
N	114	84	162	124	115	172	107	184	49	88

Table 38. Length frequency distribution of skipjack sampled from gill nets in Pelabuhan Ratu, South of West Java, 1984.

LENGTH	Jan	Feb	Mar	Apr	1984 May	Jun	Jul	Aug	Sep	Okt
28 - 31	2									
32 - 35	2					1				
36 - 39	2	2	1					4	1	
40 - 43	2	1	10		1	8	5	6	1	
44 - 47	29	37	39	9	6	21	43	38	8	8
48 - 51	63	60	42	64	35	105	81	51	28	30
52 - 55	93	41	21	120	69	138	152	91	53	41
56 - 59	37	171	90	29	85	75	137	210	146	98
60 - 63	3	25	36	11	85	9	33	130	174	149
64 - 67				6	16	2	3	20	73	44
68 - 71		1	1	2	1					2
72 - 75			1							
76 - 79										
N	233	339	242	241	298	359	454	550	484	372

Table 39. Length frequency distributions of tuna and tuna-like fishes from Padang, May to August 1985.

Length class (cm)	<u>T. albacares</u>				<u>K. pelamis</u>				<u>E. affinis</u>				<u>A. thazard</u>				<u>A. rochei</u>			
	5	6	7	8	5	6	7	8	5	6	7	8	5	6	7	8	5	6	7	8
16 - 19					1															
20 - 23	1				1	4	1	1		2			5		3					
24 - 27	7	1		4	18	26	56	10	2	22			20	24	14	26			3	
28 - 31	13	0	1	1	51	64	103	41	2	26			49	21	11	61			6	
32 - 35	28	10	4	5	78	96	210	35	2	19			22	24	1	44			5	
36 - 39	38	11	7	4	102	103	228	131	1	18			71	8	1	30			10	
40 - 43	25	8	2	12	101	113	178	177	1	3			64	5	0	64			1	
44 - 47	29	2	0	6	125	118	130	186	1				50	2	6	55			1	
48 - 51	46	9	2	50	191	146	168	155	1					1	6	9			1	
52 - 55	93	12	6	80	127	129	82	141								1				
56 - 59	58	9	11	62	122	101	58	152												
60 - 63	41	3	4	84	47	60	23	29												
64 - 67	10	2	1	51	18	13	15	49												
68 - 71	12	1	1	12	9			2												
72 - 75	7	0	1	3	2															
76 - 79	1	0		0	2															
80 - 83	3	0		2	1															
84 - 87	4	0		0	0															
88 - 91	3	2		2	1															
92 - 95	1			1																
	420	70	40	380	1000	970	1252	1108	10	90			276	100	43	269			29	

Source : Research Institute for Marine Fisheries

Table 40. Number of tagged fish released and recovered during tagging programme.

	Sorong			Ambon			Bitung			Total		
	1	2	3	1	2	3	1	2	3	1	2	3
Released	2,449	530	2,979	1,688	308	1,996	1,288	146	1,434	5,425	987	6,409
Recovered	101	2	12	-	-	-	15	-	15	25	2	27

Remarks : - 1 - skipjack, Katsuwonus pelamis

- 2 - yellowfin tuna, Thunnus albacares

- 3 - sum

- Source - Research Institute for Marine Fisheries (RIMF)

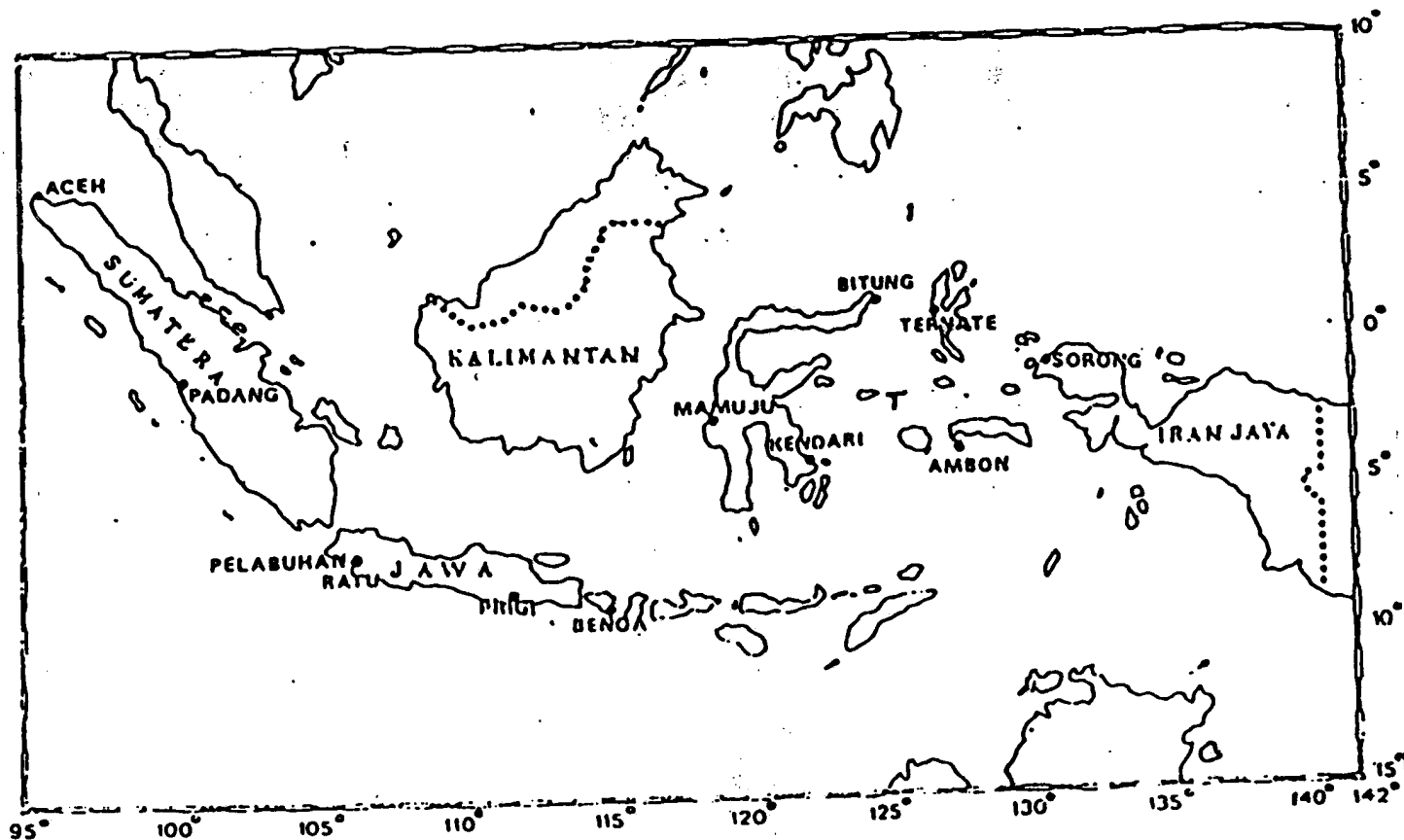
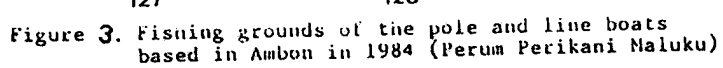
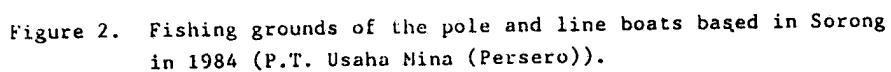
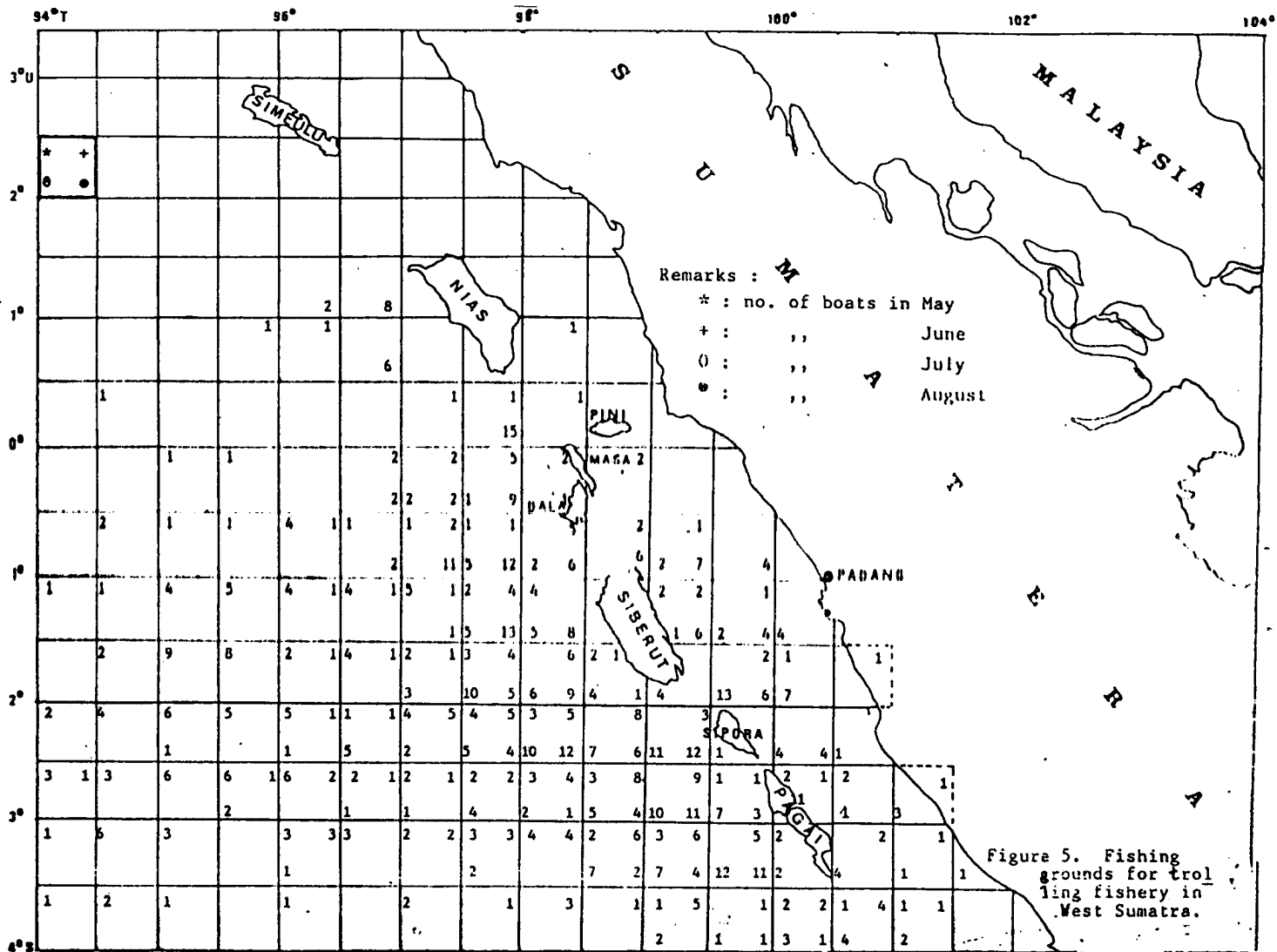
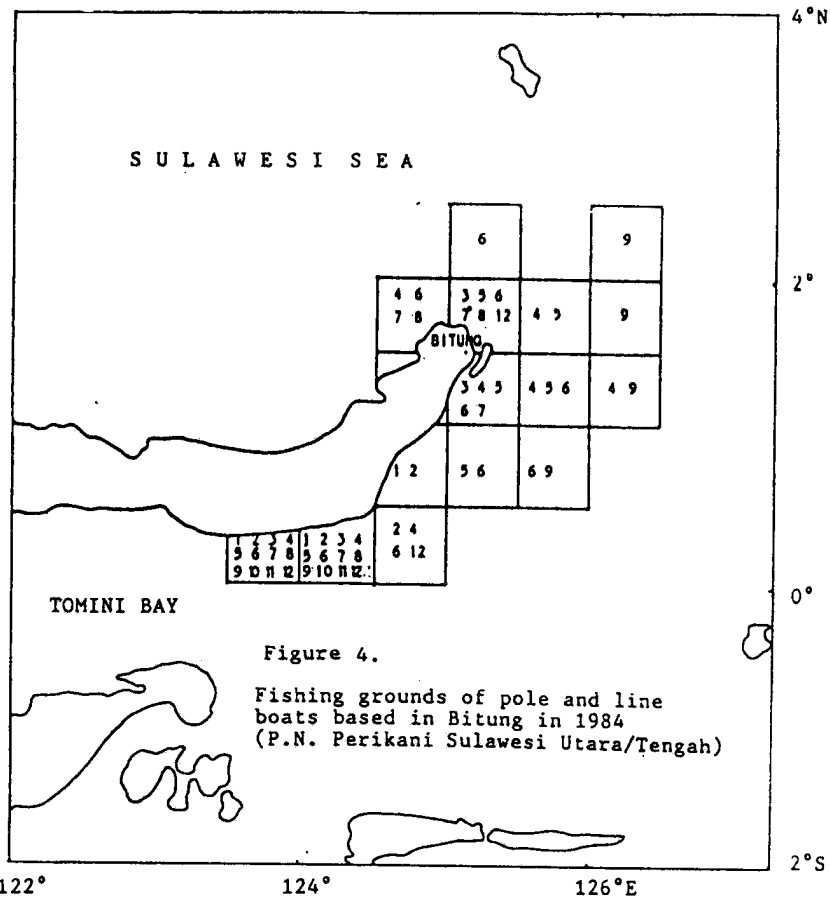


Figure 1 Map showing tuna sampling sites

Table 4j. Tag and recovery information for each tagged shipjack released in east Indonesian waters

RECNO		TAGNO.	SP.	DATE	G.	LAT.	LONG.	LENGTH	DAYS	DIST.
1	RELEASE	A0121	Y	19 12 83	1	S 00 14	E 129 53	45		
1	RECOVERY	A0121	Y	28 02 84	1	S 00 31	E 130 34	46	71	44.4
2	RELEASE	B0016	S	12 04 84	1	N 01 28	E 125 23	44		
2	RECOVERY	B0016	S	07 03 84	1	N 01 40	E 125 30	46	25	13.0
3	RELEASE	A5121	S	04 05 84	1	N 00 19	E 124 14	44		
3	RECOVERY	A5121	S	16 05 84	1	S 00 20	E 123 10	45	10	76.7
4	RELEASE	A5138	S	04 05 84	1	N 00 19	E 124 14	46		
4	RECOVERY	A5138	S	21 05 84	1	S 00 20	E 123 00	47	15	85.4
5	RELEASE	A5022	S	03 03 84	1	N 00 10	E 123 46	46		
5	RECOVERY	A5022	S	09 03 84	1	S 00 20	E 123 00	48	4	54.9
6	RELEASE	A5056	S	05 05 84	1	N 00 25	E 124 15	45		
6	RECOVERY	A5056	S	14 05 84	1	S 00 20	E 123 10	0	9	79.1
7	RELEASE	A5017	S	05 05 84	1	N 00 10	E 123 46	46		
7	RECOVERY	A5017	S	19 05 84	1	N 00 05	E 123 55	48	14	10.3
8	RELEASE	A5637	S	20 05 84	1	N 00 21	E 124 31	48		
8	RECOVERY	A5637	S	20 05 84	1	S 00 15	E 123 55	50	0	50.9
9	RELEASE	B0116	S	12 04 84	1	N 01 28	E 125 23	45		
9	RECOVERY	B0116	S	13 05 84	1	S 01 35	E 125 40	42	31	203.6
10	RELEASE	A1000	S	18 04 84	1	S 00 41	E 131 03	41		
10	RECOVERY	A1000	S	27 04 84	1	S 00 35	E 130 50	42	9	14.3
11	RELEASE	A0919	S	18 04 84	1	S 00 41	E 131 03	45		
11	RECOVERY	A0919	S	28 04 84	1	S 00 35	E 130 50	45	10	14.3
12	RELEASE	A0769	S	16 04 84	1	S 00 37	E 130 53	44		
12	RECOVERY	A0769	S	28 04 84	1	S 00 35	E 130 50	44	12	3.6
13	RELEASE	A0761	S	16 04 84	1	S 00 37	E 130 53	56		
13	RECOVERY	A0761	S	02 05 84	1	S 00 35	E 130 50	56	16	3.6
14	RELEASE	B0645	S	25 04 84	1	N 01 03	E 125 23	44		
14	RECOVERY	B0645	S	12 07 84	3	N 00 22	E 132 47	52	78	444.0
15	RELEASE	B0220	S	12 04 84	1	N 01 28	E 125 23	42		
15	RECOVERY	B0220	S	15 08 84	3	N 01 10	E 131 30	53	125	345.0
16	RELEASE	A2116	S	11 05 84	1	S 00 12	E 129 53	55		
16	RECOVERY	A2116	S	15 08 84	1	N 01 10	E 131 30	60	96	127.0
17	RELEASE	A0982	S	18 04 84	1	S 00 41	E 131 03	41		
17	RECOVERY	A0982	S	09 09 84	1	S 00 30	E 131 10	51	144	13.0
18	RELEASE	A0161	S	07 01 84	1	S 00 03	E 129 14	42		
18	RECOVERY	A0161	S	27 08 84	3	N 00 58	E 147 21	55	233	1088.5
19	RELEASE	A0118	Y	19 12 83	1	S 00 14	E 129 53	42		
19	RECOVERY	A0118	Y	02 09 84	1	N 00 20	E 123 10	60	258	404.4
20	RELEASE	B0147	S	12 04 84	1	N 01 28	E 125 24	48		
20	RECOVERY	B0147	S	17 09 84	1	N 00 22	E 124 45	50	150	76.6
21	RELEASE	A0958	S	18 04 84	1	S 00 41	E 131 03	43		
21	RECOVERY	A0958	S	27 10 84	3	N 02 02	E 147 28	51	192	998.2
22	RELEASE	B0116	S	12 04 84	1	N 01 28	E 125 24	43		
22	RECOVERY	B0116	S	13 05 84	1	N 01 35	E 125 40	45	31	31.4
23	RELEASE	B0954	S	25 04 84	1	N 01 03	E 125 23	45		
23	RECOVERY	B0954	S	20 09 84	1	S 03 05	E 127 45	48	148	285.7
24	RELEASE	A0171	S	07 01 84	1	S 00 03	E 129 14	42		
24	RECOVERY	A0171	S	06 12 84	1	S 00 30	E 131 10	50	334	119.1
25	RELEASE	B0123	S	12 04 84	1	N 01 28	E 125 24	40		
25	RECOVERY	B0123	S	01 02 85	1	N 07 20	E 022 20	0	295	396.9
26	RELEASE	A2242	S	11 05 84	1	S 00 12	E 129 53	48		
26	RECOVERY	A2242	S	16 10 84	3	N 02 57	E 145 38	51	158	5322.8
27	RELEASE	B0821	S	25 04 84	1	N 01 03	E 125 23	44		
27	RECOVERY	B0821	S	22 01 85	2	S 00 46	E 145 55	55	272	1229.1





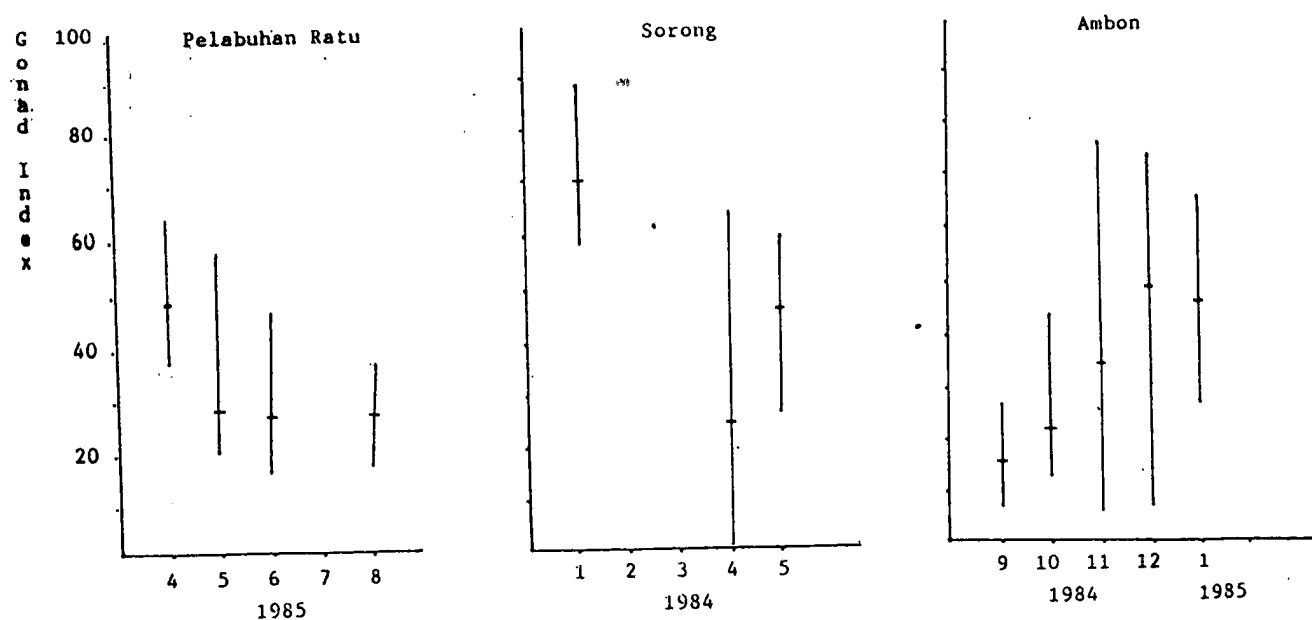


Figure 6. Gonad Index development for skipjack caught in Pelabuhan Ratu, Sorong and Ambon

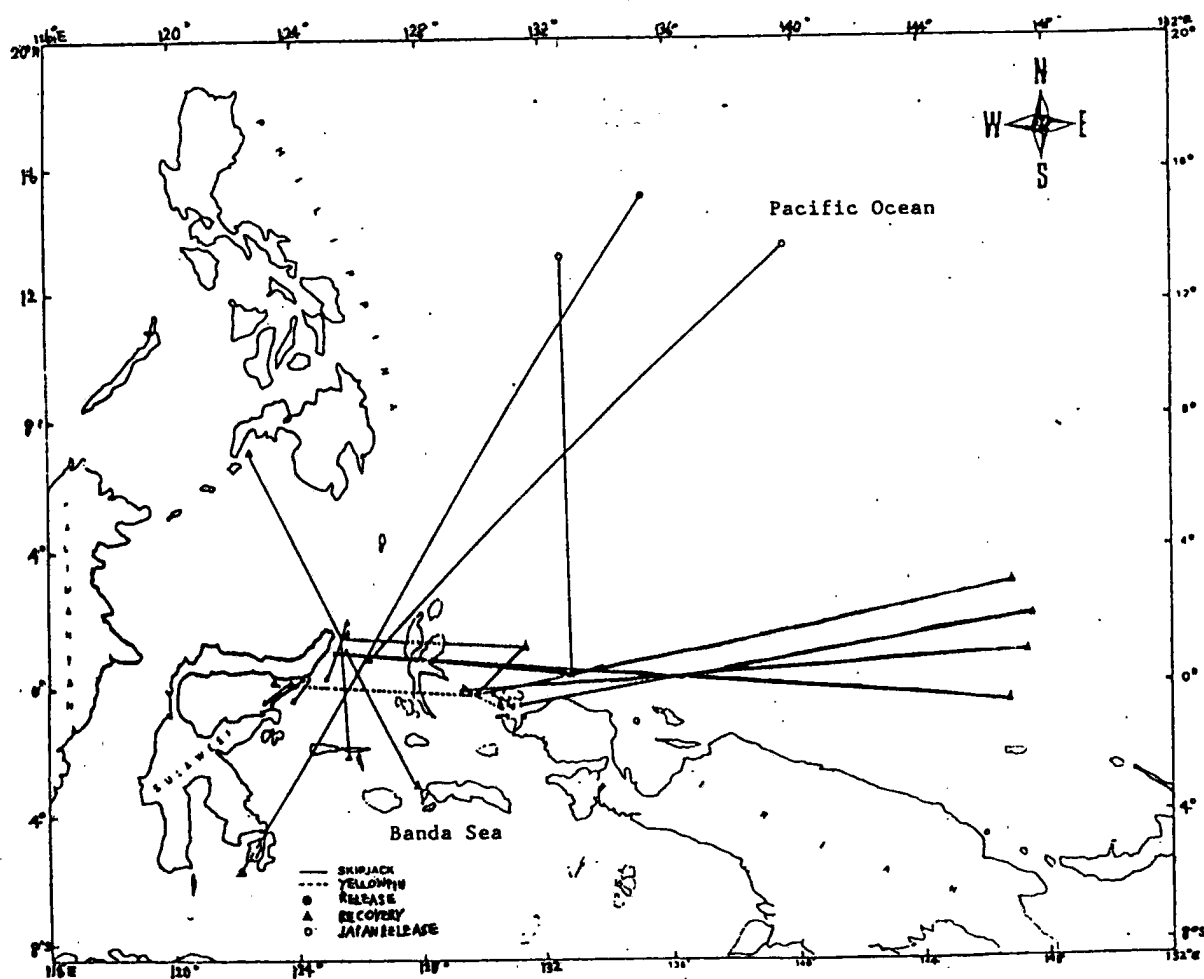


Figure 7. Straight line representations for tagged yellowfin and skipjack in East Indonesian waters.

Philippines - Tuna Production and Marketing

Table 1 Production of Tuna from 1980-1984 (M.T.)

SPECIES	COMMERCIAL					MUNICIPAL					TOTAL				
	1980	1981	1982	1983	1984	1980	1981	1982	1983	1984	1980	1981	1982	1983	1984
Frigate /Bullet Tuna	53310	47141	39862	34097	47360	43564	3107	27501	40236	32945	96874	78248	67363	74 33	80305
Yellowfin/Big-eye Tuna	11496	20073	19787	20507	22254	3527	36103	3135	41585	3670	48023	56176	58922	62092	58924
Skipjack	12486	17706	31188	39613	28871	18692	20733	19612	17455	15800	31178	38439	50795	57068	44671
Eastern Little Tuna	9958	13071	14442	12359	18832	14772	17820	32082	36605	23067	24730	30891	46524	49064	41899
TOTAL	87250	97991	105274	105676	117317	113555	105763	111330	135881	108482	200805	203754	216604	242557	225799

Table 2 - Philippine Tuna Landings for 1984 by type of gear (M.T.)

COMMERCIAL LANDINGS

	TOTAL	BAGNET	TRAWL	PURSE SEINE	RINCNET	ROUNDHAUL	HOOK & LINE	BEACH SEINE
Frigate	47360	5781	1	15695	25386	9	117	357
Yellowfin/Big-eye	22294	735	6	18728	2259	-	98	428
Skipjack	28943	36	34	23440	5256	-	78	-
Eastern Little Tuna	18932	6240	28	8232	4317	-	11	4
TOTAL	117589	12791	69	66095	37110	9	304	789

Philippines - Tuna Production and Marketing

Table 3 Philippine Tuna Landings for 1984 by type of Gear (M.T.)

MUNICIPAL LANDINGS

SPECIES	TOTAL	GILLNET	BAGNET	FISH CORRAL	BEACH SEINE	PURSE SEINE	HOOK & RINGNET	LONG-LINE	TROL-LINE	OTHERS
Frigate	32945	9519	22801	79	562	4966	11976	1359	2075	129
Yellowfin/Big-eye	36670	2160	17	30	84	2001	30906	857	586	29
Skipjack	15800	1221	28	616	104	1281	11403	624	502	21
Eastern little tuna	23067	3268	3762	71	90	3792	11010	164	11	899
TOTAL	108482	16168	6087	796	840	12040	65295	3004	3174	1078

Table 4 Tuna Landings by Statistical Fishing Area 1984 (M.T.)

STATISTICAL FISHING AREA	QUANTITY	PERCENTAGE
1. Lingayen Gulf	7185	3.18
2. Manila Bay	6797	3.01
3. Batangas Coast	6546	2.90
4. Tayabas Bay	4153	1.84
5. West Palawan Waters	999	0.44
6. Cuyo Pass	17882	7.92
7. West Sulu Sea	6031	2.67
8. South Sulu Sea	26443	11.71
9. East Sulu Sea	14560	6.45
10. Moro Gulf	59769	26.47
11. Davao Gulf	6603	2.93
12. Bohol Sea	18117	8.02
13. Leyte Gulf	2898	1.28
14. Camotes Sea	3720	1.65
15. Visayan Sea	9648	4.27
16. Guimaras Strait	8943	3.96
17. Sibuyan Sea	3907	1.73
18. Ragay Gulf	10837	4.80
19. Samar Sea	3078	1.36
20. Lagonoy Gulf	2393	1.06
21. Lamon Bay	3670	1.62
22. Casiguran Sound	982	0.44
23. Babuyan Channel	638	0.28
TOTAL	225799	99.99

Table 5 Export of Tuna from 1980 - 1984 (M.T.)

	1980	1981	1982	1983	1984
	Volume	Volume	Volume	Volume	Volume
Frozen/Chilled Tuna	47290	35830	17731	18401	13387
Smoked	551	341	193	88	-
Canned	71	18033	19411	23538	22599
Dried	-	-	-	-	44
TOTAL	47912	54204	37335	42027	36030

Philippine - Tuna Production and Marketing

Table 6 Export of fresh/frozen/chilled tuna from the Philippines by Destination (M.T.)

	1980	1981	1982	1983	1984
Denmark		24	63	22	
Hawaii	1115	325	1018		3
Hongkong			3		
Israel	66	73	85		45
Italy	948	5651	4545	8310	6238
Japan	1923	3710	5120	4812	6998
Korea	2067				
Panama	100				
Puerto Rico	1280				
Singapore	4138	1696		593	
Spain		200			
Switzerland	350	533			
Thailand			360		
United Kingdom			20		
U.S.A.	26770	23616	6509	4796	103
Others	1245	947	1008		
TOTAL	40002	36775	18739	18533	13387

Table 7 Export of Canned Tuna from the Philippines by Destination, 1980-1984 (M.T.)

	1980	1981	1982	1983	1984
Australia		294	14278	384	585
Belgium		95	51	78	69
Canada		2	1268	1790	2056
Denmark		145	40	15	56
Finland		243	67	165	48
France		141	42	143	140
Federal Republic of Germany	71	3	2717	3312	4763
Israel		88	122	13	28
Lebanon			71	14	257
Malta-Gozo					173
Netherlands		45	79	64	198
Sweden		69	164	463	553
Switzerland		140	126	168	214
United Kingdom		1327	1368	3049	3050
U.S.A.		10699	13252	13610	10224
Others		18020	19377	23514	22567
TOTAL	71	31311	53022	46782	44981

Table 8 Average Producers' Price of Tuna

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

Philippines - Tuna Research Project

Table 1 No. of vessels monitored and total no. of tuna landed and sampled from January-December 1984.

SAMPLING SITES	FISHING GEAR	VESSELS			LANDINGS (Kg.)		
		TOTAL NO.	MONITORED	% MONITORED	TOTAL NO.	NO. SAMPLED	% SAMPLED
STA. CRUZ	Ringnet	184	179	97	57,330	11,680	20.23
	Handline	545	538	99	31,883	12,414	38.93
O P O L	Ringnet	304	271	89	243,545	2,480	1.01
	Handline	115	82	71	1,649	1,649	100.00
ZAMBOANGA CITY	Ringnet	352	325	92	785,937	17,854	2.27
	Purse seine	122	122	100	13,304,650	478,275	3.59
	Handline	377	317	84	64,253	41,430	62.53
	Troll line	170	170	100	19,001	8,736	45.98
	Multiple handline	77	77	100	5,171	762	14.74
	Fish Coral	9	9	100	12,465	12,465	100.00
GEN. SANTOS CITY	Ringnet	461	178	39	2,310,449	4,703	0.20
	Purse seine	173	60	49	442,610	1,667	0.38
	Handline	3,340	195	6	1,104,893	75,015	6.79
NAVOTAS	Purse seine	95	95	100	4,677,885	55,775	1.19
	Tuna longline	1	1	100	5,000	-	-
ALL SITES	Ringnet	1,301	953	73	3,399,281	34,159	1.00
	Purse seine	353	277	78	18,425,145	535,717	2.91
	Handline	4,377	1,132	26	1,204,680	150,508	10.83
	Multiple handline	77	77	100	5,171	762	14.74
	Troll line	170	170	100	19,001	8,736	45.98
	Tuna longline	1	1	100	5,000	-	-
	Fish coral	9	9	100	12,465	12,465	100.00

Table 2 Percentage species composition, site and fishing gear (1984)

SAMPLING SITES	FISHING GEARS	SPECIES							
		SJ	YF	BET	FT	BT	ELT	OB	
STA. CRUZ	Ringnet	73.66	13.68	-	9.66	2.93	0.06	-	
	Handline	15.04	82.91	2.04	0.01	-	-	-	
O P O L	Ringnet	4.16	5.76	-	0.14	89.93	-	-	
	Handline	21.01	74.01	-	4.97	-	-	-	
ZAMBOANGA CITY	Ringnet	65.97	1.56	-	8.96	13.33	8.08	2.10	
	Handline	18.60	74.43	3.88	0.32	0.82	1.95	-	
	Purse seine	55.96	37.07	2.29	0.31	4.37	-	-	
	Troll line	74.99	22.59	2.42	-	-	-	-	
	Multiple Handline	-	-	-	6.03	61.79	28.43	3.75	
	Fish Coral	39.00	52.51	8.50	-	-	-	-	
GEN. SANTOS CITY	Ringnet	56.02	25.30	2.85	9.21	4.91	1.71	-	
	Handline	0.12	98.02	1.86	-	-	-	-	
	Purse seine	49.42	22.25	0.75	14.76	11.38	1.44	-	
NAVOTAS	Purse seine	51.79	33.77	1.75	8.23	3.69	0.66	0.11	
	Tuna longline	25.00	43.00	32.00	-	-	-	-	

Philippines - Tuna Research Project

Table 3 Catch and Catch Rate of tunas caught by different fishing gear per area (1984) (kg.)

SAMPLING CENTERS	FISHING GEAR	TOTAL NO. OF VESSELS	TOTAL NO. OF FISHING DAYS	TOTAL CATCH (KG.)	CATCH RATE (KG.)
STA. CRUZ	RN	184	169	57,350	342
	HL	545	655	31,885	58
O P O L	RN	304	84	245,545	808
	HL	115	40	1,649	14
GEN. SANTOS CITY	RN	461	310	2,310,449	5,012
	HL	3,340	382	1,104,893	331
	PS	123	85	442,610	3,598
ZAMBOANGA CITY	RN	352	165	785,937	2,233
	HL	377	300	66,253	176
	PS	122	833	13,304,650	109,054
	MHL	77	41	5,171	67
	TL	170	140	19,001	112
	FC	9	8	12,465	1,385
NAVOTAS, M.M.	PS	95		4,677,888	49,241
	TLL	1		5,000	5,000

LEGEND:

RN - Ringnet
 HL - Handline
 PS - Purse seine
 TL - Troll line
 MHL - Multiple hand line
 FC - Fish Corral
 TLL - Tuna longline

Table 4 Total tuna catch (in kg.) landed in Sta. Cruz by species, gear and by month (1984)

FISHING GEAR	MONTH	NO. OF VESSEL	S P E C I E S								TOTAL
			SJ	YF	BET	FT	BT	ELT	OB		
RINGNET	JAN	18	10,001	497		495	123			11,116	
	FEB	18	8,062							8,062	
	MAR	13	2,913	209		182				3,304	
	APR	17	2,385	313		29				2,727	
	MAY	18	1,999	573		267	55	1.00		2,895	
	JUN	22	2,150	1,407		567	391			4,515	
	JUL	12	455	842		361	132			1,790	
	AUG	12	3,272	845		476	175			4,768	
	SEP	16	1,685	908		532	121	34		3,280	
	OCT	12	5,166	1,561		1,675	280			8,682	
	NOV	12	1,030	620		203	73			1,926	
	DEC	14	3,127	70		755	333			4,285	
TOTAL		184	42,245	7,845		5,542	1,683	35		57,350	
HANDLINE	JAN	61	300	3,328	359					3,987	
	FEB	30	14	2,221	138					2,373	
	MAR	60	254	4,611						4,865	
	APR	55	3,832	85						3,917	
	MAY	56	166	1,748						1,914	
	JUN	61	130	2,273						2,403	
	JUL	47	17	2,054						2,071	
	AUG	14	4	778	48					830	
	SEP	80	39	4,811	105					4,955	
	OCT	11	21	1,038		4				1,063	
	NOV	52	19	3,021						3,040	
	DEC	18		465						465	
TOTAL		545	4,796	26,433	650	4				31,883	

Philippines - Tuna Research Project

Table 4 Total tuna catch (in kg.) landed in Zamboanga City by species, gear and by month (1984)

FISHING GEAR	MONTH	NO. OF VESSEL	S P E C I E S						TOTAL	
			SJ	YF	BET	FI	BT	ELT		OB
RINGNET	JAN	32	20,063			5,304	13,520	3366	2348	44,601
	FEB	28	45,194			6,342	6,610	3026	1326	62,498
	MAR	37	105,996			6,867	14,030	3638	2006	132,537
	APR	27	37,097			9,371	5,526	4156	1244	57,394
	MAY	24	16,256			7,120	7,840	5845	1326	38,387
	JUN	26	52,210			3,944	3,434	5848	1632	67,068
	JUL	37	70,819			7,474	13,158	10,174	1782	103,407
	AUG	29	40,581			7,503	6,193	10,166	2244	66,687
	SEP	28	40,003			2,856	6,384	4114	1358	54,715
	OCT	26	27,744			4,128	5,653	5202		42,727
	NOV	37	35,224	12,240		8,932	17,806	3864	646	78,712
	DEC	21	27,292			578	4,616	4100	618	37,204
TOTAL		352	518,479	12,240		70,419	104,770	63,499	16,530	785,937
PURSE SEINE	JAN	16	397,083	156,699	984		9,297			564,063
	FEB	10	592,821	178,322	17,414		36,149			824,706
	MAR	16	1,352	2,780	164					4,296
	APR	7	731,697	426,034	162,910		14,135			1,334,776
	MAY	14	1,281,800	1,004,531	35,504	39,984	104,702			2,466,521
	JUN	15	1,279,260	1,044,729	4,926		286,046			2,614,961
	JUL	9	403,792	464,683			28,443			896,918
	AUG	7	407,901	311,060			3,500			722,461
	SEP	6	381,066	182,068						563,134
	OCT	11	1,009,133	562,821	82,422		43,386			1,697,762
	NOV	6	456,344	178,650			44,320			679,314
	DEC	5	502,920	419,842		1,524	11,452			955,738
TOTAL		122	7,445,169	4,932,219	304,324	41,508	581,430			13,304,650
MULTIPLE HANDLINE	JAN	14					440	35		475
	FEB	9					637	40		677
	MAR	4					171		14	185
	APR	10				25	69	165	64	323
	MAY	1						4	3	7
	JUN	7					286		11	297
	JUL	7					372	39	88	499
	AUG	8				117	835	692		1,644
	SEP	2				52	30	71		153
	OCT	6				118	189	225		532
	NOV	6					132	145		277
	DEC	3					34	54	14	102
TOTAL		77				312	3,195	1,470	194	5,171
FISH CORAL	JAN	4	2,819	2,003						4,822
	FEB	5	2,042	4,542	1,059					7,643
	TOTAL	9	4,861	6,545	1,059					12,465

Philippines - Tuna Research Project

Table 5 No. and weight of juvenile tunas caught by different gear (1984)

FISHING GEARS:											
S. P. B. C. I. E. S.											
SIZE LIMIT (CM)	SJ	VF	DET	PT	RT	BLT	Z	RT	Z	BLT	Z
	45	55	55	38	38	42					
RINGNET											
Number	3,968	67	2,176	94	94	100	2,728	88	3,784	99	981
Weight (kg)	2,089.737	1,603.08	76	117.19	100	922.19	69	946.85	97	647.43	74
PURSE SEINE											
Number	4,654	43	5,784	59	101	21	3,955	56	1,882	70	554
Weight (kg)	3,556.07	14	8,116.96	20	491.92	5	1,101.60	94	439.81	27	321.60
HANDLINE											
Number	652	26	2,552	41	52	24	48	59	15	100	15
Weight (kg)	864.2	14	3,899.84	3	156.47	3	12.21	7	5.52	100	13.33
TROLL LINE											
Number	137	8	167	57	10	38	-	-	-	-	-
Weight (kg)	202.91	5	374.35	12	33.12	5	-	-	-	-	-
MULTIPLE											
Number	-	-	-	-	-	-	117	82	859	100	394
Weight (kg)	-	-	-	-	-	-	56.38	70	249.82	100	242.06
FISH CORAL											
Number	-	-	5	4	-	-	-	-	-	-	-
Weight (kg)	-	-	14.35	2	-	-	-	-	-	-	-

NOTE: 1. No size limit available for Oriental Bonito (OB)

2. No samples for tuna longline (Navotas)

3. No juvenile catch by fish corals for skipjack and big-eye tuna.

Philippines - Tuna Research Project

Table 4 Total tuna catch (in kg.) landed at Navotas by species, gear and by month (1984)

FISHING GEAR	MONTH	NO. OF VESSEL	S P E C I E S							TOTAL
			SJ	YF	BLT	FT	BT	ELT	OB	
Purse Seine	JAN	9	316560	223280	1240	77,035	46,480	315		664,910
	FEB	9	284600	137640	1240	40,180				463,660
	MAR	13	387000	335040	2900	44,310	4,270	1225		774,145
	APR	7	287760	167680	6520	6,685	420	420		469,485
	MAY	11	426600	192200	16,000	59,150	19,600	8050	5075	726,675
	JUN	6	156320	98680	7,800	45,955	28,900	5950		343,605
	JUL	6	93400	153,650	33,400	39,725	39,550	3850		363,575
	AUG	4	53400	59,240	560	7,140	4,025			124,365
	SEP	8	95760	37120	3,200	11,370	960	350		148,760
	OCT	7	101600	75,600	9,200	28,105	20,825	10150		245,480
	NOV	9	92240	45,400	240	10,920	2,485	490		151,775
	DEC	6	127600	54,320		14,280	5,250			201,450
TOTAL		95	2,422,840	1,579,850	81,700	384,855	172,765	30,800	5,075	4,677,885 kg.
Tuna Longline										
	JUL	1	1,250	2,150	1,600					5,000

Table 6 Percentage of small-size fish in number and weight of tuna captured by different fishing gears (1984)

S P E C I E S	SIZE LIMIT (cm.)		F I S H I N G G E A R				MHL	FC
			RN	HL	PS	TL		
SKIPJACK TUNA	45	Number	67	26	43	8	-	-
		Weight	37	14	14	5	-	-
YELLOWFIN TUNA	55	Number	94	41	59	57	-	4
		Weight	76	3	20	12	-	2
BIG-EYE TUNA	55	Number	100	24	21	38	-	-
		Weight	100	3	5	5	-	-
FRIGATE TUNA	38	Number	88	59	98	-	84	-
		Weight	69	7	94	-	70	-
BULLET TUNA	38	Number	99	100	70	-	100	-
		Weight	97	100	27	-	100	-
EASTERN LITTLE TUNA	42	Number	88	100	81	-	100	-
		Weight	74	100	62	-	100	-

L E G E N D :

RN - Ringnet
 HL - Hook and Line
 PS - Purse Seine
 TL - Troll Line
 MHL - Multiple Handline
 FC - Fish Coral

Philippines - Tuna Research Project

Table 7 Size distribution of tuna species caught by different fishing gear/area (1984)

SAMPLING CENTER	FISHING GEAR	SIZE RANGE (CM)							
		SJ	YY	DET	YT	BT	ELY	OB	
STA. CRUZ	Ringnet	13-75	15-69		11-44	14-27	17-25		
	Handline	10-70	14-161	105-128					
O P O L	Ringnet	15-65	16-68		18-37	10-26	45-56		
	Handline	19-69	16-89		22-30				
GEN. SANTOS CITY	Ringnet	17-30	14-68	15-62	20-53	15-36	15-28	44-50	
	Handline		12-177	58-173					
	Purse seine	16-28	17-68	16-62	23-49	15-41	15-28	46-51	
ZAMBOANGA CITY	Ringnet	37-63	51-58		18-49	18-46	20-61	20-43	
	Handline	37-62	37-168	48-166	45-79	25-32	30-41		
	Purse seine	36-75	40-166	58-164	53-59	31-59			
	Troll line	34-64	38-163	49-144				22-44	
	Multiple handline				24-43	20-35	23-41	22-44	
	Fish Coral	53-66	53-81	62-72					
NAVOTAS, M.M.	Purse seine	19-64	21-66	45-69	18-43	18-32	20-51	32-37	
ALL SITES AND ALL FISHING GEARS	Ringnet	13-75	15-69	20-53	11-49	14-46	17-61	20-43	
	Handline	30-70	12-168	48-173	22-79	25-32	30-41		
	Purse seine	18-75	16-166	23-164	15-59	15-59	16-51	32-37	
	Troll line	34-64	38-163	49-144					
	Multiple handline				24-43	20-35	23-41	22-44	
	Fish Coral	53-66	53-81	62-72					

Form A

Tuna Sampling Master Form

Landing Center _____ Date _____
 Fishing Boat _____ No. of Sample _____
 Fishing Ground _____

Name of Boat	No. of Tuna Caught	Total Catch		Total Sample		Species Composition (Pct/Kg)
		Pct	Wt	Pct	Wt	

Total boats landed (including night landings)		Total landed catch		Total Pct/Kg	
Gen	No. of boats	Gen	Wt	Gen	Pct/Kg
RN		RN		RN	
PS		PS		PS	
HL		HL		HL	

Remarks: _____

Legend: RN - Ringnet
 PS - Purse seine
 HL - Handline

Observer

Team B

Length Frequency Form

Date _____
 Observer _____
 no. of sample _____
 Total wt of sample _____

Fishing boat _____
Fishing gear _____
Fishing ground _____
landing center _____

[illegible][illegible][illegible]

no. of fish measured

Form C

Monthly Report

Landing center _____ month _____

sampling days

1	2	3	4	5	6	7	8	9	10
1	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30

A. Total catch³¹

Pak Gear									Total
	Bat								
	wit								
	Bat								
	wit								

B Total Sample

[illegible]

Remarks:

Observer	Supervisor
----------	------------

Thailand - Recent Development of Tuna Fisheries and Resources

Table 1. Annual catch of coastal tunas in Thailand, 1971-1983.

Year	Total (metric ton)	Gulf		Andaman Sea	
		metric ton	%	metric ton	%
1971	5185	3298	63.6	1887	36.4
1972	7199	5508	76.5	1691	23.5
1973	8224	6519	79.3	1705	20.7
1974	9925	8715	87.8	1210	12.2
1975	14088	11172	79.3	2916	20.7
1976	10717	8890	83.0	1827	17.0
1977	12932	11296	87.3	1636	12.7
1978	10353	8258	79.8	2095	20.2
1979	16845	14713	87.3	2132	12.7
1980	13683	12895	94.2	788	5.8
1981	22273	20198	90.7	2075	9.3
1982	49307	39661	80.4	9646	19.6
1983	85820	82001	95.5	3819	4.5

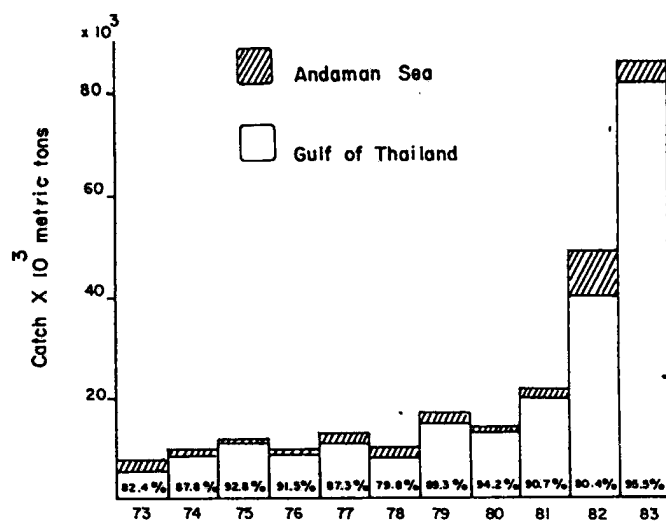


Fig. 1 Tuna Production of Thailand, 1973-1983.

Table 2. Annual catch of coastal tunas by species in Thailand, 1979-1983.

F 71 (Gulf of Thailand)

	1979	1980	1981	1982	1983
Total Catch* (%)**	24.8 (5.6)	22.2 (5.8)	31.4 (6.8)	48.0 (12.4)	90.2 (18.5)
~ LOT	42.6	35.8	31.7	34.0	55.9
• TUN	16.6	22.2	32.6	48.6	35.0
~ KGX	40.8	42.0	35.7	17.4	9.1
Total	100.0	100.0	100.0	100.0	100.0

F 57 (Andaman Sea)

	1979	1980	1981	1982	1983
Total Catch (%)	4.2 (9.6)	2.8 (11.3)	4.6 (18.2)	11.5 (16.3)	4.9 (5.9)
~ LOT	45.2	25.3	35.2	61.6	67.8
• TUN	5.0	2.8	10.3	22.0	9.6
~ KGX	49.8	71.9	54.5	16.4	22.6
Total	100.0	100.0	100.0	100.0	100.0

* Total Catch : Tuna-like fishes in 1,000 metric tons.

** Percentage of total catch : Proportion of tuna-like fishes in overall catch by all types of pelagic fishing gears.

Thailand - Recent Development of Tuna Fisheries and Resources

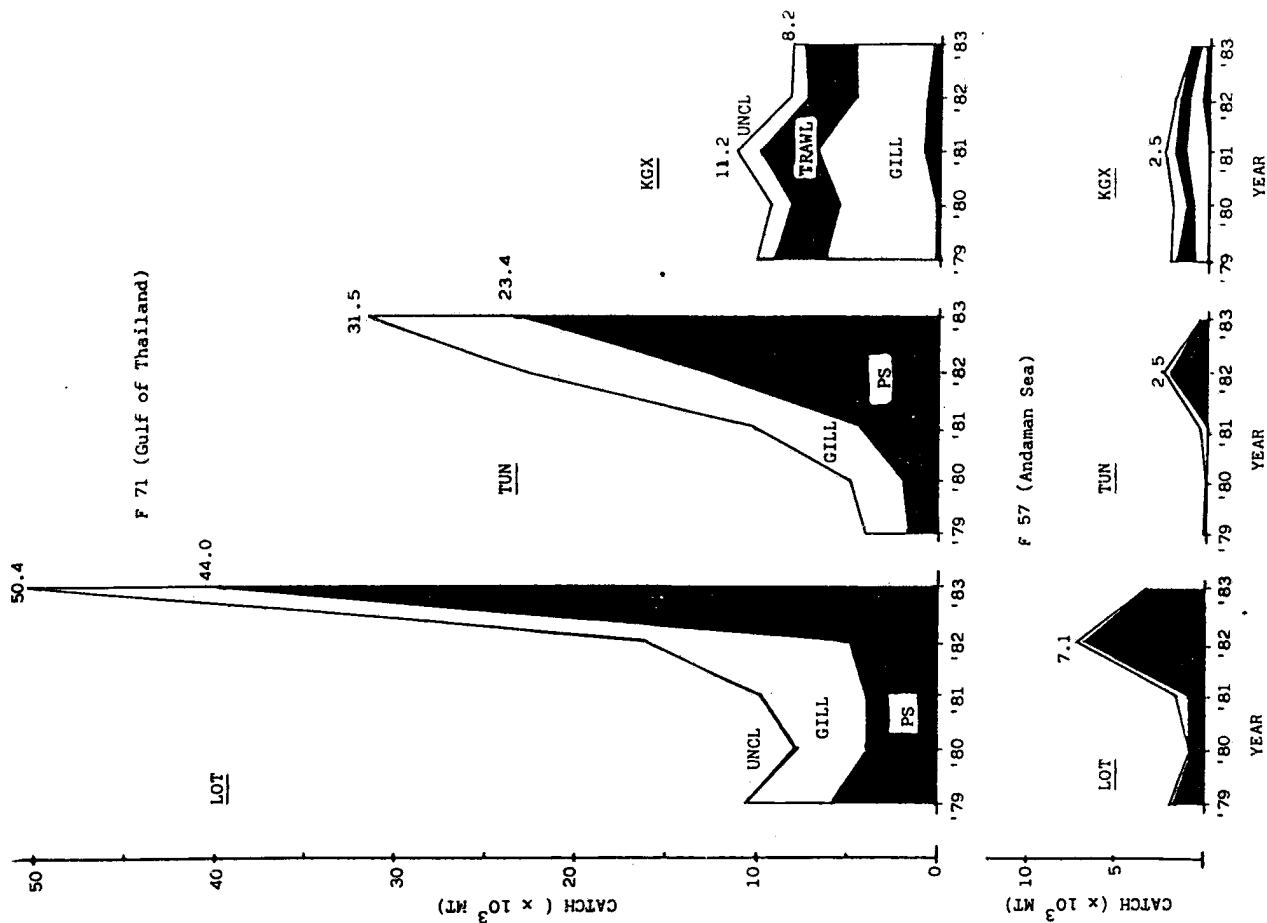


Fig. 2 Tuna production of Thailand by species, 1979-1983.

Table 3 Annual catch by types of gear of coastal tuna in Thailand, 1971 - 1983

Gear	LPS		TPS		CPS		KMGN		MEGN		Others	
	G	A	G	A	G	A	G	A	G	A	G	A
1971	-	-	3203	1887	-	-	-	-	-	-	95	-
1972	-	-	2579	991	205	680	646	20	665	-	1413	-
1973	509	-	2190	1205	-	406	2880	94	245	-	695	-
1974	403	-	3915	1010	-	146	1775	54	630	-	1992	-
1975	984	-	4124	1173	-	1596	2632	147	222	-	3210	-
1976	966	-	3321	1333	-	404	2385	76	704	-	1514	14
1977	3520	-	2416	431	-	1079	4692	115	557	-	111	11
1978	1444	-	2356	1521	-	478	2873	96	424	-	1161	-
1979	6935	1296	612	92	-	575	4328	150	1441	-	1397	18
1980	4075	-	2150	99	-	526	5722	141	568	-	380	22
1981	7659	-	1032	256	-	908	11218	897	18	-	271	14
1982	16913	5947	1210	106	-	3195	19376	324	1867	-	295	74
1983	67033	653	281	29	-	3108	13105	24	1371	-	211	5

Source : Fisheries Record of Thailand, 1971-1983, Department of Fisheries

Notes : TPS = Thai purse seine; KMGN = King mackerel drift gill net
 LPS = Luring purse seine; MEKN = Mackerel encircling gill net
 CPS = Chinese purse seine
 G = Gulf of Thailand; A = Andaman Sea

Thailand - Recent Development of Tuna Fisheries and Resources

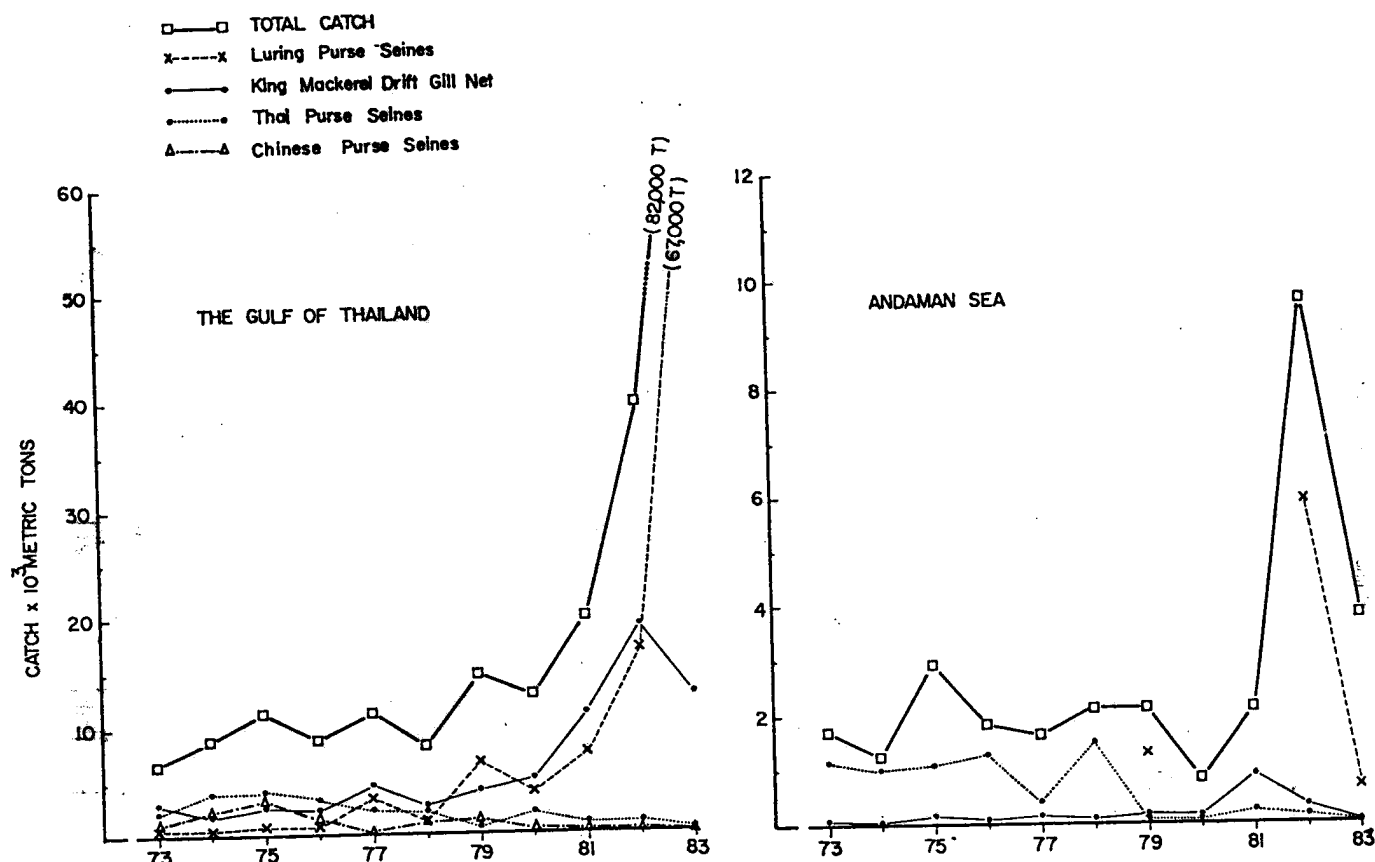


Fig. 3 Annual catch of tunas in Thailand by types of gear, 1973-1983.

Table 4. Number of fishing boats registered in Thailand, 1971 - 1983

Year	LPS		TPS		CPS		KMGN		MENG		APS		Total	
	G	A	G	A	G	A	G	A	G	A	G	A	G	A
1971	1	-	328	61	14	27	134	17	244	-	42	2	763	107
1972	1	-	317	54	34	32	118	20	254	5	48	-	772	111
1973	109	-	347	68	3	50	170	61	227	1	66	37	922	217
1974	152	1	289	112	2	28	120	28	183	5	46	36	792	210
1975	193	-	289	85	1	17	134	43	187	-	30	10	834	155
1976	300	-	262	89	2	15	135	22	226	-	45	13	970	139
1977	410	95	138	22	-	22	206	38	314	-	14	5	1,082	182
1978	510	68	82	47	-	15	115	36	358	1	28	3	1,093	170
1979	478	69	64	4	-	15	203	24	353	3	43	8	1,141	123
1980	507	113	103	12	-	12	272	24	304	3	28	6	1,214	170
1981	603	127	40	17	-	14	301	26	257	1	13	19	1,214	204
1982	585	139	42	1	-	13	250	31	227	11	24	32	1,128	227
1983	556	135	40	-	-	18	234	30	141	3	37	60	1,008	246

Source : Thai fishing vessels statistics, 1971 - 1983 (Department of Fisheries).

Notes : LPS = Luring purse seine KMGN = King mackerel drift gill net
 TPS = Thai purse seine MEGN = Mackerel encircling gill net
 CPS = Chinese purse seine APS = Anchovy purse seine

G = Gulf of Thailand

A = Andaman Sea

Thailand - Recent Development of Tuna Fisheries and Resources

- Total number of Fishing boats
- x---x Luring Purse Seiners
- King Mackerel Drift Gill Netter
- Thai Purse Seiners
- Δ---Δ Chinese Purse Seiners

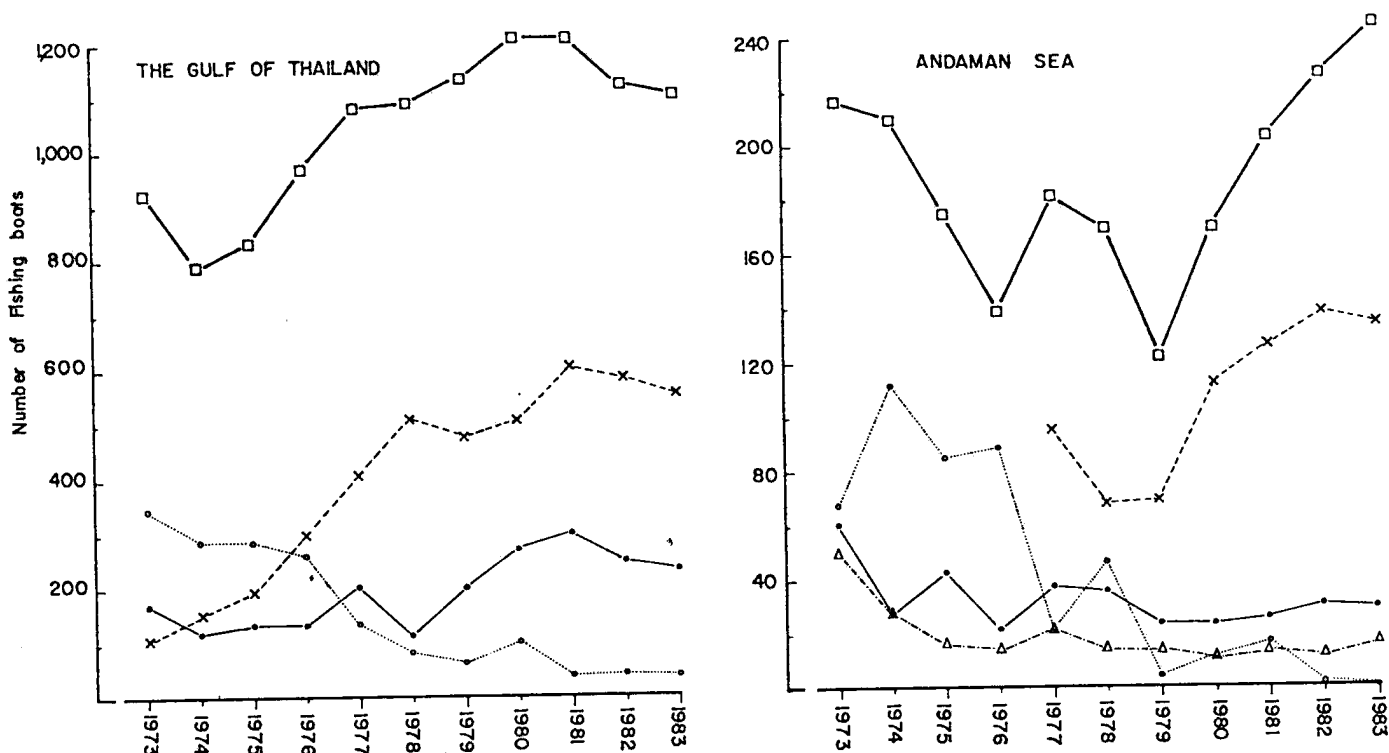


Fig. 4 Annual variation in number of fishing boats registered in Thailand, 1973-1983.

Table 5 Utilization, export and import of tuna in Thailand, 1979 - 1985

Year	Domestic Catch (metric tons)	Exported canned tuna		Tuna used for Katsvo- bushi	Tuna used for canning (metric tons)	Imported frozen tuna (metric tons)
		Total (metric tons)	into USA (metric tons)			
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	.....	39,834 ^{1/}	.....	.....	113,811 ^{3/}	80,000 ^{2/}
1985	.....	20,667 ^{1/}	.....	.....	59,049 ^{3/}	150,000 ^{2/}
		(Jan-Mar)			(Jan-Mar)	

Sources : Fisheries Economic Sub-division

1/ Statistics from Department of Customs

2/ Data from Fish Canning Association

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

Thailand - Catch and Effort Data

Table 1. Catch and effort data of coastal tunas in Thailand, 1971-1983.

A) Gulf of Thailand (Luring and Thai purse seines as standard gear)

Year	Cs	Xs	d	C	E
1971	3,203	58,514	54.7	3,298	60,250
1972	2,579	32,640	79.0	5,508	69,710
1973	2,699	71,217	52.7	6,519	123,707
1974	4,318	75,471	57.2	8,715	152,323
1975	5,108	99,659	51.3	11,172	217,970
1976	4,287	121,098	35.4	8,890	251,123
1977	5,936	149,665	39.7	11,296	284,807
1978	3,800	167,482	22.7	8,258	633,965
1979	7,547	116,429	64.8	14,713	226,980
1980	6,225	117,385	53.0	12,895	243,161
1981	8,691	126,567	68.7	20,198	294,143
1982	18,123	121,828	148.8	39,661	266,613
1983	67,314	118,691	567.1	82,001	144,597

B) Andaman Sea (Luring, Thai and chinese purse seines as standard gear)

Year	Cs	Xs	d	C	E
1971	1,887	20,495	92.07	1,887	20,495
1972	1,671	20,824	80.24	1,691	21,074
1973	1,611	25,727	62.62	1,705	27,228
1974	1,156	17,515	66.00	1,210	18,333
1975	2,769	19,063	145.26	2,916	20,074
1976	1,737	12,439	139.64	1,827	13,084
1977	1,510	6,648	227.14	1,636	7,203
1978	1,999	6,345	315.05	2,095	6,650
1979	1,963	15,080	130.17	2,132	16,379
1980	625	4,739	131.88	788	5,975
1981	1,164	4,766	244.23	2,075	8,496
1982	9,248	19,902	464.68	9,646	20,758
1983	3,790	21,443	176.75	3,819	21,607

Note: Cs = catch by standard gear (metric tons)
 Xs = effort by standard gear (fishing days)
 d = catch per unit effort (kg/day)
 C = total catch (metric tons)
 E = total standard effort (fishing days)

Thailand - Catch and Effort Data

Table 2. Catch and effort data (KMGN as standard gear) of coastal tunas Thailand, 1971-1983.

A) Gulf of Thailand

Year	CS	XS	d	C	E
1971	-	-	-	3,298	-
1972	646	18,902	34.2	5,508	161,053
1973	2,880	32,023	89.9	6,519	72,485
1974	1,775	22,997	77.2	8,715	112,912
1975	2,632	25,959	101.4	11,172	110,188
1976	2,385	26,909	88.6	8,890	100,302
1977	4,692	30,198	93.5	11,296	120,852
1978	2,873	26,857	107.0	8,258	77,196
1979	4,328	32,926	131.4	14,713	111,932
1980	5,722	35,515	161.1	12,895	80,036
1981	11,218	41,478	270.5	20,198	74,681
1982	19,376	40,302	480.8	39,661	82,495
1983	13,129	47,253	277.8	82,001	295,180

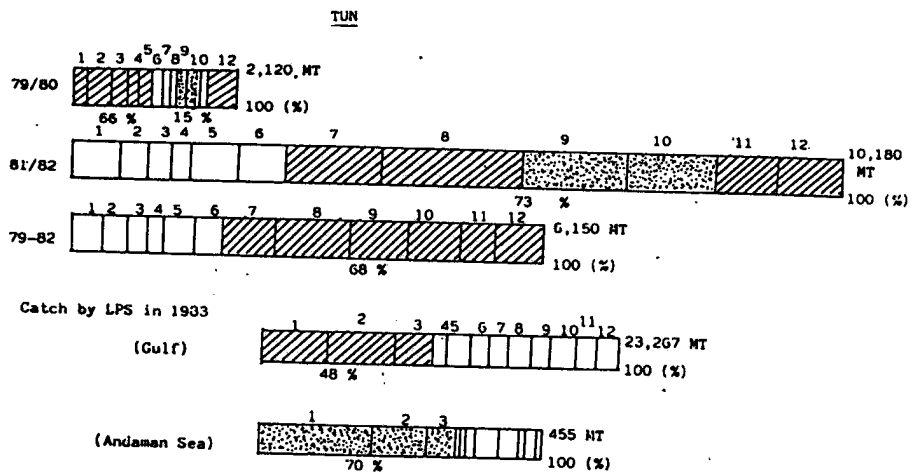
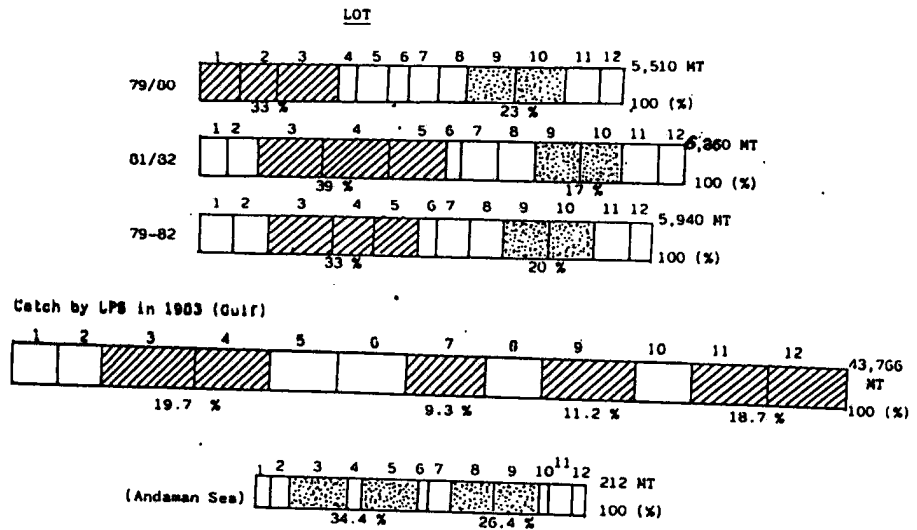
B) Andaman Sea

Year	Cs	Xs	d	C	E
1971	-	-	-	1,887	-
1972	20	6,289	3.2	1,691	531,735
1973	94	8,720	10.8	1,705	158,166
1974	54	4,989	10.8	1,210	111,791
1975	147	8,134	18.1	2,916	161,352
1976	76	5,860	13.0	1,827	140,871
1977	115	6,859	16.8	1,636	97,577
1978	96	7,083	13.6	2,095	154,572
1979	150	8,431	17.8	2,132	119,833
1980	141	9,104	15.5	788	50,879
1981	897	8,855	101.3	2,075	20,484
1982	324	3,872	83.7	9,646	115,276
1983	24	1,210	19.8	3,819	192,879

Note: Cs = catch by standard gear (metric tons)
 Xs = effort by standard gear (fishing days)
 d = catch per unit effort (kg/day)
 C = total catch (metric tons)
 E = total standard effort (fishing days)

Thailand - Catch and Effort Data

purse seines



gill nets

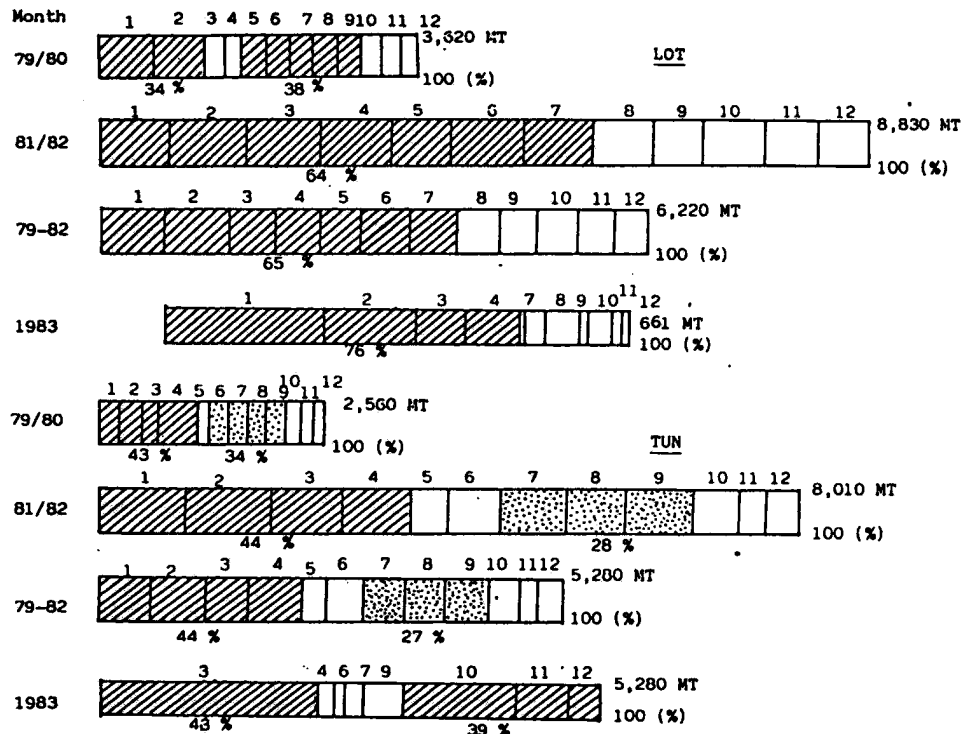


Fig. 1 Monthly composition (in percentage) of tuna catch

Gulf of Thailand
 Andaman Sea

Thailand - Catch and Effort Data

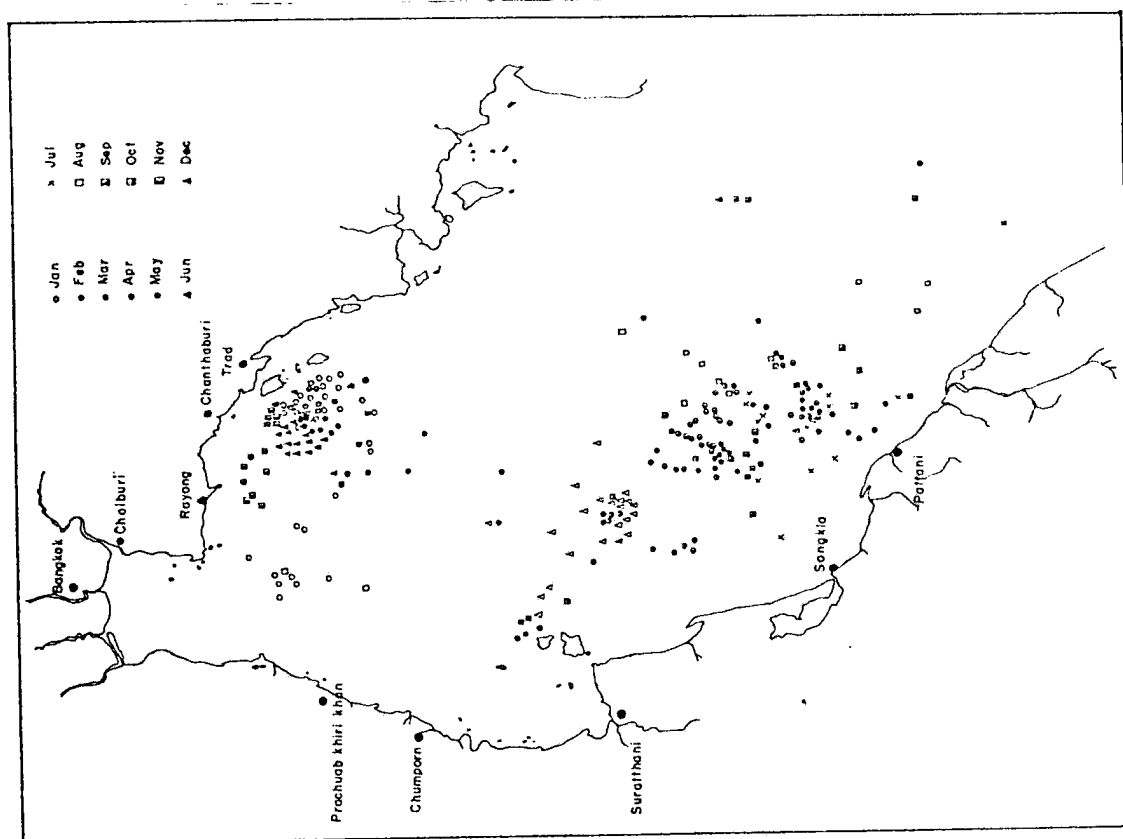


Fig. 2. Movement for tuna fishing in the Gulf of Thailand by month

Table 3 Catch per unit of effort for coastal tunas.

PURSE SEINES		1979	1980	1981	1982	1983
CPUE (kg/haul)	LOT	30.84	20.37	19.45	20.15	213.26
	TUN	9.21	12.09	21.76	55.29	113.62
	KGX	1.81	1.79	4.71	3.64	2.11
	TOTAL	41.86	34.25	45.92	79.08	328.99
CPUE (kg/day)	LOT	49.91	33.28	32.41	39.74	370.00
	TUN	14.91	19.76	36.26	109.04	197.13
	KGX	2.94	2.92	7.85	7.18	3.66
	TOTAL	67.76	55.96	76.52	155.96	570.79

DRIFT GILL NETS		1979	1980	1981	1982	1983
CPUE (kg/hr)	LOT	10.44	14.11	21.30	28.89	13.21
	TUN	8.90	11.87	20.06	26.13	17.11
	KGX	17.50	20.41	19.19	8.76	8.65
	TOTAL	36.84	46.12	60.55	63.78	38.97
CPUE (kg/day)	LOT	70.95	87.51	136.00	252.44	120.86
	TUN	60.50	73.60	134.48	228.33	156.48
	KGX	118.88	126.59	122.52	76.57	79.11
	TOTAL	250.33	287.70	393.00	557.34	356.45

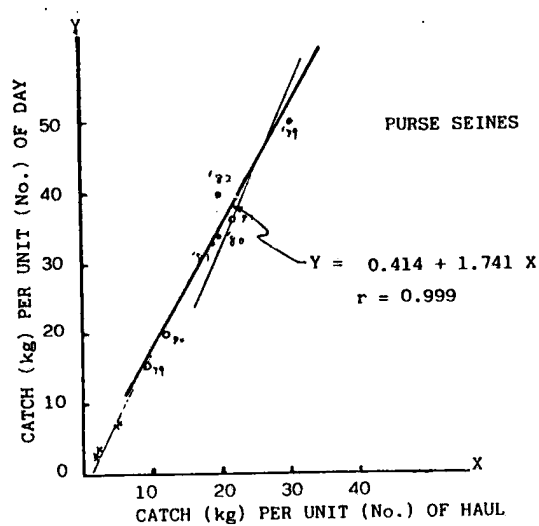
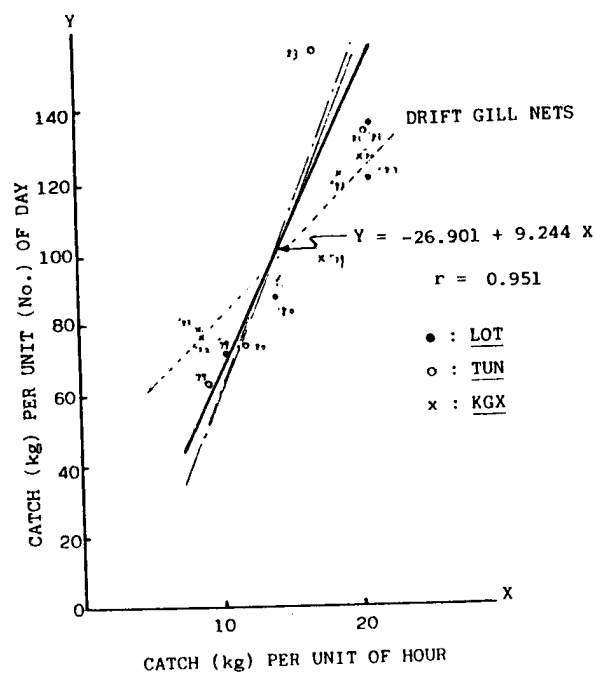


Fig. 3 Relationships among CPUEs:



Purse seiners 1979A) EFFORT (No. of fishing days)

AREA	I	II	III	Sub-total	IV
TPS	7221	3454	-	10675	810
CPS	-	-	-	-	3828
LPS	26171	70019	9564	105754	10442
TOTAL	33392	73473	9564	116429	15080

B) Catch (MT)
LOT & TUN

AREA	I	II	III	Sub-total	IV
TPS	508	104	-	612	92
CPS	-	-	-	-	0
LPS	3994	1867	1074	6935	1296
Pool	4502	1971	1074	7547	1388

KGX

AREA	I	II	III	Sub-total	IV
TPS	31	1	-	32	0
CPS	-	-	-	-	0
LPS	209	81	20	310	5
Pool	240	82	20	342	5

C) CPUE (kg/day)
LOT & TUN

AREA	I	II	III	Sub-total	IV
TPS	70.3	30.1	-	57.3	113.6
LPS	152.6	26.7	112.3	65.6	124.1
Pool	134.8	26.8	112.3	64.8	92.0

KGX

AREA	I	II	III	Sub-total	IV
TPS	4.3	0.3	-	3.0	0.0
LPS	8.0	1.2	2.1	2.9	0.5
Pool	7.2	1.1	2.1	2.9	0.3

Purse seiners 1980A) EFFORT (No. of fishing days)

AREA	I	II	III	Sub-total	IV
TPS	8858	6208	88	15154	1927
CPS	-	-	-	-	3591
LPS	28132	58078	16021	102231	-
TOTAL	36990	64286	16109	117385	5518

B) CATCH (MT)LOT

AREA	I	II	III	Sub-total	IV
TPS	712	293	0	1005	83
CPS	-	-	-	-	526
LPS	150	1555	1196	2901	-
Pool	862	1848	1196	3906	609

TUN

AREA	I	II	III	Sub-total	IV
TPS	1002	129	14	1145	16
CPS	-	-	-	-	0
LPS	447	372	355	1174	-
Pool	1449	501	369	2319	16

KGX

AREA	I	II	III	Sub-total	IV
TPS	30	20	0	50	10
CPS	-	-	-	-	56
LPS	49	118	126	293	-
Pool	79	138	126	343	66

C) CPUE (kg/day)LOT

AREA	I	II	III	Sub-total	IV
TPS	80.4	47.2	0	66.3	43.1
LPS	5.3	26.8	74.7	28.4	146.5*
Pool	23.3	28.7	74.2	33.3	110.4

TUN

AREA	I	II	III	Sub-total	IV
TPS	113.1	20.8	159.1	75.6	8.3
LPS	15.9	6.4	22.2	11.5	0*
Pool	39.2	7.8	22.9	19.8	2.9

KGX

AREA	I	II	III	Sub-total	IV
TPS	3.4	3.2	0	3.3	5.2
LPS	1.7	2.0	7.9	2.9	15.6*
Pool	2.1	2.1	7.8	2.9	12.0

* : CPS (Chinese purse seine)

Thailand - Catch and Effort Data

Purse seiners 1981

A) EFFORT (No. of fishing days)

AREA	I	II	III	Sub total	IV
TPS	1176	5107	413	6696	1409
CPS	-	-	-	-	3357
LPS	22631	76718	20522	119871	-
TOTAL	23807	81825	20935	126567	4766

B) CATCH (MT)

LOT

AREA	I	II	III	Sub total	IV
TPS	257	187	19	463	166
LPS	17	2397	1225	3639	907 *
Pool	274	2584	1244	4102	1073

TUN

AREA	I	II	III	Sub total	IV
TPS	302	72	195	569	108
LPS	1807	1668	545	4020	1 *
Pool	2109	1740	740	4589	109

KGX

AREA	I	II	III	Sub total	IV
TPS	1	11	1	13	7
LPS	24	809	147	980	52 *
Pool	25	820	148	993	59

C) CPUE (kg/day)

LOT

AREA	I	II	III	Sub total	IV
TPS	218.5	36.6	46.0	69.1	117.8
LPS	0.8	31.2	59.7	30.4	270.2 *
Pool	11.5	31.6	59.4	32.4	225.1

TUN

AREA	I	II	III	Sub total	IV
TPS	256.8	14.1	472.2	85.0	76.7
LPS	79.8	21.7	26.6	33.5	0.3 *
Pool	88.6	21.3	35.3	36.3	22.9

KGX

AREA	I	II	III	Sub total	IV
TPS	0.9	2.2	2.4	1.9	5.0
LPS	1.1	10.5	7.2	8.2	15.5 *
Pool	1.1	10.0	7.1	7.8	12.4

: CPS (Chinese purse seine)

Purse seiners 1982

A) EFFORT (No. of fishing days)

AREA	I	II	III	Sub total	IV
TPS	236	4539	526	5301	520
CPS	-	-	-	-	3166
LPS	20200	65608	30719	116527	16216
TOTAL	20436	70147	31245	121828	19902

B) CATCH (MT)

LOT

AREA	I	II	III	Sub total	IV
TPS	142	115	410	667	57
CPS	-	-	-	-	3195
LPS	556	2751	867	4174	3566
TOTAL	698	2866	1277	4841	6818

TUN

AREA	I	II	III	Sub total	IV
TPS	55	238	250	543	49
CPS	-	-	-	-	-
LPS	1375	4453	6911	12739	2381
TOTAL	1430	4691	7161	13282	2430

KGX

AREA	I	II	III	Sub total	IV
TPS	3	45	0	48	0
CPS	-	-	-	-	322
LPS	208	532	84	824	198
TOTAL	211	577	84	872	520

C) CPUE (kg/day)

LOT

AREA	I	II	III	Sub total	IV
TPS	601.7	25.3	779.5	125.8	109.6
LPS	27.5	41.9	28.2	35.8	219.9
Pool	34.2	40.9	40.9	39.7	342.6

(1009.2) *

TUN

AREA	I	II	III	Sub total	IV
TPS	233.1	52.4	475.3	102.4	94.2
LPS	68.1	67.9	225.0	109.3	146.8
Pool	70.0	66.9	229.2	109.0	122.1

KGX

AREA	I	II	III	Sub total	IV
TPS	12.7	9.9	0	9.1	0
CPS	-	-	-	-	101.7
LPS	10.3	8.1	2.7	7.1	12.2
Pool	10.3	8.2	2.7	7.2	26.1

Thailand - Catch and Effort Data

Purse seiners 1983

A) EFFORT (No. of fishing days)

AREA	I	II	III	Sub total	IV
TPS	156	5648	-	5804	900
CPS	-	-	-	-	5258
LPS	16667	42882	53338	112887	7697
TOTAL	16823	48530	53338	118691	13855

B) CATCH (MT)

LOT

AREA	I	II	III	Sub total	IV
TPS	1	149	-	150	22
CPS	-	-	-	-	3108
LPS	8687	12604	22475	43766	212
Pool	8688	12753	22475	43916	3342

TUN

AREA	I	II	III	Sub total	IV
TPS	0	131	-	131	7
CPS	-	-	-	-	0
LPS	5183	4234	13850	23267	455
Pool	5183	4365	13850	23398	462

KGX

AREA	I	II	III	Sub total	IV
TPS	0	22	-	22	3
CPS	-	-	-	-	115
LPS	83	128	109	320	100
Pool	83	150	109	342	218

C) CPUE (kg/day)

LOT

AREA	I	II	III	Sub total	IV
TPS	6.4	26.4	-	25.8	24.4
CPS	-	-	-	-	591.1
LPS	521.2	293.9	421.4	387.7	27.5
Pool	516.4	262.8	421.4	370.0	241.2

TUN

AREA	I	II	III	Sub total	IV
TPS	0	23.2	-	23.2	1.3
CPS	-	-	-	-	0
LPS	311.0	98.7	259.7	206.1	59.1
Pool	308.1	89.9	259.7	197.1	33.3

KGX

AREA	I	II	III	Sub total	IV
TPS	0	3.9	-	3.8	3.3
CPS	-	-	-	-	21.9
LPS	5.0	3.0	2.0	2.8	13.0
Pool	4.9	3.1	2.0	2.9	15.7

Gill net 1979

A) EFFORT (No. of fishing days)

AREA	I	II	III	Sub total	IV
DGN	5995	18672	8257	32924	8431
MEGN	-	69633	-	69633	-
TOTAL	5995	88305	8257	102557	8431

B) CATCH (MT)

LOT & TUN

AREA	I	II	III	Sub total	IV
DGN	1041	1561	1746	4348	150
MEGN	-	1382	-	1382	-
TOTAL	1041	2943	1746	5730	150

KGX

AREA	I	II	III	Sub total	IV
DGN	834	1751	1329	3914	203
MEGN	-	7928	-	7928	-
Pool	834	9679	1329	11842	203

C) CPUE (kg/day)

LOT & TUN

AREA	I	II	III	Sub total	IV
DGN	173.6	83.6	211.4	132.1	17.8
MEGN	-	19.8	-	19.8	-
Pool	173.6	33.3	211.4	55.9	17.8

KGX

AREA	I	II	III	Sub total	IV
DGN	139.1	93.8	160.9	118.9	24.1
MEGN	-	113.9	-	113.9	-
Pool	139.1	109.6	160.9	115.5	24.1

Gill net 1980

A) EFFORT (No. of fishing days)

AREA	I	II	III	Sub total	IV
DGN	7183	17358	10974	35515	9104
MEGN	512	31370	687	31569	-
TOTAL	7695	48728	11661	68084	9104

B) CATCH (MT)

LOT

AREA	I	II	III	Sub total	IV
DGN	791	729	1588	3108	78
MEGN	0	568	0	568	-
TOTAL	791	1297	1588	3676	78

TUN

AREA	I	II	III	Sub total	IV
DGN	927	508	1179	2614	63
MEGN	0	0	0	0	-
TOTAL	927	508	1179	2614	63

KGX

AREA	I	II	III	Sub total	IV
DGN	955	2132	1409	4496	199
MEGN	6	28	3	37	-
TOTAL	961	2160	1412	4533	199

C) CPUE (kg/day)

LOT

AREA	I	II	III	Sub total	IV
DGN	110.1	42.0	144.7	87.5	8.6
MEGN	0	18.1	0	17.4	-
Pool	102.8	26.6	136.2	54.0	8.6

TUN

AREA	I	II	III	Sub total	IV
DGN	129.1	29.3	107.4	73.6	6.9
MEGN	0	0	0	0	-
Pool	120.5	10.4	101.1	38.4	6.9

KGX

AREA	I	II	III	Sub total	IV
DGN	132.9	122.8	128.4	126.6	21.8
MEGN	11.7	0.9	4.4	1.1	-
Pool	124.9	44.3	121.1	66.6	21.8

Gill net 1981

A) EFFORT (No. of fishing days)

AREA	I	II	III	Sub total	IV
DGN	2699	20863	17916	41478	8855
MEGN	889	24756	3862	29507	-
TOTAL	3588	45619	21778	70985	8855

B) CATCH (MT)

LOT

AREA	I	II	III	Sub total	IV
DGN	273	1269	4099	5641	524
MEGN	0	2	0	2	-
TOTAL	273	1271	4099	5643	524

TUN

AREA	I	II	III	Sub total	IV
DGN	460	1526	3592	5578	373
MEGN	0	8	0	8	-
TOTAL	460	1534	3592	5586	373

KGX

AREA	I	II	III	Sub total	IV
DGN	362	2775	1945	5082	302
MEGN	4	178	3	185	-
TOTAL	366	2953	1948	5267	302

C) CPUE (kg/day)

LOT

AREA	I	II	III	Sub total	IV
DGN	101.1	60.8	228.8	136.0	59.2
MEGN	0.0	0.08	0.0	0.07	-
Pool	76.1	27.9	188.2	79.5	59.2

TUN

AREA	I	II	III	Sub total	IV
DGN	170.4	73.1	200.5	134.5	42.1
MEGN	0.0	0.3	0.0	0.3	-
Pool	128.2	33.6	164.9	78.7	42.1

KGX

AREA	I	II	III	Sub total	IV
DGN	134.1	133.0	108.6	122.5	34.1
MEGN	4.5	7.2	0.8	6.3	-
Pool	102.0	64.7	89.4	74.2	34.1

Gill net 1982

A) EFFORT (No. of fishing days)

AREA	I	II	III	Sub total	IV
DGN	8363	17578	14361	40302	3872
MEGN	-	24060	0	24060	-
TOTAL	8363	41638	14361	64362	3872

B) CATCH (MT)

LOT

AREA	I	II	III	Sub total	IV
DGN	1120	3459	5595	10174	218
MEGN	-	1123	-	1123	-
TOTAL	1120	4582	5595	11279	218

TUN

AREA	I	II	III	Sub total	IV
DGN	2268	739	6195	9202	106
MEGN	-	744	-	744	-
TOTAL	2268	1483	6195	9946	106

KGX

AREA	I	II	III	Sub total	IV
DGN	548	1718	820	3086	214

C) CPUE (kg/day)

LOT

AREA	I	II	III	Sub total	IV
DGN	133.9	196.8	389.6	252.4	56.3
MEGN	-	46.7	-	46.7	-
Pool	133.9	110.0	389.6	175.2	56.3

TUN

AREA	I	II	III	Sub total	IV
DGN	271.2	42.0	431.4	228.3	27.4
MEGN	-	30.9	-	30.9	-
Pool	271.2	35.6	431.4	154.5	27.4

KGX

AREA	I	II	III	Sub total	IV
DGN	65.5	97.7	57.1	76.6	55.3

Gill net (1983)

A) EFFORT (No. of fishing days)

AREA	I	II	III	Sub Total	TV
DGN	14,063	16,913	16,277	47,253	1,210
MEGN	299	25,294	3,332	28,925	344
TOTAL	14,362	42,207	19,609	76,178	1,554

B) CATCH (MT)

i) LOT

AREA	I	II	III	Sub total	IV
DGN	694	1,674	3,343	5,711	14
MEGN	0	508	153	611	0
TOTAL	694	2,182	3,496	6,372	14

ii) TUN

AREA	I	II	III	Sub total	IV
DGN	1,014	1,810	4,570	7,394	10
MEGN	0	250	460	710	0
TOTAL	1,014	2,060	5,030	8,104	10

iii) KGX

AREA	I	II	III	Sub total	IV
DGN	1,065	1,556	1,117	3,738	48
MEGN	0	13	6	19	0
POOL	1,065	1,569	1,123	3,757	48

C) CPUE (kg/day)

i) LOT

AREA	I	II	III	Sub total	IV
DGN	49.3	99.0	205.4	120.9	11.6
MEGN	0	20.1	45.9	22.9	0
POOL	48.3	51.7	178.3	83.6	9.0

ii) TUN

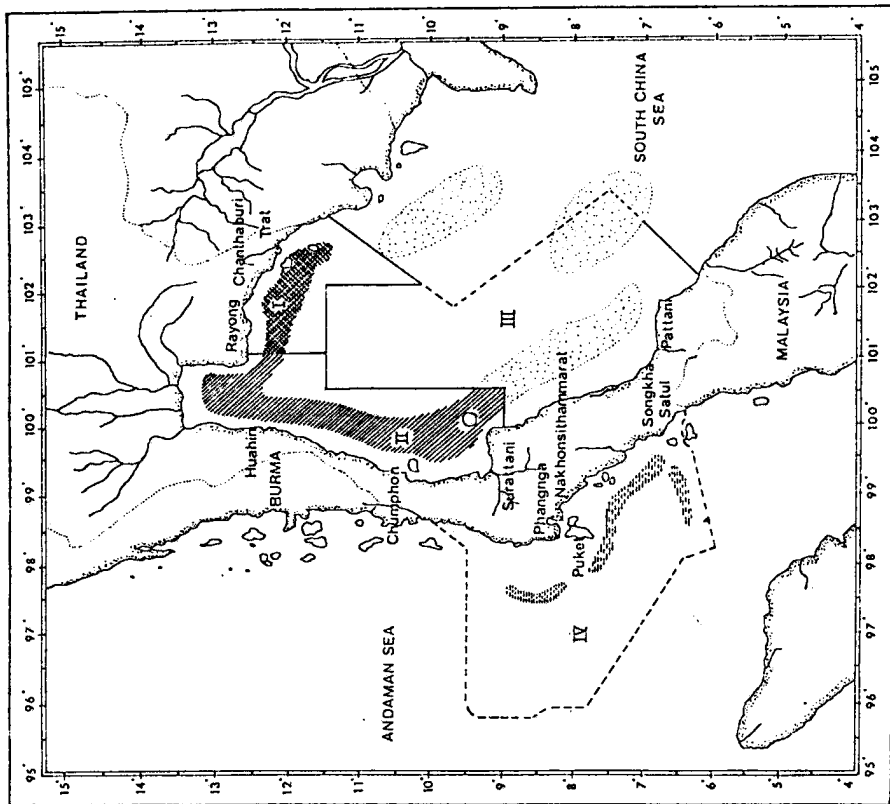
AREA	I	II	III	Sub total	IV
DGN	72.1	107.0	280.8	156.5	8.3
MEGN	0	9.9	138.1	24.5	0
POOL	70.6	48.8	256.5	106.4	6.4

iii) KGX

AREA	I	II	III	Sub total	IV
DGN	75.7	92.0	68.6	79.1	39.7
MEGN	0	0.5	1.8	0.7	0
POOL	74.2	37.2	57.3	49.3	30.9

- 2 -

THAI & CHINESE PURSE SEINES EFFORT

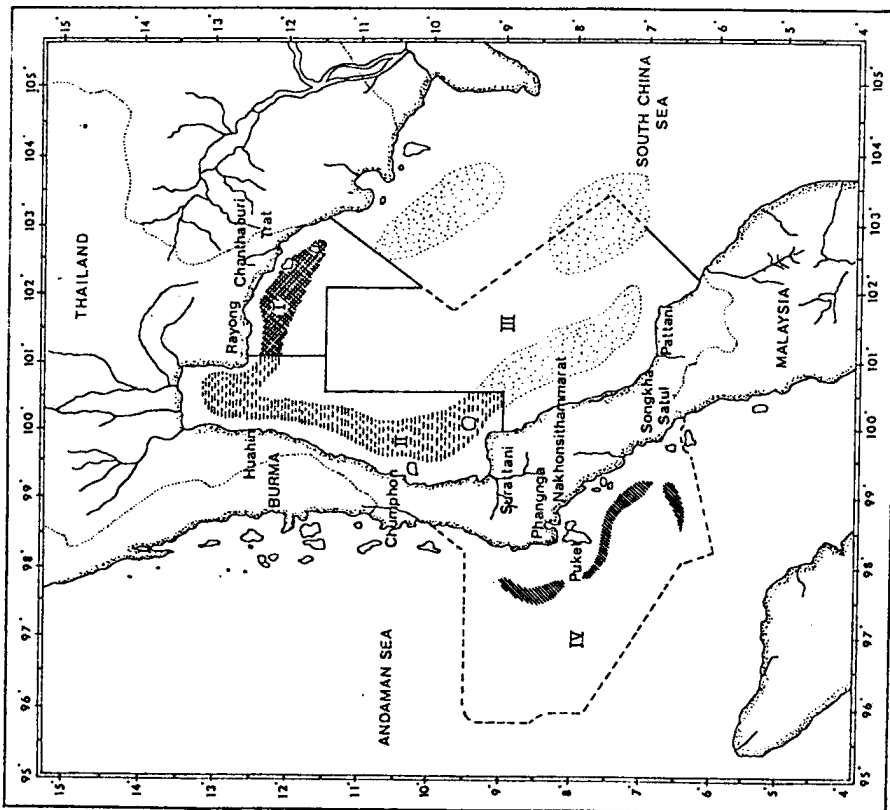


1979/1980 average

Area	I	II	III	IV	Total
Fishing days	8,039	4,831	88	3,710	16,568
(%)	48.2	29.0	0.5	22.3	100

- 1 -

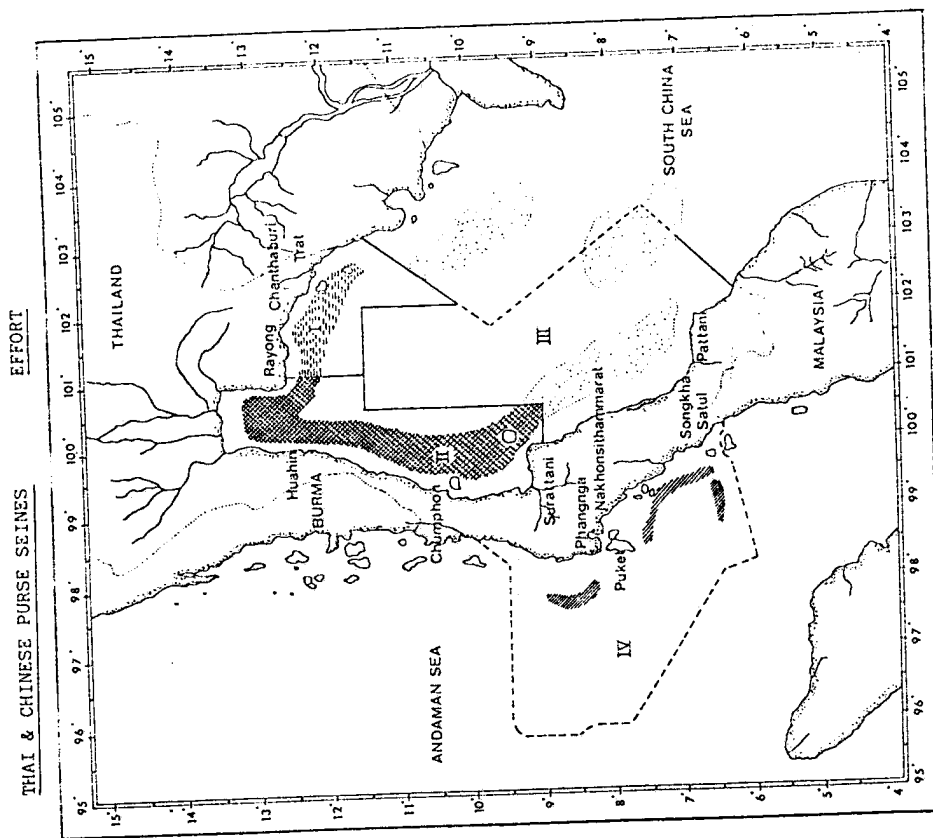
THAI & CHINESE PURSE SEINES CATCH



1979/1980 average

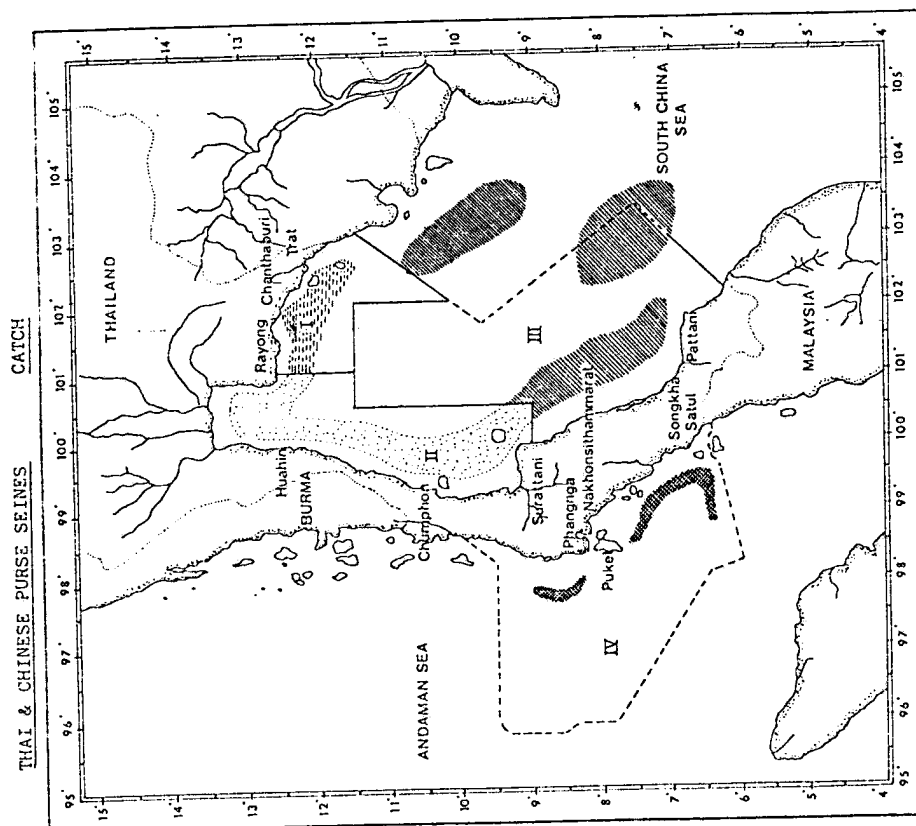
Area	I	II	III	IV	Total
Catch (MT)	1,111	263	14	309	1,697
(%)	65.5	15.5	0.8	18.2	100

Thailand - Catch and Effort Data



1981/1982 average

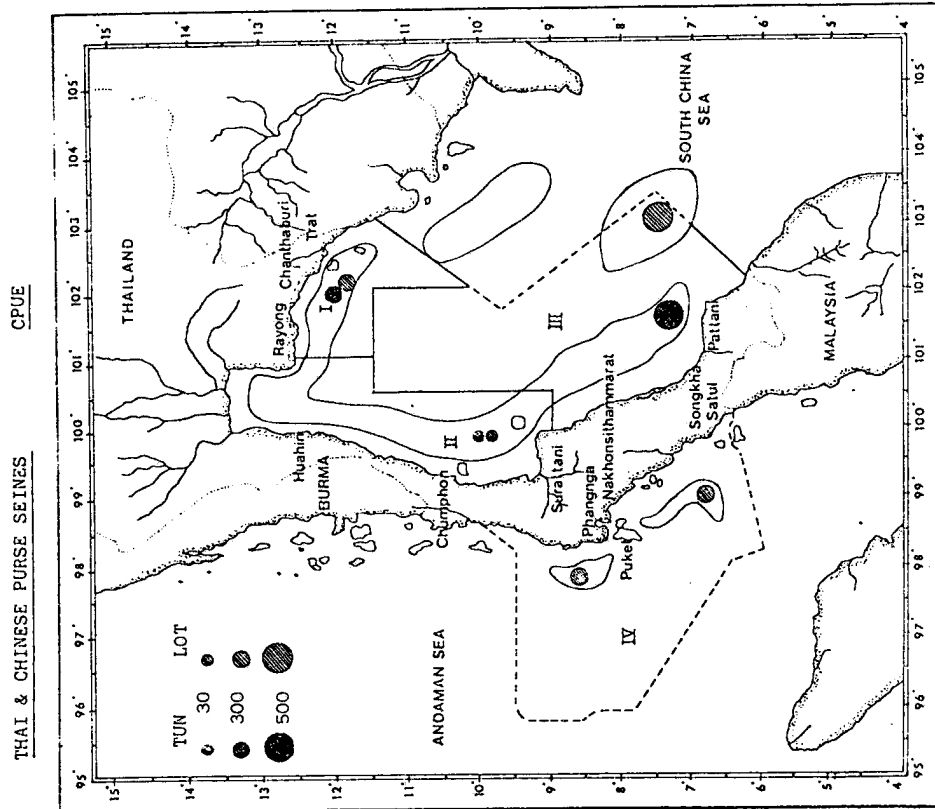
Area	I	II	III	IV	Total
Fishing days	706	4,823	470	3,261	9,260
(%)	7.6	52.1	5.1	35.2	100



1981/1982 average

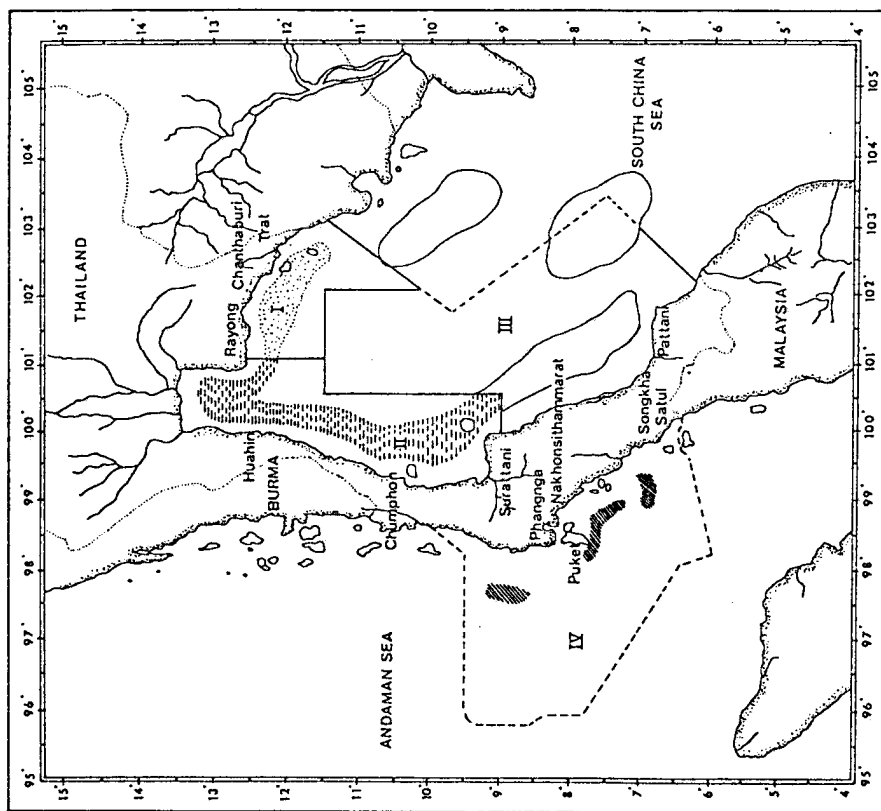
Area	I	II	III	IV	Total
Catch (NT)	378	306	437	2,051	3,172
(%)	11.9	9.6	13.8	64.7	100

Thailand - Catch and Effort Data



Estimated catch rate (kg/day), average in 1981-1982

THAI & CHINESE PURSE SEINES CATCH

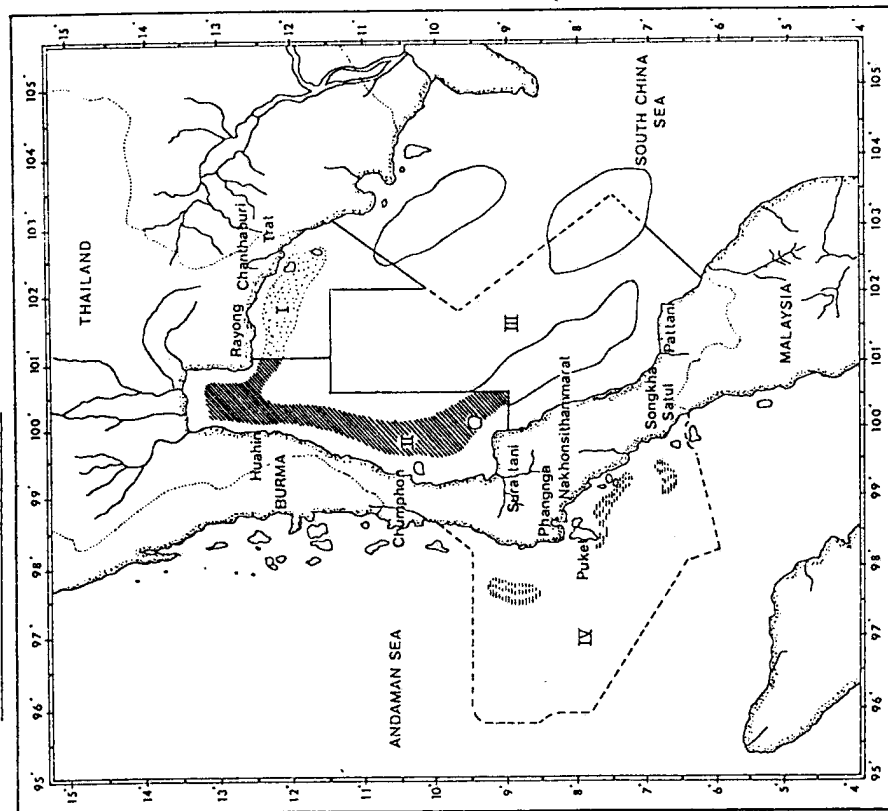


1983

Area	I	II	III	IV	Total
Catch (MT)	1	280	-	3,108	3,389
(%)	0	8.3	-	91.7	100

Thailand - Catch and Effort Data

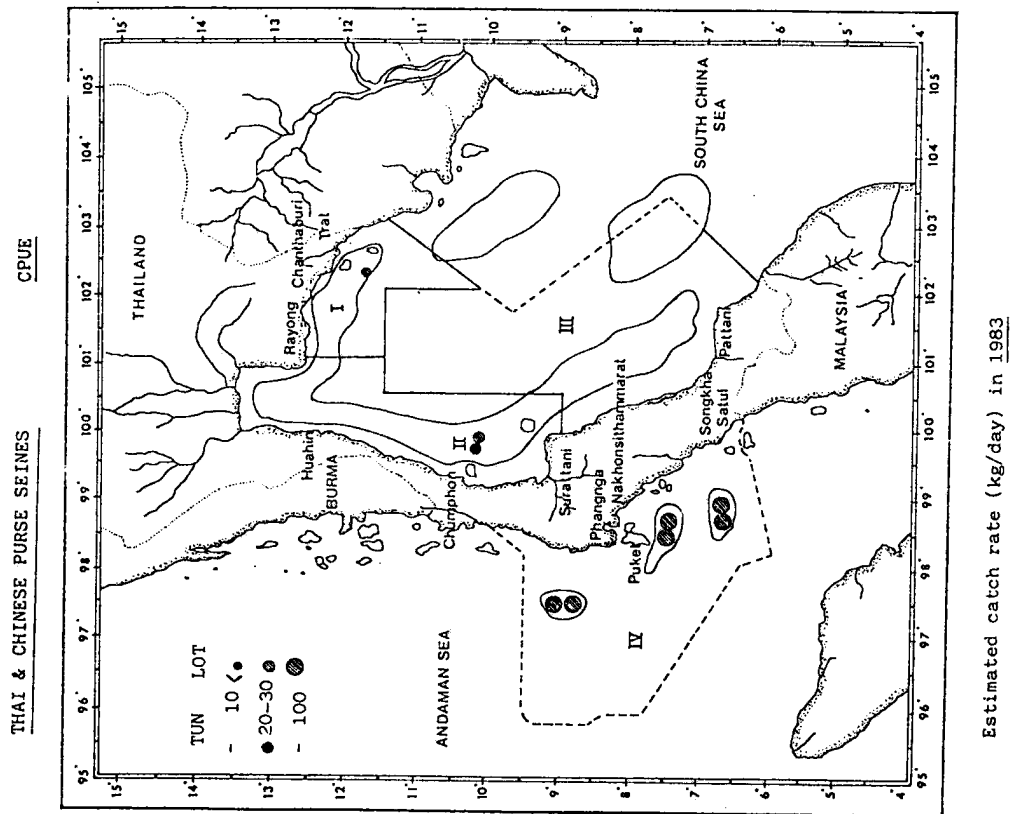
THAI & CHINESE PURSE SEINES EFFORT



1983

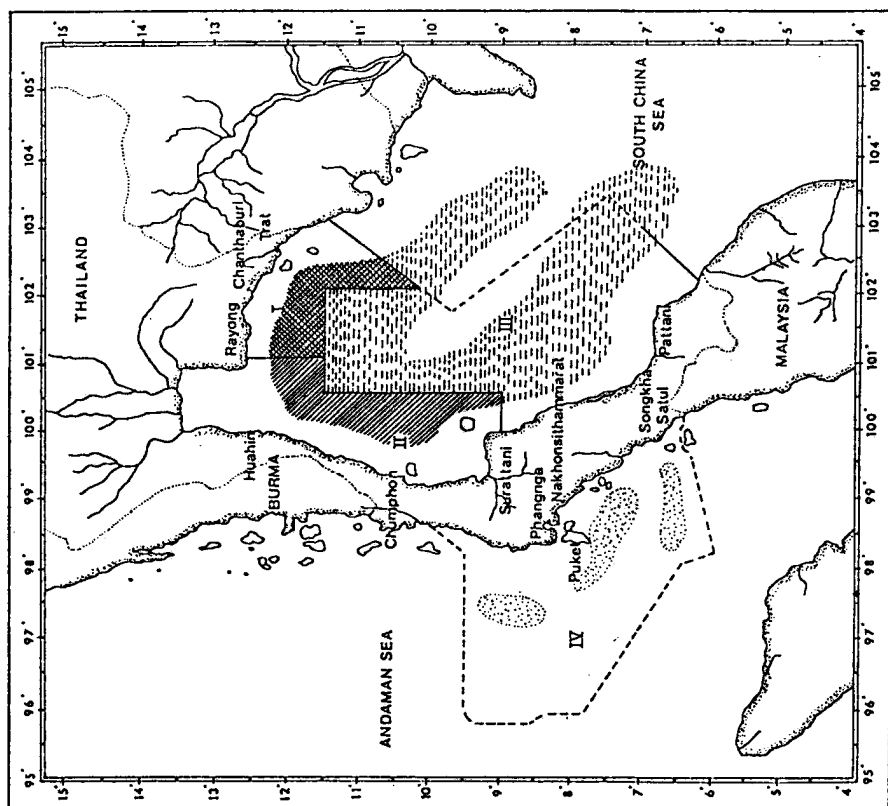
Area	I	II	III	IV	Total
Fishing days	156	5,648	-	5,258	11,062
(%)	1.4	51.1	-	47.5	100

Thailand - Catch and Effort Data



75
Thailand - Catch and Effort Data

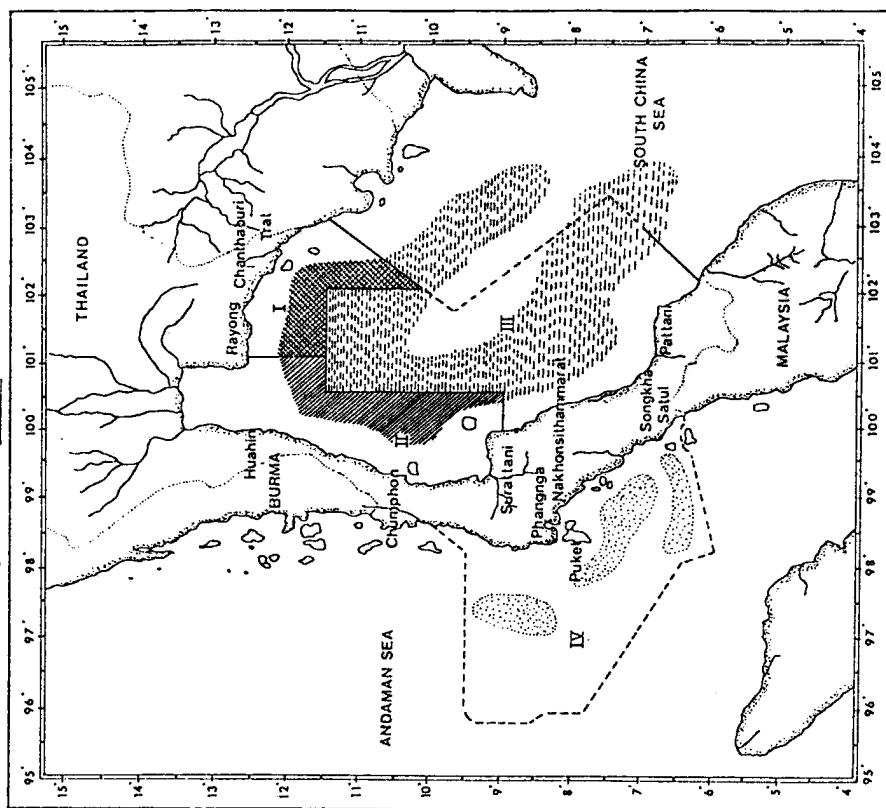
LURING PURSE SEINE CATCH



1979/1980 average

Area	I	II	III	IV	Total
Catch (MT)	2,295	1,897	1,312	1,296	6,800
(%)	33.7	27.9	19.3	19.1	100

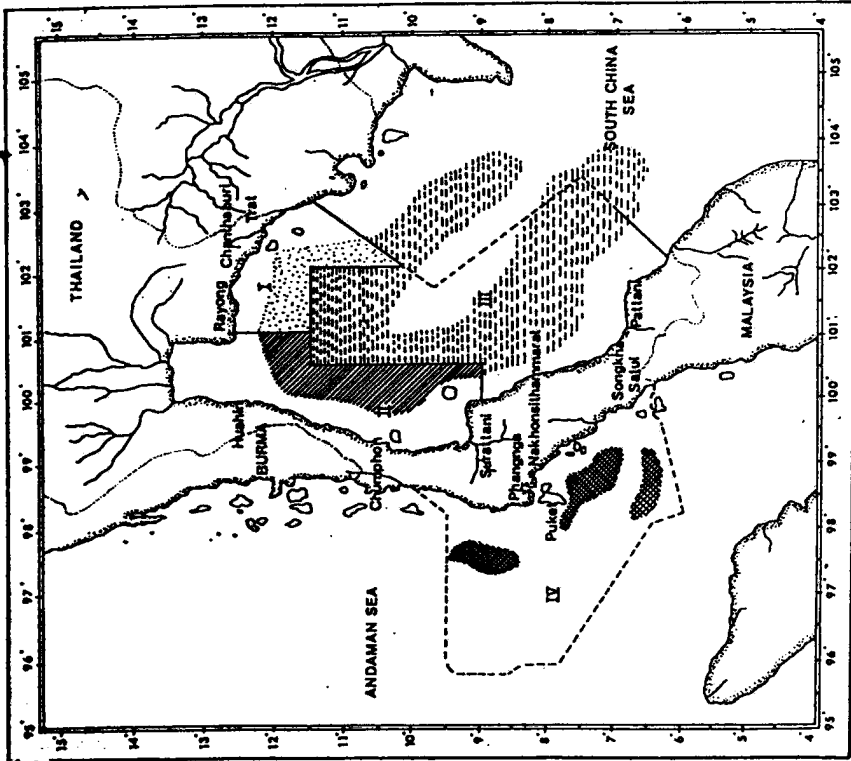
LURING PURSE SEINE EFFORT



1979/1980 average

Area	I	II	III	IV	Total
Fishing days	27,151	64,048	12,792	10,442	114,433
(%)	23.7	56.0	11.2	9.1	100

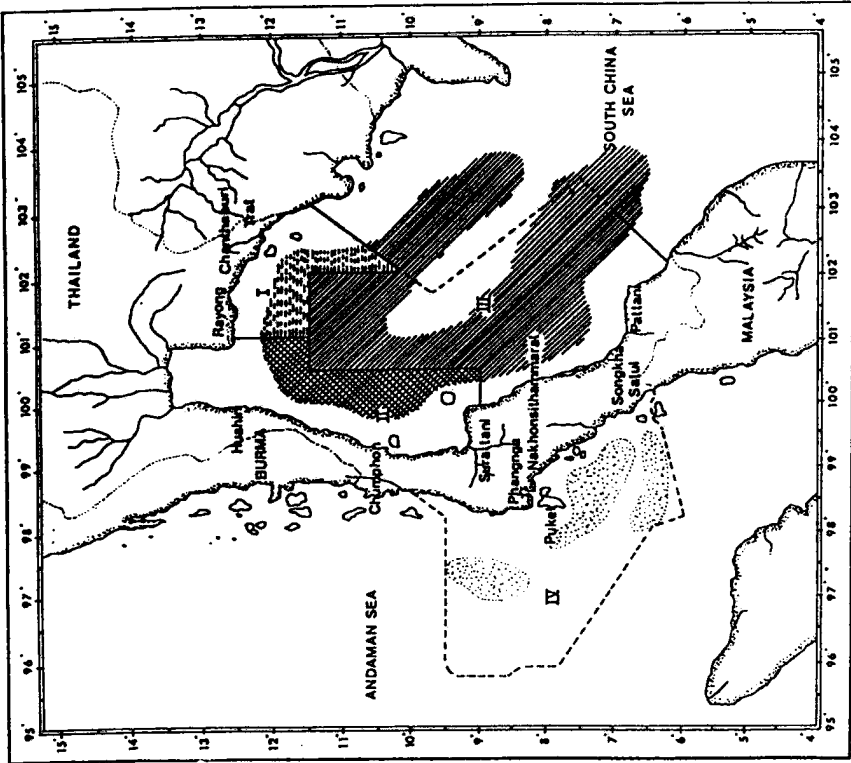
LURING PURSE SEINE CATCH



1981/1982 average

Area	I	II	III	IV	Total
Catch (MT)	1,877	5,634	4,774	5,947	18,232
(%)	10.3	30.9	26.2	32.6	100

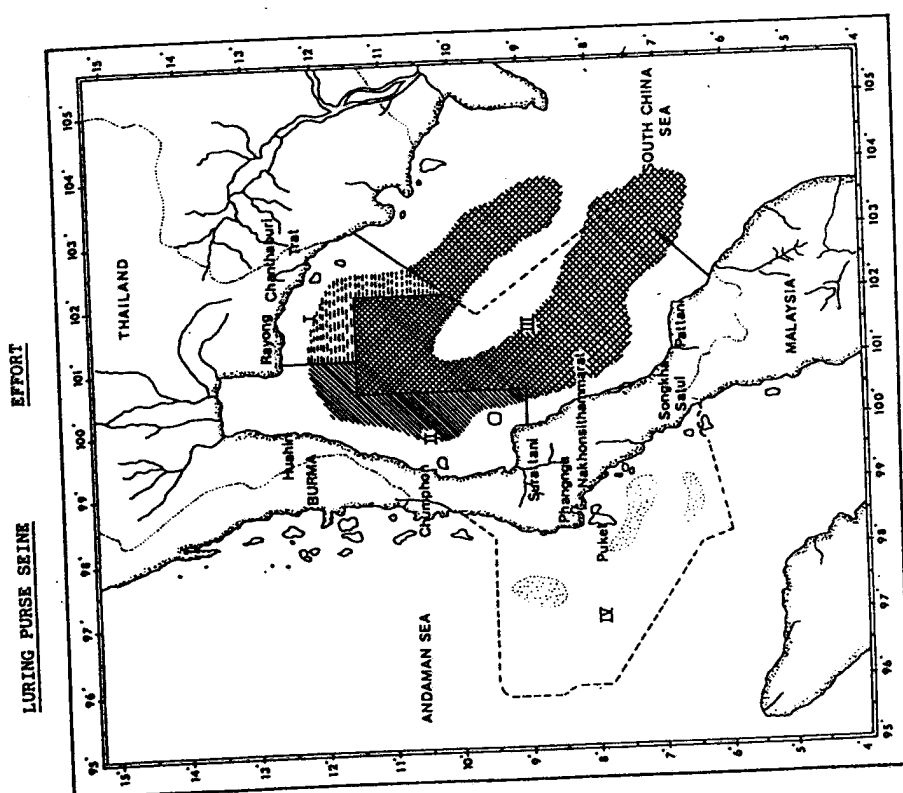
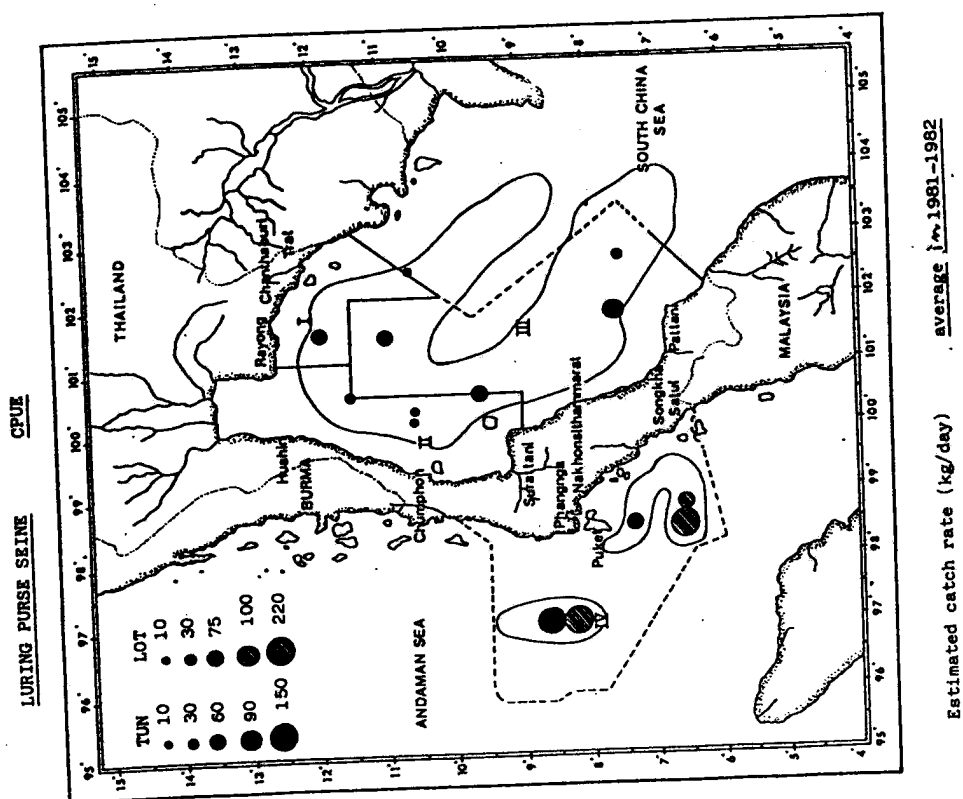
LURING PURSE SEINE EFFORT



1981/1982 average

Area	I	II	III	IV	Total
Fishing days	21,415	71,163	25,620	16,216	134,414
(%)	15.9	52.9	19.1	12.1	100

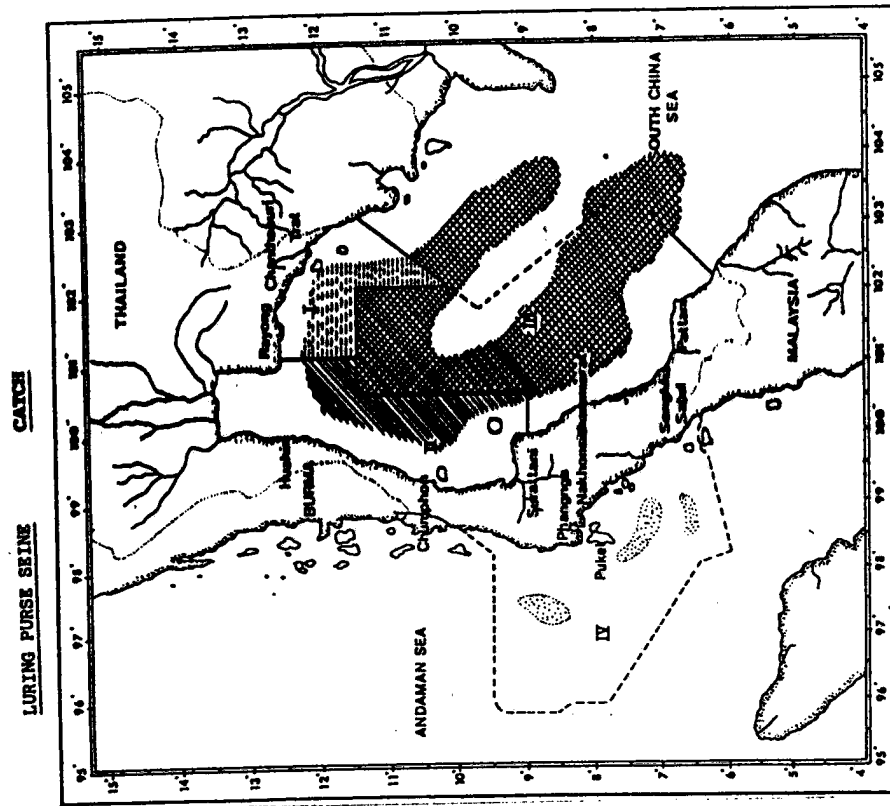
Thailand - Catch and Effort Data



1983

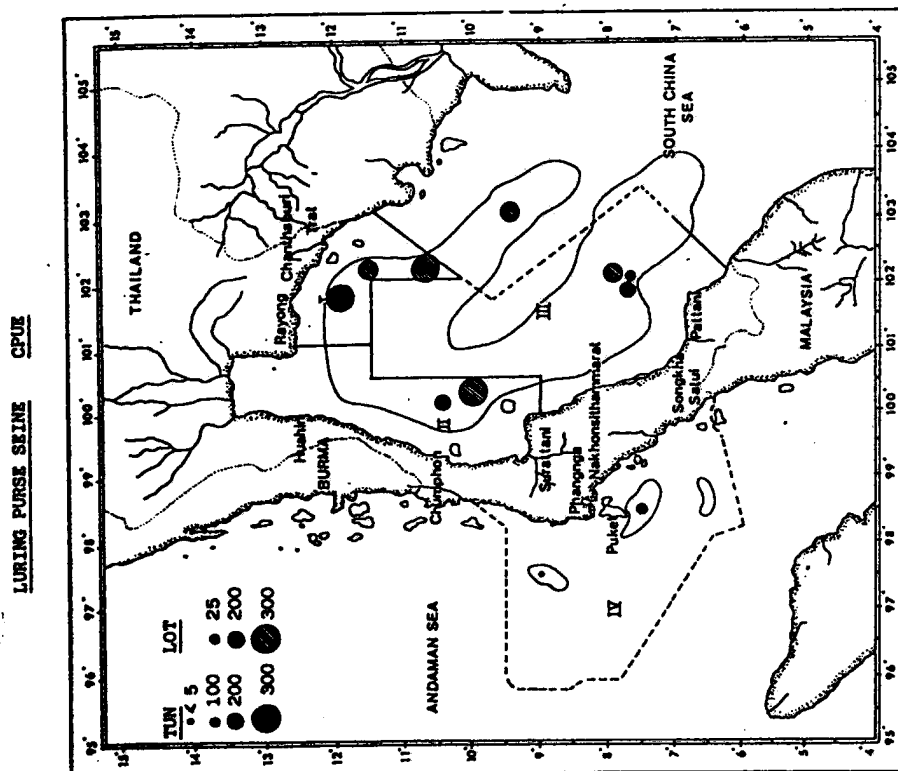
	I	II	III	IV	Total
Area	16,667	42,882	53,336	7,697	120,584
Fishing days (%)	13.8	35.6	44.2	6.4	100

Thailand - Catch and Effort Data



1983

Area	I	II	III	IV	Total
Catch (MT)	13,870	17,118	36,325	667	67,981
(%)	20.4	25.2	53.4	1.0	100

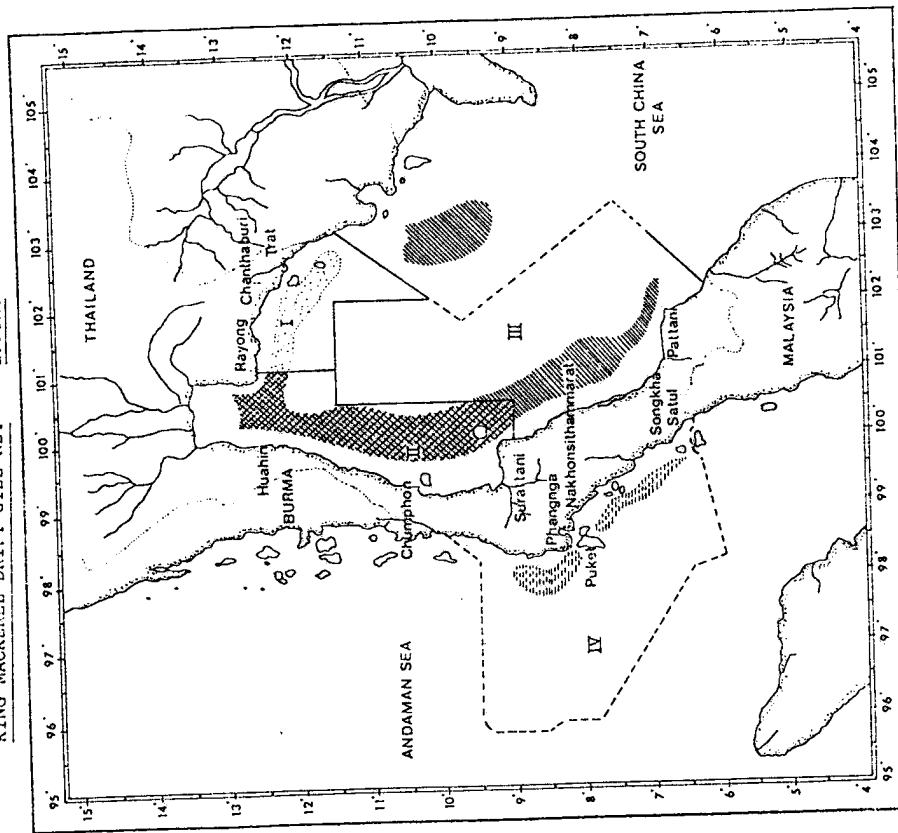


Catch rate (kg/day) in 1983

Thailand - Catch and Effort Data

(2)

KING MACKEREL DRIFT GILL NET EFFORT

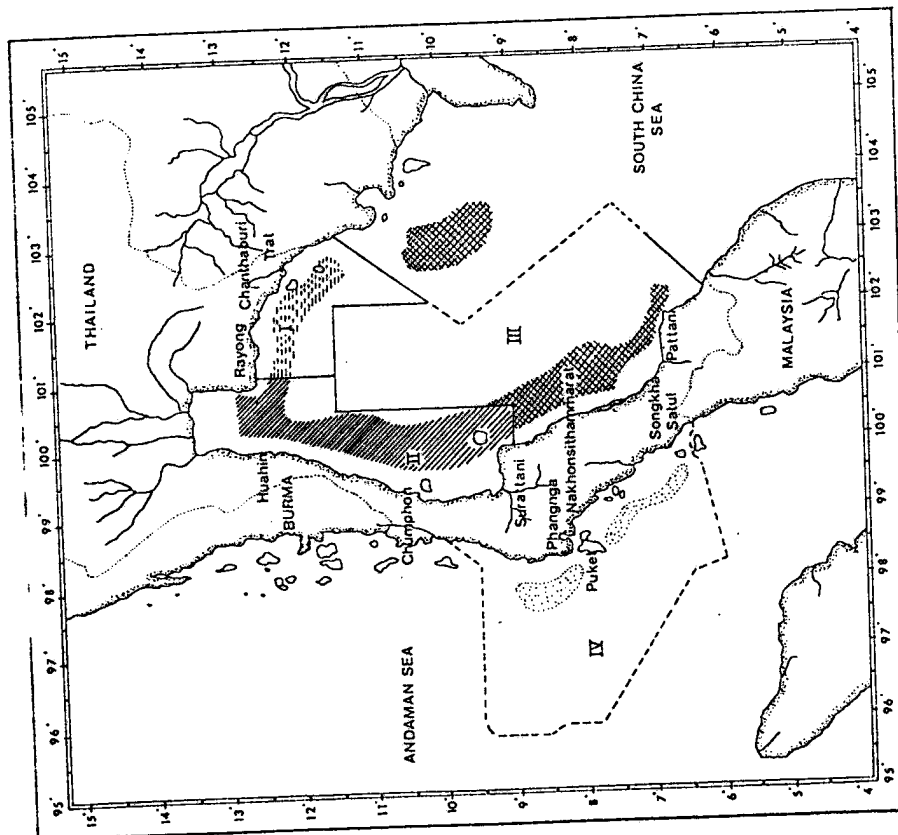


1979/1980 average

Area	I	II	III	IV	Total
Fishing days	6,589	18,015	9,615	8,768	42,987
(%)	15.3	41.9	22.4	20.4	100

(1)

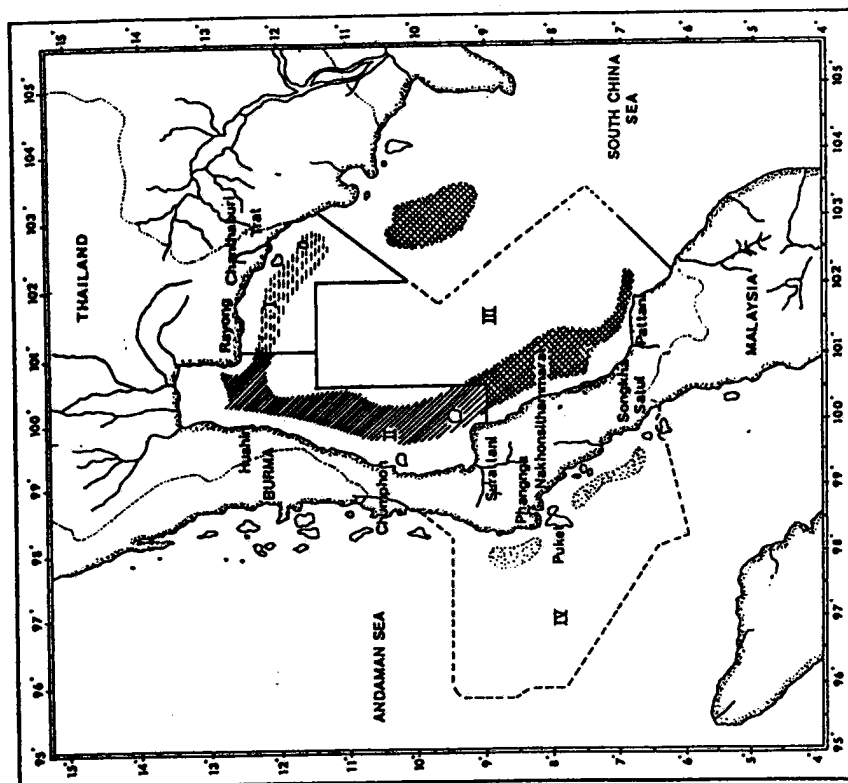
KING MACKEREL DRIFT GILL NET CATCH



1979/1980 average

Area	I	II	III	IV	Total
Catch (MT)	1,380	1,399	2,256	145	5,180
(%)	26.6	27.0	43.6	2.8	100

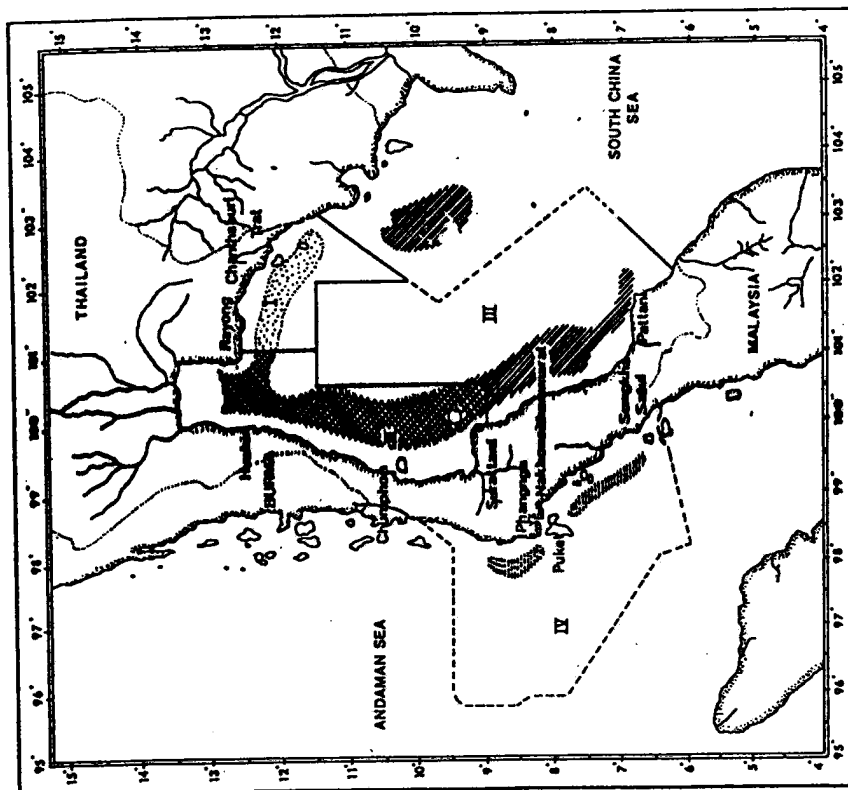
KING MACKEREL DRIFT GILL NET CATCH



1981/1982 average

Area	I	II	III	IV	Total
Catch (TN)	2,060	3,496	9,740	610	15,906
(%)	13.0	22.0	61.2	3.8	100

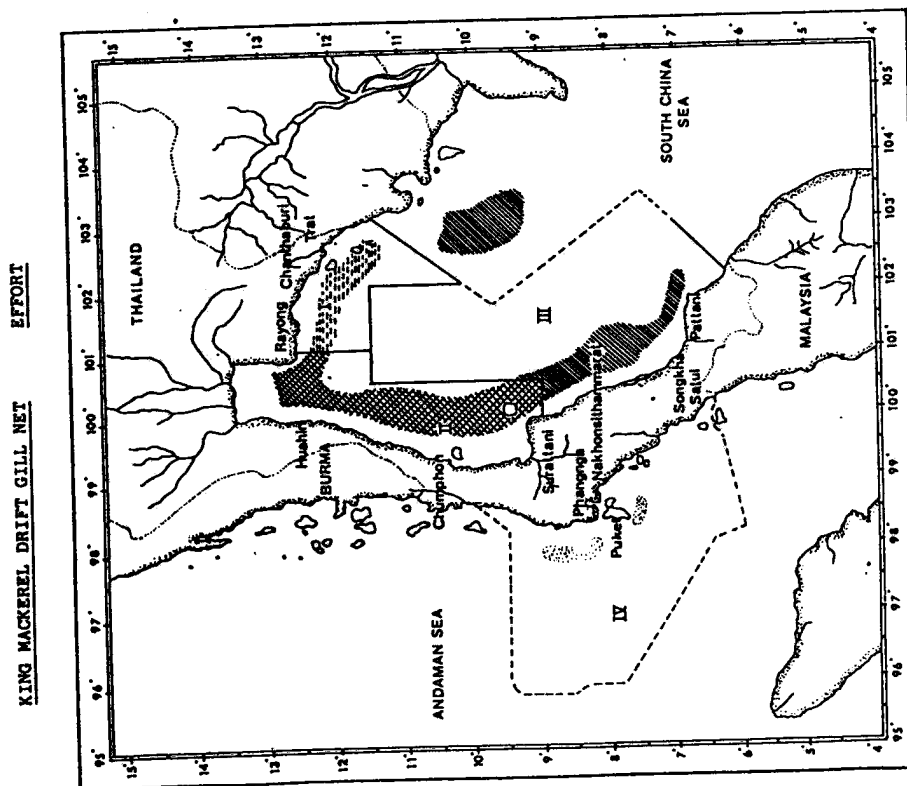
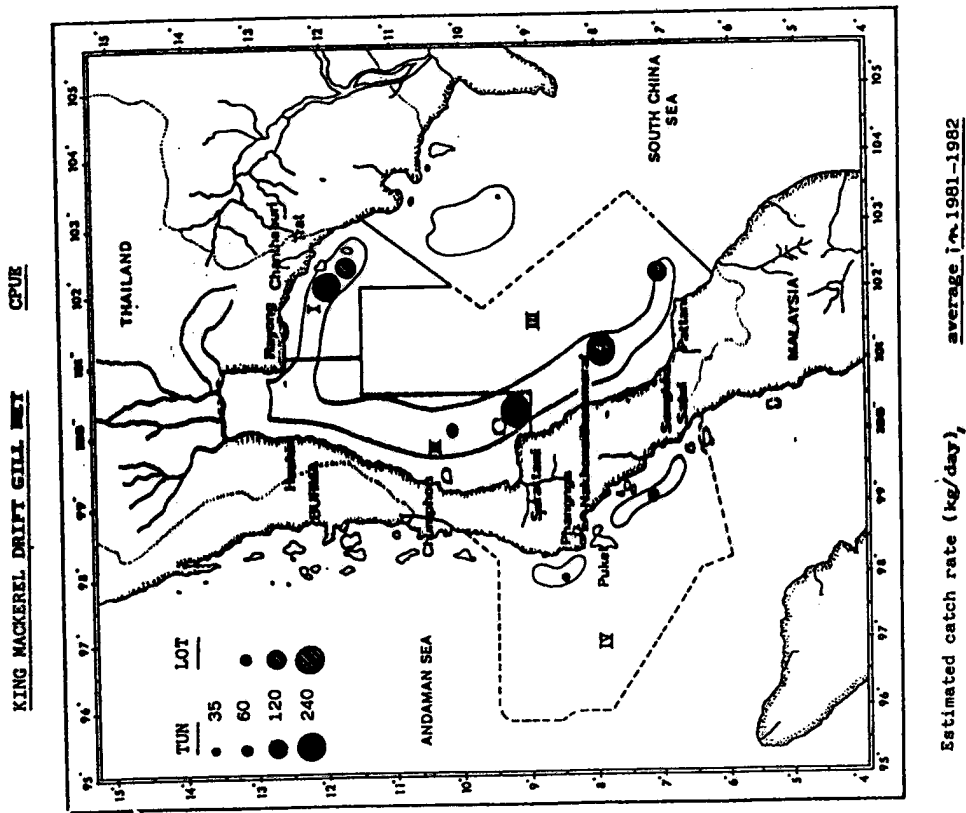
KING MACKEREL DRIFT GILL NET EFFORT



1981/1982 average

Area	I	II	III	IV	Total
Fishing days	5,531	19,220	17,612	6,364	48,727
(%)	11.4	39.4	36.1	13.1	100

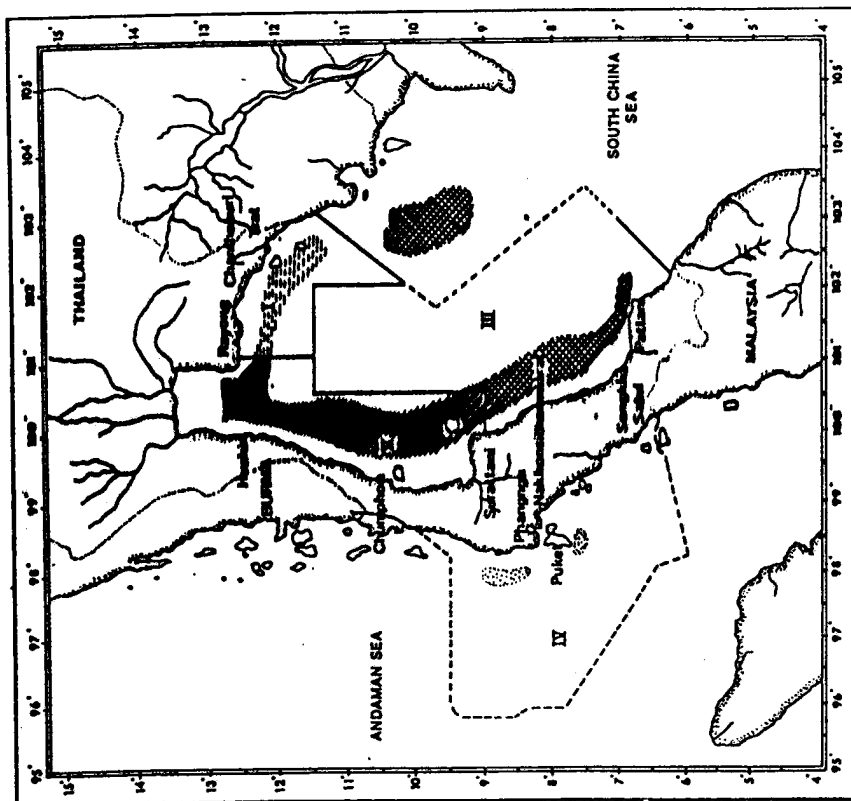
Thailand - Catch and Effort Data



1983

	I	II	III	IV	Total
Area	14,063	16,913	16,277	1,210	48,463
Fishing days (%)	29.0	34.9	33.6	2.5	100

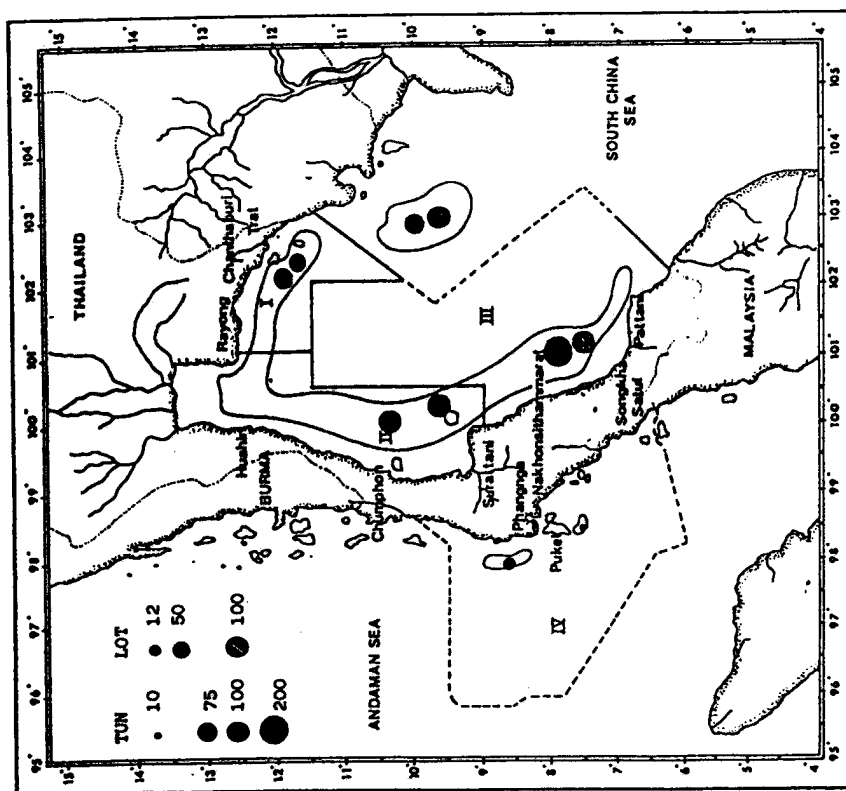
KING MACKEREL DRIFT GILL NET CATCH



1983

Area	I	II	III	IV	Total
Catch (MT)	1,708	3,484	7,913	24	13,129
(%)	13.0	26.5	60.3	0.2	100

KING MACKEREL DRIFT GILL NET CPUE



Estimated catch rate (kg/day) in 1983

Thailand - Biological Data

Table 1 Average size and percentage of age groups of the coastal tunas caught in the Gulf of Thailand, 1979 and 1984.

Species	Year	Length cm	Average length cm	% of ≤ 1 years fish	% of >2 Years fish
Longtail tuna	1979	20 - 55	40.7	94.7	5.3
	1984	17 - 50	38.5	99.9	0.1
Kawakawa	1979	18 - 56	38.7	58.6	41.4
	1984	15 - 49	29.3	91.0	9.0
Frigate tuna	1979	19 - 49	35.9	59.1	40.9
	1984	15 - 53	28.9	84.7	15.3

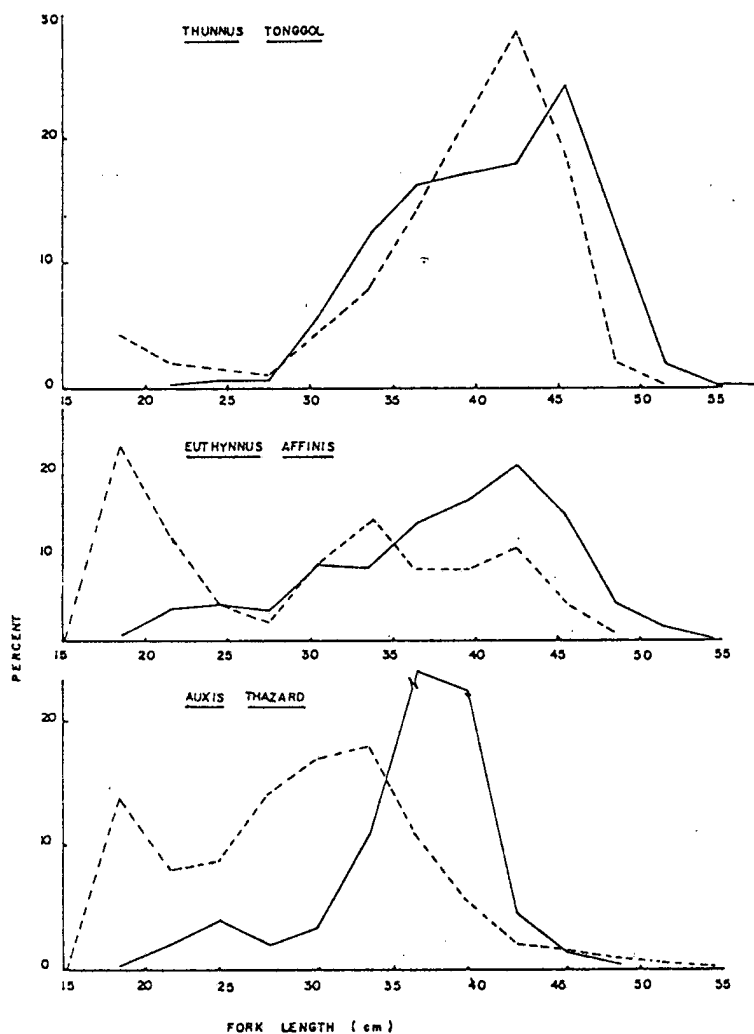


Fig. 1 Size composition of coastal tunas caught in the Gulf of Thailand in 1979 and 1984

— 1979 : mostly from drift gill net samples
 ---- 1984 : mostly from purse seine samples

Thailand - Biological Data

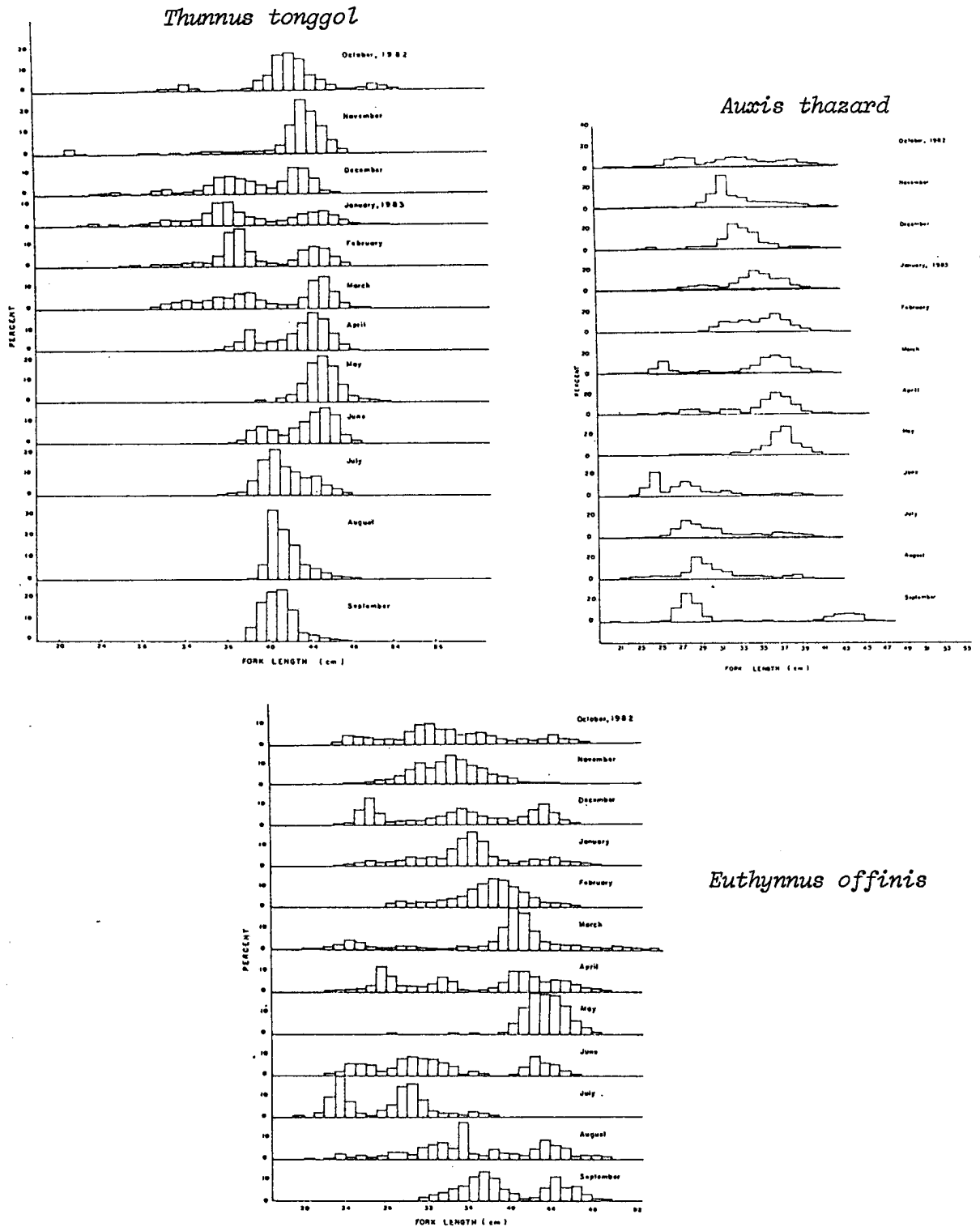


Fig. 2 Length frequency distribution of coastal tunas in the Gulf of Thailand, 1983

Table 2. Summary of biological studies of coastal tunas in Thai waters.

Species	Distribution	Size composition	Recruitment	Spawning	Length at maturity	Fecundity	Sex ratio	Lt - Wt Relation
<i>Thunnus tonggol</i>	<u>Adults:</u> Throughout Thai water of > 20 m depth <u>Larvae:</u> Off Chumporn-Nakorn-Sriphamarat 15-30 m depth (Not abundance)	22-55 cm FL <u>Modes in the catch:</u> <u>East:</u> 35.0, 47.0, 51.0 cm <u>West (upper):</u> 31.0, 35.0, 47.0 cm <u>West (lower):</u> 26.0, 37.0, 47.0, 50.0 cm	<u>East:</u> All year round <u>Peak:</u> Jan - Feb. <u>Sept.- Dec.</u> <u>Length 22.0 cm</u> <u>West (upper):</u> Jan.- Feb. Apr.- June Sept.- Dec. <u>Length 23.0 cm</u> <u>West (lower):</u> Apr.- May Sept.- Dec.	<u>Season:</u> Mar.- May Jul.- Dec. <u>Area:</u> Edge of the basin of the Gulf	♀ 39.6 cm FL	<u>Average:</u> 1,400,000 (TL: 43.8 - 48.1 cm)	1:1	W=0.000021L ^{2.979}
<i>Euthynnus affinis</i>	Same as <i>T. tonggol</i>	21 - 60 cm FL <u>Modes:</u> <u>East:</u> 21.0, 35.0, 51.0 cm <u>West (upper):</u> 26.0, 47.0 cm <u>West (lower):</u> 25.0, 32.0, 34.0, 42.0 cm	<u>East:</u> 11-21 cm Feb.- Mar. Aug. - Dec. <u>West (upper):</u> <u>Length:</u> 26.0 cm Mar.- Apr Jun.- Aug. <u>West (lower):</u> <u>Length:</u> 25 cm Mar.- Apr. Aug.- Sept.	<u>Season:</u> Jan.- Mar. Jun.- Aug. <u>Area:</u> Not clear	♀ 37.5 cm FL.	<u>Average:</u> 1,730,000 (TL: 39.5 - 51.0 cm)	1:1	W=0.000015L ^{3.222}
<i>Auris thazard</i>	Same as <i>T. tonggol</i>	19-49 cm FL. <u>Modes:</u> <u>East:</u> 27.0, 45.0 cm <u>West (upper):</u> 35.0 cm <u>West (lower):</u> 35.0 cm	<u>East:</u> <u>Length:</u> 21.0 cm Feb. and Sept. <u>West (upper):</u> All year round <u>Length:</u> 19-27 cm Apr.- May Aug.- Dec. <u>West (lower):</u> <u>Length:</u> 19-27 cm Apr.- May Oct.- Nov.	<u>Season:</u> Apr.- Jun. Aug.- Sept. <u>Area:</u> Not clear	♀ 34.1 cm FL.		1:1	W=0.000021L ^{2.990}

FL : Fork Length
 TL : Total Length

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 M. YESAKI The status of tuna 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. and M. YESAKI. Tuna fisheries in the Philippines. Colombo, Indo-Pacific Tuna Development and Management Programme. December, 1982.
- 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.
- 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. Indo-Pacific Tuna Development and Management Programme. July, 1983.
- IPTP/83/WP/8 WHITE T.F. and M. YESAKI. The Balinese Tuna Fishery. Indo-Pacific Tuna Development and Management Programme. October, 1983. 15p.
- IPTP/83/WP/9 WHITE T.F. and J.C.B. UKTOLSEJA. The West Java Tuna Fishery. Indo-Pacific Tuna Development and Management Programme. 1983. 21p.
- IPTP/84/WP/10 JOSEPH B.D.L. Review of Tuna Fishery in Sri Lanka. Indo-Pacific Tuna Development and Management Programme. July, 1984. 35p.
- IPTP/84/WP/11 SAKURAI T. Major Findings from the Indo-Pacific Historical Tuna Fisheries Data Summary. Indo-Pacific Tuna Development and Management Programme. September, 1984. 11p.

DATA SUMMARIES

- IPTP Data
Summary No. 1 Indo-Pacific Tuna Fisheries Data Summary (Draft).
Indo-Pacific Tuna Development and Management programme.
September 1983. 186p.
- IPTP Data
Summary No. 2 Indo-Pacific Historical Tuna Fisheries Data Summary.
(Revised Indo-Pacific Tuna Development and Management Programme.
Edition) September 1984. 141p.
- IPTP Data
Summary No. 3 Indian Ocean Tuna Fisheries Data Summary.
Indo-Pacific Tuna Development and Management Programme.
March 1985. 62p.
- IPTP Data
Summary No. 4 Western Pacific Ocean Tuna Fisheries Data Summary.
Indo-Pacific Tuna Development and Management Programme.
May 1985. 73p.

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. Indo-Pacific Tuna Development and Management
Programme. February, 1983.
- 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. Indo-Pacific Tuna
Development and Management Programme. March, 1984.
- IPTP/84/GEN/6 Report on the ad hoc workshop on the stock assessment of
tuna in the Indo-Pacific region. 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.
Indo-Pacific Tuna Development and Management Programme.
April, 1985.

MANUALS

- IPTP Manual No.1 Manual for the collection of historical data on tuna and
SCS Manual No. 2 tuna-like species in the Indo-Pacific region. 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). Indo-Pacific Tuna Development and Management Programme. February, 1984

PERIODIC PROGRESS REPORTS

- IPTP/PR/82/1 HOOKER, P.J. Project progress report of the Indo-Pacific Tuna Development and management Programme, project INT/81/034. 1 January - 30 June 1982.
- IPTP/PR/82/2 HOOKER, P.J. Project progress report for the Indo-Pacific Tuna Development and Management Programme, project GCP/RAS/099/JPN. 1 January 1982 - 30 September 1982.
- IPTP/PR/82/3 HOOKER, P.J. Project progress report of the Indo-Pacific Tuna Development and Management Programme, Project INT/81/034. 1 July - 31 December 1982.
- IPTP/PR/83/4 HOOKER, P.J. Project progress report for the Indo-Pacific Tuna Development and Management Programme, Project GCP/RAS/099/JPN. 1 October 1982 - 31 March 1983.
- IPTP/PR/83/5 HOOKER. P.J. Project progress report for the Indo-Pacific Tuna Development and Management Programme, Project INT/81/034. 1 January - 30 June 1983.
- IPTP/PR/83/6 HOOKER. P.J. Project progress report for the Indo-Pacific Tuna Development and Management Programme, project GCP/RAS/099/JPN. 1 April - 30 September 1983.
- IPTP/PR/83/7 HOOKER. P.J. Project progress report for the Indo-Pacific Tuna Development and Management Programme, Project INT/81/034. 1 July - 30 December 1983.
- IPTP/PR/83/8 HOOKER. P.J. Project progress report for the Indo-Pacific Tuna Development and Management Programme, Project GCP/RAS/099/JPN. 1 October - 30 December 1983.
- IPTP/PR/84/9 HOOKER, P.J. Project progress report for the Indo-Pacific Tuna Development and Management Programme, Project INT/81/034. 1 January - 30 June 1984.
- IPTP/PR/84/10 HOOKER, P.J. Project progress report for the Indo-Pacific Tuna Development and Management Programme, Project GCP/RAS/099/JPN. 1 January - 30 June 1984.
- IPTP/PR/84/11 INTERIM REPORT: IPTP Progress to Date and Options for the Future. Indo-Pacific Tuna Development and Management Programme, November, 1984.