EXPLOITATION OF THE LARGE AND MEDIUM SEINERS FISHERIES

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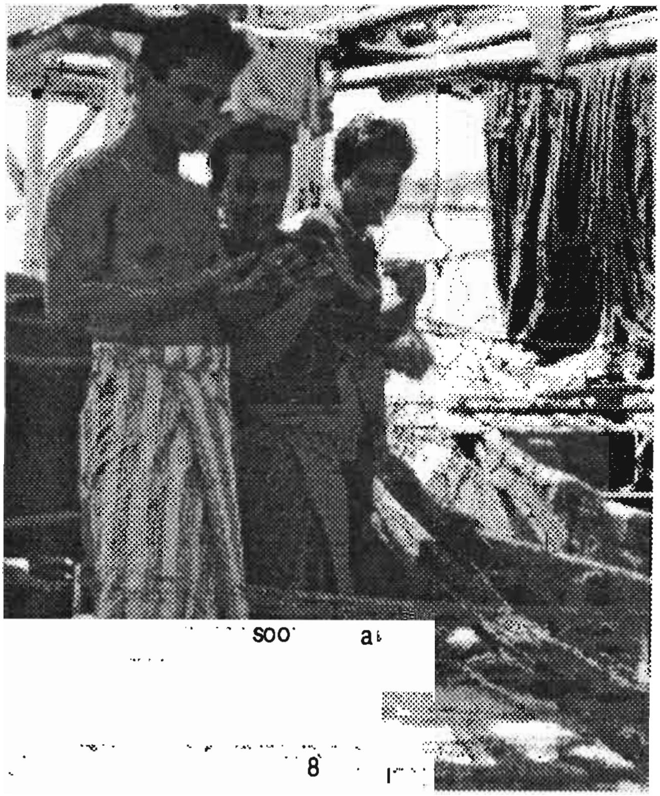


REPAIRING THE NET

MENJURAI DAN MEMPERBAIKI JARING

ABSTRACT

Since the trawl ban in 1980 pelagic species are the main resources exploited in the Java Sea by numerous fisheries. Among those the purse-seine fisheries are the main ones. The large and medium seiners located in the province of Central Java are heavily involved in this exploitation. The fleets consisting of wooden vessels prospect the Java Sea, the Makassar Strait and the southern part of the South China Sea.

high since 1976 it is new in Juwana and related to the displacement of the main fishing grounds to the eastern part of the Java Sea.

Since 1979, the landing of the seiners has increased four times reaching 155 000 tons in 1992. Among the thirty species caught by the seiners seven species form 90% of the landings. Two species of scads are the main targets of the exploitation and represent up to 60% of the catch. Mackerels, sardines and big eyes scads are the other species caught in great number by the seiners. Their importance in the landings varies according to the years. These species are part of different populations with different ecological needs. According to the environment and the geographic location of the catch, they are more or less exploited by the seiners. The fishing pressure is high on the coastal and neritic populations and lower on the oceanic populations. Modelization of these resources is difficult as some parameters are still lacking.

Sejak larangan trawl pada tahun 1980, ikan-ikan pelagis adalah sumber daya utama yang diusahakan di Laut Jawa, dimana sumber daya tersebut diusahakan oleh bermacam-macam alat tangkap. Diantara alat tangkap yang ada, purse seine merupakan alat tangkap utama. Purse seine besar dan sedang yang berada di Propinsi Jawa Tengah mempunyai peranan yang paling penting didalam pengusahaan sumber daya tersebut. Armada purse seine terdiri dari kapal kayu yang beroperasi di seluruh Laut Jawa, Selat Makassar dan bagian Selatan Laut Cina Selatan. Pekalongan dan Juwana merupakan pusat dari penangkapan purse seine, 90% dari hasil tangkapan didaratkan disana dan 70% dari kapal-kapal purse seine berasal dari Pekalongan dan Juwana. Kegiatan di Pekalongan sangat tinggi sejak tahun 1976, sedangkan di Juwana berkembang belum lama setelah daerah penangkapan bergeser lebih ke Timur Laut Jawa.

Sejak tahun 1979 ikan yang didaratkan oleh purse seine mencapai 155.000 ton pada tahun 1992. Diantara tiga puluh species yang tertangkap, 7 species diantaranya merupakan 90% dari hasil tangkapan yang didaratkan. Dua species ikan layang merupakan tujuan penangkapan dan mencapai 60% dari hasil tangkapan. Banyar, Siro dan Bentong merupakan species lain yang tertangkap cukup banyak oleh purse seine. Berdasarkan tahun, jumlah masing-masing species yang tertangkap sangat bervariasi.

Species-species tersebut merupakan bagian dari populasi yang berbeda yang mempunyai kebutuhan ekologi yang berbeda. Berdasarkan keadaan lingkungan dan lokasi geografi dari pada hasil tangkapan, mereka lebih banyak tertangkap oleh purse seine. Tekanan penangkapan lebih besar di daerah pantai dan populasi neuritik dari pada populasi yang bersifat oseanik. Modelisasi dari sumber daya tersebut adalah tidak mudah, sepanjang beberapa parameter belum diketahui.

INTRODUCTION

Since the trawl ban in 1980, pelagic species are the main resources exploited in the Java Sea. Their exploitation by artisan fisheries is very old and has an important socio-economic impact on the islands bordering that sea. First limited to onshore resources of the North coast of the Java Island, the exploitation extended offshore since the implementation of the purse seine.

The purse seine was introduced in the Java Sea in order to have a longer fishing period and a higher catch than with the traditional nets. It spreads out quickly and the seiners were able to extend their exploitation area outside the Java Sea in order to free themselves from the high seasonal fluctuations of the catch occurring there. The exploitation of the resource by the large purse seiners is now twenty years old and during this period many changes occurred.

The fishery is not a static but a dynamic system which quickly reacts to internal and external changes. In 1987 smaller seiners coming from the Pekalongan harbor entered the fishery The geographic distribution of pelagic is such that the mini, medium and large seiners are now exploiting same or overlapping populations. This is why in the statistics analysis on large and medium seiners the data collected on other fisheries has also to be taken into account.

1. MATERIAL AND METHODS

Accurate data has been available since 1979. Before that year a lack of accuracy in the national system or the implementation lag of the sampling scheme proposed by FAO in 1976 did not allow to have reliable data. Since 1985 with the beginning of the cooperation between ORSTOM (French Institute for Research and Development in Cooperation) and BPPL (Indonesian Research Institute for Marine Fisheries) a sampling scheme for the collect of data coming from the large seiners fishery has been set in the different landing places. The catch and effort are now known by fishing ground and by commercial category.

Since the Java Sea Pelagic Fishery Assessment Project started in May 1991 the sampling scheme has been improved. Catch is known by species and by fishing ground. Effort data is collected from the fishing port administration of Pekalongan where entries and exits of the seiners are registered. At other landing places the effort estimation is derived from enquiries on board of the seiners during every landing. Such data has been available since mid-1984.

Table I

DEFINITIONS OF THE DIFFERENT CATEGORIES REFERRING TO DIVERSE SOURCES

PENJELASAN DARI BEBERAPA KATAGORI YANG BERBEDA BERDASARKAN BEBERAPA SUMBER

STATISTICAL	LANDING PLACES	SIZE CATEGORIES	SPECIES
Layang	**Layang**	**Unyir** = very small **Bloco** = small **Layang** = standard **Korok** = big	*Decapterus russelli macrosoma*
Lemuru	**Siro**		*Amblygaster sirm*
Kembung	**Kembung**	**Kemari** = small **Kembung** = standard	*Rastrelliger brachysoma*
	Banyar	**Kemari** = small **Banyar** = standard	*Rastrelliger kanagurta*
Tembang	**Tanjan -Juwi**		*Sardinella gibbosa lemuru fimbriata*
Selar	**Bentong**	**Mandring** = small **Bentong** = standard	*Selar crumenophthalmus*
	Selar	**Selar** = standard	*Selaroides leptolepis*
		Como = big	*Atule mata* *Aleppes djeddaba*
Lain-lain	**Campuran**		Mixed species

2. EXPLOITED SPECIES

The Javanese seiners catch around thirty pelagic and semi-pelagic species. Eleven of these species form 90% of the landings. According to official statistics, these eleven species are gathered in five statistical categories. In the different landing places the names of these categories are replaced by local names related to species and size (tab. I).

3. FLEETS

The large seiners fleet is the oldest to use the seine net in the Java Sea. The number of fishing vessels increased from 1979 until 1985 when the fleet reached 520 units. In 1987 and 1988, the number of large seiners drastically decreased. Despite the construction of many new vessels in the last years the number of seiners, with 357 units in activity in 1992 (fig. 1), is still far from the 1985 figure. This fleet represents 61% of the whole seiners in activity in the province of Central Java .

Medium seiners appeared in 1987 and their number slightly increased until 1991. In 1992, with new investors, the fleet quickly expanded and reached 232 units (fig. 1).

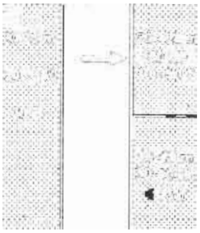
These two well distinct fleets with different vessels and fishing strategies tend to overlap each other. Since 1979, size, horse power (fig. 2) and fish hold capacity have increased. This evolution linked with a better fishing efficiency (fig. 3) allowed the exploitation located in the traditional Javanese fishing grounds to extend to the eastern part of the Java Sea, to the Makassar Strait and to the South China Sea. In 1992, we can assess three segments (fig. 3) exploiting different fishing grounds in the fishery :

Table II

SEINERS LANDINGS IN THE DIFFERENT LANDING PLACES OF THE FISHERY FROM 1979 TO 1992

PENDARATAN PURSE SEINE PADA TEMPAT PENDARATAN IKAN YANG BERBEDA DARI TAHUN 1979 SAMPAI DENGAN TAHUN 1992

YEAR	TEGAL	PEKALONGAN	BATANG	JUWANA	REMBANG
1979	8 100	21 200	12 100		3 200
1980	9 100	24 300	8 400		4 400
1981	8 600	21 700	4 900		3 200
1982	12 500	28 300	4 400		4 700
1983	16 100	45 100	4 700		9 100
1984	11 500	49 800	5 500	6 400	7 100
1985	13 500	57 600	11 900	15 700	8 600
1986	11 700	63 300	8 800	20 600	3 800
1987	10 100	45 100	2 400	13 500	12 200
1988	9 200	41 400	1 400	13 300	
1989	12 600	56 800	600	22 200	
1990	13 000	57 500	1 000	27 000	
1991	13 700	74 300	300	33 400	1 700
1992	16 000	86 000	400	41 300	5 100



4. LANDING PLACES

In 1992, 90% of the seiners catch was landed at Pekalongan and Juwana but the situation of the two harbors is rather different. The fishing vessels landing at Pekalongan are registered there, while the activity of Juwana mainly depends on vessels registered in other places (fig. 6). Opened in 1984 to the large seiners the landings made at Juwana, quickly grew. The harbor is well located, near the main fishing grounds.

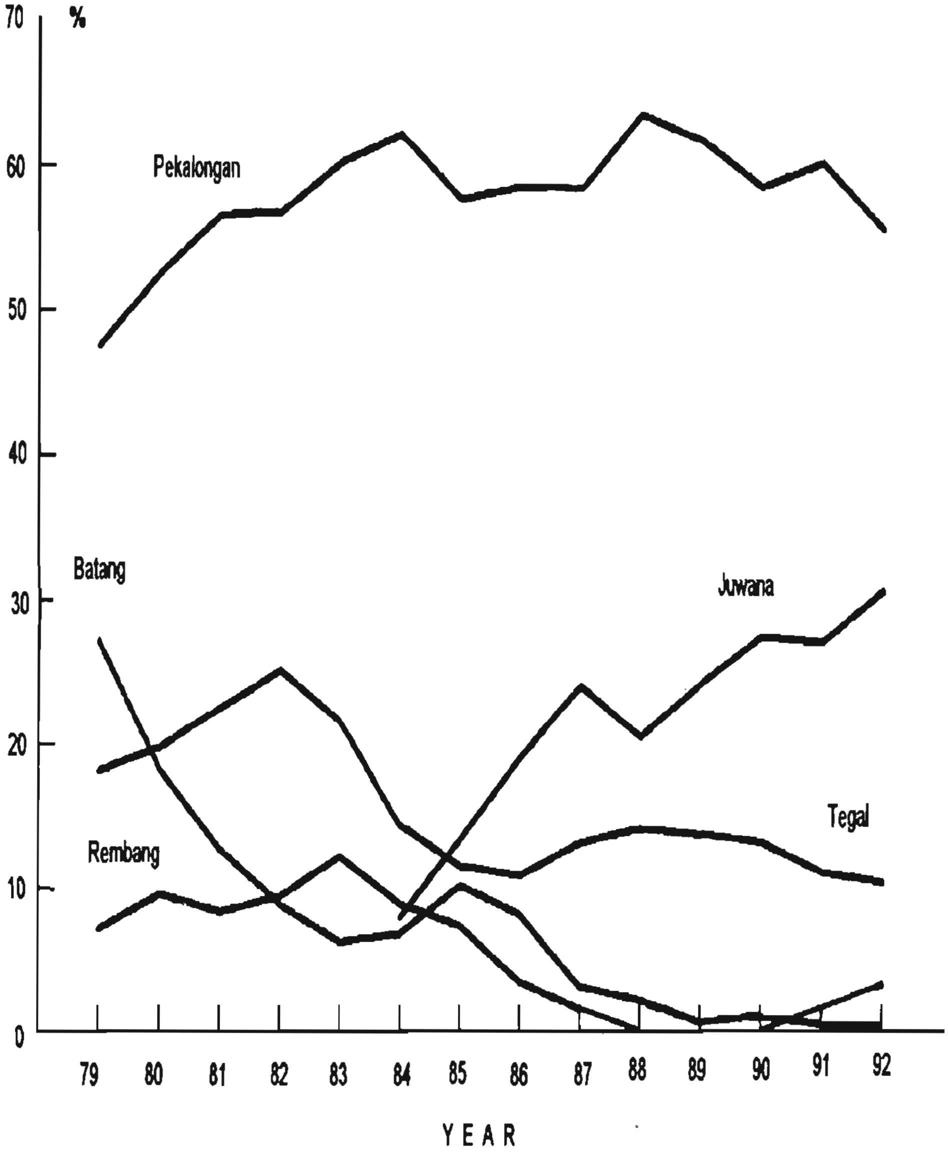


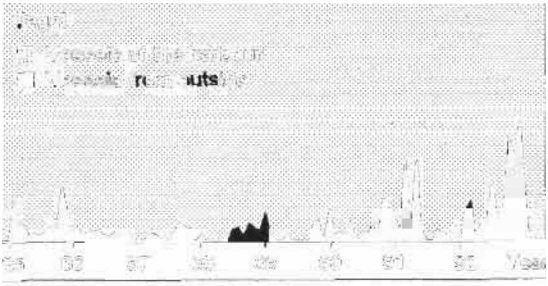
Figure 5

EVOLUTION IN PERCENTAGE OF THE LANDINGS IN THE LANDING PLACES OF THE SEINERS FLEET BETWEEN 1979 AND 1992

EVOLUSI PERSENTASE PENDARATAN PADA DAERAH PENDARATAN PURSE SEINE DARI TAHUN 1979 SAMPAI DENGAN TAHUN 1992

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	BENTO[illegible]	[illegible]LAR
1979	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1980	[illegible] 100	10 [illegible]	[illegible]	[illegible]0	[illegible]	[illegible]	[illegible]
1981	[illegible] 0[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1982	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1983	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1984	[illegible]	[illegible]00	[illegible]	[illegible]	[illegible]00	[illegible]	[illegible]
1985	117 [illegible]	[illegible]0	[illegible]	9 [illegible]	[illegible]	[illegible]	[illegible]
1986	[illegible]	[illegible]0 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1987	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1988	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1989	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8 [illegible]	[illegible]
1990	[illegible] 6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1991	[illegible]00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1992	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

5. CATCHES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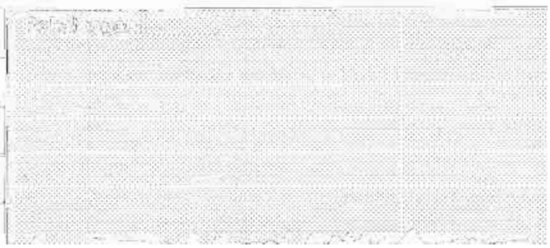

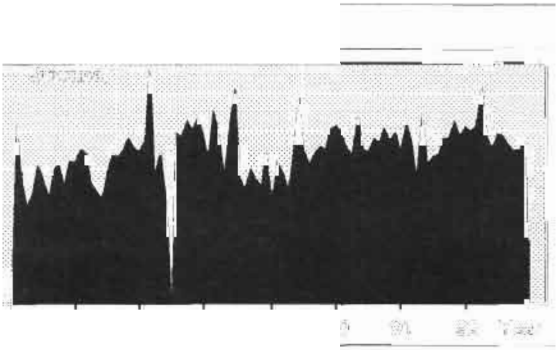
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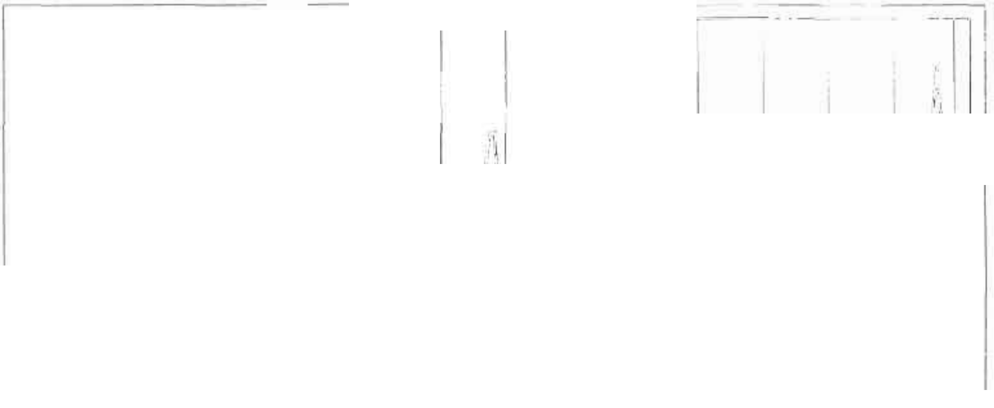
Year



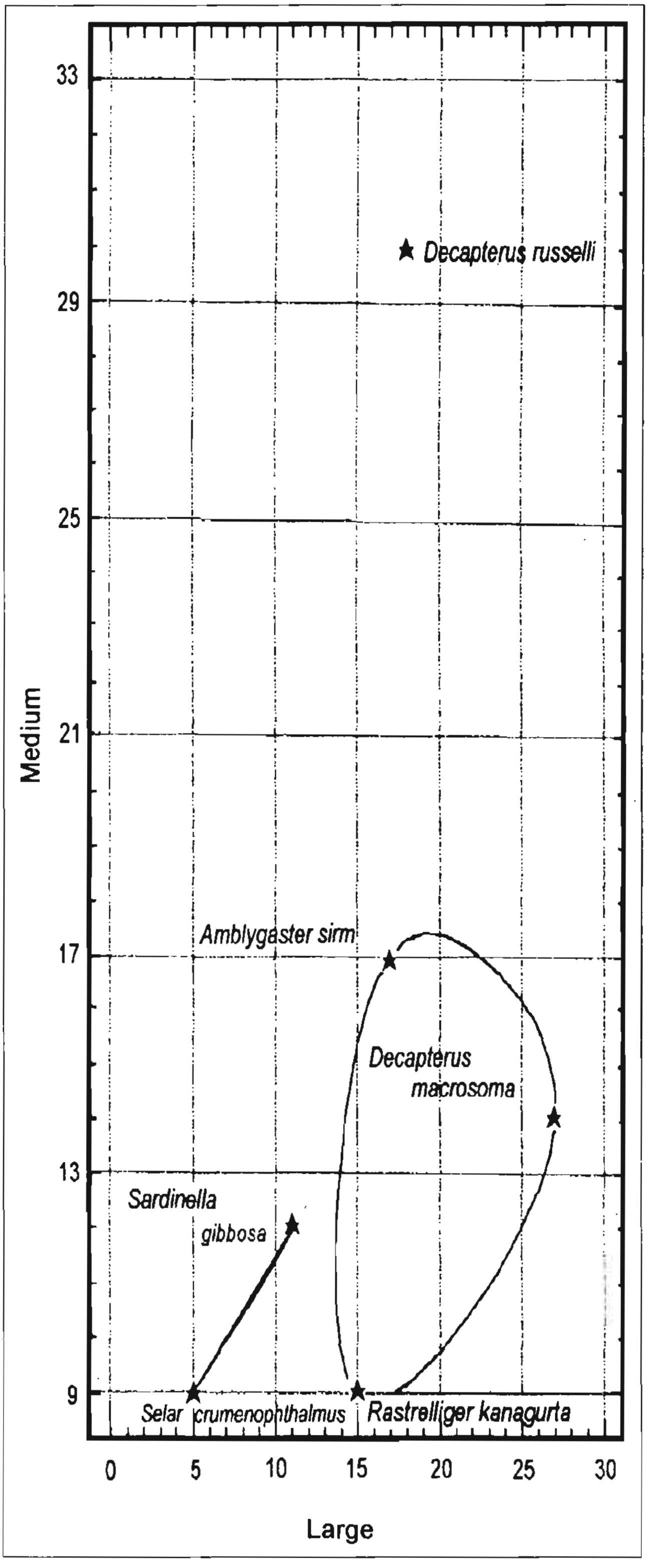


Figure 13

Results of a cluster analysis performed on the species caught on the seiners.

Hasil analisis cluster pada ikan-ikan yang tertangkap oleh purse seine

Right page

Figure 14 (top)

Evolution of the number of trips (a) and mean days per trip(b) in the large and medium seiners fisheries between 1979 and 1992

Evolusi jumlah trip dan jumlah hari rata-rata setiap trip pada purse seine besar () dan sedang (.) dari tahun 1979 sampai dengan tahun 1992

Figure 15 (bottom)

Yearly evolution of the effort in fishing days in different fishing areas of the seiners between 1979 and 1992

Evolusi tahunan dari upaya penangkapan purse seine dalam hari laut pada daerah penangkapan yang berbeda dari tahun 1979 sampai dengan tahun 1992

near the continental shelf edge. They are found in waters where salinity is more than 34‰. They are caught at the end of the year when the oceanic waters enter the Java Sea.

- NERITIC POPULATIONS

Decapterus russelli. They live on the continental shelf in waters with salinities between 32-34 ‰. They are caught along the year by the seiners.

- COASTAL GROUP

Selar crumenophthalmus, Sardinella gibbosa. They are found near the coasts and live in waters with high fluctuations of salinity. They are found along the year in small quantity in the seiners catch.

6. EFFORT

It is difficult to classify the seiners fishing power and define a standard fishing vessel. Length, width and gross tonnage are underestimated in the registration forms. The engine power is the only parameter which could allow to perform this task, as it is well reported and acts on the fishery at one level; the surface of the prospected area grows when the engine power grows.

The time spent to search actively the fish has been defined as the best index of effort for purse seine fisheries by Marchal (1967) and Fréon (1980). According to them the days not related to search actively for fish, *i.e.* route from harbor to fishing grounds, setting time and rest time, have to be deducted from the days spent at sea. Since the Javanese fishermen fish around rafts, the seiners cannot be considered as searching actively for the fish. Thus, that index might not be the best one for the study of this fishery.

The number of sets, the number of rafts or the light power could give a good estimation of the effort. Because the Pelfish Project has not yet enough data to use these estimations, the number of trips and fishing days have been taken to estimate the effort. The number of days at sea and the fishing grounds prospected are known from enquiries and from the exit-entries books. From the time spent to go from the harbor to the fishing ground, we estimate the number of fishing days.

Expressed in number of trips (fig. 14A) the effort has decreased continuously since 1979. As the trips decreased the average number of days at sea per trip increased from 8 in 1979 to 24 in 1992 (fig. 14B). It can be related to the extension of the fishery, the growing distance between harbors and fishing grounds and the use of larger vessels which stay longer at sea.

The number of fishing days (tab. IV) increased from 1985 to 1987. Since 1987, it slightly decreased until 1991 before increasing sharply again in 1992. Most part of the effort comes from the large seiners vessels and is spent in the Java Sea (50 to 70 %) the rest is spent in the Makassar Strait and in the South China Sea (fig. 15). The effort is highly seasonal and related to environmental and human factors (fig. 16). When winds are stronger than 20 knots the vessels are not able to stay at sea. This situation occurs mainly during the first months of the year when the North western monsoon is well established. During these months, floods on the North coast of Java Island can entirely stop the activity of the seiners because the landing places are flooded. The fishing vessels are also at port around the end of the fasting month and during two weeks the effort drastically decreases. The effort is high in the second part of the year from August to November. Medium seiners deploy their whole effort in the Java Sea, while large seiners share it among the whole fishery space.

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1990	1991	1992
Large	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Medium			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]								
Large	[illegible]	[illegible]	[illegible]	1 297	[illegible]	1 687	2 006	[illegible]
Medium			512	[illegible]	411	[illegible]	[illegible]	[illegible]

7. CPUE

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CONCLUSION

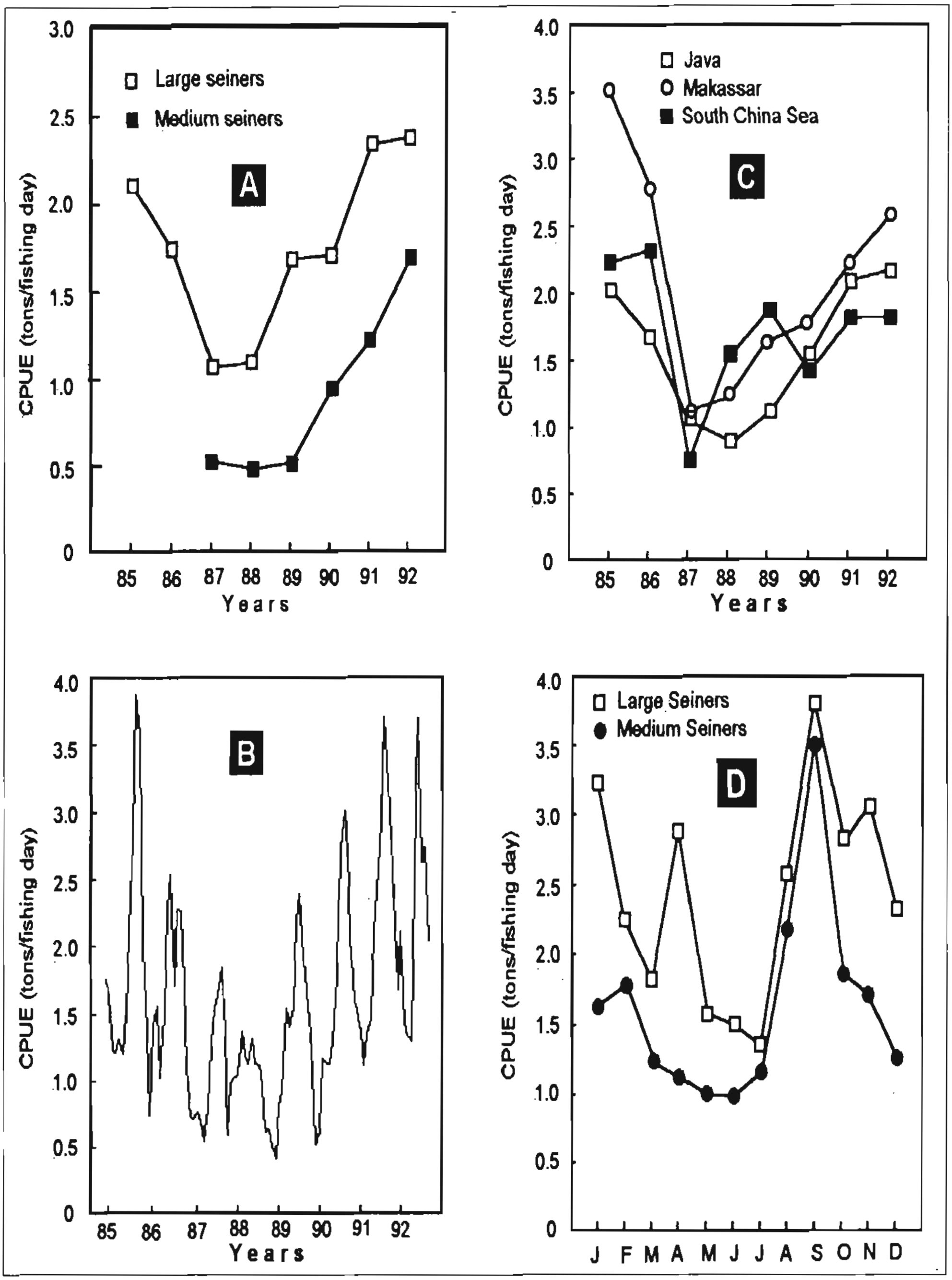

Figure 17

CPUE EVOLUTION (TONS/FISHING DAYS) OF THE SEINERS BETWEEN 1985 AND 1992

EVOLUSI HASIL TANGKAPAN PER UNIT UPAYA (TON/HARI LAUT) DARI TAHUN 1985 SAMPAI DENGAN TAHUN 1992

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