

CATCHES OF ARTISANAL AND INDUSTRIAL FLEETS IN INDONESIA: AN UPDATE

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ABSTRACT

This document is about a major review conducted on the catches of Indonesian vessels in the Indian Ocean. The new catches of artisanal and industrial fleets estimated by the IOTC led to slightly lower catches in years prior to 1991 and much higher catches after that year. These changes in the estimates originated in:

Re-estimation of longline catches: The estimation of the catches of longline fleets was conducted on the assumption that previous data reported or estimated from the FAO databases were inconsistent due to underreporting of catches and aggregation of catches of domestic and foreign vessels as Indonesian. The new figures estimated were, thus, lower in years where most of the fleet was made up by foreign longliners and higher in recent years, in which all foreign longliners changed the flag to Indonesia. The catches of longliners from 1973 to 1981, previously recorded aggregated, were estimated separately in order to complete the series. The number of ships and catches estimated for recent years, averaging 70,000 tons, situate Indonesia among the most important fishing fleets in the Indian Ocean, second only to the Taiwanese fleet.

Re-estimation of artisanal catches: The catches of artisanal fleets in Indonesia were only estimated when they have not been reported to the IOTC, since 1993. The data recorded in the FAO databases were used to conduct the new estimates with new figures much higher than those previously estimated. Recent catches amount to more than 110,000 tons.

FISHERY

Indonesia is among the most important fishing countries in the Indian Ocean, with tuna catches exceeding 100,000 t in recent years. Statistical data have not been reported to IOTC since 1993. The number of industrial longliners operating under the Indonesian flag has increased enormously in recent years as foreign flag vessels are now required to fly the Indonesian flag. There are reports, however, that the catches of foreign flag vessels have been included in Indonesian statistics, although probably not systematically.

The Indonesian fleet can be split into two components:

- Artisanal fleet: some 1,200 boats were reported to operate in the Indian Ocean in 1993 using troll lines (400 boats), gillnets (320), small purse seines (300) and Danish seines (payang, 180). Banda Aceh (purse

seines), Padang and Pariaman (troll lines), Pelabuhan Ratu (Danish seines and gillnets), Prigi (purse seines and gillnets) and Benoa (troll lines) have been reported as being the main landing places for boats using artisanal gears. Skipjack tuna is the most important species in the landings, with catches of seerfish, neritic tunas and large tunas also important. It is important to note that the catches of artisanal boats in Indonesia are reported aggregated under the following categories:

- Tuna: including yellowfin, bigeye, albacore and southern bluefin tunas and all billfish species.
- Cakalang: Referring to skipjack tuna only, although juvenile yellowfin and bigeye tunas might be also recorded.

- Tongkol: including longtail, kawakawa, frigate and bullet tunas and small specimens of skipjack and other tuna and tuna-like species.
- Tenggiri (Mackerels): referring to narrow-barred Spanish mackerel although probably including all seerfish species. The catches of Indo-Pacific king mackerel, recorded as Tenggiri papan, are usually recorded at the species level.

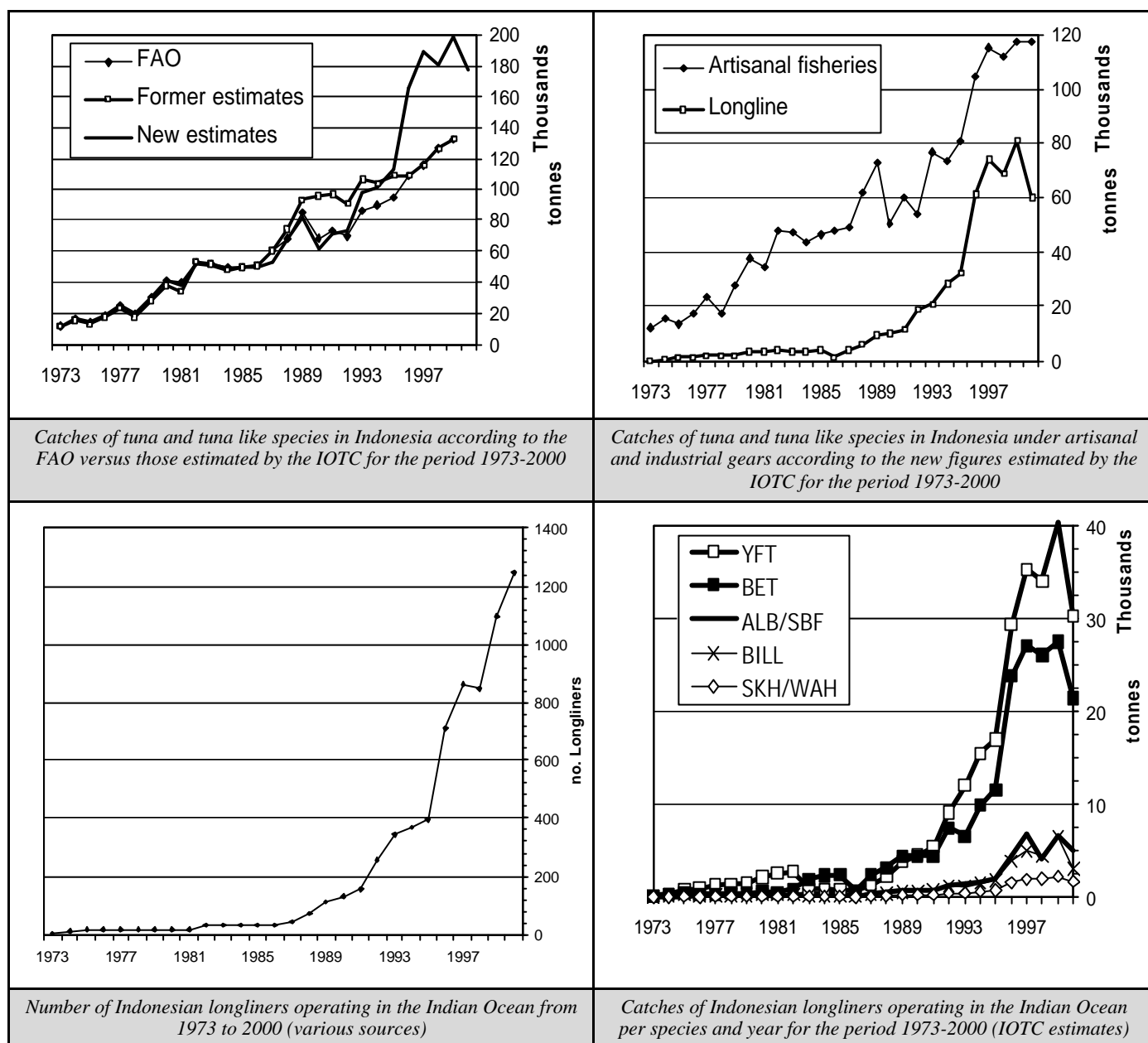
The lack of information regarding how the artisanal fleet has evolved in recent years and the high species aggregation of the catches reported makes it really difficult to conduct reliable catch estimates.

- Industrial longliners: The spectacular increase in the number of longliners operating in Indonesia in recent years is attributable mainly to:
 - An increase in the number of locally built longliners ordered either by domestic or foreign companies,
 - The change to Indonesian flag of all foreign longliners operating in Indonesia as a consequence of the Regulations put forward by the Government

Three domestic longliners started operating from Banda Aceh in 1972; after years of relative stability, the fleet increased rapidly after 1985, the year the Japanese sashimi market opened to fresh tuna. In only five years, the number of longliners increased from the 36 recorded in 1986 (34 Indonesian) to 536 in 1991 (158 Indonesian). More than 1,000 longliners were estimated to operate in 1999 and 2000, all under the Indonesian flag.

Artisanal and industrial catches of tuna and tuna-like species in Indonesia according to the FAO and the IOTC (former and new estimates) for the period 1970-2000

Year	PREVIOUS IOTC			FAO	NEW ESTIMATES		
	ART	LL	TOTAL		ART	LL	TOTAL
1973	12.216		12.216	12.400	12.216	180	12.396
1974	15.335		15.335	16.090	15.335	722	16.057
1975	13.267		13.267	14.725	13.267	1.398	14.665
1976	17.762		17.762	19.418	17.762	1.596	19.358
1977	23.359		23.359	25.307	23.359	1.899	25.258
1978	17.738		17.738	19.979	17.738	2.178	19.916
1979	27.913		27.913	30.295	27.913	2.318	30.231
1980	37.815		37.815	41.066	37.815	3.166	40.981
1981	34.416		34.416	39.695	34.416	3.513	37.929
1982	48.052	5.437	53.489	53.464	48.052	4.059	52.111
1983	47.210	4.727	51.937	51.909	47.210	3.203	50.413
1984	44.013	4.992	49.005	49.832	44.013	3.694	47.707
1985	46.417	3.236	49.653	49.622	46.417	3.717	50.134
1986	47.826	2.831	50.657	50.625	47.826	1.508	49.334
1987	49.193	10.629	59.822	59.790	49.193	4.274	53.467
1988	62.211	12.233	74.444	69.000	62.211	6.187	68.398
1989	72.529	20.947	93.476	85.120	72.529	9.405	81.934
1990	50.753	45.025	95.778	68.091	50.753	10.229	60.982
1991	60.032	36.726	96.758	73.918	60.032	11.190	71.222
1992	54.483	36.865	91.348	69.801	54.098	18.936	73.034
1993	70.241	36.236	106.477	86.656	77.187	21.112	98.299
1994	68.285	36.239	104.524	89.442	73.358	28.547	101.905
1995	72.907	36.238	109.145	94.550	80.910	32.258	113.168
1996	72.597	36.087	108.684	108.682	104.371	61.502	165.872
1997	77.831	38.687	116.518	116.519	115.508	74.099	189.607
1998	84.279	41.893	126.172	126.173	112.106	68.706	180.812
1999	88.394	43.937	132.331	132.330	117.579	81.169	198.748
2000					117.579	59.805	177.384



DATA COLLECTION AND PROCESSING

The Research Institute for Marine Fisheries (RIMF, under the Agency for Agricultural Research and Development of the Ministry of Agriculture¹) has been collecting fishery statistics in Indonesia since 1978.

Statistics are also aggregated from three different sources at the District-Province-National level by the Directorate-

General of Fisheries. The **coastal fisheries** (artisanal gears) are currently monitored in three different ways²:

- Landings at commercial processing plants: Each company collects the catch information from vessels unloading to its facilities, producing monthly statistics, which are forwarded to the District Fisheries Office in a monthly basis. The catches are aggregated under the species groups referred to in the previous section and no gear information is available.
- Landings of small-scale fishing vessels to important landing centers in the country: Enumerators collect

¹ In a recent reorganization, RIMF has been integrated with the Ministry of Marine Affairs and Fisheries.

² 'Possible approach to estimate accurate tuna catch statistics in the IOTC area of Indonesia after 1995', B.Gafa and T.Nishida, WPDCS/00/05

landing statistics in selected landing places every Wednesday. The statistics collected are raised weekly to all landing places, monthly aggregated and forwarded to the District Fisheries Office.

- Landings of small-scale fishing vessels to landing places not monitored above: Enumerators collect landing statistics from several landing places as well as information on the number of vessels operating on a quarterly basis. The landings sampled are raised according to the total number of vessels operating being the final figures sent quarterly to the District Fisheries Office.

The statistics received at the District Fisheries Office are aggregated and send to the corresponding Province³ in a quarterly basis, where they are compiled and forwarded to the DGF. Finally, the quarterly reports are compiled at the DGF and published in the Fisheries Statistics of Indonesia.

Thus, the final statistics produced are more or less underestimated, depending on how they originated, and highly aggregated regarding the species composition. Furthermore, the catch and fishing craft series published were found highly inconsistent for some years, with catch figures dramatically changing over the time and/or not in agreement with the number of vessels recorded operated.

It is thought that the main reasons for these inconsistencies are the insufficient data validation and verification procedures and the many bodies involved in the collection and compilation of fishery statistics in Indonesia.

Size frequency statistics are also collected since 1996 in several landing places mainly from small purse seines, trollers and bait boats. The quality of these statistics is apparently satisfactory although the data are kept confidential.

Detailed information regarding the activities of **industrial tuna longliners** in Indonesia, both foreign and national, has been collected since these boats started operating. Lists including all vessels (either domestic or foreign) licensed to operate in Indonesia, their identification, main characteristics and ports of operation, have been produced by the Inspectorate of Fishing Boats (WASKI) since 1972.

There is little information regarding the way the catches are estimated by the RIMF. Nevertheless, it is known that all specimens going through the processing plants in Indonesia are individually handled, their names and weights recorded and these records kept by the shipping agencies dealing with tuna longliners. State and other tuna Companies have been gathering these data since 1975. The availability of these records remains uncertain.

From 1995 to 1999, a logbook system was implemented, but the data have not been computerised or otherwise processed. In 2000, a new logbook system was implemented. The data are held in paper form by the WASKI offices.

The new logbook system implemented by the RIMF in 1999 to replace that implemented in 1998 by the Directorate General of Fisheries (DGF), is apparently providing better data, but from only about 25 longliners from one company.

Regarding size frequency statistics, apart from the individual records gathered at the company level, it is important to note the on-going sampling programme operated jointly by the CSIRO and the RIMF (BPPL) in Benoa. This programme is primarily oriented for the collection of data on southern bluefin tuna, although other tuna and billfish species are also monitored.

REPORTING

No catches have been reported to the IOTC since 1992, despite many requests.

The total catches reported to the FAO, which had been used before, were not considered in further reviews due to them being underestimated and highly aggregated as refers gears and species. The lack or insufficient reporting of longline tuna catches regarding the Indonesian vessels along with the different IOTC and FAO boundaries, with the IOTC boundary extending further to the Banda Sea, were the main reasons for not estimating the catches directly from the FAO records.

The use of other information available, as issues of the DGF Fishery Statistics of Indonesia and some WASKI and RIMF records, was limited due to inconsistent or incomplete data.

³ Indonesia is divided currently into 27 Provinces, with 14 recording fully or partially landings from vessels operating in the Indian Ocean.

NEW ESTIMATES

The lack of complete and/or reliable catch data from the sources reviewed led to data from many sources used in the estimation, with high numbers of assumptions made throughout the process.

The following datasets were used to estimate the catches:

Fleet	Period	Fishing Craft	Nominal Catches			Assumptions
			Total Catches	Gear Breakdown	Species Breakdown	
Artisanal	1970-1981	No Data	Liaison Officer	Liaison Officer (PS and UNCL only)	Liaison Officer (highly aggregated)	1-. Catches reported do not include longline catches
	1982-1992	Liaison Officer	Liaison Officer	Liaison Officer	Liaison Officer (highly aggregated)	
	1993-2000	No data	FAO FishStat	Liaison Officer (1993)	Liaison Officer (1993)	1-. Total catches proportional to 1988-92 SKJ, COM and GUT catches. 2-. No changes in the gears operated since 1993 3-. No changes in the species caught since 1993
Industrial	1973-1981	PT PSB Gafa et al.	Marcille et al.	No need	Marcille et al.	1-. Most of the longline activity occurred in the Indian Ocean 2-. Only PT PSB longliners operating under the Indonesian flag
	1982-1992	IOTC Naamin et al. DGF (individual vessel records)	Marcille et al. (1977-81) CSIRO/RIMF sampling (1998) PT PSB (effort)	No need	Marcille et al. CSIRO/RIMF	1-. Number of longliners operating in the Indian Ocean from 1982-85 same as 1986. 2-. PT PSB longliners using regular longlines until 1982, deep-longlines thereafter. 3-. All other longliners using regular longlines 4-. Almost all PT PSB longliners operating in the Indian Ocean 5-. Average catches non-PT PSB longliners same as 1993-95 without change from 1982 to 1992 6-. Species composition same as Benoa 1998 in all landing places
	1993-2000	DGF (individual vessel records) IOTC	CSIRO/RIMF DGF WASKI	No need	CSIRO/RIMF Marcille et al.	1-. Same proportion of catches by Indonesian and Foreign vessels unloaded in Benoa and other Indian Ocean ports 2-. Species composition same as Benoa non PT PSB 1998 (CSIRO) in ports other than Benoa 3-. Billfish and other species catches according to 1981 proportions (Marcille).

NOTE: Detailed information about the estimation process can be found in Annex.

1 Estimation of the number of Indonesian LL operating in the Indian Ocean from 1973-2000

KEY	"TENTANG PERKEMBANGAN KAPAL PERIKANAN BERBENDERA INDONESIA DAN ASING DENGAN IZIN DIREKTORAT JENDERAL PERIKANAN" (DGF, INDONESIA)
SOURCE	"STATISTIK PERIKANAN INDONESIA" (FISHERIES STATISTICS OF INDONESIA), DGF
	"REVIEW OF TUNA FISHERY IN THE WESTERN PART OF INDONESIAN WATERS - INDIAN OCEAN SIDE", NURZALI NAAMIN, RIMF, JAKARTA (PROCEEDINGS OF THE 5th EXPERT CONSULTATION ON INDIAN OCEAN TUNAS).
	"ANALYSES OF THE INDONESIAN TNA LONGLINE FISHERIES DATA IN THE INDIAN OCEAN, (1978-94), BACHITAR GAFA IR, et al. (WPTT-00-13)
	BROCHURE FROM P.T. PERIKANAN SAMODRA BESAR (12-5-1993). Only LL from this company included
	CATCHES PSB STATE COMPANY BY MARCILLE ET AL. (1984), UTKOSEJA (1989) AND OTHERS
	PERSONAL COMMUNICATION FROM TIM DAVIS (CSIRO)
	CSIRO: PAPER "CATCH MONITORING OF THE FRESH TUNA CAUGHT BY THE BALI-BASED LONGLINE FISHERY".
	CSIRO: PAPER "Southern Bluefin tuna in the Indonesian longline fishery: historical development, composition, season and size, estimation and catch statistics for 1993", Tim Davis, Sofri Bahar, and Jessica Farley.
	WASKI
	IOTC Database (Different Sources)
	IPTP background information (databases and paperfiles)

T1 BASIC DATA

	Number of LL and no of Trips (Benoa only)													
Year	Jakarta no	Benoa no		Trips	Sabang no	Bungus no	Bengkulu no	Total IO no	no	no	Total IO/PO no	no	no	Year
1973											3		3	1973
1974											27	12	12	1974
1975											33	18	18	1975
1976											20	18	18	1976
1977											18	18	18	1977
1978											18	18	18	1978
1979											19	18	18	1979
1980		17									372	17	17	1980
1981											20	20	20	1981
1982											73	20	19	1982
1983											170	20	19	1983
1984		20									277	20	17	1984
1985		21									395	20	15	1985
1986		9						34			74	17	17	1986
1987								46			111	17	17	1987
1988								71			233	17	17	1988
1989								112			874	17	17	1989
1990								132			879	17	19	1990
1991								158	216		3311	17	21	1991
1992		269			94	625		255	308		1321	12	14	1992
1993	212	535			127	761		345	423		2171		14	1993
1994	193	391			360	351	388				2152		17	1994
1995	72	640	376	1629	29	116	5				1649		24	1995
1996	76	2042	470	2719							2790			1996
1997	600	563	561	3613		909					3009			1997
1998	172	674	502	5088	134		117	845			2285			1998
1999		545	485	6440				1095						1999
2000				7013				1247						2000

T2 NEW ESTIMATES

Year	Ind.Ocean no LL IDN	Remarks
1973	3	It was assumed that all ships from PSB were operating in the Indian Ocean between 1973 and 1977 (see below)
1974	12	
1975	18	
1976	18	
1977	18	
1978	18	From 1978 onwards all but one to three PSB ships operated in the Indian Ocean (Analyses of the Indonesian Tuna Longline Fisheries Data in the Indian Ocean (WPTT 00-13).
1979	18	
1980	17	
1981	17	On the basis of 1986 Totals in IO and IOPO from Naamin and IPTP
1982	34	
1983	34	
1984	34	
1985	34	
1986	34	
1987	46	
1988	71	
1989	112	
1990	132	Estimated according to 1998 number of Indonesian boats in Benoa and total.
1991	158	
1992	255	
1993	345	Estimated by interpolation
1994	371	
1995	396	
1996	709	
1997	861	
1998	845	
1999	1095	
2000	1247	

The number of Indonesian Longliners operating in the Indian Ocean was estimated from several sources (KEY SOURCE). The heterogeneity of the data available both among and within the different sources made it impossible to use some datasets due to its low reliability. The following criteria were used to estimate the number of longliners operating in each period:

a/ 1973-1981: 1973 was the first year that longliners under the flag of Indonesia operated in the Indian Ocean (Brochure from PTT Perikanan Samodra Besar). Before that year only foreign ships, mainly from Japan and Taiwan,China, exploited the Indonesian EEZ. The state company P.T.T. Perikanan Samodra Besar (PT PSB) started operating three longliners in Sabang (Aceh province) in 1973, opening a new base in Bali, Benoa the year after where almost all the activity has been recorded thereafter. PT PSB was the only company operating domestic longliners, between 3 and 20, from 1973 to 1981. Fishing occurred fully in the Indian Ocean in the first years of operation (1973-77), extending subsequently to the Banda Sea (1978 onwards) and farther East (Brochure from PT PSB and WPTT-00-13). Nevertheless, the number of PT PSB longliners exploiting the Banda Sea waters has been always low not exceeding 3 between 1978 and 1995. Thus, the following was assumed:

- 1973-77: Source is PT PSB; all vessels recorded presumed to operate in the Indian Ocean
- 1978-81: Source is WPTT-00-13; all but three longliners presumed to operate in the Indian Ocean.

b/ 1982-1985: Only partial statistics are available, including the number of vessels operating from Benoa (DGF) and total number in the Indian and Pacific Oceans both from PT PSB and DGF. The total numbers from the DGF cannot be used due to them probably including not only domestic but also foreign longliners. The statistics from the DGF are, furthermore, highly inconsistent over the time, with vessel numbers drastically fluctuating from year to year. The number of vessels operating was estimated by using the proportion of longliners operating in the Indian Ocean (from Nurzali Naamin, RIMF) and total number in the Pacific and Indian oceans (reported by the IOTC Liaison Officer) recorded in 1986. Considering that the total number of longliners operating under the flag of Indonesia remained constant from 1982 to 1986, it was also assumed a constant number of longliners operating in the Indian Ocean. The figure from Naamin, 34 longliners in 1986, was then carried backwards up to 1982.

c/ 1986-1991: The statistics from Naamin (RIMF), were used for this period for they refer exclusively to the Indian Ocean. The increasing number of longliners reported is also in agreement with the numbers available from other sources referring to previous and following years or to all oceans in the same year. The statistics from the DGF might include both domestic and foreign longliners and are unreliable for some years.

d/ 1992, 1993 and 1998: The figures used come from lists published by the DGF including individual records of domestic and foreign vessels based in Indonesia during those years. These statistics are thought accurate, although it is possible that vessels licensed to operate in some ports were not really active during the year that the license was issued. The port or ports where each longliner is licensed/ bound to operate are recorded in these lists that make it easier to separate which longliners operated in the Indian Ocean from those active in the Pacific Ocean. Jakarta, Bali, Cilacap, Bitung and Sabang are, thus, presumed ports of operation for Indian Ocean longliners (information from several sources, mainly RIMF, DGF and Mathews & Ghofar in "Sampling Systems in the Indonesian Indian Ocean tuna fishery"). Considering that almost all calls and landings of the longliners occur in the first out of the ports quoted (Mathews & Ghofar), all activity was assigned to the first port.

e/ 1994: The only statistics available, from the DGF, cannot be used due to both foreign and domestic vessels recorded aggregated and to inconsistencies in the data. The number of longliners was therefore estimated by interpolation (between 1993 and 1995).

f/ 1995-1997: The statistics from the CSIRO were used as basis for the estimation of the number of Indonesian longliners operating in the Indian Ocean during this period. The proportion between the total number of longliners operating in Indonesia during 1998, from the DGF lists (see **T1**), and the number of longliners active in Benoa (from the CSIRO) was used to estimate the total number of longliners in 1995-97, years where the only data reliable come from the CSIRO. The WASKI also provided useful information regarding the total number of trips of domestic longliners in Benoa. The average number of trips per vessel obtained by dividing the total number of trips from the WASKI by the number of vessels from the CSIRO is consistent although probably slightly high, about 12 trips per vessel per year. Anyway, the figures obtained are in agreement with the massive change from foreign to Indonesian flag of longline fleets based in the country, which occurred mainly from 1995 to 1997, following the new Regulations implemented in the country. The data from the CSIRO was, thus, used until more information become available.

g/ 1999-2000: The DGF statistics were used as provided for they originated in the individual records kept at the DGF. The same said for 1992-93 and 1998 applies in this case.

2 Estimation of the total catches per year of Indonesian LL operating in the Indian Ocean from 1973-2000

A/ 1973-1981

BASIC DATA

T3 PT PSB: Catch and effort information

Year	Effort			Catches Per Species										TOTAL	Source	CPUE kg/hook	AvCatch/ LL
	DAYS	FDAYS	HOOKS	ALB	BET	YFT	SBF	BLZ	BLM	MLS	SWO	SFA	SKH	KGX			
1973	384	266	291132		27	105		11	11	1			19		174	PSB	0.60
1974	1612	1051	1227690	41	219	275		35	46	7	13		43		679	PSB	0.55
1975	3652	2395	3333159	52	393	629			144				93		1311	PSB	0.39
1976	3760	2258	2847506	135	284	887	7	50	30	30	15		25	30	1493	PSB	0.52
1977	2760	1891	2537904	114	293	1194	5	44	37	10	15	30	38		1780	PSB	0.70
1978	3642	2851	3893420	205	402	1234	4	58	14	30	21	34	30	2	2034	PSB	0.52
1979	4335	3448	5064262	257	386	1322	6	57	20	30	31	19	52	2	2184	PSB	0.43
1980	4130	3210	4986500	229	485	1950	4	102	29	35	39	28	53	2	2954	PSB	0.59
1981	4437	3147	5103939	228	495	2796	3	124	25	15	53	47	60	1	3847	PSB	0.75

T4 IOTC / ICCAT / FAO: RAISING FACTORS (DRESSED TO ROUND WEIGHT)

	PROCESS	IOTC PENANG	FAO			ICCAT		IOTC
			1	2	3	1	2	
ALB	RND	1.10	1.00	1.00	1.00			1.00
BET	GUT	1.09	1.11	1.30				1.09
YFT	GUT	1.09	1.11	1.20	1.10	1.13		1.09
SBF								1.09
SWO	HDD		1.30	1.30	1.32	1.33	1.32	1.31
BIL	HDD	1.16				1.2		1.20
SHK	TAL	1.55						1.55
TUN	RND	1.10	1.11	1.2				1.10
TUX			1.00					1.00
OTH		1.10						1.10

NEW ESTIMATES

T6 NEW CATCHES 1973-81

Year	Catches Per Species												TOTAL	Source
	ALB	BET	YFT	SBF	BLZ	BLM	MLS	SWO	SFA	SKH	WAH			
RF	1.00	1.09	1.09	1.09	1.20	1.20	1.20	1.31	1.00	1.55	1.00		T4	
1973	0	29	114	0	13	13	1	0	9	16	0	196	IOTC	
1974	41	239	300	0	42	55	8	17	20	23	0	745	IOTC	
1975	52	428	686	0	79	47	47	26	33	62	0	1460	IOTC	
1976	135	310	967	8	60	36	36	20	25	47	0	1642	IOTC	
1977	114	319	1301	5	53	44	12	20	30	59	0	1958	IOTC	
1978	205	438	1345	4	69	17	36	27	34	46	2	2224	IOTC	
1979	257	420	1441	7	69	24	36	41	19	80	2	2398	IOTC	
1980	229	528	2126	4	122	35	42	51	28	82	2	3248	IOTC	
1981	194	459	2591	3	126	26	16	59	40	79	1	3592	IOTC	

T5 BREAKDOWN BY SPECIES 1973-76

Proportion of Marlin species 1976				
	BLZ	BLM	MLS	Total
Catch	50	30	30	110
Proport.	0.45	0.27	0.27	1.00

Proportion of SWO, SFA & SKH 1976				
	SWO	SFA	SKH	Total
Catch	15	25	30	70
Proport.	0.21	0.36	0.43	1.00

Proportion of SFA & SKH 1975			
	SFA	SKH	Total
Catch	25	30	55
Proport.	0.45	0.55	1.00

Only PT PSB longliners operated between 1973 and 1981 (see **1a**). The information available for this period come from two sources (**T3**):

- PT PSB company: both the number of longliners operated and the effort recorded (regarding the total number of days at sea, fishing days and total number of hooks deployed) per year are from a brochure issued by the owner and, therefore, are thought accurate.

- Marcille *et al.*: The catches per species and year are from different publications being the primary source also PT PSB.

Considering that the main source for the information is the Company exploiting the longliners the data are thought reliable. The CPUE and catches per longliner per year estimated for the period are also consistent, but the mean catches per vessel recorded in 1980 and 1981 which are much higher than those in previous years. The reason of this is unknown since both the number of vessels and catches for the period are from the same source. It is also possible that higher levels of activity were recorded in this period, as it can be assessed from the number of hooks recorded from 1979 to 1981.

Thus, the figures from Marcille *et al.* (**T3**) were used to estimate the catches for the period; the following steps were given:

- Species breakdown for years in which species aggregates were recorded: the catches of Swordfish, marlins, Indo-Pacific sailfish and sharks, reported more or less aggregated from 1973 to 1975, were break according to the figures available in 1976. The catches recorded under KGX (seerfish) were input as wahoo considering that this is the only seerfish species usually caught under longlines.

- Raising of the catches according to the raising factors from IPTP (Penang sampling in 1982) or from other sources (FAO, ICCAT): The catches recorded refer to processed weights and were consequently raised to obtain round weights for the species. The factors used are in the table on the left (first row).

17 longliners were accounted for in 1981 instead of the 20 for which the catches recorded referred to (Ghafa *et al.*)

B/ 1982-1992

BASIC DATA

T7 IOTC nominal catches database (reported by Liaison Officer)

Year	Catches Per Species											TOTAL	Source
	ALB	BET	YFT	SBF	BLZ	BLM	MLS	SWO	SFA	SKH	KGX		
1982	302	897	3897	2	120	24	14	113	67	119	1	5556	LO
1983	721	583	2984	5	209	46	27	75	76	74	1	4801	LO
1984	123	517	3687	1	449	29	2	82	101	90	1	5082	LO
1985	271	485	2148	4	151	31	33	58	53	72	2	3308	LO
1986	237	424	1879	3	132	27	29	51	47	63	2	2894	LO
1987	1806	2774	5514	17	211	43	46	185	33	225		10854	LO
1988	1232	3529	5572	29	795	160	171	390	355	118		12351	LO
1989	1753	3138	13912	24	978	197	211	375	345	467	14	21414	LO
1990	3768	6744	29900	54	2099	423	454	808	744	1003	31	46028	LO
1991	3073	5500	24389	44	1713	344	370	659	608	818	26	37544	LO
1992	1059	9100	23494	1884	604	121	131	232	214	822	26	37687	IOTC

Since 1982 longliners other than the PT PSB operated in the Indian Ocean. The amount of information regarding this period is scarce. The data reported to the IOTC for the period are inconsistent due to the catches of Indonesia and several foreign flags reported aggregated (T7). This catches are thought, indeed, underestimated.

The tables T7 and T8 show the catch figures available for the period 1982-92:

Nominal catches formerly recorded at the IOTC database (T7): The catches were reported by the Indonesian Liaison Officer to the IOTC until 1991. Nevertheless, the high catches reported since the mid-eighties tend to indicate that, at least partially, both domestic and foreign longliners were accounted for. This is specially true for the last years of the series agreeing with the increase in the number of fresh tuna longliners in Indonesia, mostly from Taiwan, China, since the mid-eighties. This increase in the number of fresh-tuna longliners was boosted by the increasing demand of fresh-tuna for the Japanese *sashimi* market.

T8 CSIRO / RIMF: Sampling PT PSB Benoa

Year	Catches Per Species				Source	Remarks
	ALB	BET	YFT	SBF		
1978	4	202	67	0	CSIRO	Data from PSB; Data not raised; Dressed Weight; Includes Foreign Fleets
1979	10	236	67	1	CSIRO	
1980	8	173	73	0	CSIRO	
1981	3	148	79	0	CSIRO	
1982	2	143	76	0	CSIRO	
1983	3	245	70	0	CSIRO	
1984	1	54	85	0	CSIRO	
1985	4	44	81	0	CSIRO	
1986					CSIRO	
1987	3	293	55	0	CSIRO	
1988	3	126	54	0	CSIRO	
1989	8	95	35	1	CSIRO	
1990	4	137	50	0	CSIRO	
1991	2	46	65	1	CSIRO	
1992	4	31	14	1	CSIRO	

T9 GAFA et al. (Table 3): Use of regular and deep longlines by PT PSB longliners

Year	no Operations					Remarks	ShipsPO
	LL Surface	LL Deep	Total	%Suff	%Deep		
1978	2064	1	2065	1.00	0.00	Use of Regular Longlines until 1982	
1979	1288		1288	1.00	0.00		
1980	2513		2513	1.00	0.00		
1981	1321		1321	1.00	0.00		3
1982	1268	1	1269	1.00	0.00		2
1983	105	909	1014	0.10	0.90	Use almost exclusive of Deep Longlines since 1983	3
1984	231	1480	1711	0.14	0.86		1
1985	205	1663	1868	0.11	0.89		
1986							
1987	185	1163	1348	0.14	0.86		
1988	12	1449	1461	0.01	0.99		
1989	4	2306	2310	0.00	1.00		
1990	3	1223	1226	0.00	1.00		2
1991	47	745	792	0.06	0.94		2
1992	17	1576	1593	0.01	0.99		
1993	6	1570	1576	0.00	1.00		
1994	6	1445	1451	0.00	1.00		
1995	45	2201	2246	0.02	0.98		

T10 PT PSB: Fishing effort of PT PSB longliners

Year	Effort		
	DAYS	FDAYS	HOOKS
1982	4297	3243	5175828
1983	3131	2270	3718260
1984	3392	2642	4406856
1985	3398	2622	4342032
1986	372	261	428040
1987	2937	2246	3472316
1988	3349	2362	3611498
1989	3684	2635	3968310
1990	2792	2029	3065819
1991	1242	907	1350523
1992	2478	1760	1897540

Catches from the CSIRO (T8): This dataset refers only to sampling data from the company PT PSB. The catches of species other than tunas are not recorded.

The tables T9 and T10 show other pieces of information retrieved for the period referring exclusively to the company PT PSB. The most important fact regarding the operation of PT PSB longliners is the change from regular to deep longlines occurred in 1983. Almost all skippers on-board PT PSB longliners shifted from regular to deep longlines since that year to increase the catches of bigeye tuna. On the contrary, all non-PT PSB longliners have been using regular longlines since the beginning of the fishery to date, with higher catches of yellowfin tuna.

The table T10 shows the effort in days, fishing days and number of hooks as reported by PT PSB. The sharp decrease in activity (effort) recorded in 1986 is apparently due to problems regarding the availability of fuel in the country during that year (PT PSB information).

NEW ESTIMATES

T11 Mean Catch Per ship 1977-81 (from T6)

Year	CPUE kg/hook	AvCatch/ LL	Av CPUE	Catch /LL
1977	0.77	109	0.63	154
1978	0.57	124		
1979	0.47	133		
1980	0.65	191		
1981	0.70	211		

The catches of longliners belonging to PT PSB and those operated by other companies were estimated separately, considering the different targeting since 1983.

PT PSB vessels: The number of vessels (from T1 and T9) and number of hooks deployed (T10) per year were used as basis to estimate the catches for the period.

Total catch: the average CPUEs of PT PSB longliners during the 5 years prior to 1982 were used to estimate the total catches from 1982-92.

Total Catch Y_i = no hooks deployed Y_i * 0.60 (average CPUE 1977-81) / 1000 * no LL PT PSB Y_i (Indian Ocean) / no LL PT PSB Y_i (Total)

Species breakdown: The species composition of the catches was estimated depending on the type of longline used:

Use of regular longlines (T12: 1982): total catches break into species according to 1981 estimates

Use of deep longlines (T13: 1983-92): total catches break into species according to 1998 CSIRO / RIMF sampling data. Catches of billfish species break according to 1981 proportions. Catches of sharks and wahoo added according to 1981 proportions. 1998 was the first year which the CSIRO reported catches of PT PSB and non-PT PSB longliners separately.

T12 Species breakdown estimation: 1982 PT PSB longliners

Year	Catches Per Species											TOTAL	Remarks
	ALB	BET	YFT	SBF	BLZ	BLM	MLS	SWO	SFA	SKH	WAH		
1981	194	459	2591	3	126	26	16	59	40	79	1	3592	1-. Basic Data: From T6
Prop	0.05	0.13	0.72	0.00	0.04	0.01	0.00	0.02	0.01	0.02	0.00	1.00	2-. Species breakdown regular longlines PT PSB (1982)

T13 Species breakdown estimation: 1983-92 PT PSB longliners

Year	Catches Per Species											TOTAL	Remarks
	ALB	BET	YFT	SBF	BLZ	BLM	MLS	SWO	SFA	SKH	WAH		
1998	121	742	97	6			38					1003	1-. Basic Data: CSIRO / RIMF Sampling
RF	1.00	1.09	1.09	1.09	1.20	1.20	1.20	1.31	1.00	1.55	1.00		From T4 (IOTC)
Raised	121	809	106	6			45					1087	2-. Dressed to round weight: 1998 * RF
1998	0.11	0.73	0.10	0.01			0.04			0.02	0.00	1.00	3-. Species breakdown including sharks and wahoo (from T12)
Billfish					0.02	0.00	0.00	0.01	0.01				According to T12 billfish proportions
Prop	0.11	0.73	0.10	0.01	0.02	0.00	0.00	0.01	0.01	0.02	0.00	1.00	4-. Species Breakdown deep longlines PT PSB

T14 Species breakdown estimation: 1982-92 non-PT PSB longliners

Year	Catches Per Species											TOTAL	Remarks
	ALB	BET	YFT	SBF	BLZ	BLM	MLS	SWO	SFA	SKH	WAH		
1998	114	1861	2548	191			294					5007	1-. Basic data: CSIRO / RIMF Sampling
RF	1.00	1.09	1.09	1.09	1.20	1.20	1.20	1.31	1.00	1.55	1.00		From T4 (IOTC)
Proport. BIL					0.02	0.00	0.00	0.01	0.01			0.04	According to T12 billfish proportions
New est	114	2028	2778	208	166	34	21	86	44	122	1	5601	2-. Dressed to round weight, billfish species breakdown and calculation of sharks and wahoo catches
Prop	0.02	0.36	0.50	0.04	0.03	0.01	0.00	0.02	0.01	0.02	0.00	1.00	3-. Species breakdown regular longlines non-PT PSB

Non-PT PSB vessels: The number of vessels (from **T1** and **T9**) operated per year was used as basis to estimate the catches for the period.

Total catch: the average catches of non-PT PSB longliners during the years 1993-95 (see **T33** in **2C**) were used to estimate the total catches for the period 1982-92.

Total catch Y_i = no LL non-PT PSB _(Indian Ocean) Y_i * 58 (average catch/LL 1993-95)

The low average catches per year recorded for the period 1993-95 could be due to longliners operating in a seasonal basis exploiting both Indian and Pacific grounds. Whether this apply to previous years or not is not known. The same levels of activity were, however, presumed until more information become available.

Species breakdown (**T14**): The species composition of the catch was estimated according to the figures provided by the CSIRO / RIMF regarding non-PT PSB vessels in 1998. The catches of billfishes were break according to PT PSB 1981 catches. The catches of sharks and wahoo were estimated according to 1981 proportions.

T15 Catches PSB Boats

Year	Effort HOOKS	no LL PSB IO	no LL PSB IO	Catches Per Species											TOTAL PSB	TOTAL	Source
				ALB	BET	YFT	SBF	BLZ	BLM	MLS	SWO	SFA	SKH	WAH			
1982	5175828	20	18	34	159	377	2131	2	104	21	13	49	33	65	1	2955	IOTC
1983	3718260	20	17	34	218	1459	191	11	39	8	5	18	12	44	0	2005	IOTC
1984	4406856	20	19	34	288	1933	253	15	51	11	6	24	16	58	1	2655	IOTC
1985	4342032	20	20	34	299	2005	262	15	53	11	7	25	17	60	1	2754	IOTC
1986	428040	17	17	34	29	198	26	2	5	1	1	2	2	6	0	271	IOTC
1987	3472316	17	17	46	239	1603	209	12	42	9	5	20	13	48	0	2202	IOTC
1988	3611498	17	17	71	249	1668	218	13	44	9	5	21	14	50	0	2291	IOTC
1989	3968310	17	17	112	273	1832	239	14	48	10	6	23	15	55	0	2517	IOTC
1990	3065819	17	15	132	186	1249	163	9	33	7	4	16	10	38	0	1716	IOTC
1991	1350523	17	15	158	82	550	72	4	15	3	2	7	5	17	0	756	IOTC
1992	1897540	12	12	255	131	876	114	7	23	5	3	11	7	26	0	1204	IOTC

T16 Catches non-PSB Boats

Year	Effort HOOKS	no LL PSB IO	no LL non PSB	no LL IO	Catches Per Species											TOTAL OTHER	TOTAL	Source
					ALB	BET	YFT	SBF	BLZ	BLM	MLS	SWO	SFA	SKH	WAH			
1982	4140662	18	16	34	24	433	593	44	35	7	4	18	9	26	0	1195	4150	IOTC
1983	3160521	17	17	34	26	460	630	47	38	8	5	19	10	28	0	1270	3275	IOTC
1984	3305142	19	15	34	23	406	556	42	33	7	4	17	9	25	0	1121	3776	IOTC
1985	3039422	20	14	34	21	379	519	39	31	6	4	16	8	23	0	1046	3800	IOTC
1986	428040	17	17	34	26	460	630	47	38	8	5	19	10	28	0	1270	1542	IOTC
1987	5923363	17	29	46	44	785	1074	80	64	13	8	33	17	47	0	2167	4369	IOTC
1988	11471817	17	54	71	82	1461	2001	150	120	25	15	62	32	88	1	4035	6325	IOTC
1989	22175850	17	95	112	144	2570	3520	263	211	43	26	109	56	155	1	7098	9615	IOTC
1990	21100048	15	117	132	177	3165	4335	324	260	53	32	134	68	191	2	8742	10458	IOTC
1991	11360282	15	143	158	217	3869	5298	396	317	65	40	164	84	234	2	10684	11440	IOTC
1992	38425185	12	243	255	368	6574	9003	674	539	111	67	278	142	397	3	18156	19360	IOTC

T17 NEW CATCHES 1982-92

Year	no LL IO	Catches Per Species											TOTAL	Source
		ALB	BET	YFT	SBF	BLZ	BLM	MLS	SWO	SFA	SKH	WAH		
1982	34	184	810	2724	46	139	29	17	67	42	91	1	4150	IOTC
1983	34	243	1919	820	58	76	16	10	38	22	72	1	3275	IOTC
1984	34	311	2339	808	56	84	17	11	41	25	83	1	3776	IOTC
1985	34	320	2384	781	54	84	17	10	41	25	83	1	3800	IOTC
1986	34	55	658	656	49	43	9	5	22	12	34	0	1542	IOTC
1987	46	283	2388	1284	93	107	22	13	53	30	96	1	4369	IOTC
1988	71	331	3128	2218	162	164	34	20	83	46	138	1	6325	IOTC
1989	112	417	4402	3759	277	259	53	32	131	71	210	2	9615	IOTC
1990	132	364	4414	4498	334	293	60	36	149	79	229	2	10458	IOTC
1991	158	299	4419	5370	401	332	68	41	170	88	250	2	11440	IOTC
1992	255	499	7450	9117	680	562	116	70	289	149	423	4	19360	IOTC

C/ 1993-2000**BASIC DATA****T18 IOTC: Nominal catches estimates**

Year	Catches Per Species											TOTAL	Source
	ALB	BET	YFT	SBF	BLZ	BLM	MLS	SWO	SFA	SKH	KGX		
1993	1041	8945	23093	1852	594	119	128	228	210	822	26	37058	IOTC
1994	593	10164	22780	1639	481	97	104	185	170	822	26	37061	IOTC
1995	745	11708	20890	1477	646	130	140	248	228	822	26	37060	IOTC
1996	1474	14925	15624	1974	957	193	207	368	339	819	26	36906	IOTC
1997	1580	16001	16750	2116	1026	206	222	395	363	877	28	39564	IOTC
1998	1711	17327	18138	2291	1111	223	241	427	393	951	31	42844	IOTC
1999	1795	18172	19023	2403	1165	234	252	448	413	951	32	44888	IOTC

The catches obtained are thought, however, inaccurate, due to the following reasons:

1-. The catches recorded in the FAO databases refer to the FAO Area. The IOTC Area F57 (or IO_Eastern) extends farther east to the Banda Sea than the FAO Area 57 (see the map below). Thus, the catches recorded in the FAO databases would lack of all those occurred in the area in-between boundaries. The use of FAO total catches would then lead to underestimation of the catches by not accounting for the catches occurred in an area where longline fishing is thought important.

2-. The catches reported by the FAO seem to cope badly with the dramatic increase in the number of domestic longliners in the country. The slight yearly increases assessed from the FAO figures are not consistent with the four-fold increase in the number of domestic fresh-tuna longliners operating in the Indian Ocean.

3-. The estimation of the catches per gear proportionally to 1991 catches was misleading due to the different development of artisanal and industrial fisheries in the country. While no major changes were to note regarding the artisanal fisheries, this has not been the case with the industrial fishery which has underwent major changes, especially regarding the number of ships in activity, since 1995.

T19 CSIRO/RIMF: Sampling Program in Benoa

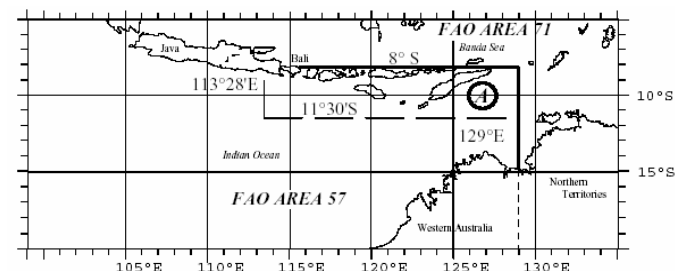
Year	Catches Per Species											TOTAL	Source
	ALB	BET	YFT	SBF	BLZ	BLM	MLS	SWO	SFA	SKH	KGX		
1993	716	6182	14601	1190			849					23538	CSIRO
1994	337	5357	10825	788			543					17851	CSIRO
1995	463	6529	10590	721			722					19023	CSIRO
1996	1032	10545	11034	1399			1465					25474	CSIRO
1997	2373	10114	12025	1922			1813					28247	CSIRO
1998	902	12581	15739	1156			1929					32308	CSIRO
1999	1707	9945	16174	2159			3034					33019	CSIRO
2000	1999	8408	12388	979			737					24511	CSIRO

1998	114	1861	2548	191			294					5007	CSIRO
1998	121	742	97	6			38					1003	CSIRO

Indonesia has not reported catch statistics since 1992. The longline catches recorded in the IOTC nominal catches database (**T18**) come originally from the FAO. Previous estimates were conducted by following the criteria below:

1-. Total catch as recorded in the FAO FishStat database.

2-. Catches assigned to the different gears and break into species on the basis of 1991 figures.



The CSIRO/RIMF sampling program conducted in Benoa-Bali has been producing catch estimates in this port since 1993 (**T19**). Although the figures produced are thought reliable, they cannot be directly used due to the following reasons:

1-. The catches recorded refer exclusively to landings occurred in Benoa. Other ports recording important longline catches from the Indian Ocean (e.g. Jakarta and Cilacap) are not considered.

2-. The catches recorded refer not only to the domestic fleet but also to foreign fleets.

3-. The catches refer to dressed weights.

4-. The catches of billfish species are recorded aggregated and no catches of sharks or other species are included.

Separate sets of catches are available for 1998 referring to samplings on landings from longliners operated by PT PSB or operated by companies other than this.

T20 Directorate General of Fisheries (DGF): Catches under 'Tuna' and 'Tuna Longline' (Fisheries Statistics of Indonesia)

Country	Area	Year	Species	Catch1	Units	Gear	Catch2	Units	Local Name	TUX-LL	%
IDN	Bali-Nusatenggara-Timor	1992 TUX		12660 MT	LL		7842 MT		Rawai tuna	4818	0.4
IDN	Bali-Nusatenggara-Timor	1993 TUX		10352 MT	LL		7841 MT		Rawai tuna	2511	0.2
IDN	Bali-Nusatenggara-Timor	1994 TUX		9655 MT	LL		5325 MT		Rawai tuna	4330	0.4
IDN	Bali-Nusatenggara-Timor	1995 TUX		14595 MT	LL		10781 MT		Rawai tuna	3814	0.3
IDN	Bali-Nusatenggara-Timor	1996 TUX		13055 MT	LL		11417 MT		Rawai tuna	1638	0.1
IDN	Bali-Nusatenggara-Timor	1997 TUX		8142 MT	LL		10268 MT		Rawai tuna	-2126	-0.3
IDN	Bali-Nusatenggara-Timor	1998 TUX		44902 MT	LL		14166 MT		Rawai tuna	30736	0.7
IDN	Bali-Nusatenggara-Timor	1999 TUX		16712 MT	LL		12513 MT		Rawai tuna	4199	0.3
IDN	Barat Sumatera	1992 TUX		8595 MT	LL		3495 MT		Rawai tuna	5100	0.6
IDN	Barat Sumatera	1993 TUX		6334 MT	LL		621 MT		Rawai tuna	5713	0.9
IDN	Barat Sumatera	1994 TUX		7680 MT	LL		388 MT		Rawai tuna	7292	0.9
IDN	Barat Sumatera	1995 TUX		10603 MT	LL		301 MT		Rawai tuna	10302	1.0
IDN	Barat Sumatera	1996 TUX		10228 MT	LL		0 MT		Rawai tuna	10228	1.0
IDN	Barat Sumatera	1997 TUX		12487 MT	LL		360 MT		Rawai tuna	12127	1.0
IDN	Barat Sumatera	1998 TUX		24692 MT	LL		1389 MT		Rawai tuna	23303	0.9
IDN	Barat Sumatera	1999 TUX		11598 MT	LL		1931 MT		Rawai tuna	9667	0.8
IDN	Selat Malaka-Aceh	1992 TUX		1129 MT	LL		0 MT		Rawai tuna	1129	1.0
IDN	Selat Malaka-Aceh	1993 TUX		1922 MT	LL		0 MT		Rawai tuna	1922	1.0
IDN	Selat Malaka-Aceh	1994 TUX		931 MT	LL		296 MT		Rawai tuna	635	0.7
IDN	Selat Malaka-Aceh	1995 TUX		1415 MT	LL		475 MT		Rawai tuna	940	0.7
IDN	Selat Malaka-Aceh	1996 TUX		2444 MT	LL		0 MT		Rawai tuna	2444	1.0
IDN	Selat Malaka-Aceh	1997 TUX		1575 MT	LL		0 MT		Rawai tuna	1575	1.0
IDN	Selat Malaka-Aceh	1998 TUX		1479 MT	LL		3 MT		Rawai tuna	1476	1.0
IDN	Selat Malaka-Aceh	1999 TUX		1764 MT	LL		26 MT		Rawai tuna	1738	1.0
IDN	Selatan Jawa	1992 TUX		661 MT	LL		58 MT		Rawai tuna	603	0.9
IDN	Selatan Jawa	1993 TUX		1610 MT	LL		210 MT		Rawai tuna	1400	0.9
IDN	Selatan Jawa	1994 TUX		561 MT	LL		19 MT		Rawai tuna	542	1.0
IDN	Selatan Jawa	1995 TUX		389 MT	LL		320 MT		Rawai tuna	69	0.2
IDN	Selatan Jawa	1996 TUX		792 MT	LL		0 MT		Rawai tuna	792	1.0
IDN	Selatan Jawa	1997 TUX		1564 MT	LL		0 MT		Rawai tuna	1564	1.0
IDN	Selatan Jawa	1998 TUX		1877 MT	LL		0 MT		Rawai tuna	1877	1.0
IDN	Selatan Jawa	1999 TUX		1771 MT	LL		0 MT		Rawai tuna	1771	1.0
IDN	Utara Jawa (DKI Jakarta)	1992 TUX		0 MT	LL		5557 MT		Rawai tuna	-5557	#DIV/0!
IDN	Utara Jawa (DKI Jakarta)	1993 TUX		7756 MT	LL		5557 MT		Rawai tuna	2199	0.3
IDN	Utara Jawa (DKI Jakarta)	1994 TUX		10609 MT	LL		8555 MT		Rawai tuna	2054	0.2
IDN	Utara Jawa (DKI Jakarta)	1995 TUX		12399 MT	LL		15224 MT		Rawai tuna	-2825	-0.2
IDN	Utara Jawa (DKI Jakarta)	1996 TUX		13786 MT	LL		16968 MT		Rawai tuna	-3182	-0.2
IDN	Utara Jawa (DKI Jakarta)	1997 TUX		17840 MT	LL		16678 MT		Rawai tuna	1162	0.1
IDN	Utara Jawa (DKI Jakarta)	1998 TUX		9741 MT	LL		12176 MT		Rawai tuna	-2435	-0.2
IDN	Utara Jawa (DKI Jakarta)	1999 TUX		11995 MT	LL		13468 MT		Rawai tuna	-1473	-0.1

T21 DGF: Total landings per Area (from T20)

Year	Catches of Rawai Tuna per Area (Indian Ocean)				
	Bali-Nusatenggara-Timor	Barat Sumatera	Selat Malaka-Aceh	Selatan Jawa	Utara Jawa (DKI Jakarta)
1992	7842	3495	0	58	5557
1993	7841	621	0	210	5557
1994	5325	388	296	19	8555
1995	10781	301	475	320	15224
1996	11417	0	0	0	16968
1997	10268	360	0	0	16678
1998	14166	1389	3	0	12176
1999	12513	1931	26	0	13468

The table **T21** shows the total landings of longliners per region obtained from table **T20**. These catches have no value as such but to estimate the proportion of landings occurred in each area over the period. Thus, about half of the catches of tuna longliners in the Indian Ocean, irrespective of the flag, have been unloaded in Benoa since 1992.

The table **T22** shows the total number of longliners, total number of trips of domestic and foreign longliners and total catches unloaded in Benoa according to Waski records. The catches recorded are thought underestimated, probably not including but the export fish reported by the shipping agencies or vessel skippers. Average catches per trip estimated from the WASKI records, between one and two tons, are thought too low. Nevertheless, the number of trips recorded in the statistics is thought reliable and can be used to estimate the proportion of catch landed by domestic and foreign fleets.

The table **T23** shows the number of longliners and total landings per month recorded in Jakarta from 1994 to 1998. The total catches per year estimated from these figures are not consistent with the figures also published by the DGF in the 'Fishery Statistics of Indonesia'. These statistics were not used in the estimation process due to the inconsistencies referred to above and to the data being from a single port avoiding any estimation of longline activity among the different Indian Ocean ports.

T22 WASKI: Number of LL operating, number of trips and total landings from 1995-2000

1995										1998									
Trips										Trips									
Month	noShips	FOREIGN	IDN	TOTAL	TOTAL	FOREIGN	IDN	FOREIGN	IDN	Month	noShips	FOREIGN	IDN	TOTAL	TOTAL	FOREIGN	IDN	FOREIGN	IDN
JAN										JAN	511	3	282	285	677.153	7	670	0.01	0.99
FEB										FEB	175	16	312	328	620.532	30	590	0.05	0.95
MAR	238	132	108	240	856	471	385	0.55	0.45	MAR	341	10	322	332	1369.229	41	1328	0.03	0.97
APR	268	121	139	260	901	419	482	0.47	0.53	APR	320	10	359	369	1224.47	33	1191	0.03	0.97
MAY	260	107	155	262	893	365	528	0.41	0.59	MAY	318	9	342	351	1233.525	32	1202	0.03	0.97
JUN	272	109	160	269	812	329	483	0.41	0.59	JUN	365	6	385	391	1359.186	21	1338	0.02	0.98
JUL	246	103	139	242	829	353	476	0.43	0.57	JUL	426	5	448	453	1278.36	14	1264	0.01	0.99
AUG	234	95	134	229	782	324	458	0.41	0.59	AUG	529	5	501	506	1329.23	13	1316	0.01	0.99
SEP	219	85	137	222	751	288	463	0.38	0.62	SEP	524		550	550	1357.835	0	1358	0.00	1.00
OCT	302	87	199	286	949	290	659	0.31	0.69	OCT	550		538	538	1149	0	1149	0.00	1.00
NOV	307	75	227	302	981	244	737	0.25	0.75	NOV	494		501	501	1065.55	0	1066	0.00	1.00
DEC	310	82	231	313	1021	267	754	0.26	0.74	DEC	524		548	548	1128.9	0	1129	0.00	1.00
TOTAL		996	1629	2625	8775	3350	5425	0.38	0.62	TOTAL		64	5088	5152	12495.29	154	12341	0.01	0.99

The catch figures reported in the Fisheries statistics of Indonesia (**T20**) are highly inconsistent, with catches dramatically increasing or decreasing over the years. Furthermore, the catches could inconsistently refer to domestic and foreign fleets which avoids them being used at a quantitative level. The catch statistics recorded in the 1993 to 1999 issues were, nevertheless, used to estimate the proportion of catches from the Indian Ocean unloaded in Benoa *versus* those landed in other ports. The following assumptions were made:

1-. All longline catches unloaded in Bali-Nusatenggara-Timor, Barat Sumatera, Selat Malaka-Aceh, Selatan Jawa and Utara Jawa (DKI Jakarta) come from the Indian Ocean. This is in agreement with the information published in several papers and documents. The amount of fish caught by longliners beyond the IOTC boundary and unloaded in either of these ports is thought very low.

2-. The method to estimate the catches is the same all over the country. Thus, the catch values recorded in the DGF statistics for the different Indian Ocean ports can be used to compare the levels of activity (percentage of landings in one port in relation to total landings) among them.

The catches of Tunas (TUX; Catch1) and "Rawai Tuna" ("Tuna long line"; Catch2) in Tables 1.5 ("Production of marine fishery by species, coastal area and Province") and 1.6 ("Production of marine fishery by type of fishing gear, coastal area and Province") from the DGF statistics were used to estimate the catches in Bali-Benoa and other ports. The term Tunas in Indonesia refer both to tunas belonging to the genus Thunnus and to all billfish species. The figures in the table 1.5 (catches under Tunas) were simply used to check the consistency of those recorded in Table 1.6 (longline catches). The reason for this is the almost constant proportion between the catches recorded under Tunas and those under longline since 1992 in each Province.

Thus, the catches under longline were found inconsistent in 1992 and 1997 (Utara Jawa) and 1998 (Selatan Jawa). The values recorded in these years and Provinces were changed in order to give consistency to the data:

a/ Selatan Jawa, 1998 and 1999: Deletion of 10889 tons recorded under longlines. The value was set to nil according to previous years values and proportions between the catches recorded under tunas and longline.

b/ Utara Jawa, 1992: Nil catches were recorded both under Tunas and longlines, which are not in agreement with next years figures. The 1992 catches under longlines were set to the same value than 1993 since the same levels of activity are thought for both years.

c/ Utara Jawa, 1997: The 26,678 catches reported under longlines are inconsistent both with previous figures and proportions Tunas-Longline catches. This value was set to 16,678, matching more with previous and former years values and proportions.

1996										1999									
Month	Trips		LANDINGS				PROPORTIONS			Month	Trips		LANDINGS				PROPORTIONS		
	noShips	FOREIGN	IDN	TOTAL	TOTAL	FOREIGN	IDN	FOREIGN	IDN		noShips	FOREIGN	IDN	TOTAL	TOTAL	FOREIGN	IDN	FOREIGN	IDN
JAN	272	75	192	267	876	246	630	0.28	0.72	JAN	477		454	454	1042.56	0	1043	0.00	1.00
FEB	201	19	110	129	704	104	600	0.15	0.85	FEB	432		412	412	795.55	0	796	0.00	1.00
MAR	226	62	160	222	728	203	525	0.28	0.72	MAR	438		525	525	850.45	0	850	0.00	1.00
APR	187	24	166	190	594	75	519	0.13	0.87	APR	589	1	613	614	1179.63	2	1178	0.00	1.00
MAY	192	20	164	184	572	62	510	0.11	0.89	MAY	508		576	576	924.65	0	925	0.00	1.00
JUN	183	7	178	185	577	22	555	0.04	0.96	JUN	470		504	504	740.2	0	740	0.00	1.00
JUL	223	17	209	226	695	52	643	0.08	0.92	JUL	464	1	539	540	792.875	1	791	0.00	1.00
AUG	280	28	258	286	886	87	799	0.10	0.90	AUG	484	1	497	498	652.65	1	651	0.00	1.00
SEP	268	25	238	263	814	77	737	0.10	0.90	SEP	504		504	504	690.555	0	691	0.00	1.00
OCT	345	37	312	349	1084	115	969	0.11	0.89	OCT	600	1	571	572	1024	2	1022	0.00	1.00
NOV	387	32	353	385	1187	99	1088	0.08	0.92	NOV	572		627	627	765.15	0	765	0.00	1.00
DEC	445	60	379	439	1377	188	1189	0.14	0.86	DEC	645	1	618	619	860	1	859	0.00	1.00
TOTAL		406	2719	3125	8514	981	7533	0.12	0.88	TOTAL		5	6440	6445	8480.16	8	8472	0.00	1.00

1997							2000												
Trips							Trips												
Month	noShips	FOREIGN	IDN	LANDINGS		FOREIGN	IDN	FOREIGN	IDN	Month	noShips	FOREIGN	IDN	LANDINGS		FOREIGN	IDN	FOREIGN	IDN
				TOTAL	TOTAL									TOTAL	TOTAL				
JAN	364	53	321	374	1175.1	167	1009	0.14	0.86	JAN	553	581	581	928.073	0	928	0.00	1.00	
FEB	377	51	230	281	974.1	177	797	0.18	0.82	FEB	452	541	541	688.72	0	689	0.00	1.00	
MAR	321	47	280	327	1028	148	880	0.14	0.86	MAR	584	674	674	1020.156	0	1020	0.00	1.00	
APR	338	46	301	347	1013.5	134	879	0.13	0.87	APR	426	679	679	675.599	0	676	0.00	1.00	
MAY	236	31	208	239	666.5	86	580	0.13	0.87	MAY	628	717	717	954.119	0	954	0.00	1.00	
JUN	370	48	325	373	1093.2	141	953	0.13	0.87	JUN	475	560	560	769.465	0	769	0.00	1.00	
JUL	352	41	295	336	879.9	107	773	0.12	0.88	JUL	399	555	555	1904.037	0	1904	0.00	1.00	
AUG	305	30	292	322	811	76	735	0.09	0.91	AUG	480	531	531	1660.794	0	1661	0.00	1.00	
SEP	328	27	308	335	982.1	79	903	0.08	0.92	SEP	456	580	580	1727.833	0	1728	0.00	1.00	
OCT	320	13	305	318	502.8	21	482	0.04	0.96	OCT	571	603	603	1689.147	0	1689	0.00	1.00	
NOV	360	9	341	350	602.1	15	587	0.03	0.97	NOV	585	613	613	1759.927	0	1760	0.00	1.00	
DEC	432	18	407	425	1005.9	43	963	0.04	0.96	DEC	424	379	379	938.573	0	939	0.00	1.00	
TOTAL		414	3613	4027	8585	850	7735	0.10	0.90	TOTAL		0	7013	7013	13099.65	0	13100	0.00	1.00

T23 DGF Jakarta: Number of LL operating from Jakarta and catches unloaded (Pelabuhan Perikanan Samudera Jakarta Laporan Statistik Tahun 1994-1998)

1994			1995			1996			1997			1998		
Month	noShips	Catches	Month	noShips	Catches	Month	noShips	Catches	Month	noShips	Catches	Month	noShips	Catches
JAN	220	683	JAN	260	1467	JAN	205	1778	JAN	170	704	JAN	189	936.92
FEB	186	863	FEB	242	1648	FEB	256	1107	FEB	202	630	FEB	149	845.79
MAR	260	982	MAR	183	715	MAR	193	770	MAR	130	567	MAR	199	1051.18
APR	207	1076	APR	241	1113	APR	295	1381	APR	240	1576	APR	181	471.26
MAY	184	1178	MAY	166	972	MAY	250	1294	MAY	271	1638	MAY	192	539.8
JUN	246	1481	JUN	228	1868	JUN	291	1828	JUN	124	798	JUN	180	923.89
JUL	265	2057	JUL	226	1412	JUL	269	1853	JUL	267	2006	JUL	230	690.41
AUG	263	1567	AUG	238	1377	AUG	309	1584	AUG	142	977	AUG	171	709.47
SEP	317	1591	SEP	232	1087	SEP	255	1185	SEP	205	878	SEP	199	846.26
OCT	223	1381	OCT	214	798	OCT	237	935	OCT	169	786	OCT	198	516.85
NOV	268	1730	NOV	175	890	NOV	162	504	NOV	203	1059	NOV	166	535.19
DEC	249	1614	DEC	204	1006	DEC	191	919	DEC	169	943	DEC	202	612.5
TOTAL		16203	TOTAL		14353	TOTAL		15136	TOTAL		12562	TOTAL		8679.52

NEW ESTIMATES

T25 Benoa: Proportion of domestic versus foreign longliners

Year	Foreign	IDN	Source	Estimation Process
1991	0.67	0.33	DGF	Estimated from individual vessel records (below table)
1992	0.69	0.31	DGF	
1993	0.55	0.45	DGF	
1994	0.46	0.54	IOTC	Estimated by interpolation
1995	0.38	0.62	WASKI	Estimated from Waski Data (previous page)
1996	0.12	0.88	WASKI	
1997	0.10	0.90	WASKI	
1998	0.01	0.99	WASKI	
1999	0.00	1.00	WASKI	
2000	0.00	1.00	WASKI	

T26 DGF: Number of Indonesian and Foreign longliners operating in Indonesia

Total Number of Ships IO/PO			
Year	Foreign	IDN	Total
1991	446	216	662
1992	684	308	992
1993	508	423	931

Bali-Benoa: The catches from the CSIRO/RIMF sampling program (**T19**) were used to estimate the landings of domestic longliners in this port. The estimation process is explained below:

1-. Estimation of landings of domestic longliners: The CSIRO/RIMF figures refer not only to domestic but also to foreign fleets. The catches of domestic longliners were estimated according to the proportions obtained from the DGF and WASKI statistics (see the tables **T25** and **T26**):

1993 (DGF data): The total number of domestic and foreign tuna longliners operating in Indonesia was used to estimate the proportion of foreign and domestic vessels operating in Benoa. This assuming equal levels of activity of domestic and foreign longliners in all ports in the country.

1994 (IOTC): The 1994 proportions were estimated by interpolation due to lack of detailed information. It is likely that the proportion of Indonesian longliners obtained be slightly overestimated, this due to 1995 being the first year recording a massive re-flagging from foreign to Indonesian flag.

1995-2000 (WASKI): The proportion of Indonesian and foreign vessels operating in Benoa was obtained from the WASKI.

The same catch rates and levels of activity were presumed for both domestic and foreign longliners. This is likely to be the case due to the Indonesian fleet mainly made up by ex-foreign vessels (re-flagging).

2-. Species breakdown: The species composition of the catch was estimated from the CSIRO/RIMF data as regards tunas and billfish (**T19**). The catches of other species as sharks and wahoo were estimated according to previous years data (**T27**).

a/ Estimation of catches of tuna species: The catches of tunas obtained from above (1) were raised to round weight according to the figures in **T4**. Thus,

Catch TunSps_i Y_i= Catch TunSps_{sk(CSIRO)} Y_i* Proportion Domestic longliners Y_i * Raising Factor TunSps_i

T27 IOTC: Proportions of seerfish, billfish and shark species (from T12)

In relation to total catches of billfish

BLZ	BLM	MLS	SWO	SFA
0.47	0.10	0.06	0.22	0.15

In relation to total catch

SKH	WAH	TOTAL
0.02	0.00	0.02
0.99	0.01	

b/ Estimation of catches of billfish species: The catches of billfish obtained from above (1) were break into species according to the proportions obtained from previous reports (T27) and afterwards raised to round weight according to T4. Thus,

$$\text{Catch of BilSps}_x \text{ Y}_i = \text{Catch Bil}_{(\text{CSIRO})} \text{ Year}_i * \text{Proportion Domestic longliners Y}_i * \text{Proportion BilSps}_x * \text{Raising Factor BilSps}_x$$

c/ Estimation of catches of sharks and wahoo: The catches of sharks and wahoo, not recorded in the statistics from the CSIRO, were estimated according to previous years values (T27). Thus,

$$\text{Catch of OtSps}_x \text{ Y}_i = \text{Total Catches Year}_i * \text{Proportion Domestic longliners Y}_i * \text{Proportion OtSps}_x * \text{Raising Factor OtSps}_x$$

T28 DGF: Total landings in Benoa versus other ports (from T21)

Year	Bali	Other Ports	TOTAL	Proportion	
				Bali	Other
1992	7842	9110	16952	0.46	0.54
1993	7841	6388	14229	0.55	0.45
1994	5325	9258	14583	0.37	0.63
1995	10781	16320	27101	0.40	0.60
1996	11417	16968	28385	0.40	0.60
1997	10268	17038	27306	0.38	0.62
1998	14166	13568	27734	0.51	0.49
1999	12513	15425	27938	0.45	0.55

T29 CSIRO/RIMF & IOTC: Species breakdown non PT-PSB longliners (from T14)

Year	Catches Per Species											TOTAL
	ALB	BET	YFT	SBF	BLZ	BLM	MLS	SWO	SFA	SKH	WAH	
1998	0.02	0.36	0.50	0.04	0.03	0.01	0.00	0.02	0.01	0.02	0.00	1.00

T30 IOTC: Proportion of PT PSB versus non-PT PSB longliners in the Indian Ocean

Year	Number longliners		Proportions	
	PSB	TOTAL	PT PSB	OTHER
1991	19	158	0.12	0.88
1992	14	255	0.05	0.95
1993	14	345	0.04	0.96
1994	17	371	0.05	0.95
1995	24	396	0.06	0.94
1996	24	709	0.03	0.97
1997	24	861	0.03	0.97
1998	24	845	0.03	0.97
1999	24	1095	0.02	0.98
2000	24	1247	0.02	0.98

Other Ports (1993-99): The Indian Ocean catches unloaded to Indonesian ports other than Bali where estimated by following the steps below:

- 1-. Estimation of total catches: The total catches were estimated according to the proportions shown in table T28, estimated from DGF catch data.
- 2-. Species breakdown: The total catches obtained from above were broken into species according to the 1998 CSIRO/RIMF sampling data in Benoa on non-PT PSB longliners. The estimation process is explained in 2B. The table T29 shows the proportions used.

The following assumptions were made:

- a/ All longliners unloading their Indian Ocean catches to plants in ports other than Benoa operate as those not belonging to-PT PSB in Benoa.
- b/ No changes in the species composition of the catch occurred from 1993 to 1999.

Thus:

$$\text{Catch Sps}_x \text{ Y}_i = \text{Total Catch Y}_i \text{ Benoa} * (\text{Proportion Other Y}_i / \text{Proportion Benoa Y}_i) * \text{Proportion Sps}_x (\text{1998})$$

Other Ports (2000): The catches were estimated following the same method above. Considering the lack of information from the DGF regarding the year 2000, the 1999 proportions between Benoa and other ports (from T28) were used instead to estimate the total catches for 2000.

T31 NEW CATCHES BENOA

Year	Catches Per Species											TOTAL	Source
	ALB	BET	YFT	SBF	BLZ	BLM	MLS	SWO	SFA	SKH	WAH		
RF	1.00	1.09	1.09	1.09	1.20	1.20	1.20	1.31	1.00	1.55	1.00		
1993	325	3062	7231	589	218	45	27	113	58	180	1	11849	IOTC
1994	181	3132	6328	460	165	34	21	85	44	190	1	10641	IOTC
1995	286	4400	7137	486	253	52	32	130	67	269	2	13112	IOTC
1996	913	10170	10642	1349	734	151	92	379	194	738	4	25366	IOTC
1997	2138	9933	11809	1888	926	190	115	477	244	846	5	28572	IOTC
1998	891	13545	16944	1244	1080	222	135	557	285	1168	7	36076	IOTC
1999	1705	10830	17613	2351	1718	353	214	885	453	1223	7	37353	IOTC
2000	1999	9165	13503	1067	418	86	52	215	110	902	5	27522	IOTC

T32 NEW CATCHES OTHER PORTS

Year	Catches Per Species											TOTAL	Source
	ALB	BET	YFT	SBF	BLZ	BLM	MLS	SWO	SFA	SKH	WAH		
RF	1.00	1.09	1.09	1.09	1.20	1.20	1.20	1.31	1.00	1.55	1.00		
1993	196	3495	4787	358	287	59	36	148	76	211	2	9653	IOTC
1994	375	6698	9174	686	549	113	68	283	145	404	4	18500	IOTC
1995	403	7187	9842	736	589	121	73	304	155	434	4	19849	IOTC
1996	765	13650	18693	1398	1119	230	140	577	295	824	7	37698	IOTC
1997	962	17166	23509	1759	1408	290	176	726	371	1036	9	47410	IOTC
1998	701	12511	17134	1282	1026	211	128	529	271	755	7	34553	IOTC
1999	934	16672	22832	1708	1367	281	170	705	361	1007	9	46045	IOTC
2000	688	12284	16823	1259	1007	207	126	519	266	742	6	33927	IOTC

T33 NEW CATCHES TOTAL

Year	Catches Per Species											TOTAL	Source	Av.Catch Per Ship
	ALB	BET	YFT	SBF	BLZ	BLM	MLS	SWO	SFA	SKH	WAH			
1993	521	6557	12018	948	505	104	63	260	133	391	3	21503	IOTC	75
1994	556	9830	15502	1147	714	147	89	368	188	594	5	29141	IOTC	
1995	689	11586	16979	1222	842	173	105	434	222	703	5	32961	IOTC	
1996	1678	23820	29335	2747	1854	381	231	956	489	1562	11	63064	IOTC	87
1997	3100	27099	35318	3646	2333	480	291	1203	615	1883	14	75982	IOTC	
1998	1592	26055	34078	2526	2106	433	263	1085	555	1923	13	70629	IOTC	
1999	2639	27502	40445	4059	3085	634	385	1590	814	2229	16	83398	IOTC	
2000	2687	21449	30326	2325	1425	293	178	735	376	1644	11	61449	IOTC	

3 Estimation of the catches of artisanal ships in the Indian Ocean from 1970-2000

A/ 1970-81

BASIC DATA

T34 IOTC Nominal Catches Database: data reported by the Liaison Officer

Year	Gear	YFT	SKJ	TUN	FRZ	KAW	COM	GUT	Total
1974	PS	21	96	223					340
1975	PS	39	177	410					626
1976	PS	56	251	583					890
1977	PS	73	328	760					1161
1978	PS	74	333	772					1179
1979	PS	84	377	875					1336
1980	PS	89	397	921					1407
1981	PS	91	407	945					1443
1970	UNCL	600	2300	2900			1300	400	7500
1971	UNCL	600	2400	3000	1	1	1300	500	7802
1972	UNCL	1000	3700	4700	2	2	1600	600	11604
1973	UNCL	986	4100	5124	3	3	1400	600	12216
1974	UNCL	750	4351	7923	4	4	1204	759	14995
1975	UNCL	144	3749	6372	129	26	1723	498	12641
1976	UNCL	294	5262	8346	450	81	2124	315	16872
1977	UNCL	971	3706	12319	1225	211	3666	100	22198
1978	UNCL	1392	3761	7132	280	54	3783	157	16559
1979	UNCL	2167	8211	11075	887	156	3682	399	26577
1980	UNCL	1769	8590	18648	851	151	5962	437	36408
1981	UNCL	141	7649	19312	979	173	4244	475	32973

T35 FAO FishStat Database (no gear information)

Year	YFT	SKJ	TUX	COM	GUT	Total
1973	1100	4100	5200	1400	600	12400
1974	1071	4447	8609	1204	759	16090
1975	869	3925	7710	1723	498	14725
1976	1317	5513	10149	2124	315	19418
1977	2345	4034	15162	3666	100	25307
1978	2811	4093	9131	3787	157	19979
1979	3692	8588	13931	3685	399	30295
1980	3983	8986	21695	5965	437	41066
1981	4030	8056	22888	4246	475	39695

The table **T34** shows the catches of tuna and tuna-like species in the Indian Ocean as reported by the Indonesian Liaison Officer to the IOTC. The total catches reported mostly agree with those in the DGF Fisheries Statistics of Indonesia and FAO FishStat database (**T35**):

Gear assignment: the catches were reported under purse seines and other unspecified gears, being most catches recorded under the latter. The catches not recorded under specific gears probably come from lines (troll and handlines) and gillnets. The catches of Indonesian industrial longliners operating from 1973 to 1981, not reported separately, were presumably overlooked, not recorded along with the artisanal catches.

Species Breakdown: The total catches of skipjack (cakalang), narrow-barred Spanish mackerel (Tenggiri) and Indo-Pacific king mackerel (Tenggiri papan) are mostly in agreement with those published in the fisheries statistics of Indonesia. On the contrary, the catches reported under yellowfin tuna, frigate tuna, kawakawa and tunas come probably from the categories tuna and tongkol by the DGF. These catches were probably estimated by the Liaison Officer, although no documentation about the process was found.

The quality of these data is thought poor due to several reasons:

The catches under each species are not thought to represent the actual catches of the species but to include catches of several species. This is in relation with the way in which the statistics are collected and processed in Indonesia, with commercial groups including more than one species accounted for under single species names. Furthermore, the catches reported under TUN, making up between 25%-50% of the total catch, might include catches of the species recorded plus catches of other species not recorded separately, as other tunas (longtail tuna, bigeye tuna), seerfishes (wahoo) and billfishes (all species, specially Indo-Pacific sailfish).

The changes in the amounts reported over the years, specially concerning some species as the yellowfin and frigate tunas are not thought very reliable.

NEW ESTIMATES

The statistics were left unchanged for this period due to the lack of information from other sources allowing to improve the estimates. The quality of the dataset was set to Poor until more information become available on the method used to produce these estimates.

B/ 1982-92

BASIC DATA

T36 IOTC Nominal Catches Database: data reported by the Liaison Officer

Year	Gear	YFT	SKJ	TUN	FRZ	KAW	COM	GUT	BIL	Total	SKH
1982	GILL	53	516		12	6			49	636	71
1983	GILL	74	726		16	8			70	894	99
1984	GILL	82	802		18	9			77	988	110
1985	GILL	33	326		7	4			31	401	45
1986	GILL	29	287		7	3			27	353	39
1987	GILL	29	282		6	3			27	347	39
1988	GILL	61	593		13	7			57	731	81
1989	GILL	83	810		18	9			78	998	111
1990	GILL	178	1743		40	20			167	2148	239
1991	GILL	288	2815		64	32			270	3469	385
1992	GILL	288	2815		64	32			270	3469	385
1982	PS	145	648	1058						1851	
1983	PS	158	708	1643						2509	
1984	PS	214	95	1567						1876	
1985	PS	214	1058	2010						3282	
1986	PS	179	895	2488						3562	
1987	PS	183	912	2538						3633	
1988	PS	192	957	2665						3814	
1989	PS	255	929	2711						3895	
1990	PS	270	996	2803						4069	
1991	PS	603	865	821						2289	
1992	PS	293	1417	3177						4887	
1982	UNCL	1058	12140	23044	2664	82	5618	959		45565	
1983	UNCL	770	12008	22898	1064	41	6146	880		43807	
1984	UNCL	416	9510	25097	358	23	4954	791		41149	
1985	UNCL	1767	10035	23209	1321	49	5043	1310		42734	
1986	UNCL	2915	10054	23055	316	24	6319	1228		43911	
1987	UNCL	1698	10836	23214	596	32	7332	1505		45213	
1988	UNCL	1460	12199	24243	1899	67	8686	9112		57666	
1989	UNCL	44	17421	29070	1146	49	8592	11314		67636	
1990	UNCL	68	11974	18389	1771	66	7041	5227		44536	
1991	UNCL	117	11465	27015	3034	100	8202	4341		54274	
1992	UNCL	117	12763	18812	3035	101	9353	1561		45742	

The catches of skipjack tuna (SKJ), narrow-barred Spanish mackerel (COM) and Indo-Pacific king mackerel (GUT) reported in the Fisheries Statistics of Indonesia for the year 1992 (**T38**) in the areas of landing of ships operating in the Indian Ocean are much higher than those reported to the IOTC or the FAO. The reason for this is not fully understood although might indicate underestimation of the catches reported to both institutions by the Liaison Officers. The catches recorded under LOT refer to the Indonesian category Tongkol, aggregating catches of kawakawa (KAW), frigate tunas (FRZ), other small tuna species and juveniles of large tunas (TUN). The catches under this group are usually included in TUX in the FAO statistics, break into FRZ, KAW and TUN in the IOTC's. The DGF figures under this group are also much higher than those reported under TUX in the FAO statistics.

NEW ESTIMATES

The statistics were left unchanged for this period due to the lack of information from other sources allowing to improve the estimates. The quality of the dataset was set to Poor until more information become available on the method used to produce these estimates.

T37 FAO FishStat Database (no gear information)

Year	YFT	SKJ	TUX	COM	GUT	Total
1982	5153	13304	28429	5619	959	53464
1983	3986	13441	27455	6147	880	51909
1984	4398	11263	28425	4955	791	49832
1985	4162	11418	27687	5045	1310	49622
1986	5002	11236	26838	6321	1228	50625
1987	7425	12030	31498	7332	1505	59790
1988	7166	12790	31936	7996	9112	69000
1989	10906	18076	36977	7936	11225	85120
1990	8250	13857	34080	6678	5226	68091
1991	8110	13522	39972	8023	4291	73918
1992	9950	14186	35791	8345	1529	69801

T38 DGF: Fisheries Statistics of Indonesia 1992

Area	COM	GUT	LOT	SKJ	TUX	TOTAL
Bali-Nusatenggara-Timor	2194	311	15410	8747	12660	39322
Barat Sumatera	5339	1162	19447	11169	8595	45712
Selat Malaka-Aceh	896		329	1626	1129	3980
Selat Malaka-Sumatera Utara	1300	367	10792			12459
Selatan Jawa	1844	32	7246	4200	661	13983
TOTAL DGF	11573	1872	53224	25742	23045	115456
TOTAL IOTC	9353	1561		16995		
TOTAL FAO	8345	1529		14186		

Table **T36** and **T37** show the same as **T34** and **T35** above for the period 1982 to 1992.

The only difference regarding the data recorded for this and the former period is the separate reporting of catches under gillnets, with two new species groups, billfish and sharks, recorded.

Gear assignment, species breakdown and data quality are thought much likely as those referred to for the previous period.

The catches of industrial longliners in Indonesia were reported separately during this period.

The difference between the total catches in **T36** and **T37** originates than the fact that the FAO statistics lack of gear information being the longline catches recorded along the catches of artisanal fleets.

C/ 1993-2000

BASIC DATA

T39 IOTC Nominal Catches Database: data estimated by IOTC

Year	Gear	YFT	SKJ	TUN	FRZ	KAW	COM	GUT	BIL	Total	SKH
1993	GILL	288	2088		64	32			270	2742	385
1994	GILL	288	2422		64	32			270	3076	385
1995	GILL	288	2597		64	32			270	3251	385
1996	GILL	287	2586		64	32			269	3238	383
1997	GILL	307	2772		68	34			289	3470	411
1998	GILL	333	3002		74	38			312	3759	444
1999	GILL	350	3149		78	40			327	3944	444
1993	PS	293	1229	3177						4699	
1994	PS	293	1425	3177						4895	
1995	PS	293	1528	3177						4998	
1996	PS	292	1522	3164						4978	
1997	PS	312	1631	3392						5335	
1998	PS	339	1766	3673						5778	
1999	PS	356	1852	3852						6060	
1993	UNCL	117	15663	23428	3036	102	12172	8282		62800	
1994	UNCL	117	18164	23428	3036	102	10462	5005		60314	
1995	UNCL	117	19475	23428	3036	102	11500	7000		64658	
1996	UNCL	116	19392	23328	3023	101	11451	6970		64381	
1997	UNCL	125	20790	25011	3241	109	12277	7473		69026	
1998	UNCL	135	22512	27082	3510	117	13294	8092		74742	
1999	UNCL	141	23611	28404	3681	123	13943	8487		78390	

T40 FAO FishStat Database (no gear information)

Year	YFT	SKJ	TUX	COM	GUT	Total
1993	8637	18980	38585	12172	8282	86656
1994	9031	22011	42933	10462	5005	89442
1995	12279	19645	40935	11581	10110	94550
1996	13247	27474	42113	12330	13518	108682
1997	15316	35506	42191	11622	11884	116519
1998	23046	30958	45853	16034	10282	126173
1999	24170	32470	48090	16820	10780	132330

Indonesia has not reported statistics to the IOTC since 1992. The 1993 to 1999 nominal catches (**T39**) were estimated by using data mainly from the FAO (**T40**). All details about the method used to estimate the catches can be found in **2C**.

As it was referred in **2C**, the catches estimated for the period are thought inaccurate, specially due to the different trend in catches and activity underwent by the artisanal and industrial fisheries in Indonesia along with the inconsistent reporting of longline catches.

Table **T41** shows the catches published in the Fisheries Statistics of Indonesia (DGF) for the period 1993-99. As in the previous period, the catches of skipjack tuna recorded in the DGF issues are higher than those reported to the FAO or estimated by the IOTC.

The new estimates conducted did not take into account these discrepancies being based on the catches reported to the FAO. This was done for the sake of consistency on the basis of previous data reported to the FAO and the IOTC matching perfectly. Nevertheless, as it was mentioned in the previous section, it is possible that the new catches be underestimated.

T41 DGF: Fisheries Statistics of Indonesia 1993-98

Year	Area	COM	GUT	LOT	SKJ	TUX	TOTAL
1993	Bali-Nusatenggara-Timor	2150	577	14981	8081	10352	36141
	Barat Sumatera	6834	3047	16452	9691	6334	42358
	Selat Malaka-Aceh	1320	4647	3463	2028	1922	13380
	Selat Malaka-Sumatera Utara	2845	587	14514			17946
	Selatan Jawa	1582	22	8480	10823	1610	22517
TOTAL		14731	8880	57890	30623	20218	132342
1994	Bali-Nusatenggara-Timor	2682	714	23330	8905	9655	45286
	Barat Sumatera	5236	2066	15657	11188	7680	41827
	Selat Malaka-Aceh	550	1639	2355	1327	931	6802
	Selat Malaka-Sumatera Utara	3271	1170	19132		100	23673
	Selatan Jawa	1742	134	10769	10559	561	23765
TOTAL		13481	5723	71243	31979	18927	141353
1995	Bali-Nusatenggara-Timor	2381	490	21248	10088	14595	48802
	Barat Sumatera	5391	3164	18241	11332	10603	48731
	Selat Malaka-Aceh	979	2773	2640	1812	1415	9619
	Selat Malaka-Sumatera Utara	3961	4173	15435			23569
	Selatan Jawa	1378	1	9949	7500	389	19217
TOTAL		14090	10601	67513	30732	27002	149938
1996	Bali-Nusatenggara-Timor	3640	262	25120	12910	13055	54987
	Barat Sumatera	4858	5027	20550	12071	10228	52734
	Selat Malaka-Aceh	827	3004	4225	2695	2444	13195
	Selat Malaka-Sumatera Utara	4345	5460	12975			22780
	Selatan Jawa	2680	29	9649	14336	792	27486
TOTAL		16350	13782	72519	42012	26519	171182
1997	Bali-Nusatenggara-Timor	308		9736	3652	8142	21838
	Barat Sumatera	3938	3586	18650	14595	12487	53256
	Selat Malaka-Aceh	948	2902	3558	2468	1575	11451
	Selat Malaka-Sumatera Utara	3959	5345	13639			22943
	Selatan Jawa	3027	84	11768	19811	1564	36254
TOTAL		12180	11917	57351	40526	23768	145742
1998	Bali-Nusatenggara-Timor	6426	769	33022	12705	44902	97824
	Barat Sumatera	5797	3817	22253	14931	24692	71490
	Selat Malaka-Aceh	987	2006	2295	1789	1479	8556
	Selat Malaka-Sumatera Utara	4443	5197	15335	642		25617
	Selatan Jawa	2484	32	13303	15701	1877	33397
TOTAL		20137	11821	86208	45768	72950	236884
1999	Bali-Nusatenggara-Timor	2943	953	31453	12503	16712	64564
	Barat Sumatera	4705	4512	21015	18452	11598	60282
	Selat Malaka-Aceh	1360	1099	2949	2518	1764	9690
	Selat Malaka-Sumatera Utara	4466	4652	12844			21962
	Selatan Jawa	2741	1	19034	13671	1771	37218
TOTAL		16215	11217	87295	47144	31845	193716

Year	TOTALS	COM	GUT	LOT	SKJ	TUX	TOTAL
1993	TOTAL DGF	14731	8880		30623		
	TOTAL FAO	12172	8282		18980		
	TOTAL IOTC	12172	8282		18980		
1994	TOTAL DGF	13481	5723		31979		
	TOTAL FAO	10462	5005		22011		
	TOTAL IOTC	10462	5005		22011		
1995	TOTAL DGF	14090	10601		30732		
	TOTAL FAO	11581	10110		19645		
	TOTAL IOTC	11500	7000		23600		
1996	TOTAL DGF	16350	13782		42012		
	TOTAL FAO	12330	13518		27474		
	TOTAL IOTC	11451	6970		23500		
1997	TOTAL DGF	12180	11917		40526		
	TOTAL FAO	11622	11884		35506		
	TOTAL IOTC	12277	7473		25193		

NEW ESTIMATES

T42 FAO FishStat database: Catches of yellowfin tuna (YFT) and tuna and tuna-like species (TUX)

Year	TUX	YFT	Total
1982	28429	5153	53464
1983	27455	3986	51909
1984	28425	4398	49832
1985	27687	4162	49622
1986	26838	5002	50625
1987	31498	7425	59790
1988	31936	7166	69000
1989	36977	10906	85120
1990	34080	8250	68091
1991	39972	8110	73918
1992	35791	9950	69801

T43 IOTC Nominal Catches database: Catches of YFT, TUN, FRZ, KAW and BIL (Liaison Officer, LO) under artisanal (left) and industrial (longline, right) gears

Year	Artisanal		Industrial	Total
	TUX	All Sps	TUX	
1982	28171	48052	5437	53489
1983	26742	47210	4727	51937
1984	27861	44013	4992	49005
1985	28645	46417	3236	49653
1986	29043	47826	2831	50657
1987	28326	49193	10629	59822
1988	30664	62211	12233	74444
1989	33463	72529	20947	93476
1990	23772	50753	45025	95778
1991	32344	60032	36726	96758
1992	26189	54098	36865	90963
Average		52939	16695	

T44 Proportion of YFT, TUN and other species (COM, GUT, SKJ) in relation to total catches recorded for the period 1982-92 (artisanal gears)

Year	Tuna	Other	StandDev
1982	0.59	0.41	3.79
1983	0.57	0.43	1.81
1984	0.63	0.37	8.47
1985	0.62	0.38	6.88
1986	0.61	0.39	5.89
1987	0.58	0.42	2.75
1988	0.49	0.51	-5.54
1989	0.46	0.54	-8.69
1990	0.47	0.53	-7.99
1991	0.54	0.46	-0.95
1992	0.48	0.52	-6.42
Average	0.55		
1988-92	0.49	0.51	

T45 Catches of SKJ, COM and GUT reported to the IOTC and the FAO by Indonesia

Year	FAO	IOTC	DIFF
1982	19882	19881	1
1983	20468	20468	
1984	17009	16152	857
1985	17773	17772	1
1986	18785	18783	2
1987	20867	20867	
1988	29898	31547	-1649
1989	37237	39066	-1829
1990	25761	26981	-1220
1991	25836	27688	-1852
1992	24060	27909	-3849

T46 IOTC: New artisanal catches for the period 1993-99 (from **T39**)

Year	FAO				NEW ESTIMATES		FAO	
	SKJ	COM	GUT	SubTotal	TUX	New Total	TUX	LL
1993	18980	12172	8282	39434	37753	77187	47222	9469
1994	22011	10462	5005	37478	35880	73358	51964	16084
1995	19645	11581	10110	41336	39574	80910	53214	13640
1996	27474	12330	13518	53322	51049	104371	55360	4311
1997	35506	11622	11884	59012	56496	115508	57507	1011
1998	30958	16034	10282	57274	54832	112106	68899	14067
1999	32470	16820	10780	60070	57509	117579	72260	14751

Table **T45** shows the catches of SKJ, COM and GUT reported to the FAO and the IOTC for the period 1982-92. The catches are very close especially in the first years of the series, slightly different in later years. The reason for this different reporting to the FAO and the IOTC is not fully understood.

In light of these results and assuming that the situation remained the same from 1993 to 1999, the series of catches was estimated as follows (**T46-T48**):

A/ Total catches (species groups, **T46**):

- 1-. Total catches of skipjack (SKJ), narrow-barred Spanish mackerel (COM) and Indo-Pacific king mackerel (GUT) as recorded in the FAO FishStat database: Considering that catches of these species are almost never reported under longlines they were fully assigned to artisanal gears. This is also in agreement with previous reports.
- 2-. Total catches of Tuna estimated according to the proportion between the total catches of SKJ, COM and GUT (FAO) and the total catches of Tuna for the period 1990-92.

B/ Breakdown species and gear assignment (**T48**):

- 1-. SKJ, COM and GUT where assigned to the corresponding gears according to 1990-92 proportions (**T47**).
- 2-. The catches of Tunas where break into the corresponding species (YFT, TUN, FRZ, KAW, BIL) and gears (GILL, PS, UNCL) according to 1990-92 proportions (**T47**).
- 3-. The catches of Sharks (SKH) where estimated according to the relationship between the total artisanal catches, excluding the shark catches, and the catches of sharks for the period 1990-92 (**T47**).

T47 Species caught under artisanal gears: Relative proportions of each species in the catch for the period 1990-92

In relation to total catches of each individual species						In relation to total catches of Tunas													In relation to total artisanal			
GEAR	Catches			Proportions			GEAR	Catches						Proportions						GEAR	SKH	Prop
	SKJ	COM	GUT	SKJ	COM	GUT		YFT	TUN	FRZ	KAW	BIL	Total	YFT	TUN	FRZ	KAW	BIL				
GILL	7373			0.16			GILL	754		168	84	707	1713	0.01		0.00	0.00	0.01	GILL	1009	0.01	
PS	3278			0.07			PS	1166	6801				7967	0.01	0.08				PS			
UNCL	36202	24596	11129	0.77	1.00	1.00	UNCL	302	64216	7840	267		72625	0.00	0.78	0.10	0.00		UNCL			
TOTAL	46853	24596	11129	1.00	1.00	1.00	TOTAL	2222	71017	8008	351	707	82305	0.03	0.86	0.10	0.00	0.01	TOTAL	1009	0.01	

T48 IOTC Nominal Catches Database: New Indonesian artisanal catches for the period 1993-2000

Year	Gear	SKJ	COM	GUT	YFT	TUN	FRZ	KAW	BIL	Total	SKH
1993	GILL	2987			346		77	39	324	3773	946
1993	PS	1328			535	3120				4982	
1993	UNCL	14665	12172	8282	139	29455	3596	122		68432	
1994	GILL	3464			329		73	37	308	4211	899
1994	PS	1540			508	2965				5013	
1994	UNCL	17007	10462	5005	132	27994	3418	116		64135	
1995	GILL	3091			363		81	40	340	3915	992
1995	PS	1374			561	3270				5205	
1995	UNCL	15179	11581	10110	145	30876	3770	128		71789	
1996	GILL	4323			468		104	52	439	5386	1280
1996	PS	1922			723	4218				6864	
1996	UNCL	21228	12330	13518	187	39829	4863	166		92121	
1997	GILL	5587			518		115	58	485	6763	1416
1997	PS	2484			800	4668				7953	
1997	UNCL	27434	11622	11884	207	44079	5382	183		100792	
1998	GILL	4872			502		112	56	471	6013	1374
1998	PS	2166			777	4531				7474	
1998	UNCL	23920	16034	10282	201	42781	5223	178		98620	
1999	GILL	5110			527		117	59	494	6307	1441
1999	PS	2272			815	4752				7838	
1999	UNCL	25089	16820	10780	211	44870	5478	187		103434	
2000	GILL	5110			527		117	59	494	6307	1441
2000	PS	2272			815	4752				7838	
2000	UNCL	25089	16820	10780	211	44870	5478	187		103434	

The results from the estimates are thought, however, the best possible to obtain from the scarce information available. This lack of information led to the many assumptions made in the estimates with results which cannot be considered but preliminary. The need for a thorough review of the Indonesian statistics is clear in light of these results.

The catches of artisanal ships in Indonesia during the year 2000 (**T48**) are the repetition of 1999 catches due to the absence of information regarding this year.

The extremely high catches obtained from these estimates are hard to believe in spite of the 'reliable' method used for the estimation and the likely consistent basis regarding the data used from previous years.

According to the results shown in the table **T48**, no much catch remains after estimating the proportion of TUX and YFT catches to be assigned to artisanal gears. These catches are incredibly low if compared with those estimated caught under longlines (shown in the previous section). The reason for this difference is not fully understood, although could originate in:

1-. Unreporting of industrial catches: The catches of industrial gears could have not been accounted for in the reports to the FAO in recent years. Nevertheless, this is not in agreement with previous years reports which included not only the catches of Indonesian longliners but also those of foreign fleets operating in Indonesia.

2-. Change in the artisanal fisheries in recent years with new gears operated leading to higher catches of Skipjack tuna and seerfish versus lower catches of other tuna species. Nevertheless, this is unlikely to be the case due to the Indonesian fisheries being mostly multispecific and the proportional increase in the catches of skipjack and seerfish. The use of new gears in the Indian Ocean side, as pole and lines, or the increase in the operation of purse seiners or trollers would have led to an increase in the catches of skipjack tuna, not to major increases in the catches of other species, less caught under these gears. On the other hand, increases in the activities of gillnetters would only have led to major catches of these three species through the use of nets having small mesh-sizes. This, however, could also led to increases in the catches of juveniles of other tuna species.

3-. Recent changes in the statistical system in Indonesia leading to changes in the total catches and species composition estimated for recent years. Although there is not much information available in this respect this is thought unlikely. According to Gafa and Nishida (WPDCS/00/??) the statistical system in place has remained the same since its inception in the early seventies.

4 Catches of Artisanal and Industrial fleets in Indonesia from 1970 to 2000: Final estimates

Year	Gear	YFT	ALB	BET	SBF	SKJ	TUN	FRZ	KAW	COM	GUT	WAH	BLZ	BLM	MLS	SWO	SFA	BIL	Total	SKH
1970	UNCL	600				2,300	2,900			1,300	400								7,500	
1971	UNCL	600				2,400	3,000	1	1	1,300	500								7,802	
1972	UNCL	1,000				3,700	4,700	2	2	1,600	600								11,604	
1973	LL	114		29									13	13	1		9		196	16
1973	UNCL	986				4,100	5,124	3	3	1,400	600								12,216	
1974	LL	300	41	239									42	55	8	17	20		745	23
1974	PS	21				96	223												340	
1974	UNCL	750				4,351	7,923	4	4	1,204	759								14,995	
1975	LL	686	52	428									79	47	47	26	33		1,460	62
1975	PS	39				177	410												626	
1975	UNCL	144				3,749	6,372	129	26	1,723	498								12,641	
1976	LL	967	135	310	8								60	36	36	20	25		1,642	47
1976	PS	56				251	583												890	
1976	UNCL	294				5,262	8,346	450	81	2,124	315								16,872	
1977	LL	1,301	114	319	5								53	44	12	20	30		1,958	59
1977	PS	73				328	760												1,161	
1977	UNCL	971				3,706	12,319	1,225	211	3,666	100								22,198	
1978	LL	1,345	205	438	4							2	69	17	36	27	34		2,224	46
1978	PS	74				333	772												1,179	
1978	UNCL	1,392				3,761	7,132	280	54	3,783	157								16,559	
1979	LL	1,441	257	420	7							2	69	24	36	41	19		2,398	80
1979	PS	84				377	875												1,336	
1979	UNCL	2,167				8,211	11,075	887	156	3,682	399								26,577	
1980	LL	2,126	229	528	4							2	122	35	42	51	28		3,248	82
1980	PS	89				397	921												1,407	
1980	UNCL	1,769				8,590	18,648	851	151	5,962	437								36,408	
1981	LL	2,591	194	459	3							1	126	26	16	59	40		3,592	79
1981	PS	91				407	945												1,443	
1981	UNCL	141				7,649	19,312	979	173	4,244	475								32,973	
1982	GILL	53				516		12	6									49	636	71
1982	LL	2,724	184	810	46							1	139	29	17	67	42		4,150	91
1982	PS	145				648	1,058												1,851	
1982	UNCL	1,058				12,140	23,044	2,664	82	5,618	959								45,565	
1983	GILL	74				726		16	8									70	894	99
1983	LL	821	243	1,919	58							1	76	16	10	38	22		3,275	72
1983	PS	158				708	1,643												2,509	
1983	UNCL	770				12,008	22,898	1,064	41	6,146	880								43,807	
1984	GILL	82				802		18	9									77	988	110
1984	LL	808	311	2,339	56							1	84	17	11	41	25		3,777	83
1984	PS	214				95	1,567												1,876	
1984	UNCL	416				9,510	25,097	358	23	4,954	791								41,149	
1985	GILL	33				326		7	4									31	401	45
1985	LL	781	320	2,384	54							1	84	17	10	41	25		3,800	83
1985	PS	214				1,058	2,010												3,282	
1985	UNCL	1,767				10,035	23,209	1,321	49	5,043	1,310								42,734	
1986	GILL	29				287		7	3									27	353	39
1986	LL	656	55	658	49							0	43	9	5	22	12		1,542	34
1986	PS	179				895	2,488												3,562	
1986	UNCL	2,915				10,054	23,055	316	24	6,319	1,228								43,911	
1987	GILL	29				282		6	3									27	347	39
1987	LL	1,284	283	2,388	93							1	107	22	13	53	30		4,370	96
1987	PS	183				912	2,538												3,633	
1987	UNCL	1,698				10,836	23,214	596	32	7,332	1,505								45,213	
1988	GILL	61				593		13	7									57	731	81
1988	LL	2,219	331	3,129	162							1	164	34	20	83	46		6,327	138
1988	PS	192				957	2,665												3,814	
1988	UNCL	1,460				12,199	24,243	1,899	67	8,686	9,112								57,666	
1989	GILL	83				810		18	9									78	998	111
1989	LL	3,760	417	4,403	277							2	259	53	32	131	71		9,618	210
1989	PS	255				929	2,711												3,895	
1989	UNCL	44				17,421	29,070	1,146	49	8,592	11,314								67,636	

Year	Gear	YFT	ALB	BET	SBF	SKJ	TUN	FRZ	KAW	COM	GUT	WAH	BLZ	BLM	MLS	SWO	SFA	BIL	Total	SKH
1990	GILL	178				1,743		40	20									167	2,148	239
1990	LL	4,499	364	4,415	334							2	293	60	36	149	79		10,461	229
1990	PS	270				996	2,803												4,069	
1990	UNCL	68				11,974	18,389	1,771	66	7,041	5,227								44,536	
1991	GILL	288				2,815		64	32									270	3,469	385
1991	LL	5,372	299	4,420	401							2	332	68	41	170	88		11,444	250
1991	PS	603				865	821												2,289	
1991	UNCL	117				11,465	27,015	3,034	100	8,202	4,341								54,274	
1992	GILL	288				2,815		64	32									270	3,469	385
1992	LL	9,121	499	7,452	680							4	562	116	70	289	150		19,366	423
1992	PS	293				1,417	3,177												4,887	
1992	UNCL	117				12,763	18,812	3,035	101	9,353	1,561								45,742	
1993	GILL	346				2,987		77	39											
1993	LL	12,018	521	6,557	948							3	505	104	63	260	133	324	3,773	946
1993	PS	535				1,328	3,120												4,982	
1993	UNCL	139				14,665	29,455	3,596	122	12,172	8,282								68,432	
1994	GILL	329				3,464		73	37									308	4,211	899
1994	LL	15,502	556	9,830	1,147							5	714	147	89	368	188			594
1994	PS	508				1,540	2,965												5,013	
1994	UNCL	132				17,007	27,994	3,418	116	10,462	5,005								64,135	
1995	GILL	363				3,091		81	40											
1995	LL	16,979	689	11,586	1,222							5	842	173	105	434	222	340	3,915	992
1995	PS	561				1,374	3,270												5,205	
1995	UNCL	145				15,179	30,876	3,770	128	11,581	10,110								71,789	
1996	GILL	468				4,323		104	52									439	5,386	1,280
1996	LL	29,335	1,678	23,820	2,747							11	1,854	381	231	956	489			1,562
1996	PS	723				1,922	4,218												6,864	
1996	UNCL	187				21,228	39,829	4,863	166	12,330	13,518								92,121	
1997	GILL	518				5,587		115	58									485	6,763	1,416
1997	LL	35,318	3,100	27,099	3,646							14	2,333	480	291	1,203	615			1,883
1997	PS	800				2,484	4,668												7,953	
1997	UNCL	207				27,434	44,079	5,382	183	11,622	11,884								100,792	
1998	GILL	502				4,872		112	56										6,013	1,374
1998	LL	34,078	1,592	26,055	2,526							13	2,106	433	263	1,085	555	471		1,923
1998	PS	777				2,166	4,531												7,474	
1998	UNCL	201				23,920	42,781	5,223	178	16,034	10,282								98,620	
1999	GILL	527				5,110		117	59									494	6,307	1,441
1999	LL	40,445	2,639	27,502	4,059							16	3,085	634	385	1,590	814			2,229
1999	PS	815				2,272	4,752												7,838	
1999	UNCL	211				25,089	44,870	5,478	187	16,820	10,780								103,434	
2000	GILL	527				5,110		117	59									494	6,307	1,441
2000	LL	30,326	2,687	21,449	2,325							11	1,425	293	178	735	376			1,644
2000	PS	815				2,272	4,752												7,838	
2000	UNCL	211				25,089	44,870	5,478	187	16,820	10,780								103,434	