PERMANENT WORKING PARTY ON DATA COLLECTION AND STATISTICS

PROGRESS REPORT OF THE SECRETARIAT

ABSTRACT

The situation of the data holdings at the Secretariat improved in several areas during 2001, including the retrieval of important historical datasets from several countries, better estimation of the catches of fresh-tuna IUU vessels, progress in the sampling programmes in Thailand, Malaysia and Sri Lanka and the implementation of a sampling program in Indonesia under the scope of the IOTC-OFCF Project. On the contrary, there is still no information reported about the fleet of IUU deep-freezing longliners and the former-Soviet purse-seine vessels that continue to operate in the Indian Ocean. The situation of the data holdings for nominal catches and catch-and-effort data has improved considerably in the past year, although the scarcity of size-frequency data from the longline and artisanal fisheries continues to be a major impediment for the application of rigorous stock assessment.

DATA COLLECTION: GENERAL STATUS OF REPORTING DURING 2002

Table 3 lists the countries to which the Secretariat sent data requests during the year 2002. The countries are sorted by their most recent catches and the status regarding the submission of catches, effort, size frequency and craft statistics indicated through different colours. Timeliness of reporting and data source are also shown in each case.

Timeliness of reporting: Only three countries (13 in 2001) submitted statistics to IOTC before the deadline of June 30. Furthermore, only partial statistics were submitted in most cases. Reminders were sent to **55 countries** in June-July 2002. Second and third reminders were needed in most cases.

Table 1 below shows the catches for 2001 reported (**Rep**) and unreported (**Unrep**, as catches of 2000 carried forward for non-reported strata) in the IOTC Nominal Catches (NC) database by the deadline for data submission and before November 2002 (**Nov-02**). Only 22% of the catch was still unreported by the deadline, with only the 34% of the catches reported before November 20th, 2002. The reporting of species other than tropical tunas before the deadline was negligible. No longline data, whether preliminary or final, were reported for 2001.

Late reports also compromise the validation and verification of data, especially when data are submitted close to or during Working Party meetings.

Table 1. Nominal Catches reported to IOTC (thousands of tonnes) by the deadline for data submission (30th June 2002) and before 1st November 2002

Reporting 2001	Jul-02			Nov-02		
	Unrep	Rep	%Unrep	Unrep	Rep	%Unrep
Billfish	77	3	96	55	25	68
Neritic Tunas	392	1	100	359	34	91
Temperate Tunas	70	7	91	41	36	53
Tropical Tunas	521	296	64	451	366	55
TOTAL	1059	307	78	906	461	66

Table 2. Proportion of the NC, CE and SF statistics available at the IOTC Secretariat compared to the total catches estimated for 2001 (20th November 2002) and proportion of catches reported by official sources (SO) versus total catches reported.

2001	NC	CE	SF	SO
Available	1000	675	590	870
Total	1500	1500	1500	1000
% Available	**67**	**45**	**39**	**87**
% 2000	49	46	20	77

Completeness of reporting: Table 2 above summarizes the reporting of statistics to IOTC as of November 20th, 2002. Reporting rates for 2000 are shown for comparison. Levels of reporting therefore improved for 2001, although these are still very low.

Australia, China, Malaysia, and Singapore were the only countries to provide complete sets of data for 2001. More details about the reporting of each specific data set can be found below:

- **Nominal Catches**: The levels of reporting of nominal catches are similar to those in 2001, 25 out of 55 countries having provided partial or complete sets of catches.

Better levels of reporting were noted from South Africa, Sudan, Egypt and Belize, which either did not reply or submitted their statistics very late in previous years. Japan submitted the entire data series from 1970 to 2001 for the new IOTC boundaries.

Table 3: Availability of IOTC statistics for the year 2001

Country	Catch	M/C	NC	CE	SF	DI	FC	FT	VR	TI	SO
EUROPEAN UNION	245	M									
INDONESIA	185										
SRI LANKA	140	M									
INDIA	135	M									
CHINA	5	M						N/A			
TAIWAN,CHINA	115							N/A			
MALDIVES	115										
IRAN	105	M									
BELIZE	70							N/A			
PAKISTAN	60	M									
THAILAND	40	M									
JAPAN	40	M						N/A			
NETHERLANDS ANTILLES	30							N/A			
SEYCHELLES	30	M									
PANAMA	30							N/A			
HONDURAS	20							N/A			
OMAN	20	M									
MALAYSIA	15	M									
EGYPT	15										
UNITED ARAB EMIRATES	15										
MADAGASCAR	10	M									
AUSTRALIA	10	M									
COMOROS	10	M									
EQUATORIAL GUINEA	10							N/A			
YEMEN	10										
SAUDI ARABIA	10										
MOZAMBIQUE	5										
KOREA	5	M						N/A			
TANZANIA	5										
PHILIPPINES	2	C						N/A			
KENYA	2										
MAURITIUS	2	M									
QATAR	<1										
VANUATU	<1	M						N/A			
CAMBODIA	<1							N/A			
COTE D'IVOIRE	<1							N/A			
BOLIVIA	<1							N/A			
ERITREA	<1	M									
SOUTH AFRICA	<1										
FRANCE	<1	M									
KUWAIT	<1										
JORDAN	<1										
DJIBOUTI	<1										
BAHRAIN	<1										
SUDAN	<1	M									
BANGLADESH	<1										
EAST TIMOR	<1										
UNITED KINGDOM	Unkn	M									
SINGAPORE	NIL										
MYANMAR	Unkn										
SOMALIA	Unkn										
IRAQ	Unkn										

Key Table 3

Catch	Recent catches amounting to (thousands of tonnes)	
M/C	Is Member (**M**) or Cooperating Non Member Party (**C**)	
NC	Nominal Catch	
DI	Discards	Fully reported
CE	Catch and Effort	Partially Reported
SF	Size Frequency	Not Reported
FC	Fishing Craft	No catches
FT	Foreign Tuna Vessels Activity	N/A Not Applicable
VR	Vessel Record	
TI	Timeliness of Reporting	Good (before deadline)
		Fair (whithin a month after deadline)
		Poor (more than one month after deadline)
SO	Data Source	All statistics from responsible country
		Statistics from both responsible and third country
		All statistics from third countries
		No statistics reported at all

To date, no data or only partial nominal catch statistics have been received from several member or cooperating non member parties, namely the European Community, India, China, Seychelles, Oman, Madagascar, Comoros, Vanuatu, Eritrea, Sudan and United Kingdom. Furthermore, 1999 and 2000 nominal catches have not yet been submitted by Madagascar and India (seerfish).

Other important fishing parties not having submitted catch statistics to the IOTC are Indonesia, Maldives, United Arab Emirates, and Yemen. The catches of non-reporting longline fleets operating under several flags (Honduras, Belize, Panama, Equatorial Guinea, Cambodia, Taiwan,China etc.) usually recorded under NEI are mostly unreported for 2001. A fleet of purse seiners, formerly belonging to Soviet interests, has been operating since 1995 under the flags of Panama and Belize and their catches are unreported so far.

- **Catch and effort and size-frequency statistics**: Catch and effort statistics were only submitted by 11 (7 members) and size-frequency data by 5 (3 members) countries. Either incomplete or non-validated statistics were submitted by Iran, Sri Lanka, Seychelles, Sudan and the European Community.
- **Discards**: Only Australia reported discard statistics for 2001, despite the fact that discard rates are presumed high, especially from longliners and in purse seiners setting on logs.
- **Fishing craft statistics**: Fishing craft and nominal catch statistics are usually reported together. Craft statistics are not available, incomplete or inaccurate for many artisanal fleets. The number of non-reporting vessels operating in the Indian Ocean for the period 1973-2000 was re-estimated this year from new information collected through the IOTC Sampling Programs and new vessel records.
- **Vessel Record and Foreign Tuna Vessel Activity**: Many new data were received at the Secretariat during the year 2002, regarding both domestic and foreign fleets. Belize submitted lists of ships operating in the Indian Ocean for the year 2001. Nevertheless, the number of ships operating under several flags, including Taiwan,China, Honduras, Equatorial Guinea, Panama, and Cambodia, is still uncertain.
- **Data source**: The reporting of statistics is usually by the flag country. However, the statistics of purse seine fleets presumed to be European owned but flagged in non-European countries were reported by the scientists covering the EC fleet.

STATUS OF THE IOTC NOMINAL CATCHES (NC), CATCH AND EFFORT (CE) AND SIZE FREQUENCY (SF) DATABASES

MAIN PROGRESS ACHIEVED DURING 2002

The main progress achieved in the collection and verification of the data in the IOTC NC, CE and SF databases are summarized in Table 4 below (more information is provided in Annex in the Boxes referred to in **FLAG**):

Table 4: Status of the IOTC NC, CE and SF tables: Main Progress Achieved during 2001

DB	FLAG/S	PERIOD	SPECIES	DETAILS OF ACTIVITY	SOURCES	CHANGES IN DATA
NC	Japan	1970-2000	YFT, BET, ALB, SBF, SWO	New catch series of Japanese longliners reported extending to the IOTC boundaries	Japanese Liaison Officer (LO)	Slight increases in the catches, mainly of SBF
	Indonesia **(BOX 1 A) WPTT-02-02**	1973-2000	YFT, BET, SBF	Review of the catches of Indonesian longliners in the Indian Ocean in 2000 and historical review of the catches of SBF	DOF Indonesia RIMF Indonesia WASKI Indonesia PSB Indonesia CSIRO Australia CCSBT Publications IOTC Sampling Programmes Papers and Publications FAO FishStat	Decrease in the catches previously estimated for 2000 and in the historical catches of SBF, with proportional increases for the other species
		1970-2000	SKJ, SEER	Review of the catches of artisanal fleets in the Indian Ocean		Increase in the artisanal catches since the early nineties
	Non-reporting fresh tuna longliners operating under several flags **(BOX 1 B) WPTT-02-03**	1986-2000	YFT, BET, SBF	Re-estimation of the catches of non-reporting fresh tuna longliners thanks to the new information available	IOTC/AFDEC Sampling FRI (IOTC) Sampling CSIRO/RIMF Sampling IOTC/NARA Sampling CCSBT Publications SFA background information	New catches of vessels operating in Sri Lanka and Seychelles input, decrease in the catches of vessels operating in Malaysia and new 2000 catches estimated
	Non-reporting deep-freezing longliners **(BOX 1 C) WPTT-02-03**	1985-2000	YFT, BET, ALB, SBF	New review of the series of catches from data collected recently	IOTC Vessel Records IOTC Activity Records	Increase in the catches and first catches at the flag level input (1994-2000)
	Non-reporting industrial purse seiners **(BOX 1 D) WPTT-02-03**	1995-2000	SKJ, YFT, BET	New review of catches	IOTC Vessel Records European Statistics	Changes in the species composition and new catches input for 2000
	Taiwan,China	1954-1969	YFT, BET, SWO, ALB	New catches estimated according to background information available	Background information CCSBT Publications	New or updated catches input to the database
		1970-2000	SBF	Catch series for the SBF reestimated		
	South Africa	1997-2000	SWO, YFT, SKH	First catches reported of South African longliners operating in the IOTC Area of Competence	South African LO	New catches input to the database
CE	Japan	1952-2000	YFT, BET, ALB, SBF, SWO	New catch and effort series of Japanese longliners reported extending to the IOTC boundaries	Japanese LO	Catches input in areas not considered before
	Oman	1987-1999	YFT, LOT, COM	First report of catch and effort data for artisanal vessels during that period. Needs clarification of inconsistent data.	Oman LO	No catches input; dataset under review
	All artisanal	Various	Neritic, YFT	Compilation of catch and effort records assigned to heterogeneous spatio-temporal strata	IPTP Data holdings and paper files	New data input
	Australia	1994-2001	YFT, BET, ALB, BILL	Catch and effort records of surface and longline vessels reported according to the IOTC standards. Data aggregated as per request to avoid confidentiality issues	Australian LO	New records input (under heterogeneous spatio-temporal strata)

DB	FLAG/S	PERIOD	SPECIES	DETAILS OF ACTIVITY	SOURCES	CHANGES IN DATA
SF	China, Taiwan,China, Indonesia	1998-2002	YFT, BET, SWO	Validation and verification of size frequency records (fresh tuna longliners) for data input	IOTC Sampling Programmes Ship operators (processing plants)	More than 150,000 fish added to the database, especially YFT, BET and SWO and 150,000 records under review
	All artisanal	Various	Neritic YFT	Compilation of size frequency records assigned to heterogeneous spatio-temporal strata	IPTP Data holdings and paper files	New data input

PROBLEM AREAS IDENTIFIED

Despite the progress achieved regarding the statistics in the IOTC NC, CE and SF databases in recent years, there are still several problems regarding the completeness and quality of the data which should be addressed. The main areas of concern regarding the statistics in these databases are summarized in Table 5 below. Additional documentation about each case is provided in the different Boxes referred to in **PROBLEM**, found in the pages following the Table.

Table 5: Status of the IOTC NC, CE and SF databases: Problem Areas Identified

DB	PROBLEM	SPECIES	FLAG/S	PERIOD	REASON/S	PROPOSED ACTION/S
NC	Statistics not available from the flag country **(BOX 3)**	YFT, BET, ALB, SBF, SWO, BIL	TWN, BLZ, PAN, HND, GNQ, KHM, VCT, VUT	1980 to Date	Fisheries not monitored by the flag countries	Continue collecting data through the IOTC sampling schemes (fresh-tuna longliners) Identify the fleets for which important tuna catches have been unreported over the years (through retrieval of vessel and, especially, activity records)
		Mainly tropical and neritic tunas	IDN, YEM, MDG, SOM, MMR,BGD	Various	Statistical system unable to produce reliable estimates of catches (as regards IOTC species)	Identify the deficiencies in data collection and processing in the countries concerned
		All	IND, ARE, COM, MOZ, KEN	Various	Statistics available at the country level but not reported	Identify the reasons why the catches are not reported by the flag countries
	Species and/or gear aggregation **(BOX 4)**	Neritic Tunas Billfish	IDN, IND, THA, LKA, PAK	1950 to date	Statistical systems unable to produce detailed estimates of catches	Identify the deficiencies in data collection and processing in the countries concerned
	Poor quality **(BOX 5)**	Neritic Tunas Billfish	Non-reporting DWFNs, PAK, LKA, THA, IND, IDN	Various	The catches available are thought unreliable or inaccurate due to inconsistencies found during the verification processes or to the many assumptions made to produce the final catches	Continue the collection of past and recent data through the IOTCsampling programmes in ports of call of fresh-tuna longliners Continue with the collection of activity records of non reporting fleets Identify the reasons why the catches provided by several countries are of poor quality
DI	Statistics not available from the flag country or highly aggregated **(BOX 7)**	Undersized or spoiled tunas (YFT, BET, SKJ), Sharks, low-value or spoiled billfishes (SSP, SFA) and other species	All, especially industrial fleets	1952 to date	Most of the discards are unreported and when reported they are usually incomplete and highly aggregated	Collect data on industrial fisheries through observer programs
CE & SF	Statistics not available from the flag country **(BOX 6)**	All, especially Neritic tunas and Billfish	Many artisanal and non-reporting DWFNs	1950 to date	Catch and effort (size frequency) statistics not collected by the flag country	Assess the availability of records from other sources, especially in fleets which the retrieval of catch and effort (size frequency) records is considered important
					Statistical systems unable to produce reliable catch and effort (size frequency) estimates	Identify the deficiencies in data collection and processing in the countries concerned
					Catch and effort (size frequency) statistics collected by the flag country but no or incompletely reported to the IOTC	Identify the reasons why the catch and effort (size frequency) records are not reported by the flag countries

DB	PROBLEM	SPECIES	FLAG/S	PERIOD	REASON/S	PROPOSED ACTION/S
	Poor Quality	Tropical Tunas Billfish	KOR, TWN, PHL, JPN, EU, ZAF, AUS	Various	Inconsistencies found during the validation and verification of catch and effort (size frequency) records or communicated by the sources reporting the data	Identify the reasons why the data are inconsistent and the ways in which these inconsistencies might be reduced (this would require a perfect knowledge about the way the catch and effort statistics are collected and processed in the country reporting the data)
					Low coverage	Identify the reasons why the fleets concerned are poorly covered and the ways in which the fleets might be better monitored Assess the availability of records from other sources, especially in fleets which the retrieval of catch and effort (size frequency) records is considered important

STATUS OF THE IOTC FISHING CRAFT STATISTICS (FC), FOREIGN TUNA VESSEL ACTIVITY (FTVA) AND VESSEL RECORD (VR) DATABASES

DATA AVAILABILITY

The availability of **fishing craft statistics** for the period 1991-2000 can be found in **Table 7.6 of** the IOTC Data Summary 22. Data from artisanal fisheries are scarce and inconsistent in many cases. On the contrary, the statistics of industrial fleets are thought fairly complete:

Purse seine fleets: The number of purse seiners fishing for tropical tunas on the high seas (usually referred to as "industrial") is well known. This fleet is flagged mainly from the European Community, Seychelles, Belize, Netherlands Antilles, Panama, Iran, Japan and Mauritius. The Soviet fleet has reflagged into Panama and Belize. In the catalogue, the fleets flagged in other countries operate mainly in coastal waters.

Longline fleets: There are many more bngline fleets fishing tuna in the Indian Ocean, mainly under the flags of China, Taiwan,China, Indonesia, Japan, the Republic of Korea, Philippines, the EU, Seychelles, Equatorial Guinea, Honduras, South Africa, Australia, Vanuatu, Belize and Panama. The total number of non-reporting longliners was estimated this year and can be found in the catalogue under Indonesia, NEI-Frozen (Honduras, Belize, Equatorial Guinea, Panama, etc.) and NEI-Fresh (mainly Taiwan,China).

MAIN PROGRESS ACHIEVED DURING 2002

The progress achieved in the collection and verification of the data in the IOTC FC, FTVA and VR databases is summarized in the Table 6 below.

Table 6: Status of the IOTC FC, VR and FTVA databases: main progress achieved

DB	FLAG/S	SOURCES	PERIOD	DETAILS	MAIN RESULTS
FC	Non reporting DWFNs	IOTC Vessel Record IOTC Activity Record	1985-00	Historic review to complete the craft statistics	Number of non-reporting deep-freezing longliners better known: Around 200 in recent years
	Non- reporting Fresh - tuna longliners	IOTC Sampling Programmes WASKI Indonesia DGCF Indonesia CSIRO Australia RIMF Indonesia	1973-00	Historic review to complete the number of fresh tuna longliners operating in the Indian Ocean	Number of Taiwanese and Indonesian fresh tuna longliners input: More than 1,000 boats in all in recent years.
VR & FTVA	All Industrial	AVA Singapore SFA Seychelles Albion Mauritius MAF Oman AFDEC Thailand (IOTC) FRI Penang (IOTC) MRAG United Kingdom USTA & CSP Madagascar DGCF Indonesia IEO Spain / IRD France	1992-00	Reporting of foreign tuna fleets putting in to ports or licensed to operating within the EEZ of these countries	New vessel and activity records input
	Belize	INMARBE Belize	2001	Submission of names, characteristics and reported catches of ships fishing for tunas in the Indian Ocean	Statistics for Belize more complete

PROBLEM AREAS IDENTIFIED

The main area problems identified in the IOTC database concerning the tuna fleets operating in the Indian Ocean are summarized in the Table 7 below. Several alternative actions to undertake to reduce these uncertainties are proposed in the right column.

Table 7: Status of the IOTC FC, VR and FTVA databases: problem areas identified

DB	PROBLEM	FLAG/S	PERIOD	REASON/S	PROPOSED ACTION/S
FC	Series incomplete for important longline fleets	TWN, IDN, BLZ, PAN, HND, GNQ, KHM, VCT	1980 to date	Lack of information, especially regarding the first years of operation	Continue collecting data through the IOTC sampling schemes (fresh-tuna longliners) Identify the fleets for which important tuna catches have been unreported over the years (through retrieval of vessel and, especially, activity records)
	No data or data inconsistent regarding many artisanal fleets	Many artisanal	1950 to date	Statistics not reported	Identify the reasons why the statistics are not reported by the flag countries
				Statistical systems unable to produce reliable fishing craft statistics	Identify the deficiencies in data collection and processing in the countries concerned
	Lack of detailed information	All	1950-00	Incomplete reporting (vessels not reported according to their size, mechanization, etc.)	Identify the reasons why the statistics reported are not complete
FTVA & VR	Data not reported	ZAF, TWN, HND, EQG	1998-00	Fleets not monitored by the flag countries Statistics not reported by the flag countries	Continue the collection of information through the IOTC sampling programmes Continue collecting information on foreign fleets from third sources
	Information incomplete or inconsistent	All industrial, especially non-reporting flags	1995-00	Ship names, identification or characteristics mistakenly recorded Ship characteristics inconsistent between reports Lack of information about ship activity in the Indian Ocean (vessels bearing licenses to operate but not actually operating)	

OTHER IOTC DATA HOLDINGS: BIOLOGICAL DATA

Table 8 shows other datasets available at the IOTC Secretariat:

Table 8: Biological data available at IOTC

TYPE OF DATA	NUMBER RECORDS	PERIOD	SOURCE
Length-length-weight data of tuna and billfish caught by fresh tuna longliners in the Indian Ocean **(BOX 2)**	30,000	2000-02	AFDEC Thailand (IOTC Sampling Programmes) NARA Sri Lanka (IOTC Sampling Programs) RIMF Indonesia (IOTC Sampling Programs) FRI Malaysia (IOTC Sampling Programs)
Length-length-weight-sex-maturity of tuna and tuna-like species caught by longliners and purse seiners within the EEZ of Chagos	7,000	1996-99	MRAG United Kingdom (observer data)

BOX 1: ESTIMATION OF CATCHES OF NON-REPORTING FLEETS

A/ INDONESIA

Figure 1: Number of fresh-tuna longliners registered to operate in Indonesia presumed to operate in the Indian Ocean

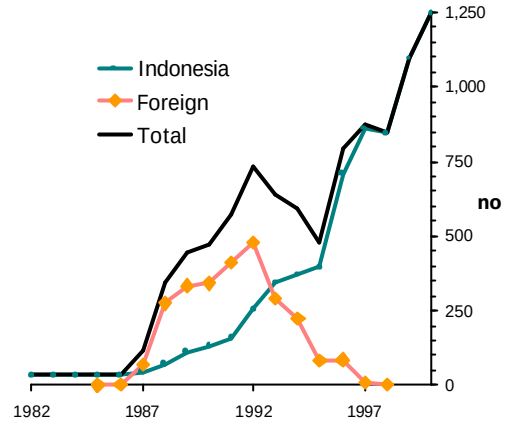
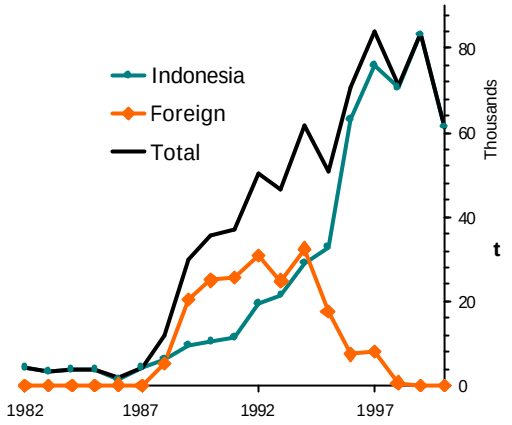


Figure 2: Estimated catches in the Indian Ocean of the domestic and foreign fresh tuna longliners putting in to ports in Indonesia



The number of fresh-tuna longliners operating in Indonesia has been increasing rapidly and continuously since the late eighties. Indonesia has in recent times provided incomplete, inaccurate or no reports and the lack of reliable information from other sources has prevented the Secretariat from estimating the catches with any accuracy. Past estimates assumed both artisanal and industrial fisheries in Indonesia unchanging. Information collected during the last year in Indonesia, together with all other data available at the Secretariat, has allowed re-estimation of the complete series of catches of Indonesian longliners and artisanal gears in the Indian Ocean, from 1970 to 2000.

These new estimates increase the number of longliners and their catches in recent years to about the third of the total number of longliners and catches of all the longline fleets in the Indian Ocean. More than 1,000 vessels catching around 75,000 t have been estimated in recent times. Furthermore, the numbers have been constantly increasing in recent years.

In spite of the current better documentation, this fleet needs much closer monitoring. Size frequency and catch and effort data have been collected from longliners landings in three key ports of Indonesia (Jakarta, Benoa, Cilacap) since August this year, thanks to the inception of a Catch Monitoring Scheme involving local and foreign institutions. The collection of information regarding the catches of artisanal vessels in Indonesia is also underway and will allow reducing considerably the uncertainties regarding species caught and gears used.

Figure 3: Total catches per species in the Indian Ocean estimated for the Indonesian domestic longline fleet

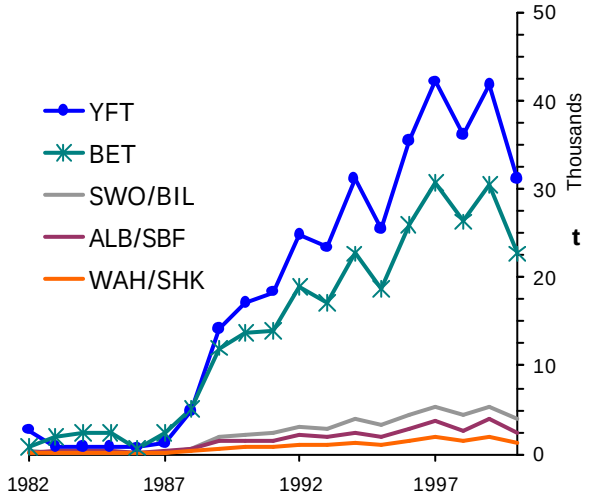
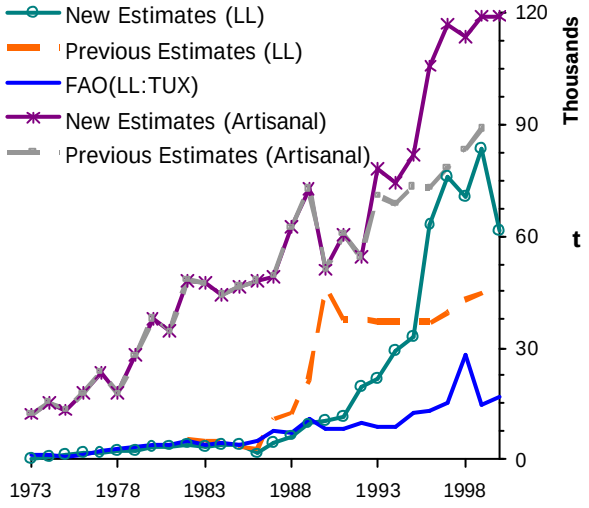


Figure 4: Total catches in the Indian Ocean estimated for the Indonesian longline fleet versus the catches estimated previously and those from the FAO database



B/ NON REPORTING FRESH TUNA LONGLINE FLEETS (OTHER THAN INDONESIA)

Figure 1: Number of non-reporting fresh-tuna longliners based in countries other than Indonesia presumed to operate in the Indian Ocean

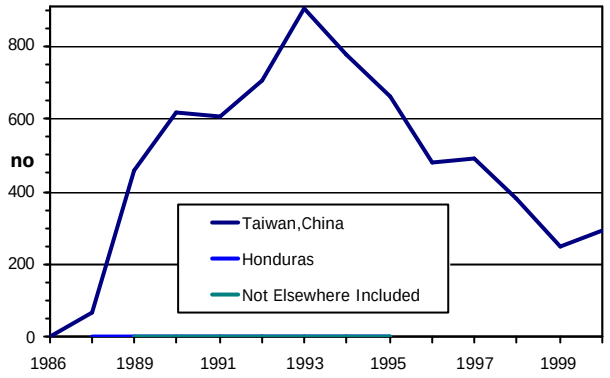
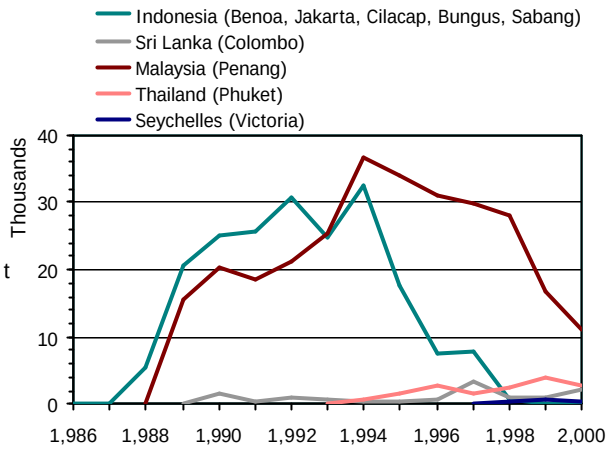


Figure 6: Estimated landings of non-reporting fresh-tuna longliners according to the country where they occurred



NOTE: **Indonesia** on the right chart refers to fresh tuna longliners operating under flags other than Indonesia unloading to ports in that country

The number of non-reporting fresh tuna longliners operating under flags other than Indonesia in the Indian Ocean sharply increased from the mid-eighties to the early nineties, topping at about 900 vessels in 1993. Almost all longliners are from Taiwan,China, flag for which no catches of fresh tuna longliners are available to the IOTC, as opposed to the deep-freezing fleet. The drop in the number of vessels and catches observed since 1993 is due to re-flagging of many Taiwanese vessels to Indonesia (see BOX 1 A).

The estimation of number of vessels and catches has been improving over time, mainly thank to the information collected through the Sampling Programs implemented by the IOTC in key ports of landing of these vessels in the Indian Ocean. The amount of historical and current information so far collected through these cooperation schemes has helped to improve the estimates in Thailand, Malaysia, Sri Lanka and Indonesia. The collection of past information should continue to allow better estimates of historical catches in countries like Indonesia.

Current catches have been estimated at about 25,000 tonnes, mostly yellowfin tuna and bigeye tuna.

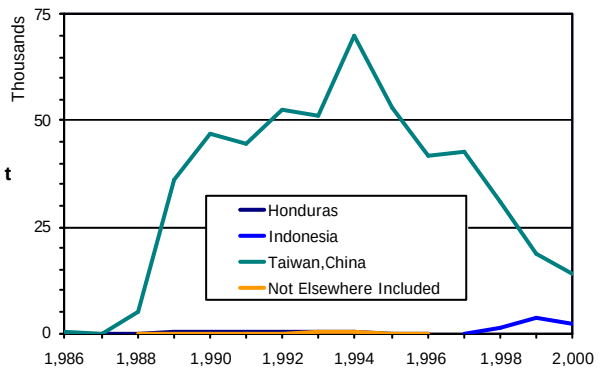


Figure 7: Estimated catches in the Indian Ocean of non-reporting fresh tuna longliners based in countries other than Indonesia

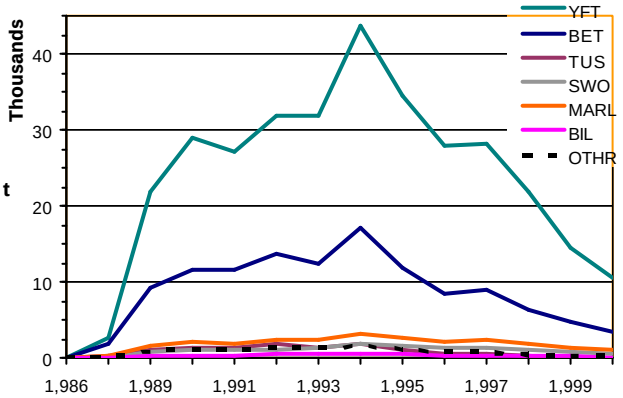


Figure 8: Total catches per species in the Indian Ocean estimated for fresh tuna lonfline fleets based in countries other than Indonesia

NOTE: **Indonesia** on the left chart refers to fresh tuna longliners operating under the Indonesia flag based in ports other than Indonesia

C/ NON REPORTING DEEP-FREEZING LONGLINE FLEETS

Figure 9: Number of non-reporting deep-freezing longliners estimated to operate in the Indian Ocean

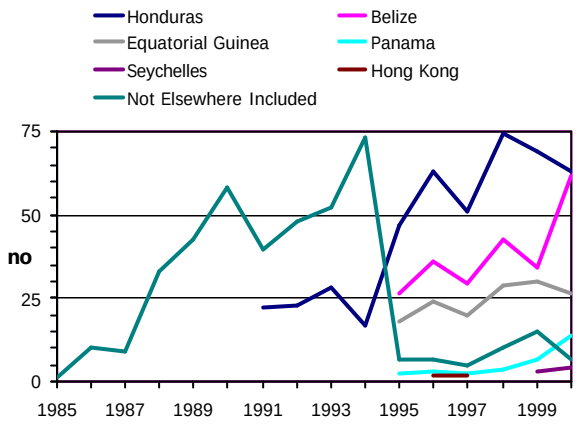
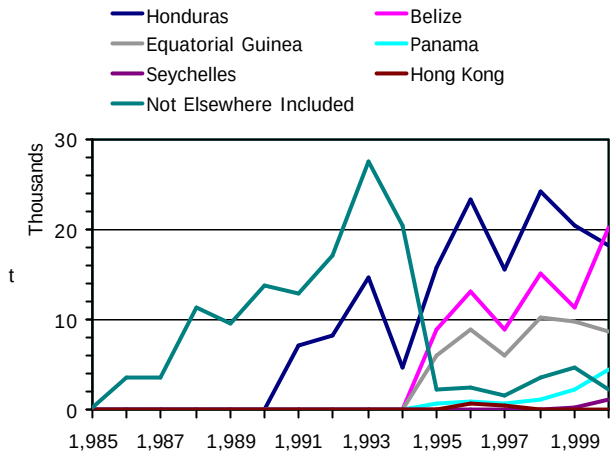


Figure 10: Estimated catches of non-reporting deep-freezing longliners according to the flag of operation



The reporting of new information regarding the activities of vessels fishing for tropical tunas in the IOTC Area of Competence during 2002 allowed the production of new estimates of numbers of non-reporting deep-freezing longliners by flag. The main sources for these data are the IOTC Vessel Record and Foreign Tuna Vessels Activity Record to which many new records where input during 2002.

The total number of longliners estimated to operate in recent years amount to about 170, with total catches estimated at 60,000 tonnes. Honduras, Belize, Equatorial Guinea and Panama have been the flags most used by non-reporting longliners over the last years. The catch series was estimated according to average catches per vessel and species composition for the Taiwanese fleet during that period, assuming that most of the vessels operating under flags of non-reporting countries were originally from Taiwan,China, still having skippers from Taiwan,China on board. Although there are many indications to support this, the assumption that the vessels from Taiwan,China and non-reporting countries are exploiting the same spatio-temporal strata over time could be wrong for some flags or periods. The lack of catch and effort and size frequency records regarding non-reporting vessels is of concern.

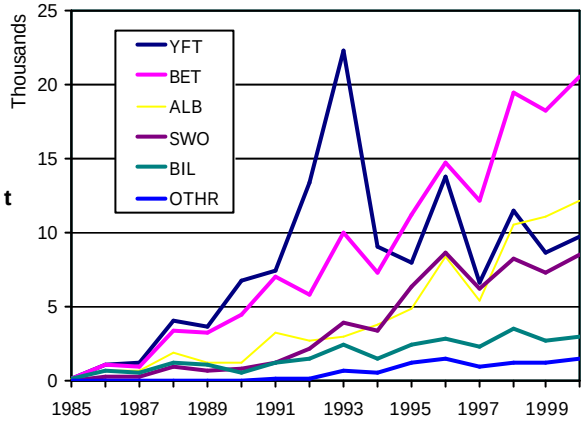


Figure 11: Total catches per species in the Indian Ocean estimated for non-reporting deep-freezing lonfline fleets

Furthermore, these un-reporting fleets are much more difficult to monitor due to partial or complete landings occurring on the high seas or not in Indian Ocean ports. The implementation of sampling programs in ports of operation of these vessels turned to be fruitless due to the impossibility of collecting complete vessel activity and catch records from individual ports.

The possibility of collecting catch and effort and size frequency records on these vessels should be further investigated. This could be achieved by enhancing the reporting from the flag countries.

D/ NON REPORTING INDUSTRIAL PURSE SEINE FLEETS

Between 9 and 11 non-reporting purse seiners have been operating in the Indian Ocean since 1995 under the flags of Panama and Belize. The catches of these vessels, mainly of skipjack, have been estimated at about 30,000 tonnes. The estimate was conducted taking into account past average catch rates for the Soviet Union fleet (to which most of these vessels belonged to) and species composition for the European fleet, assuming that the two fleets exploit the same areas. This assumption could be biased for periods in which the European vessels operate in the EEZs of third countries, which could not be the case with the ex-Soviet vessels.

The fleet owner, based in Singapore, has been gathering catch and effort data for all vessels since 1995. The Secretariat has been so far unable to obtain these statistics from the ship owner.

Detailed information about the fleet and catch estimates of non-reporting fleets has been provided in documents presented to the species Working Parties since 2000.

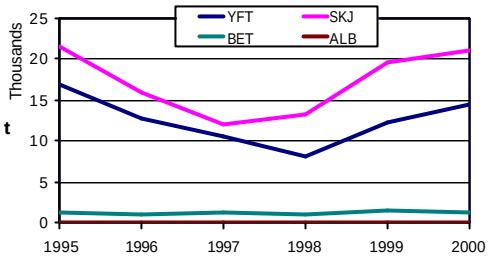


Figure 12: Total catches per species in the Indian Ocean estimated for non-reporting industrial purse seine fleets

BOX 2: IOTC SAMPLING PROGRAMS

Table 9: Total number of fish sampled and total number of length measurements taken by enumerators in processing plants of ports where IOTC Sampling is conducted

Country	Port	Year	From-To	YFT		BET		SWO		OTH		TOTAL	
				noS	noL	noS	noL	noS	noL	noS	noL	noS	noL
Thailand	Phuket	2000	April-December	28,901	3,029	14,525	1,078	1,846	501	2,832	653	48,104	5,261
		2001	January-December	28,752	3,240	21,749	2,016	1,758	214	6,905	876	59,164	6,346
		2002	January-June	7,686	1,418	9,260	1,931	103	14	562	92	17,611	3,455
Malaysia	Penang	2001	January-December		670		366					25,524	1,036
		2002	Information to be provided by the Fisheries Research Institute of Penang										
Sri Lanka	Mutwal (Colombo)	2002	March-June	8,158	1,018	4,745	659					12,903	1,677
Indonesia	Muara Baru (Jakarta)	2002	August-October	6,631	3,237	4,953	2,686	222		1,102		12,908	5,923
	Cilacap	2002	August-September	658	658	1,044	1,044	83	83	1,900	1,814	3,685	3,599
	Benoa (Bali)	2002	July-August	8,845	1,408	13,043	2,100	1,225	173	12,773	220	35,886	3,901
Total		2000	April-December	28,901	3,029	14,525	1,078	1,846	501	2,832	653	48,104	5,261
		2001	January-December	28,752	3,910	21,749	2,382	1,758	214	6,905	876	84,688	7,382
		2002	January-October	31,978	7,739	33,045	8,420	1,633	270	16,337	2,126	82,993	18,555
			TOTAL	89,631	14,678	69,319	11,880	5,237	985	26,074	3,655	215,785	31,198

noS: Total number of specimens sampled

noL: Number of length measurements

Table 10: Total number of fish recorded in landing sheets collected from shipping agents in Phuket, Penang and Colombo

Country	Port	Year	From-To	YFT	BET	SWO	OTH	TOTAL
				noS	noS	noS	noS	noS
Thailand, Malaysia	Phuket, Penang	1998	January-December	6,543	13,034	1,062	1,742	22,381
		1999	January-December	10,543	21,498	1,488	979	34,508
		2000	January-December	6,948	7,744	869	1,545	17,106
Sri Lanka	Mutwal (Colombo)	2001	January-December	Paper files to be verified and input				
			TOTAL	24,034	42,276	3,419	4,266	73,995

The Secretariat has been implementing Sampling Programmes to monitor the activities of non-reporting fleets since 2000. Sampling is currently conducted in Phuket, Penang, Sri Lanka and Indonesia, ports where most of the catches of non-reporting fresh tuna longliners operating in the Indian Ocean are unloaded.

Scientists and samplers of research institutions in the three countries, AFDEC[1], FRI[2], NARA[3] and DGCF[4]/RIMF[5] are collecting the information in close cooperation with the IOTC Secretariat.

The main objectives of these programmes are to:

- Collect current and historic information regarding the activities of non-reporting vessels in the Indian Ocean in order to be able to estimate their catches as accurately as possible.
- Collect size frequency statistics through sampling and the retrieval of current and historical data from tuna operators or buyers.
- Collect other relevant biological information concerning the main species landed.

The information collected to date has allowed the Secretariat to conduct preliminary estimates of catches for the period of activity of these fleets, more than 95% of which are longliners operating under the flags of Taiwan,China and Indonesia. These estimates will probably change as more information about the activities of this fleet is obtained through the schemes currently operating or by implementation of new schemes in other important landing ports (Maldives).

More information about the fleet and information collected through the operating schemes has been provided in documents presented to the species Working Parties since 2000.

[1] Andaman Sea Fisheries Development Centre, Phuket

[2] Fisheries Research Institute, Penang

[3] National Aquatic Resources and Development Agency, Colombo

[4] Directorate General of Capture Fisheries, Jakarta

BOX 3: DATA AVAILABILITY

The number of **coastal countries** for which tuna statistics are available in the IOTC nominal catches database ranges from 11 in 1950 to 32 in 2000 (out of the 36 coastal countries lying within the IOTC Area of Competence). The low number of countries for which statistics are available in the early years of the fishery, especially between 1950 and 1970, could be because tunas were not targeted, non-reporting or to poor monitoring of fisheries in some countries. Although the catches of most artisanal fisheries are not believed high, the existence of historical records in each country might be investigated.

The catches of **DWFNs** have, on the contrary, usually been high. The following fleets are not monitored by the flag countries:

Fresh tuna longliners (IDN, NEI-ICE, NEI-IDN): A large number of fresh tuna longliners, mainly from Indonesia and Taiwan,China, has been operating in the Indian Ocean since the early 1970's, but their catches were never monitored by the responsible countries. These fleets are currently monitored through the IOTC Sampling Schemes in Indonesia, Thailand, Malaysia and Sri Lanka. Recent estimates are close to 100,000 tonnes.

Deep-freezing longliners (NEI-DFRZ): Up to 150-200 longliners have been operating in the Indian Ocean in recent years under flags of countries not reporting to the IOTC. The catches have been estimated since the mid-eighties, mainly using information from the IOTC vessel record. Current estimates amount to some 60,000 tonnes.

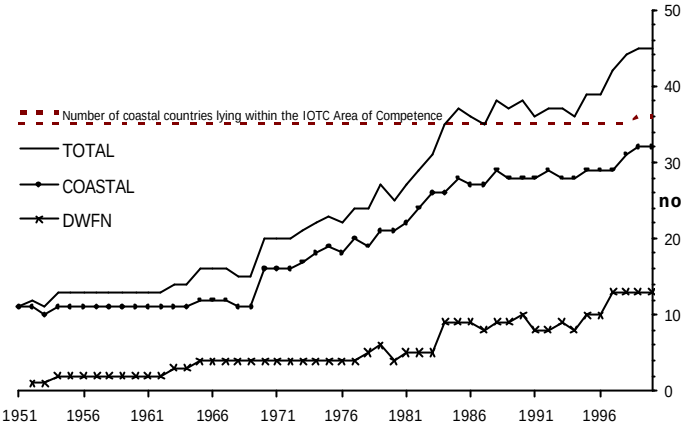
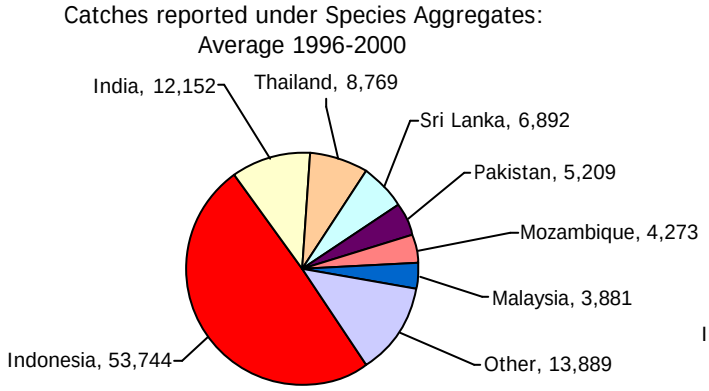


Figure 13: Number of flags for which catches are available in the IOTC NC database:

Ex-Soviet purse seiners (NEI-SUN) operating under Belize and Panama flags: No catches have been reported for the 9 to 11 ex-Soviet ships since 1995. Since then, the catches have been estimated by the Secretariat at around 30,000 tonnes a year.

BOX 4: GEAR AND SPECIES AGGREGATION



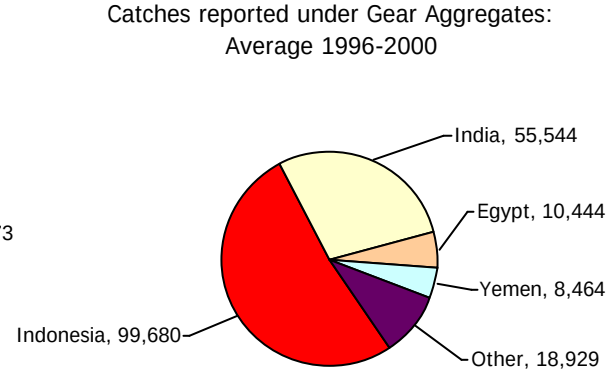


Figure 14: Proportion of the total catches recorded under species (above left) or gear (above right) aggregates in the IOTC Nominal Catches Database per country during 1996-2000 (average catches in tonnes are shown in each case)

The number of countries not reporting detailed statistics to the IOTC has been always high. More than 30% of the countries have been submitting highly aggregated statistics (80% or more of the catches reported under aggregates containing two or more species) in recent times.

Indonesia: The catches of Indonesian vessels in the Indian Ocean have not been reported to IOTC since 1993. FAO statistics used formerly cannot be used any longer as:

- The FAO and IOTC boundaries between the Indian Ocean and the Banda Sea are different, the last extending further North;

[5] Research Institute for Marine Fisheries, Jakarta

- Indonesia has always reported highly aggregated catches, the statistical system being unable to produce detailed catches for most tuna and tuna-like species;
- The FAO statistics lack gear information;
- The statistics of foreign fleets based in Indonesia have been inconsistently reported to FAO, usually confounded with domestic catches,
- The Indonesian catch statistics are not thought to fully account for the sharp increases in the number of longliners operating under its flag in recent years (especially since 1995)

New estimates conducted by the Secretariat this year resulted in catches above 150,000 t since 1995. More than 50% of the catches reported aggregated to the IOTC in recent times thus come from Indonesia. Furthermore, high proportions of tropical tunas and billfish, under IOTC mandate are caught in Indonesia.

India: India has always reported the artisanal catches aggregated at the gear level and significant catches aggregated at the species level (mainly of neritic tuna species).

Thailand: Thailand has always reported the catches of kawakawa, frigate and bullet tunas all aggregated, these species being recorded under a single commercial category.

Egypt and **Yemen**: Either reported by the flag country or estimated from the FAO databases, the catches available were all recorded under unclassified gears. It is, nevertheless, known that all three countries have statistical systems able to produce catch estimates at the gear level.

Sri Lanka, **Pakistan, Mozambique and Malaysia**: The amount of catches recorded aggregated in the IOTC Nominal Catches Database for these countries has been high in recent years. These aggregates mostly refer to neritic tuna species, although considerable amounts of billfish species have also been reported by Sri Lanka in recent years.

ALL SPECIES

- Billfish
- Neritic Tunas
- Temperate Tunas
- Tropical Tunas

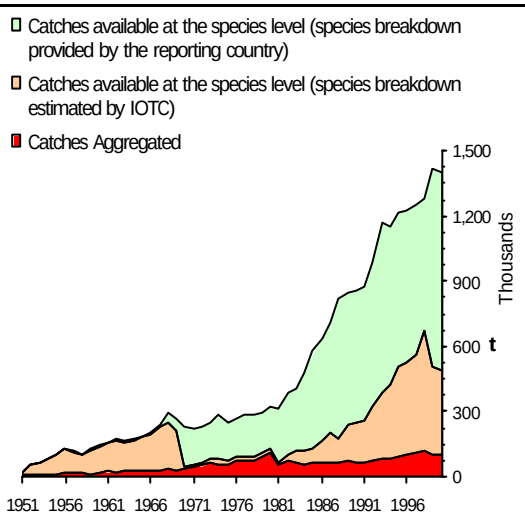


Figure 15: Amount of catch reported at the species level and aggregated

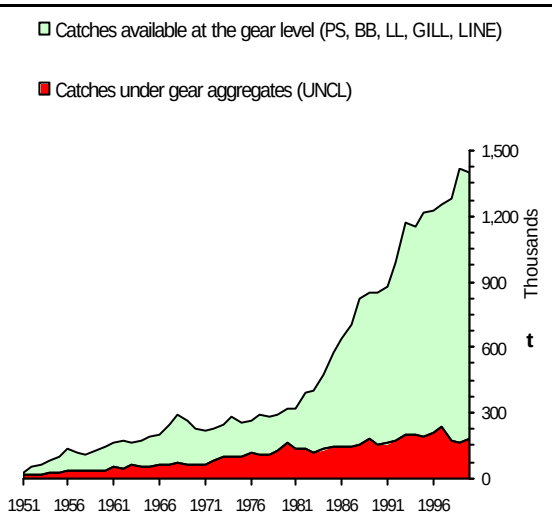


Figure 16: Amount of catch reported at the gear level and aggregated

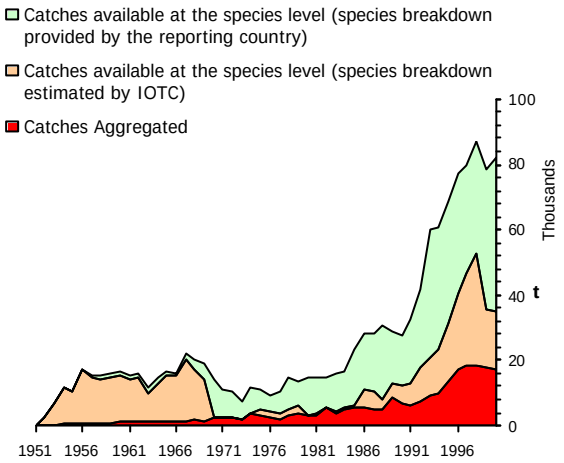
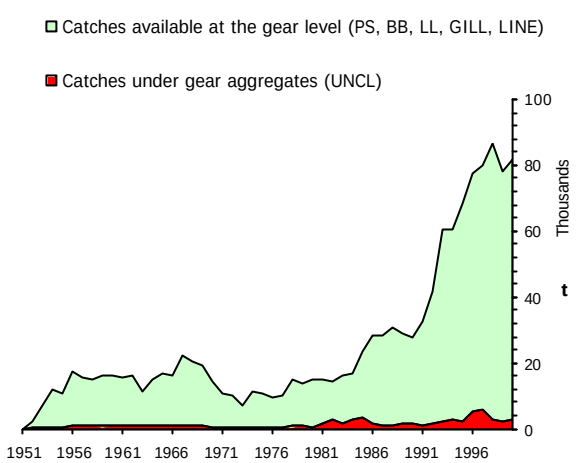
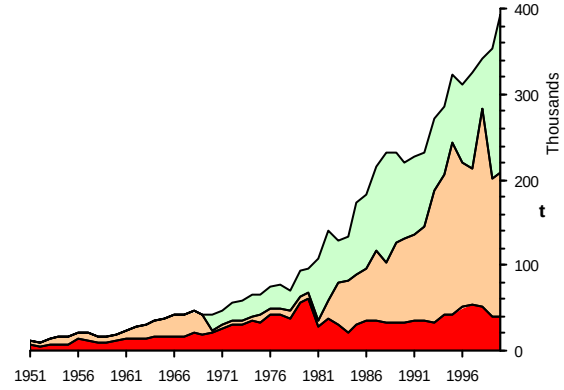
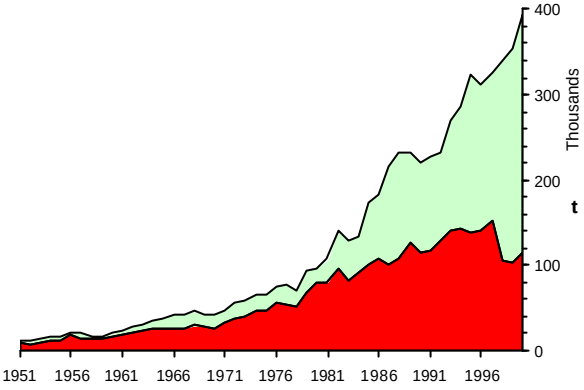
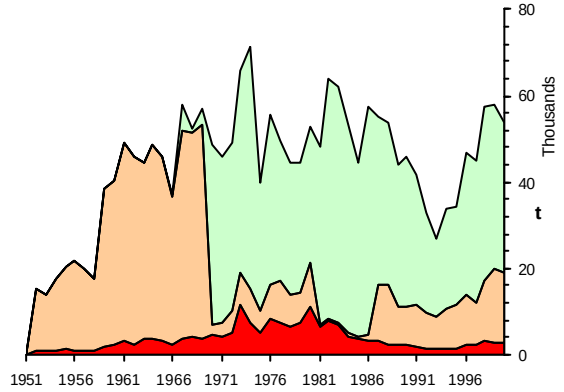
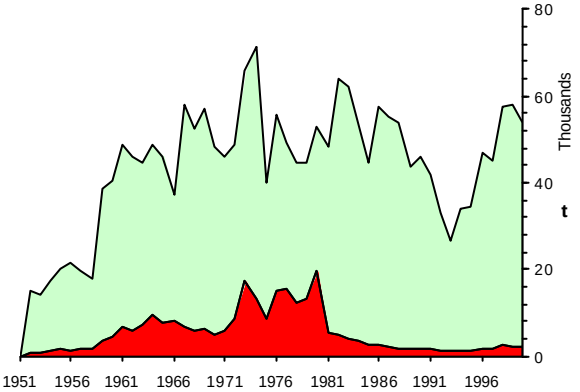
Almost all catch statistics in the IOTC databases between 1950 and 1969 come from FAO data and are thus considered as being originally aggregated (no gear information is provided in the FAO databases). Nevertheless, the Secretariat was able to assign the catches partially to the corresponding species or gears, especially in well known fisheries with more or less stable composition in species of the catches and a single gear (e.g. Japanese longliners). The amount of catch recorded under unclassified gears remained very high until the mid-eighties.

The amount of catches reported under species aggregates has been increasing since 1970, more rapidly since the early eighties. The main reason for this increase is the growing number of non-reporting fleets operating in the Indian Ocean, using mainly longlines. The Secretariat has been using different sources to estimate the catches of these vessels (sampling programmes, foreign tuna vessels activity, vessel record), although the series are still considered incomplete.

Around 15% of the catches in the IOTC NC database have been recorded under unclassified gears in recent years. This uncertainty is mostly attributable to artisanal fleets operating in coastal countries unable to produce detailed statistics or not reporting the information to IOTC. Indonesia (52% of the total catches reported under unclassified gears come from this country), India (29%), Egypt and Yemen are the major contributors in this respect.

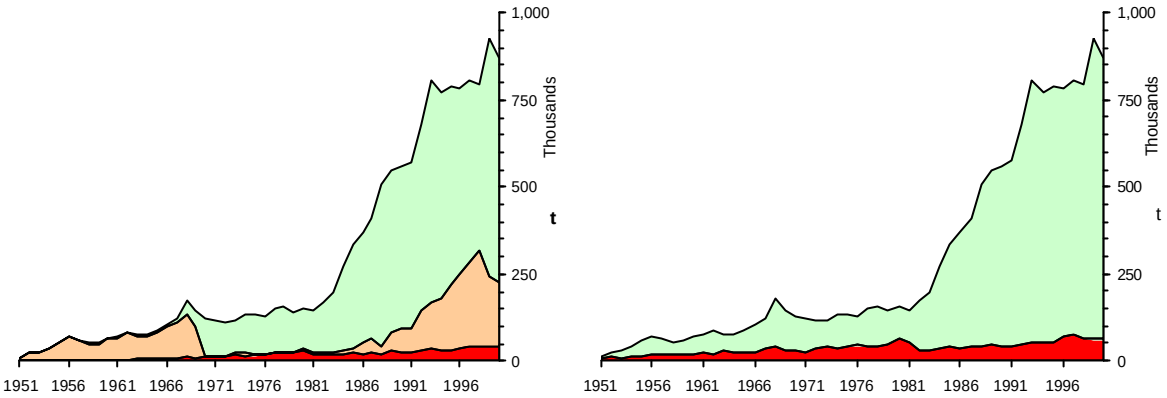
The levels of aggregation are very different between and within the different species groups:

Billfish: The species within this group are mostly caught by longlines and, to a lesser extent, gillnets. While aggregation does not represent a problem as regards the gears used it does at the species level. About half the catches of these species have been reported aggregated. Sri Lanka (32% of the total catches of billfish reported under species aggregates come from this country), India (19%) and Pakistan have been reporting high catches of billfish under species aggregates in recent years. The aggregation concerns mainly species other than the swordfish which is easily identified, mostly caught by industrial fleets and has a high market value. Catches, besides those from non-reporting fleets, are thus well known for this species.

	Figures 17-20: Amount of catch reported at the species level and aggregated	*Figure 21-24: Amount of catch reported at the gear level and aggregated*
BILLFISH Swordfish (**SWO**) Striped marlin (**MLS**) Black Marlin (**BLM**) Indo-Pacific blue Marlin (**BLZ**) Indo-Pacific sailfish (**SFA**) Short-billed spearfish (**SSP**)		
NERITIC TUNAS Narrow-barred Spanish mackerel (**COM**) Indo-Pacific king mackerel (**GUT**) Streaked seerfish (**STS**) Wahoo (**WAH**) Bullet tuna (**BLT**) Frigate tuna (**FRI**) Kawakawa (**KAW**) Longtail tuna (**LOT**)		
TEMPERATE TUNAS Southern bluefin tuna (**SBF**) Northern bluefin tuna (**BFT**) Albacore (**ALB**)		

TROPICAL TUNAS

Yellowfin tuna (**YFT**)
Bigeye tuna (**BET**)
Skipjack tuna (**SKJ**)



Neritic tunas: Species and gear aggregation are widespread within this group. Current levels of aggregation have been close to 60% and 30% as regards species and gears, respectively. India (39% and 17% of the total catches reported under gear and species aggregates, respectively, come from this country), Indonesia (36% both under gear and species aggregates) and Thailand (3% and 19% under gear and species aggregates, respectively) are the major contributors in this respect. The high levels of aggregation are thought to be mainly due to no or incomplete reporting from the countries, since several among them are known to have been routinely collecting the statistics.

Temperate and Tropical tunas: Most of the catches of the six species under these groups come from industrial fleets and, therefore, gear and species aggregation are quite low. Nevertheless, the rising number of non-reporting fleets operating in the Indian Ocean in recent years is increasing the amount of catches that have to be estimated by the Secretariat. Indonesia is the mayor contributor to this uncertainty, especially regarding the tropical tuna species (some 85% of the total catches of tropical tuna species reported under gear or species aggregates come from this country).

BOX 5: DATA QUALITY

ALL SPECIES

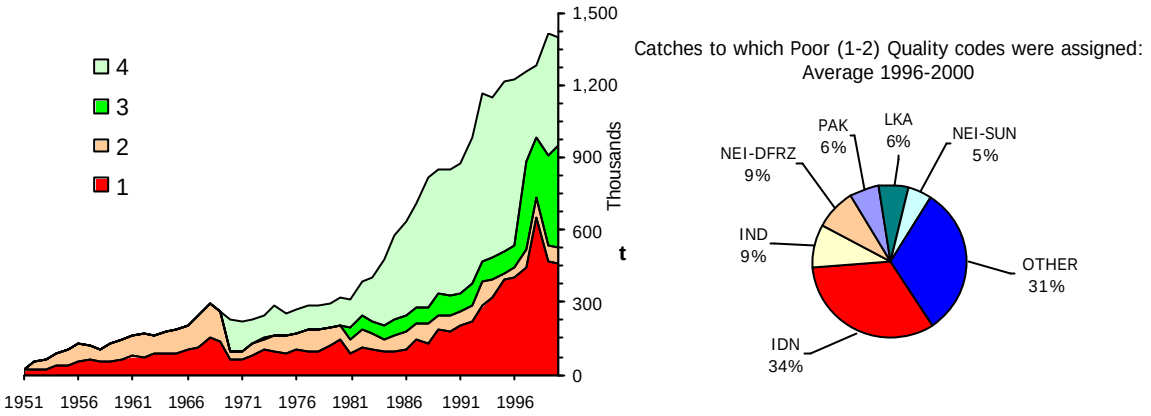


Figure 25: Presumed quality of the data in the IOTC nominal catches database and main fleets for which catches are thought inaccurate or uncertain in recent years.

The following quality codes were assigned to the records in the IOTC databases:

- **4**: The catches recorded in a given stratum are presumed to represent the actual catches occurred in that stratum. This refers to all data available from countries having data collection and processing systems with known ability to produce good catch estimates and to the data estimated by the Secretariat from sources thought to be reliable. No inconsistencies in the data were found during the verification and validation processes run at the Secretariat or communicated from the reporting source.
- **3**: This refers to data coming from the same sources as above but for which minor inconsistencies were found during validation and verification or communicated from the reporting source. These inconsistencies referred were not thought to affect the catches recorded in the strata concerned substantially.
- **2**: It is not known whether the catches recorded in a given stratum represent the actual catches occurred in that stratum as insufficient or no information was provided by the reporting source about how the estimates were obtained.
- **1**: The catches recorded in a given stratum are thought inaccurate as major inconsistencies were found during validation and verification or many assumptions had to be made in the estimates.

The assignment of quality codes was done in spite of gear or species aggregation, thus only considering whether the catches reported in each strata were accurate or not (e.g. good quality could be assigned to catches recorded under species and/or gear aggregates).

Sharp increases in the catches recorded as poor quality have been noted since the mid-eighties. This uncertainty comes mostly from:

Indonesia (IDN): Although the current estimates are possibly more accurate regarding the total catches, the catches at the species level are still thought uncertain.

Non-reporting DWFNs (NEI-DFRZ, NEI-ICE and NEI-SUN): catches estimated by the Secretariat using the number of vessels which were reported active each year and mean catches and species breakdowns from fleets thought to operate in a similar way. The IOTC sampling programmes are proving helpful to reduce the uncertainty of the catches estimated for fresh-tuna longline fleets (NEI-ICE). The amount of information available for non-reporting deep-freezing longliners (NEI-DFRZ) and purse seiners (NEI-SUN) is still very low.

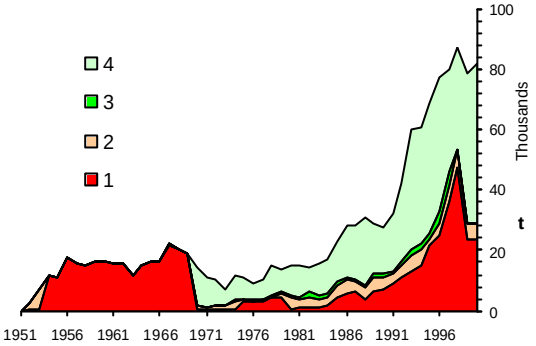
Pakistan (PAK), **Sri Lanka** (LKA) **and India** (IND): The either unreliable or highly aggregated data available from these countries needed to be re-estimated by the Secretariat, sometimes using information for years far from those which the catches had to be estimated. Thus, gear and/or species breakdowns were estimated assuming fisheries were not changing over time. The risk from these assumptions increases with the gap in time between the new catches and the year when catches were used as basis for the estimate.

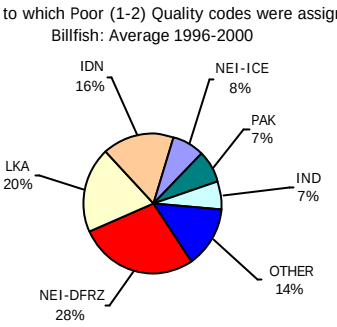
The amount of catches with a poor quality code is of concern, especially for **billfish** and **neritic tunas**. Poor quality catches amount to more than half the total catches in recent years for these categories. The fleets that contributed mostly to this uncertainty are from **India**, **Indonesia** and **Thailand** (THA), for the neritic tunas, and **NEI-DFRZ** and **Sri Lanka**, for billfish.

Although less affected than the others, the quality of the catches of **tropical** and **temperate tuna** species have been worsening in recent years. The increasing trend in the number of longline vessels from **Indonesia** and longline and purse seine vessels from non-reporting DWFNs is again the reason for these uncertain catches.

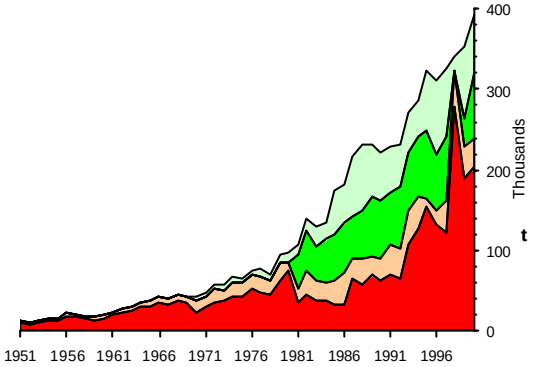
Figures 26-29: Presumed quality of the data in the IOTC nominal catches database and main fleets which catches are thought inaccurate or uncertain in recent years.

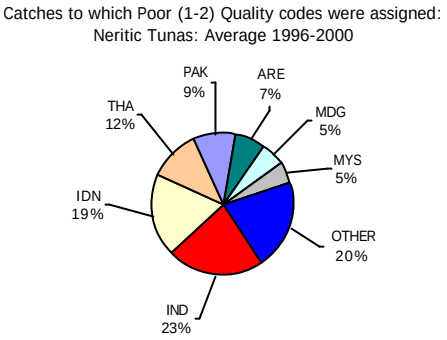
BILLFISH



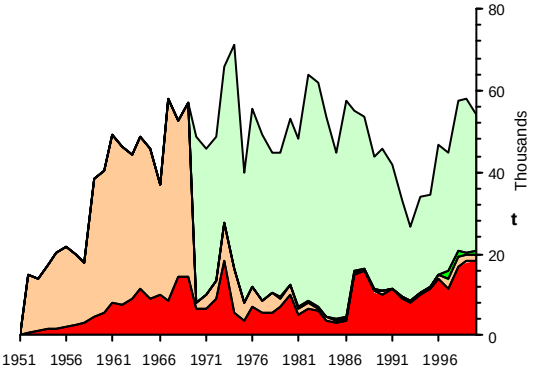


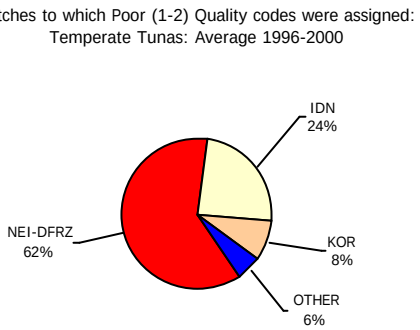
NERITIC TUNAS



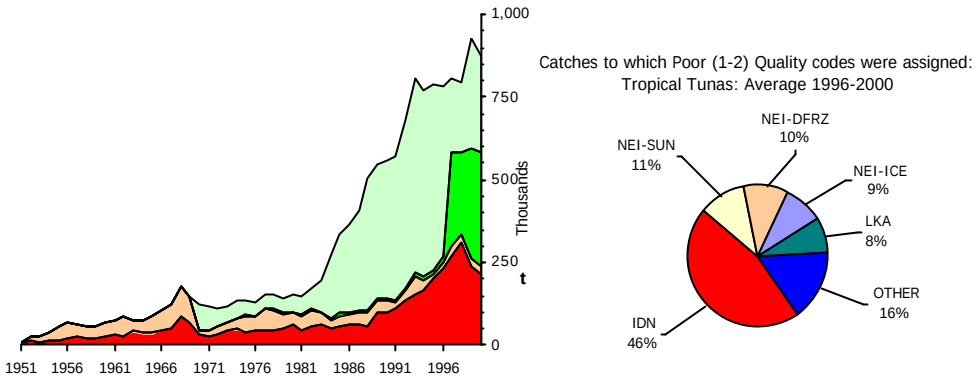


TEMPERATE TUNAS



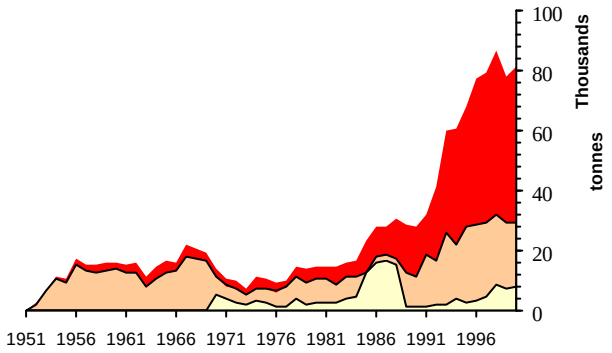


TROPICAL TUNAS

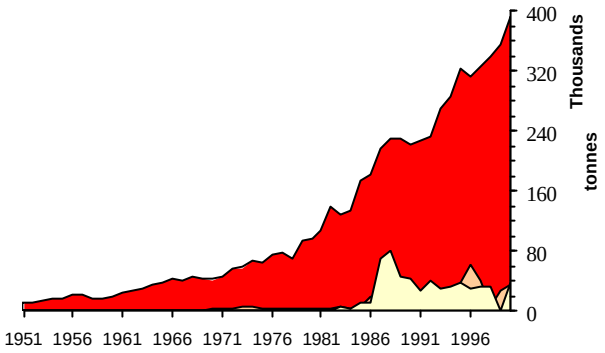


BOX 6: DATA COMPLETENESS

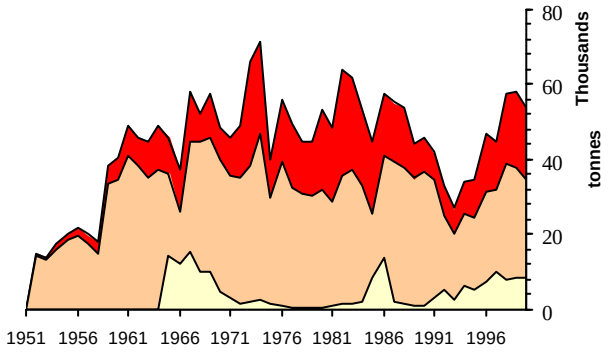
BILLFISH



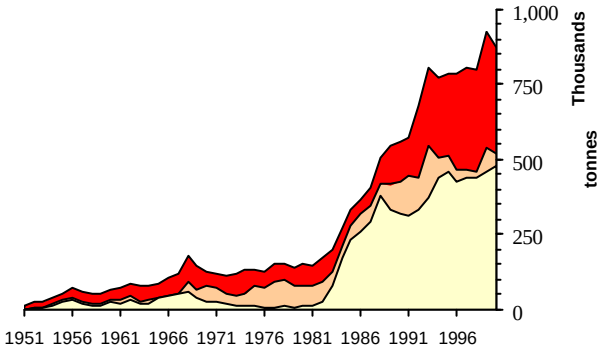
NERITIC TUNAS

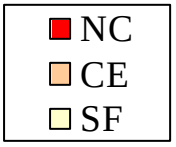


TEMPERATE TUNAS



TROPICAL TUNAS





Figures 30-33: Proportion of the total catches (NC) for which the catch and effort (CE) and size frequency (SF) records in the IOTC databases are available for the species groups managed by IOTC

The Charts above and in the next page are optimistic views about the proportion of the total catches for which records in the IOTC catch and effort and size frequency databases are available. Catch and Effort (CE) and/or size frequency (SF) records were presumed fully representative of the total catches (NC) per species, country and year whenever one or more records were found in the Catch and Effort and/or Size Frequency databases for that species, gear, year and country.

In spite of this approach, the situation is of concern for some species groups and fisheries:

BILLFISH: Recent coverage rates amount to about 35% and 10% of catch and effort and size frequency data, respectively. The low rates

are due to:

- Non-reporting of statistics for important **longline fisheries** operating in the Indian Ocean: Fresh tuna longliners from **Taiwan,China** and **Indonesia** and deep-freezing longliners (DWFNs) operating under several flags (mainly **Belize**, **Honduras**, **Equatorial Guinea** and **Panama**)
- Lack of size frequency statistics for deep-freezing longliners from **Taiwan,China**, the Republic of **Korea** and **Philippines**.

The lack of the data above concerns swordfish mostly and, to a lesser extent, all marlin species.

- Lack of catch and effort and size frequency data from **artisanal fisheries**, especially **gillnets** and **troll lines**. The Indo-Pacific sailfish and, to a lesser extent, the black and Indo-Pacific blue marlins are the species most affected.

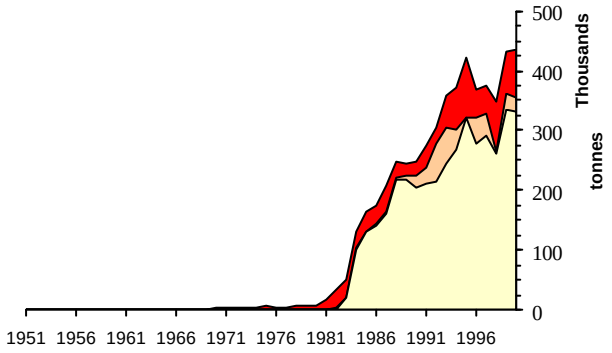
NERITIC TUNAS: These species are caught mostly by artisanal gears have been either badly monitored or not reported in detail. Recent coverage rates are around the 10% for both catch and effort and size frequency statistics. No or scarce catch and effort and size frequency statistics are available at IOTC from **India**, **Iran**, **Indonesia, United Arab Emirates** and, up to recent years, **Oman** and **Thailand**. Catch and effort records and size samples are, however, collected in all these countries.

TEMPERATE TUNAS: Current levels of coverage are around the 15%. Catch and effort data are however quite complete. The lack of reporting of size frequency statistics since 1989 from **Taiwan,China** is of concern.

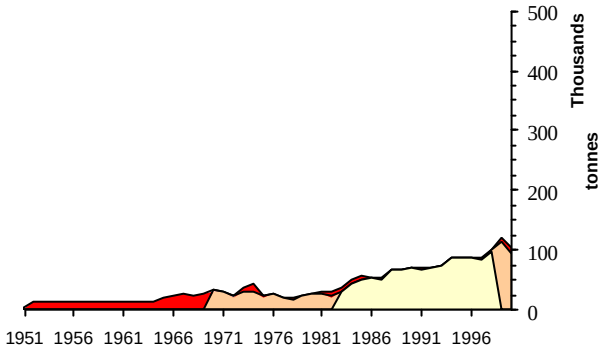
TROPICAL TUNAS: The coverage rates for both the catch and effort and size frequency data have been worsening since the mid-eighties. This is due to the increase in the number non-reporting fleets operating in the Indian Ocean, mainly fresh tuna longliners from **Indonesia** and longliners (both fresh and deep-freezing) and purse seiners (ex-Soviet) from DWFNs.

Figures 34-39: Proportion of the total catches (NC) which the catch and effort (CE) and size frequency (SF) records in the IOTC databases are available according to the gears under which the statistics were reported.

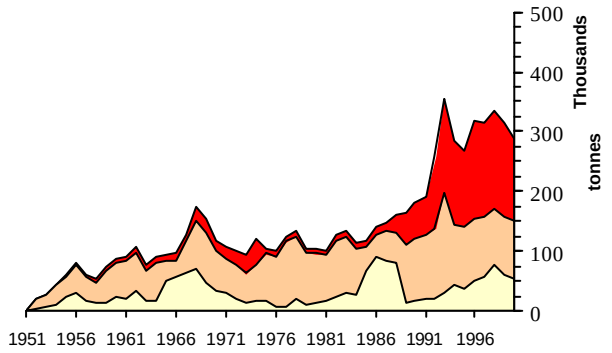
PURSE SEINE



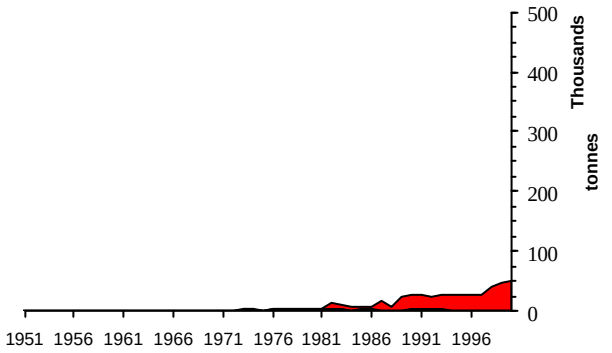
POLE AND LINE

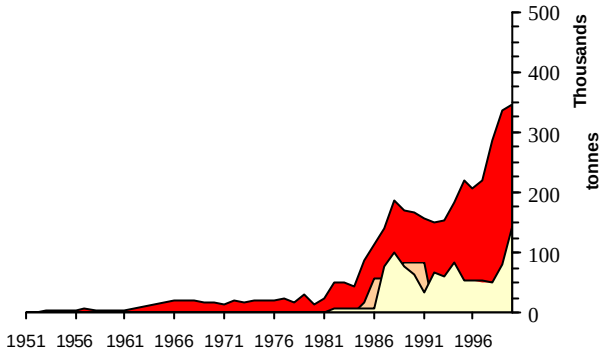
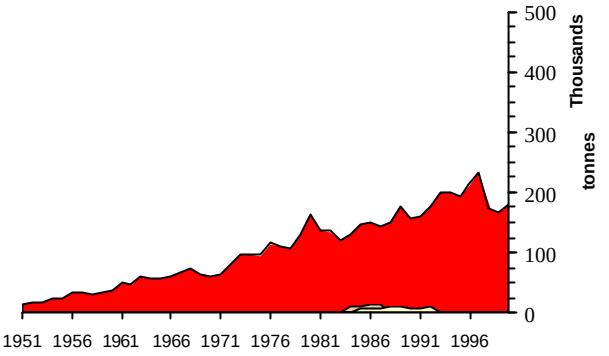


LONGLINE



LINE (HAND AND TROLL LINES)



GILLNET	UNCLASSIFIED GEARS
	

NOTE: Catch and Effort (CE) and/or size frequency (SF) records were presumed fully representative of the total catches (NC) per species, country and year whenever one or more records were found in the Catch and Effort and/or Size Frequency databases for that species, gear, year and country.

The completeness of catch and effort and size frequency data is also changing depending on the gear: while **pole and line** and **purse seines** are well covered since the mid-eighties; this is not the case with all other gears, especially **gillnets** and **lines**, both having very low coverage rates. The statistics for **longliners** have been worsening since the mid-eighties, with current coverage rates of 50% (catch and effort) and 25% (size frequency), much lower than in earlier years.

Finally, the amount of catches reported under **unclassified gears**, around 200,000 t in recent years, is of concern. These catches are usually from artisanal fisheries, mainly gillnets and lines.

BOX 7: AVAILABILITY OF CATCHES OF SPECIES OTHER THAN IOTC TUNA AND TUNA-LIKE SPECIES AND DISCARDS FROM INDUSTRIAL FLEETS OPERATING IN THE IOTC AREA OF COMPETENCE

Gear	Fleet	Av96/00	NTAD	SKH	TUX	DISCARDS
Longline	Taiwan,China	101,041	542	696	99,803	NO
	Indonesia	70,904	N/A	1,574	69,330	NO
	NEI-Deep-freezing	48,159	253	322	47,584	NO
	Japan	41,646	N/A	N/A	41,646	NO
	NEI-Fresh Tuna	27,838	126	299	27,413	NO
	Korea, Republic of	10,610	N/A	11	10,599	NO
	China	4,042	N/A	57	3,985	NO
	NEI-Indonesia Fresh Tuna	3,216	N/A	71	3,144	NO
	Spain	3,070	0	1,968	1,103	NO
	France-Reunion	2,689	67	60	2,562	NO
	Philippines	1,734	18	11	1,705	NO
	Australia	1,415	1	39	1,375	NO
	Other	4,068	88	554	3,426	NO
	TOTAL LL	320,432	1,096	5,661	313,674	
Purse seine	Spain	134412	N/A	N/A	134412	NO
	France	76,031	N/A	N/A	76,031	NO
	NEI-European	58,058	N/A	N/A	58,058	NO
	Thailand	39,603	N/A	N/A	39,603	NO
	NEI-Ex-Soviet Union	29,221	N/A	N/A	29,221	NO
	Seychelles	16,753	N/A	N/A	16,753	NO
	Other	29,343	1	N/A	29,342	NO
	TOTAL PS	383,421	1	N/A	383,420	
	TOTAL	703,852	1,097	5,661	697,094	

Table 11: Average catches of tuna and tuna-like species (TUX) for the period 1996-2000 and amounts of sharks (SKH) and other non-tuna or tuna-like species (NTAD) from the IOTC NC database

The reporting of catches of sharks and species other than those covered in the IOTC Agreement has been scarce and uneven over time. It is currently impossible to know to what extent the catches of these species are underestimated due to the lack of reliable data.

The reporting of discards has also been very low. Furthermore, when reported, the discards never represented the total amount and no indication on what proportion of the total catches was covered, being impossible to estimate their totals. These discards might involve considerable amounts of undersized tuna species, especially in purse seine fisheries exploiting schools associated to fish aggregating devices (FADs).

Gear	SppGroup	Total	Aggregated	Disaggregated
Longline	NTAD	5,480	5,110	370
	SKH	28,307	16,760	11,547
Purse seine	NTAD	5	0	5
	SKH			
	TOTAL	33,792	21,870	11,922

Table 12: Average catches of sharks (SKH) and other non-tuna or tuna-like species (NTAD) recorded under species aggregates (Aggregated) or at the species level (Disaggregated) in the IOTC NC database for the period 1996-2000

This underreporting concerns more industrial fisheries, mainly longline and purse seine, than artisanal fisheries, where the amount of discards is thought negligible.

Species aggregation is, besides underreporting, an important problem concerning the reporting of these data, with some 60% of the catches available reported under species aggregates.

The implementation of observer programs in industrial fleets might help to reduce the uncertainties regarding the catches of these species.

Species	ScientName	AvCatch	Longline	Purse seine	Baitboat	Gillnet	Line	Other
Sharks various nei	*Selachimorpha (Pleurotremata)*	44,072	3,320			20,720	186	19,845
Other non tuna-like fishes nei	*Fishes non Scombroidei*	14,594	206		9,590		4,389	409
Silky shark	*Carcharhinus falciformis*	3,655	6			3,650		
Non targeted, associated and dependent species		3,365	816			2,549		
Blue shark	*Prionace glauca*	3,176	1,933			1,242	0	
Striped bonito	*Sarda orientalis*	1,476		1	0	456	23	995
Rays, stingrays, mantas nei	*Rajiformes*	1,256	0			1,255		
Indian mackerel	*Rastrelliger kanagurta*	1,076				46		1,030
Requiem sharks nei	*Carcharhinidae*	898	17			881		
Oceanic whitetip shark	*Carcharhinus longimanus*	682	16			666		
Dogtooth tuna	*Gymnosarda unicolor*	577	0		214	7	354	2
Thresher sharks nei	*Alopias spp.*	407	11			396	0	
Hammerhead sharks nei	*Sphyrna spp.*	389	2			386	0	
Shortfin mako	*Isurus oxyrinchus*	363	314			49	0	
Common dolphinfish	*Coryphaena hippurus*	207	73				134	
Sharks mackerel, porbeagles nei	*Lamnidae*	111				108	3	
Mackerels Indian, nei	*Rastrelliger spp.*	37	0		11	0	24	2
Smooth-hound	*Mustelus mustelus*	20	20				0	
Dolphins nei	*Delphinidae*	14				14		
Tope shark	*Galeorhinus galeus*	13	3				10	
Blue mackerel	*Scomber australasicus*	8			7			1
Longfin mako	*Isurus paucus*	7	7					
Smooth hammerhead	*Sphyrna zygaena*	7	7					
Copper shark	*Carcharhinus brachyurus*	5	3				2	
Blacktip reef shark	*Carcharhinus melanopterus*	2					2	
Dusky shark	*Carcharhinus obscurus*	2					2	
Sharks nei other than oceanic whitetip shark and blue shark		1	1					
Porbeagle	*Lamma nasus*	1	1					
Butterfly kingfish	*Gasterochisma melampus*	0	0					
Broadnose sevengill shark	*Notorhynchus cepedianus*	0	0				0	
Dogfishes nei	*Squalus spp.*	0	0					
Tiger shark	*Galeocerdo cuvier*	0	0					

Table 13: Species other than tuna and tuna-like for which catches are available in the IOTC NC database and average catches reported for the last five years