Permanent Working Party on Data Collection and Statistics

Third Session, Victoria, Seychelles 3 December 2001

Progress Report of the Secretariat

DATA COLLECTION: GENERAL STATUS OF REPORTING DURING 2001

Table 1 lists the countries to which the Secretariat sent data requests during the year 2000. 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: Initial **requests** were sent to **58 countries** between February and March 2001. Despite the fact that all requests were sent in dates earlier than in previous years only 13 countries (8 in 1999) submitted statistics to IOTC before the deadline. Furthermore, only partial statistics were submitted in most cases. Second and third requests were, thus, almost always needed.

Complete data series are not available for Working Parties because of the lack of timely catch, catch and effort and size frequency statistics. Late reports also make the validation and verification of data very difficult, especially when submissions occur in dates close to or during Working Parties.

Completeness of reporting: Netherlands Antilles, Australia, United Kingdom and Singapore were the only countries to provide complete sets of data for 2000. 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 1999, 31 out of 58 countries having provided partial or complete sets of catches.

  Better levels of reporting were noted from Pakistan, the Republic of Korea and Tanzania, which either did not reply or submitted the statistics very late in previous years.

  To date, no or only partial nominal catch statistics have been received from several member or cooperating non member parties, namely India, Madagascar, Comoros, Mauritius, Philippines and Sudan. Furthermore, 1999 nominal catches have not yet been submitted by Madagascar, Sudan and India (seerfish).

  Other important fishing nations not having submitted catch statistics to the IOTC are Indonesia, Iran, United Arab Emirates, Yemen and Egypt. The catches of Illegal and/or Unregulated and/or Unreported (IUU) longline fleets operating under several flags (Honduras, Belize, Panama, Equatorial Guinea, Cambodia, etc.) usually recorded under NEI are mostly unknown for 2000 and will be estimated by the Secretariat from sources such as the sampling programmes and the vessel record, as was the case in previous years. 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 and size-frequency statistics were only submitted by 18 (12 members) and 10 (7 members) countries, respectively. Either incomplete or non-validated statistics were submitted by the Republic of Korea, Japan and Philippines.

Three countries, Oman, Netherlands Antilles and Vanuatu provided catch and effort data for the first time during the year 2001. Catch and effort data series of years prior to 2000 were also provided by Maldives and Oman. Australia submitted, for the first time, size data for southern bluefin tuna from 1997 to 2000.

Table 1: Availability of IOTC statistics for the year 2000

Country	Catch	M/C	NC	CE	SF	DI	FC	FT	VR	TI	SO
EUROPEAN UNION	225	M									
CHINA	5	M						N/A			
TAIWAN,CHINA	135							N/A			
INDONESIA	140										
MALDIVES	105										
INDIA	95	M									
IRAN	75										
SRI LANKA	75	M									
JAPAN	50	M						N/A			
THAILAND	50	M									
PAKISTAN	35	M									
OMAN	30	M									
BELIZE	20							N/A			
UNITED ARAB EMIRATES	15										
PANAMA	15							N/A			
NETHERLANDS ANTILLES	15							N/A			
KOREA	10	M						N/A			
SEYCHELLES	10	M									
MADAGASCAR	10	M									
MALAYSIA	10	M									
COMOROS	10	M									
YEMEN	10										
SAUDI ARABIA	10										
EGYPT	10										
AUSTRALIA	10	M									
MAURITIUS	5	M									
MOZAMBIQUE	5										
PHILIPPINES	5	C						N/A			
TANZANIA	1										
KENYA	1										
FRANCE	1	M									
HONDURAS	1							N/A			
SOUTH AFRICA	<1										
QATAR	<1										
KUWAIT	<1										
ERITREA	<1	M									
BAHRAIN	<1								N/A		
JORDAN	<1										
DJIBOUTI	<1										
BANGLADESH	<1										
EAST TIMOR	<1								N/A		
UNITED KINGDOM	0	M									
SINGAPORE	0										
SUDAN	Unkn	M									
IRAQ	Unkn								N/A		
MYANMAR	Unkn										
SOMALIA	Unkn										
CAMBODIA	Unkn							N/A			
COTE D'IVOIRE	Unkn							N/A			
EQUATORIAL GUINEA	Unkn							N/A			
GUINEA	Unkn							N/A			
VANUATU	Unkn							N/A			

Key Table 1

Catch Recent catches amounting to (thousands of tonnes)
M/C Is Member (**M**) or Cooperating Non Member Party (**C**)

NC Nominal Catch
DI Discards
CE Catch and Effort
SF Size Frequency
FC Fishing Craft
FT Foreign Tuna Vessels Activity
VR Vessel Record

Fully reported
Partially Reported
Not Reported
No catches
N/A Not Applicable

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

- **Discards**: Only France(Réunion), China and Australia reported discard statistics for 2000, despite the fact that discard rates are presumed high, especially from longliners. These levels are also presumed high in purse seiners setting on logs.
- **Fishing craft statistics**: Fishing craft and nominal catch statistics are usually reported altogether. Craft statistics are not available, incomplete or inaccurate for some IUU and many artisanal fleets. An estimate on the number of longliners operating under the Indonesian flag (1973-2000) was conducted this year thanks to the information collected in Indonesia by the IOTC Deputy Secretary.
- **Vessel Record and Foreign Tuna Vessel Activity**: Many new data were received at the Secretariat during the year 2001, regarding both domestic and foreign fleets. Belize, Panama and Netherlands Antilles submitted lists of ships operating in the Indian Ocean for the first time. Nevertheless, the number of ships operating under several flags such as Taiwan,China, Honduras, Equatorial Guinea, Cambodia, etc. is still uncertain.

Besides the report from countries, valuable information is being collected through the IOTC sampling programmes in Thailand, Malaysia. These will soon be extended to Sri Lanka and Indonesia.

Data source: The reporting of statistics is usually by the flag country. Nevertheless, the statistics of several fleets were partially (Belize, Panama) or fully (Honduras, Equatorial Guinea, Cambodia) submitted by countries other than the flag country.

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

STRUCTURAL CHANGES IN THE DATABASES

The structure of the IOTC NC, CE and SF databases was modified during 2001. Two new fields were added, the firs to allow recording the **quality** of each individual record in the databases and the second related with the **reporting** flag.

These additions have allowed to:

- Identify catch series of specific fleets which were previously recorded under broader aggregates: For example, catch information coming from different sources, with varying reliability, was all aggregated under NEI[1]. The new reporting field allows storage of these data separately, reducing the heterogeneity of the information recorded under each stratum.
- Flag data series or individual records in order to provide more information on their reliability.

Thorough reviews of each data series were conducted in 2001 in order to assign quality codes to all records in the IOTC databases. Although these reviews extended back to the first years for which data exist in the database, the assignment of quality codes is more uncertain in early years of the fishery, especially before 1970, due to the lack of documentation about the estimation process for catches at the species, gear and area levels.

The assignment of **quality** codes in each database followed the criteria below:

- **Nominal Catch data**: The quality was assigned to each individual record (stratum[2]) depending on whether the catches reported (or estimated) were thought to accurately represent the actual catches.
- **Catch and Effort data**: The quality was assigned to each individual record (stratum[3]) depending on whether the catches (or effort[4]) reported (or estimated) were thought to be representative of the totals.
- **Size Frequency data**: The quality was assigned to each individual record (stratum[5]) depending on whether the sample in that stratum was thought to be representative of the size frequency of the catch in the stratum.

Data source fields were also added to the catch and effort and size-frequency databases in 2001. Thorough reviews were conducted of all IOTC databases in order to provide more information on the origin of each dataset.

Catalogues on the availability and quality of the data in the IOTC databases are presented in Data Summary 21:

- **Data Availability**: Each catalogue shows the availability of nominal catch, catch and effort and size-frequency statistics in the IOTC database for the period 1950 to 1999, by species group gear, country and year. The countries in each section are sorted in descending order according to their most recent catches (average catches for the last five years) as an indication of the importance of each fishery. The nominal catch series shows the availability of data at the IOTC nominal catches database. Therefore, blanks do not necessarily mean that there were no catches in the stratum concerned and might be due to non-reporting or lack of information available to estimate catches for that stratum.

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[1] Not Elsewhere Included

[2] Flag-Reporting-Year-Gear-Area-Species-Data Source

[3] Flag-Reporting-Year-Month-Gear-Area-Species-Type of School-Data Source

[4] The catch and effort database allows the assignment of distinct quality codes to catch/es and effort/s recorded in a same stratum.

[5] Flag-Reporting-Year-Month-Gear-Area-Species-Type of Measurement-Data Source

- **Data Quality**: Each catalogue shows the presumed quality of nominal catches, catch and effort and size-frequency statistics available in the IOTC database for the period 1950 to 1999, by species, gear, country and year.

MAIN PROGRESS ACHIEVED DURING 2001

The main progress achieved in the collection and verification of the data in the IOTC NC, CE and SF databases are summarized in Table 2 below (more information is provided in Annex in the Boxes referred to in **FLAG**):

Table 2: 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	All	1950-99	BILL, SEER	Historic review to complete catch information, especially in early years of the fishery	FAO FishStat IPTP Data IOTC Catch and Effort DB	Increase in the catches of seerfish and billfish species especially before 1970
	Indonesia **(BOX 1)**	1973-00	YFT, BET, SWO	Complete review of the catches of Indonesian longliners in the Indian Ocean	DOF Indonesia RIMF Indonesia WASKI Indonesia PSB Indonesia CSIRO Australia IOTC Sampling Programmes Papers and Publications	Sharp changes in catch, with lower catches in early years, due to aggregation by Indonesia of foreign and domestic LL catches, and much higher catches in later years due to re-flagging of all LL foreign fleets to Indonesia
		1993-00	SKJ, SEER	Review of the catches of artisanal fleets in the Indian Ocean	FAO FishStat	Artisanal catches mostly unchanged due to the lack of reliable information.
	Taiwan,China **(BOX 2)**	1986-00	YFT, BET, BILL	First estimation of the catches of fresh tuna longliners at the flag level	IOTC/AFDEC Sampling CSIRO/RIMF Sampling	Assignment of fresh tuna longline catches to the specific flags.
	IUU (NEI Deep - freezing LL)	1985-00	YFT, BET, ALB, BILL	New review of the series of catches from data collected recently	IOTC Vessel Records IOTC Activity Records	Still under review; changes in the whole series expected due to the higher number of ships reported operating throughout the years
CE	Maldives	1970-00	SKJ, YFT, TUN	Complete series re-input according by atoll where the catches were reported (landed)	MOFA Maldives IPTP Data holdings	No change in the total catches from 1970-92 but in the areas fished. 1993 to 2000 data first input
	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
	Korea, Japan, Taiwan,China, EU	Various	YFT, BET, ALB, BILL	Data validation and verification of catch and effort data series	IOTC databases	Poor quality codes assigned to all (Korea) or several (Japan, Taiwan,China) records in the CE database
	South Africa	1973-99	YFT	Catches of South African vessels in the ICCAT convention area (in an area close to the IOTC western boundary) integrated to the catch and effort database	ICCAT	Under review
SF	China, Taiwan,China, Indonesia	1998-00	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
	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
	Indonesia Taiwan,China	1995-00	YFT, BET, SBF, BILL	Data from the sampling in processing plants in Benoa (fresh-tuna longliners)	RIMF Indonesia	Under review
	Various industrial	1999-00	YFT, BET	Size frequency data collected by observers aboard purse seiners and longliners licensed to operate within the EEZ of Chagos	MRAG United Kingdom	Under review
	Korea	1990-00	YFT, BET	Reporting of size frequency statistics	MOMAF Korea	The data provided needs further verification by Korean scientists
	Maldives	1983-98	SKJ, YFT	Reporting of size frequency statistics	MOFA Maldives	Complete series re-input according to the atoll where the size frequency data were collected

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 3 below. Additional documentation about each case is provided in the different Boxes referred to in **PROBLEM**, found in the pages following the Table.

Table 3: 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	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, SDN, 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, EGY, ITA, KEN, PRT	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, THA, LKA, IND	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, ARE, KOR	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 with the implementation of sampling programmes in ports of call of fresh-tuna longliners, for the collection of recent and, especially, historical data (Indonesia) 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
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
	Poor Quality	Tropical Tunas Billfish	KOR, TWN, PHL, JPN, EU	Various	Inconsistencies found during the validation and verification of catch and effort (size frequency) records or communicated by the sources reporting the data Low coverage	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) 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 1950-99 is shown in **Catalogue 1** in Annex. Both nominal catches and craft statistics are shown in the catalogue in order to illustrate discrepancies in reporting. Data from artisanal fisheries are scarce, such that gear types are identified only for purse seiners and longliners.

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 USSR/Russian fleet has reflagged into the flags listed above. In the catalogue, the fleets flagged in other countries operate mainly in coastal waters.

Longline fleets: There are many more longline 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, Belize and Panama. The statistics are much less complete, especially since the mid-eighties, as the number of non-reporting fleets has increase since that time.

Although these fresh tuna longliners fleets from Taiwan,China and Indonesia are better known since the inception of the sampling programmes and through the vessel and activity records reported from different countries (deep-freezing longline fleets), the uncertainties are still high, especially regarding the early years of operation.

MAIN PROGRESS ACHIEVED DURING 2001

The progress achieved in the collection and verification of the data in the IOTC FC, FTVA and VR databases is summarized in the Table 4 below.

Table 4: Status of the IOTC FC, VR and FTVA databases: main progress achieved

DB	FLAG/S	SOURCES	PERIOD	DETAILS	MAIN RESULTS
FC	All	IOTC	1950-99	Vessel characteristics reviewed to give consistency to each series	Craft statistics of some countries more consistent
	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
	Taiwan,China Indonesia	IOTC Sampling Programmes WASKI Indonesia DOF 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.
VR & FTVA	All Industrial **(BOX 7)**	AVA Singapore SFA Seychelles Albion Mauritius MAF Oman AFDEC Thailand (IOTC) FRI Penang (IOTC) MRAG United Kingdom USTA & CSP Madagascar	1995-00	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, Netherlands Antilles, Panama	INMARBE Belize DSMA Netherlands Antilles MP Panama	2000	First submission of names and characteristics of ships fishing for tunas in the Indian Ocean	Statistics for these countries 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 5 below. Several alternative actions to undertake to reduce these uncertainties are proposed in the right column.

Table 5: 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	IDN, 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 **(BOX 7)**	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 6 shows other datasets available at the IOTC Secretariat:

Table 6: 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	10,000	2000-01	AFDEC Thailand (IOTC Sampling Programmes)
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: INDONESIA

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

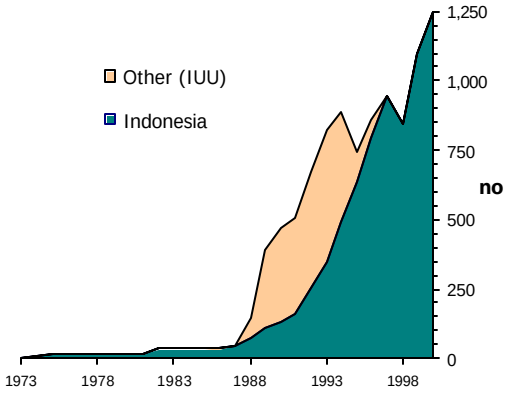
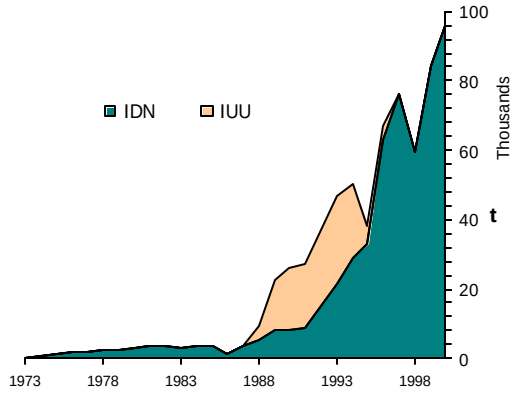


Figure 2: Estimated catches in the Indian Ocean of the domestic and foreign (IUU only) fresh tuna longliners putting into ports in Indonesia



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 a recent visit to Indonesia, together with all other data available at the Secretariat, has allowed re-estimation of the complete series of catches of Indonesian longliners in the Indian Ocean, from 1973 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 90,000 t have been estimated in recent times. Furthermore, the rates of increase are rising over time

In spite of the current better documentation, this fleet needs much closer monitoring. The collection of catch and effort and size frequency data in Indonesia is of utmost importance and should be given first priority.

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

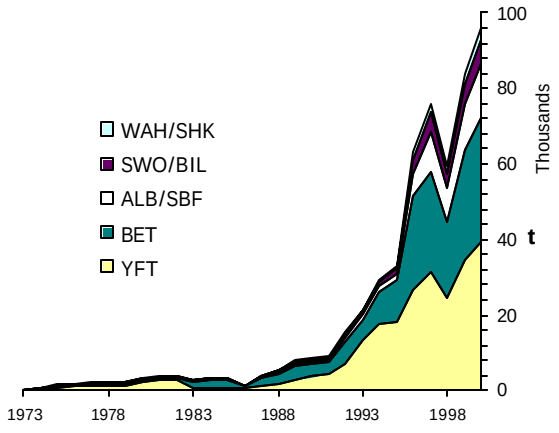
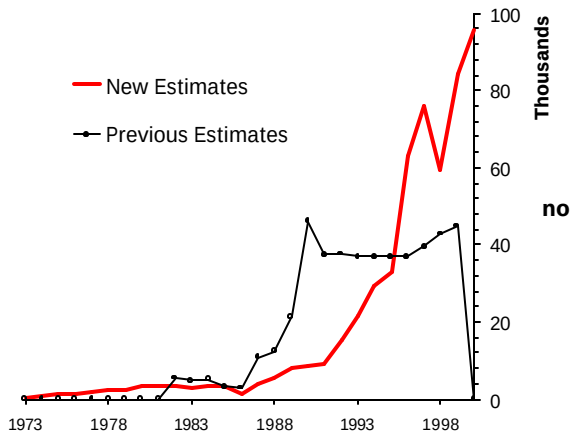


Figure 4: Total catches in the Indian Ocean estimated for the Indonesian longline fleet* versus *the catches estimated previously



BOX 2 : IOTC SAMPLING PROGRAMS

Figure 5: Number of fish sampled in processing plants dealing with tuna and tuna-like species landed by fresh-tuna longliners in Phuket and Penang from January 1998 to July 2001.

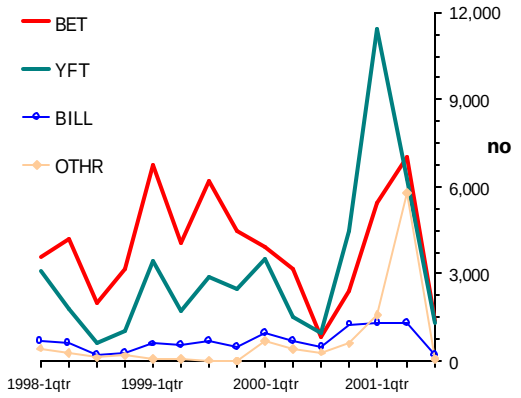


Figure 6: Total weight of the sample (raised) per species and quarter for the landings of fresh tuna longliners to processing plants in Phuket and Penang from January 1998 to July 2001.

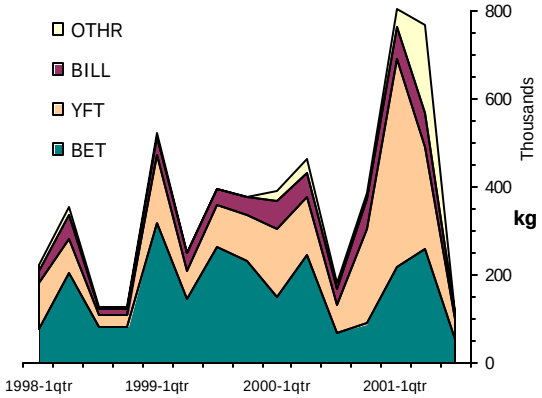
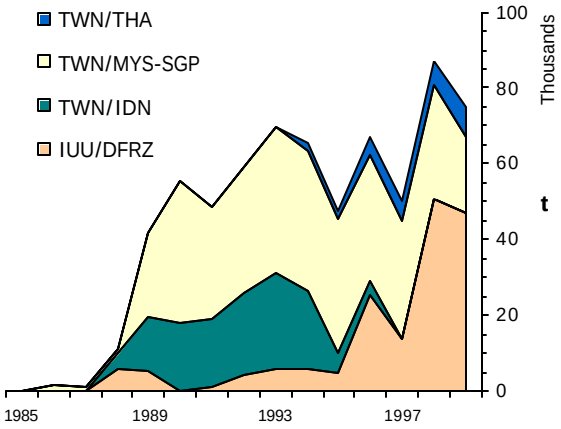


Figure 7: Estimated catches of IUU longline vessels in the Indian Ocean from 1985 to 1999.



The Secretariat has been implementing Sampling Programmes to monitor the activities of non-reporting fleets since 2000. Sampling is currently conducted in Phuket, Penang and Sri Lanka, three of the most important ports wher fresh tuna longliners operating in the Indian Ocean land. Scientists and samplers of research institutions in the three countries, AFDEC, FRI and NARA 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 IUU 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 fleet s, more than 95% of which are longliners operating under the flag of Taiwan,China. 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 (Benoa and Jakarta in Indonesia).

More information about the fleet and information collected through the operating schemes is provided in documents presented to the species Working Parties in 2000 and 2001.

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 31 in 1999 (out of the 35 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:

Taiwan,China: A large number of fresh tuna longliners has been operating in the Indian Ocean since the mid-eighties, but their catches were never monitored by Taiwan,China. This fleet is currently monitored through the IOTC Sampling Schemes in Phuket, Penang and Colombo. Recent estimates are close to 30,000 tonnes.

IUU Deep-freezing longliners operating under several flags: 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 50,000 tonnes.

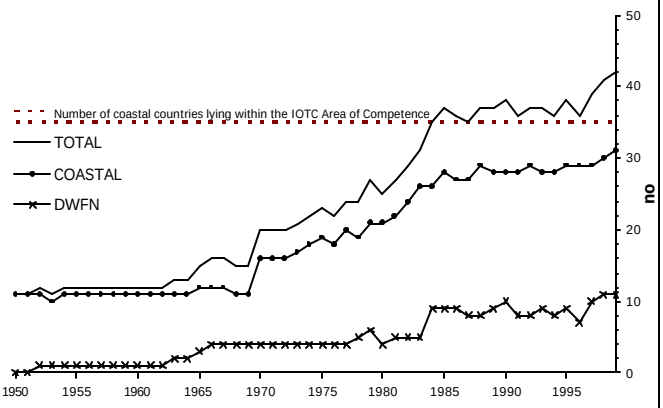


Figure 8: Number of flags for which catches are available in the IOTC NC database:

Ex-Soviet purse seiners 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

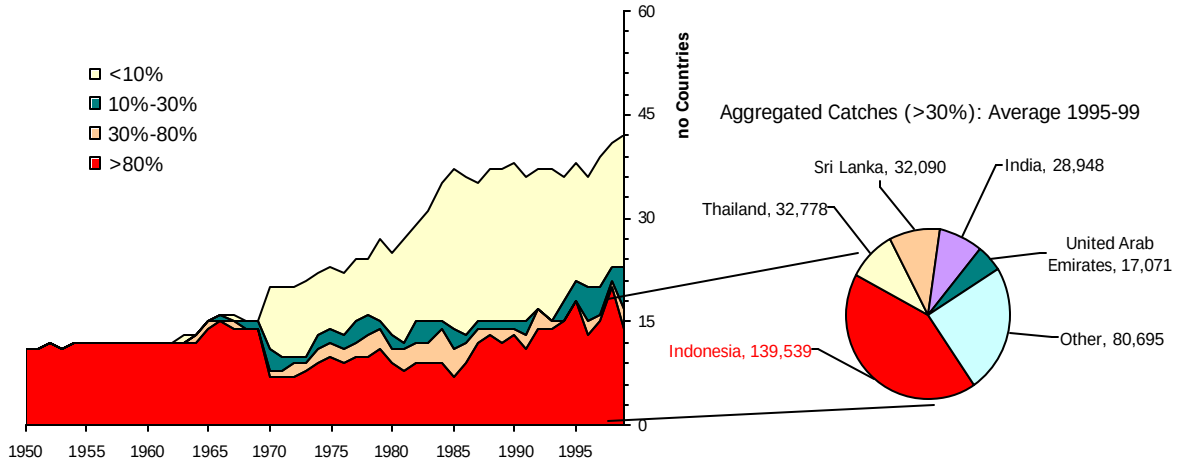


Figure 9: Number of countries for which catches of tuna species are available in the IOTC NC database according to the percentage of the catches reported as species aggregates

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 (the 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;

- 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 accounted for with domestic catches,
- The Indonesian statistics are not thought to cope fully with the sharp increases in the number of longliners operating under the Indonesian flag in recent years (especially since 1995)

New estimates conducted by the Secretariat this year resulted in catches above 130,000 t in recent years. More than 30% of the catches reported aggregated to the IOTC in recent times thus come from Indonesia. Furthermore, high proportions of tropical tunas and billfish are caught in Indonesia, species which are managed by the IOTC.

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

Sri Lanka, India and **United Arab Emirates**: 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.

ALL SPECIES

- Billfish
- Neritic Tunas
- Temperate Tunas
- Tropical Tunas

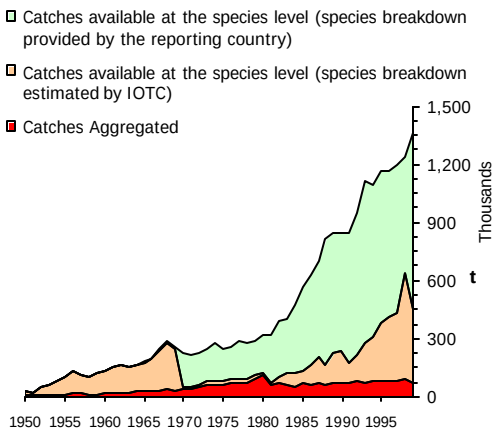


Figure 10: Amount of catch reported at the species level and aggregated

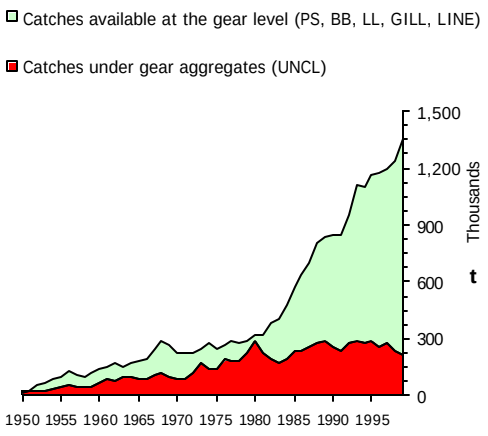


Figure 11: Amount of catch reported at the gear level and aggregated

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.

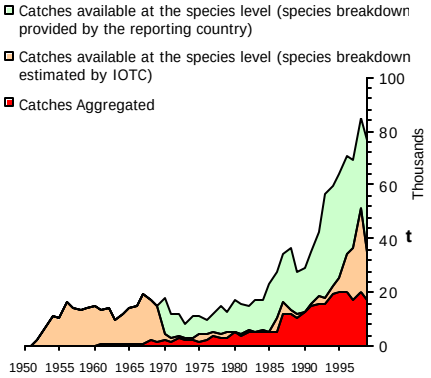
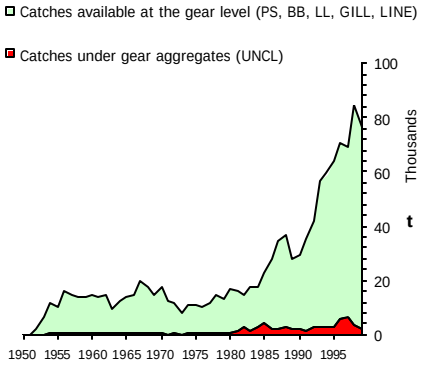
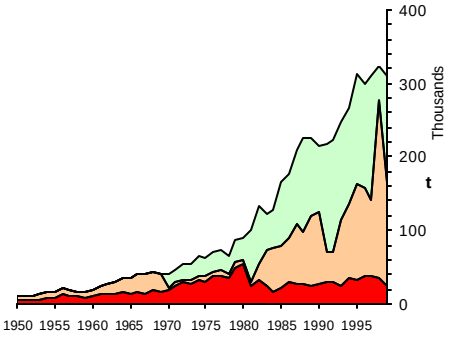
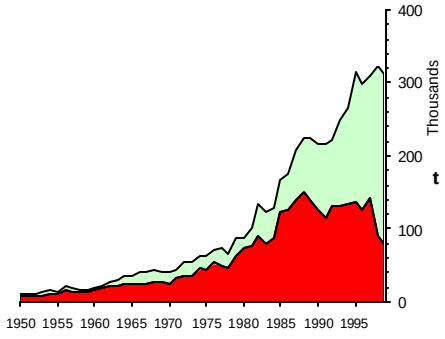
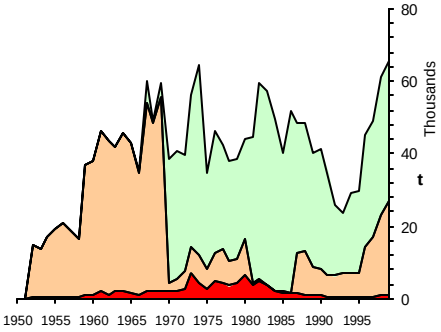
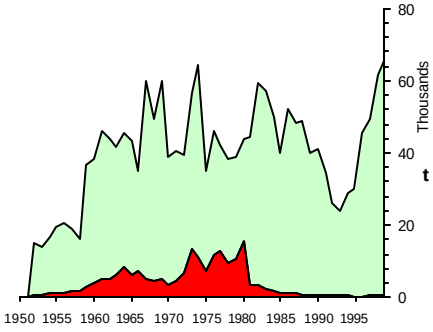
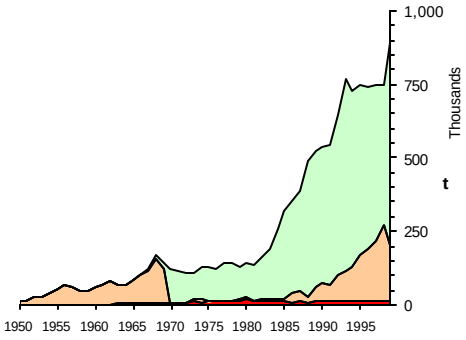
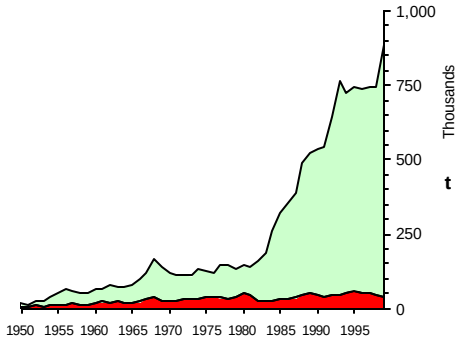
The amount of catches reported under species aggregates have been increasing since 1970, more rapidly since the early eighties. The main reason for this increase is the growing number of non-reporting fleets operating in the Indian Ocean, using mainly longlines. The Secretariat has been using different sources to estimate the catches of these vessels (sampling programmes, foreign tuna vessels activity, vessel record), although the series are not yet thought complete.

Around20% 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. India, Oman and Sri Lanka 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 over time. 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.

Neritic tunas: Species and gear aggregation are widespread within this group. Current levels of aggregation have been close to 60% and 40% as regards species and gears, respectively. India, Thailand, and the United Arab Emirates 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.

	Figures 12-15: Amount of catch reported at the species level and aggregated	*Figure 16-19: 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**)		

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.

BOX 5 : DATA QUALITY

ALL SPECIES

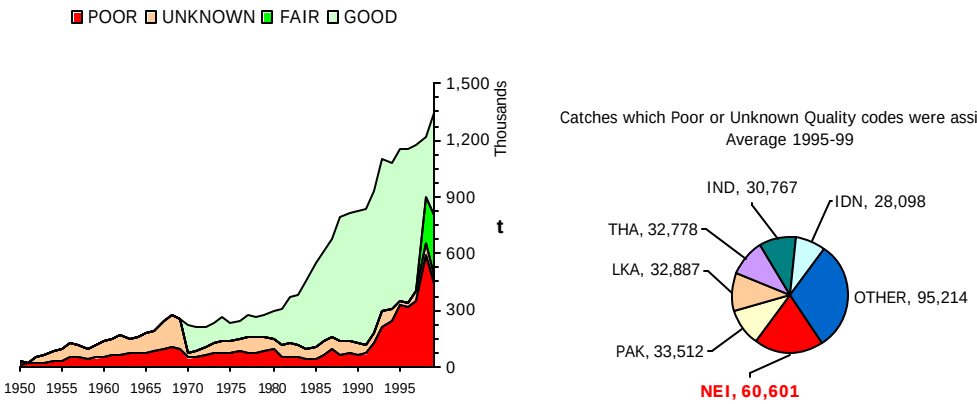


Figure 20: Presumed quality of the data in the IOTC nominal catches database and main fleets which catches are thought inaccurate or uncertain in recent years.

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

- **GOOD**: 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.
- **FAIR**: The catches recorded in a given stratum are presumed to fairly represent the actual catches in that stratum. 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.
- **UNKNOWN**: 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.
- **POOR**: The catches recorded in a given stratum are thought inaccurate as major inconsistencies were found during validation and verification or to 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:

Non-reporting DWFNs (IUU): 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.

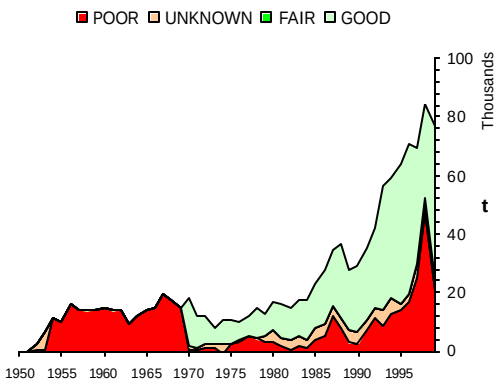
Pakistan, Sri Lanka, Thailand, India and Indonesia: The either unreliable or highly aggregated data available from these countries needed to be re-estimated by the Secretariat, sometimes using information for years far from those which the catches had to be estimated. Thus, gear and/or species breakdowns 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.

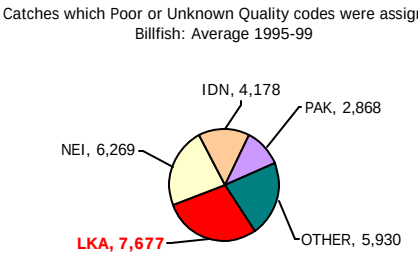
The amount of catches with a poor quality code is of concern, especially for **billfish** and **neritic tunas**. Poor quality catches amount to more than half the total catches in recent years for these categories. The fleets that contributed mostly to this uncertainty are from **Thailand** and **India**, for the neritic tunas, and **Sri Lanka** and **IUU**, 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 vessels from non-reporting DWFNs (**IUU**) is again the reason for these uncertain catches.

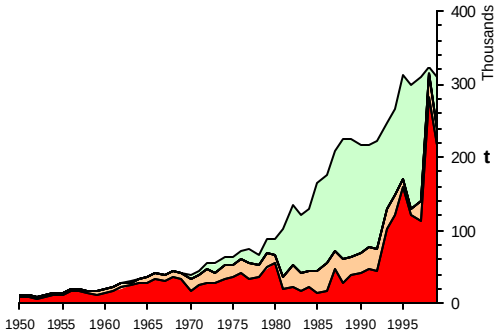
Figures 21-24: Presumed quality of the data in the IOTC nominal catches database and main fleets which catches are thought inaccurate or uncertain in recent years.

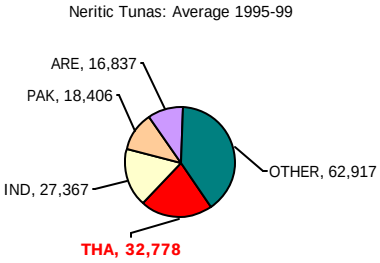
BILLFISH



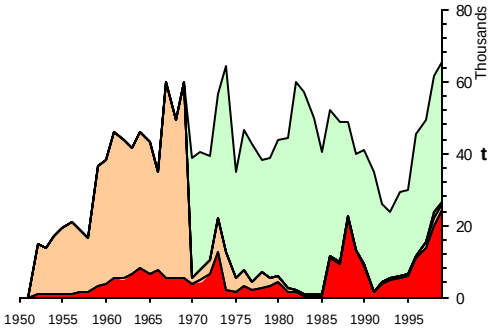


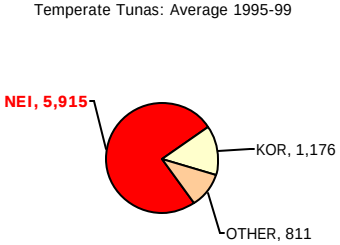
NERITIC TUNAS



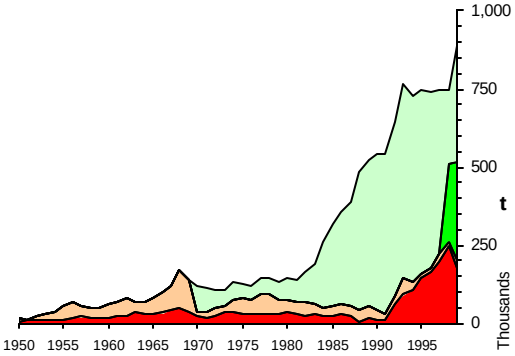


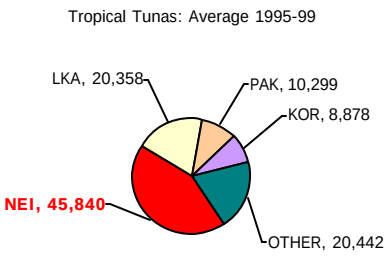
TEMPERATE TUNAS





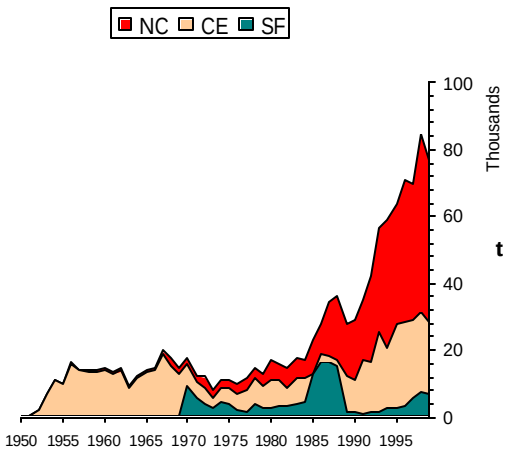
TROPICAL TUNAS



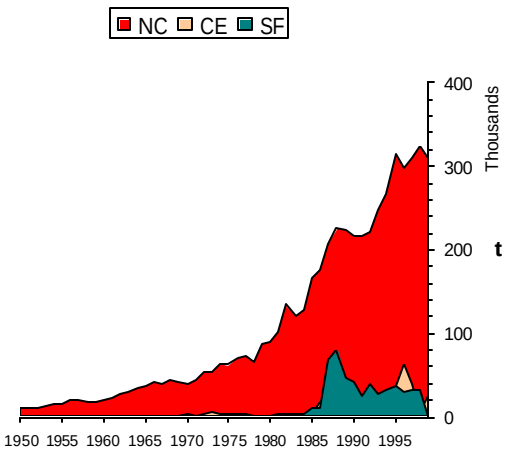


BOX 6 : DATA COMPLETENESS

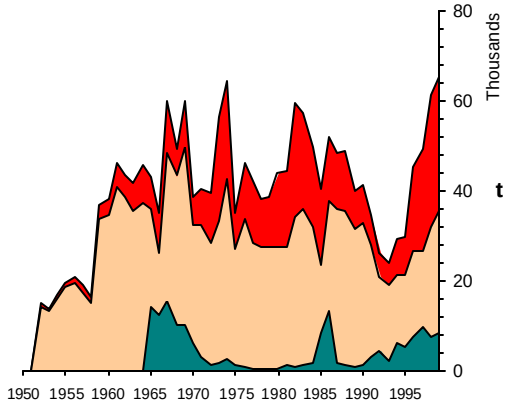
BILLFISH



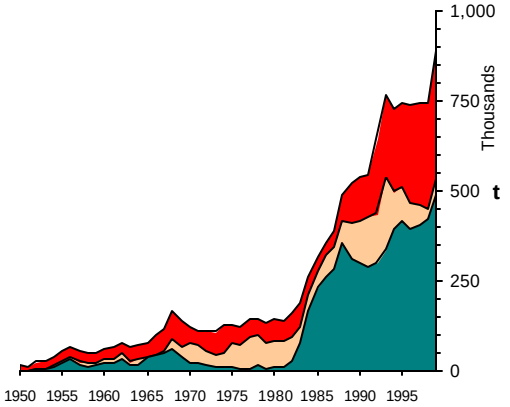
NERITIC TUNAS



TEMPERATE TUNAS



TROPICAL TUNAS



Figures 25-28: 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

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 wh enever one or more records were found in the Catch and Effort and/or Size Frequency databases for that species, gear, year and country.

The Charts above and in the next page are optimistic about the proportion of the total catches for which records in the IOTC catch and effort and size frequency databases are available.

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

BILLFISH : Recent coverage rates amount to about 40% and 10% of catch and effort and size frequency data, respectively. The low rates are due to:

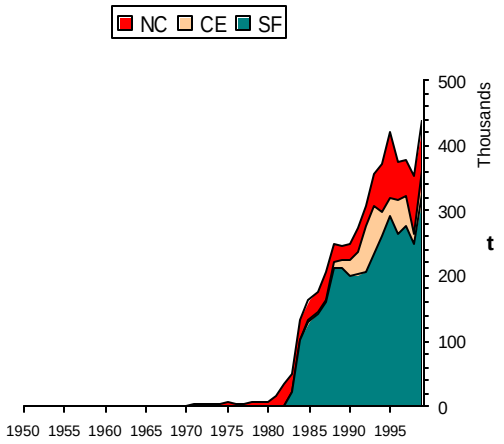
- Non-reporting of statistics for important **longline fisheries** operating in the Indian Ocean: Fresh tuna longliners from **Taiwan,China** and **Indonesia** and deep-freezing longliners (DWFNs) operating under several flags (mainly **Belize** , **Honduras**, **Equatorial Guinea** and **Panama**)
- 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, t o a lesser extent, all marlin species.

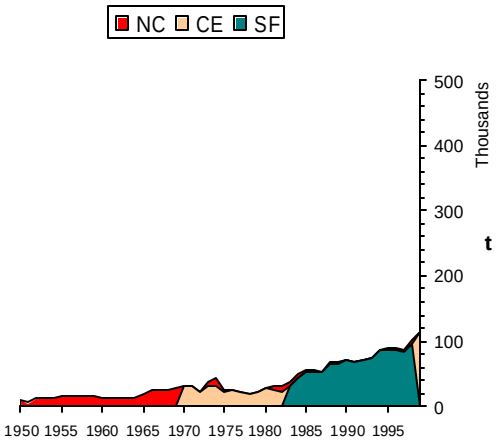
- Lack of catch and effort and size frequency data from **artisanal fisheries**, especially **gillnets** and **troll lines**. The Indo-Pacific sailfish and, to a lesser extent, the black and Indo-Pacific blue marlins are the species most affected.

Figures 29-34: 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.

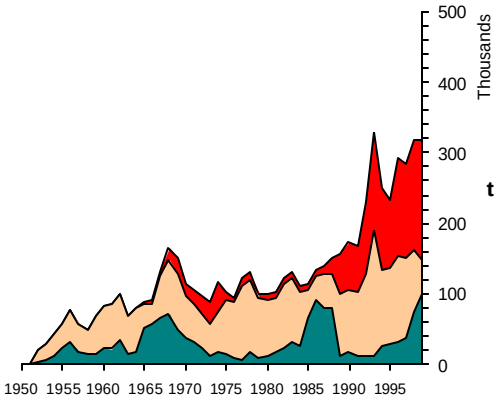
PURSE SEINE



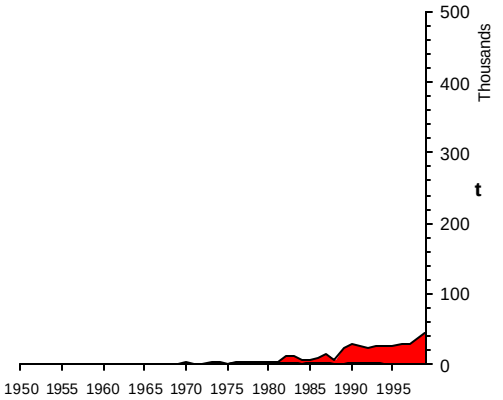
POLE AND LINE



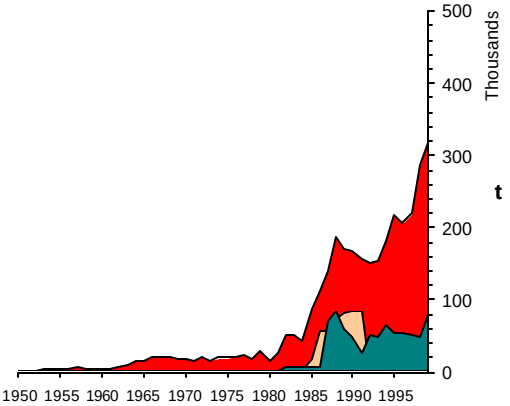
LONGLINE



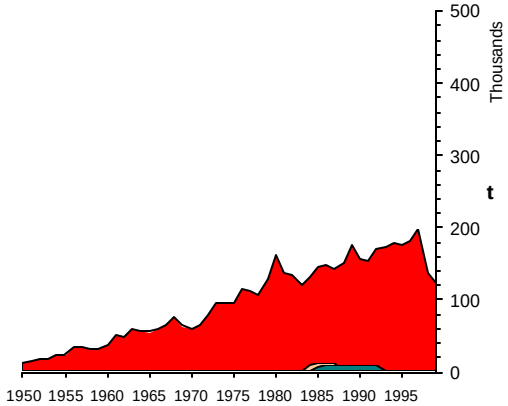
LINE (HAND AND TROLL LINES)



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.

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

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 of IUU fleets operating in the Indian Ocean, mainly **longliners** (**Taiwan,China** and **FoC**) but also purse seiners (**Ex-Soviet purse seiners**).

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 those before those 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: VESSEL RECORD COMPLETENESS

Table 7: Total number of ships in the IOTC Vessel Record Database according to the gear used and availability of complementary information regarding vessel identification and characteristics

	Total number of									
GEAR	Ship	Lloyds'	NRN	RCS	HOME	LOA	GRT	GT	CC	EPOW
Purse seine	160	49	97	116	75	149	124	19	119	124
Longline	3393	14	1156	856	1207	1540	2618		95	260
Supply vessel	9		9	9	1	9	4			2
Other	128		2	86	83	125	124			76
Unclassified	380			1	1	3	3		1	
Total	4070		1264	1068	1367	1826	2873	19	215	462

VESSEL IDENTIFICATION

Lloyds': Number of Registration Lloyds'
NRN: National Registration Number
RCS: Radio Call Sign
HOME: Homeport

VESSEL CHARACTERISTICS

LOA: Length Overall
GRT: Gross Registered Tonnage
GT: Gross Tonnage
CC: Carrying Capacity
EPOW: Engine Power

NOTES: Under unclassified gears and flags are recorded mainly ships reported as previous ships. Ship names were in most cases the only information provided.

Single ships operating under different flags over the time have been accounted for separately under each flags.

The number of vessel records available in the IOTC database is shown in the Tables 6 and 7. The completeness of the records is shown through indication of the number of vessel characteristics and identification currently available.

More than 1,000 new records were input during 2001, mainly originating from the IOTC sampling schemes in Thailand and Penang and countries reporting lists of call or activity of vessels within their Economic Exclusive Zones. More than 4,000 vessel records are currently available in the IOTC database.

Table 8: Total number of ships in the IOTC Vessel Record Database according to the flag under which they were reported to operate

FLAG	Ship
Indonesia	1099
China	244
Taiwan,China	771
Japan	609
China	244
Republic of Korea	147
Belize	137
Australia	136
Spain	97
Honduras	82
France	67
Philippines	36
Equatorial Guinea	28
Panama	28
Seychelles	16
Pakistan	15
Portugal	10
Netherlands Antilles	7
Cote d'Ivoire	6
Thailand	6
Mauritius	5
Iran	4
Cambodia	4
Liberia	4
St.Vincent & the Grenadines	4
Kenya	2
United Kingdom	1
Italy	1
Sri lanka	1
Malta	1
Mozambique	1
Russia	1
Vanuatu	1
Other Flags	12
Unclassified	487