
STATUS OF IOTC DATABASES FOR TROPICAL TUNAS

Prepared by: IOTC Secretariat

Introduction

This document describes the status of the information available on tropical tunas in the databases at the IOTC Secretariat as of 30 June 2007. It covers three main types of information:

Nominal catches which are highly aggregated statistics for each species estimated per fleet, gear and year for a large area. If these data are not reported the Secretariat estimates a total catch (eg. CATCH 2005) from a range of sources including:

- partial catch and effort data
- data in the FAO FishStat database
- catches estimated by the IOTC from data collected through port sampling
- data published through web pages or other means
- data reported by other parties on the activity of vessels (IOTC Resolution 05/04) or on imports of bigeye tuna from vessels under the flag concerned (IOTC Resolution 01/06)

Catch and effort data: refer to the fine-scale data – usually from logbooks, and reported per fleet, year, gear, type of school, month, grid and species. Information on the use of fish aggregating devices (FADs) and supply vessels is also required.

Length frequency data: Individual body lengths of IOTC species per fleet, year, gear, type of school, quarter and 5 degrees square areas.

Nominal Catch (NC) data

The nominal catch data series of yellowfin (YFT), bigeye (BET) and skipjack (SKJ) tunas are considered to be almost complete since 1950. Bigeye tuna are mainly caught by longlines and purse seines, while catches of yellowfin tuna are reported mainly by purse seines, longlines and gillnets and skipjack tuna by purse seines, gillnets and pole and lines (Figures 1-3, Tables 1-5). Large increases in the catches of these three species have been noted since the mid-1980's.

Figure 1: Catches of yellowfin tuna (YFT) per gear type and year in the IOTC Area from 1966 to 2006

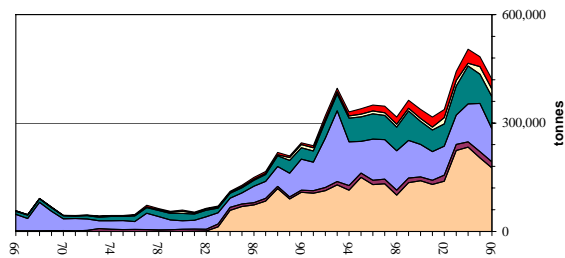
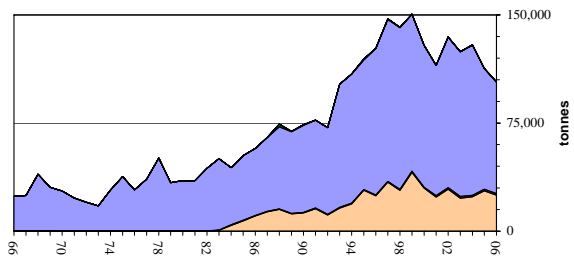


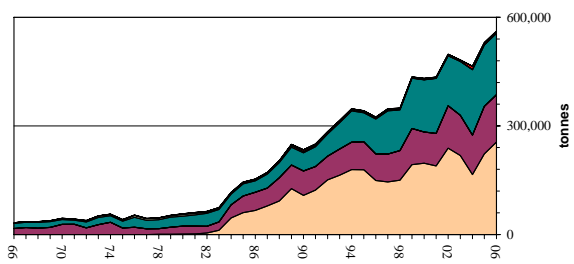
Figure 2: Catches of bigeye tuna (BET) per gear type and year in the IOTC Area from 1966 to 2006



Legend:

- Purse Seine
- Longline
- Pole and Line
- Gillnet
- Hand Line
- Troll Line

Figure 3: Catches of skipjack tuna (SKJ) per gear type and year in the IOTC Area from 1966 to 2006

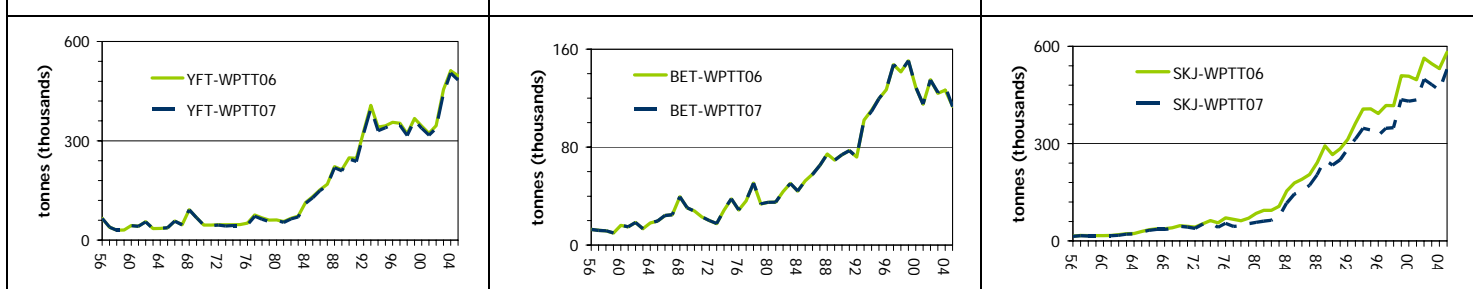


Note that the catches series estimated for 1950-2006 include catches assigned to each species after allocation of species aggregates to individual species by the Secretariat.

The Secretariat conducted several reviews of the NC database during 2006-07. While the changes to the estimates of the catches of yellowfin tuna and bigeye tuna were quite minor (Figure 4-5), the time series of catches estimated for the skipjack tuna in 2007 was markedly lower than that estimated in 2006 (by around 10%). One of the main reasons for this change was because in 2007 Indonesia reported for the first time a complete set of nominal catches for its artisanal fisheries including the catches for individual species in 2004 and 2005. This information was used to assign catches to species - which was not possible in the past. In previous years, the data that were reported as 'unspecified tuna' (as much as 90,000 t in recent years) were thought to be comprise mainly skipjack tuna with lesser amounts of longtail tuna and kawakawa. The latest information indicates that there is much less skipjack tuna in this category, consequently the catch estimates are lower.

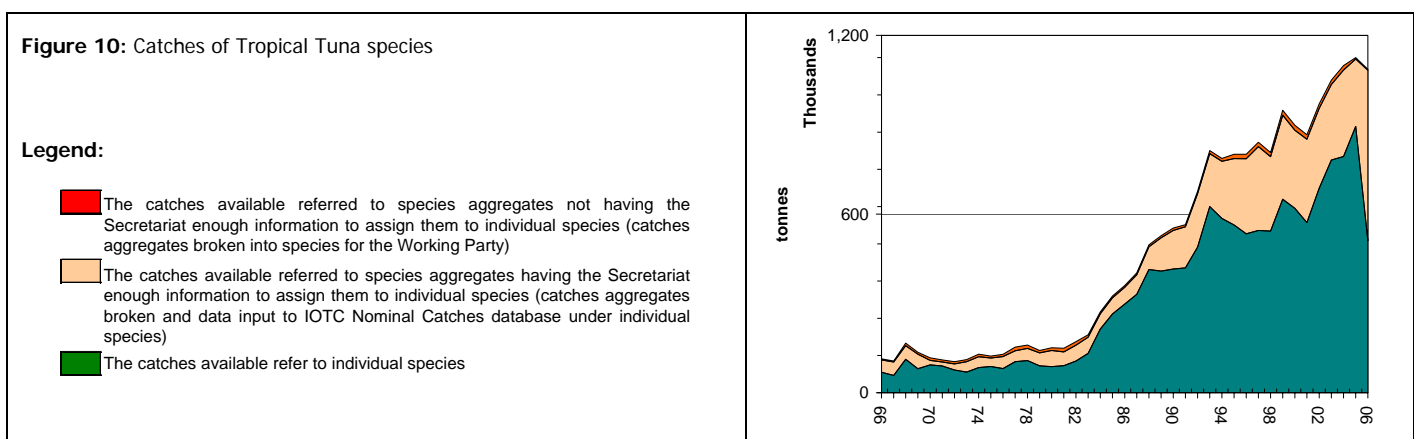
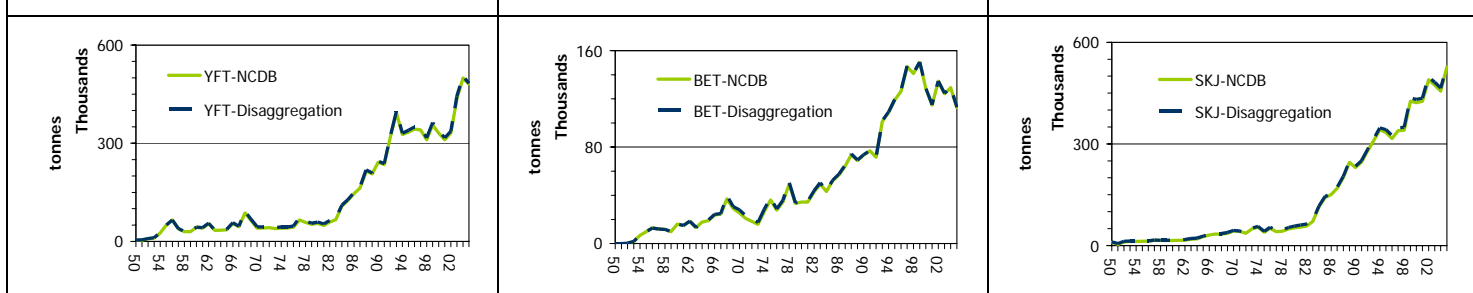
The Secretariat conducted a review aiming to estimate catches when data were not available by species or gear in the IOTC database (IOTC-2004-WPTT-06). While there are still significant amounts of catches not reported by gear the amounts of catches not reported by species are, for the above reasons, considerably lower (Figure 10). Table 2 shows the figures by species used by the WPTT in 2003, 2004, 2005, 2006 and current catch estimates. Figures 7-9 show the changes in the catch estimates after the disaggregation exercise in which aggregated data were assigned to species. This led to only very small changes in the catches of skipjack tuna, yellowfin tuna and bigeye tuna.

Figure 4: Yellowfin tuna catch estimates in 2007 versus catch estimates in 2006 (1956-2005) **Figure 5:** Bigeye tuna catch estimates in 2007 versus catch estimates in 2006 (1956 to 2005) **Figure 6:** Skipjack tuna catch estimates in 2007 versus catch estimates in 2006 (1956-2005)



Note: Ibid. footnote Figures 1-3

Figure 7: Catches of Yellowfin Tuna in the IOTC database versus those obtained after the disaggregation of catches recorded under species aggregates (1950-2006) **Figure 8:** Catches of Bigeye Tuna in the IOTC database versus those obtained after the disaggregation of catches recorded under species aggregates (1950-2006) **Figure 9:** Catches of Skipjack Tuna in the IOTC database versus those obtained after the disaggregation of catches recorded under species aggregates (1950-2006)



Although the quality of the available information on the three tropical tunas is generally good, the representativeness of the data is compromised by:

Some catch data not being available: several countries were not collecting fishery statistics, especially in years prior to the early 1970's, and others have not reported their statistics to IOTC. In most cases, the catches of tropical tunas in those countries were probably minor.

Poor resolution of catch data: catches of tunas and tuna-like species are sometimes reported in an aggregated¹ form. The Secretariat estimates the species and gear composition of these aggregates using a range of information but the accuracy of the estimates is probably low. The amount of catches received in aggregated form that the Secretariat consequently has to assign to gear and/or species has been accounting for up to 20% of the total catches in recent years (Figure 10).

¹ This is the case notably when data are not reported to the Secretariat and have to be taken from the FAO nominal catch database.

Considerable uncertainty associated with the catch estimates from the following fisheries:

- **Yemen artisanal fisheries:** The catch series for this fishery was reviewed in 2005 and the database updated with the new estimates. In 2007 the Secretariat conducted a mission to Yemen to assess the status of fisheries data collection and processing. Some of the information collected during this mission was confounding, e.g. for one year, the catches of yellowfin tuna ranged from 20,000 t and 60,000 t depending on the reporting source. The information collected during the mission is not considered sufficient for the Secretariat to revise the current catches for Yemen. The amount of data on catch and effort is, however, likely to improve in the future due to a joint project that has been initiated involving the Ministry of Fish Wealth in Yemen, the World Bank and the European Community. One of the main activities of the Project is to set up data collection and processing systems for Yemen's artisanal fisheries within the following five years. The IOTC-OFCF Project is currently evaluating if the collection of catch, effort or length frequency data in Yemen would still be required.
- **Indonesia artisanal fisheries:** Catch estimates for some Indonesian fisheries continue to be uncertain. For example, in 2005 the catch estimate for yellowfin tuna caught by Indonesia's artisanal fisheries was reported to the IOTC Secretariat as 40,000 t; at the same time a catch of only 2,000 was reported to the FAO. In this case, the amount reported to the FAO is consistent with the catches reported for this species in previous years and therefore the FAO catches were used instead of the new reported catches. Indonesia, however, has indicated that the catches of yellowfin tuna that have been recently estimated are more reliable than the previous catches because they are based upon the data collected through a more thorough sampling scheme. This matter needs to be resolved as soon as possible as it has implications for the accuracy of the entire catch history of yellowfin tuna.
- **Sri Lankan gillnet (and longline) fishery:** The IOTC-OFCF Project signed an agreement with the National Aquatic Resources and Development Agency of Sri Lanka in 2004 to allow for an extension of the sampling activities in this country. The results issuing from this program in 2005 and 2006 suggest that the catches of tropical tunas, mainly skipjack tuna and yellowfin tuna, recorded in the IOTC database for the decade prior to 2005 are likely to be overestimates.
- **Fresh tuna longliners based in Indonesia:** The data collected since June 2002 has allowed the estimation of catches of longline vessels based in Benoa for the period 2003--2006. The catch series before 2002 is considered uncertain.
- **Other fresh tuna longline fleets:** Although the catches of fresh tuna longline vessels based in various ports of the Indian Ocean were re-estimated from data coming from past or recent sampling schemes, they are generally considered to be of poor quality, especially for those fleets operating from ports not covered by sampling schemes, and where past catches have been estimated using recent catch levels. Notably, the collection of catch, effort and size data from foreign fresh-tuna longline vessels based in Phuket (Thailand) has been discontinued after the termination of the IOTC-OFCF Project. The Secretariat has also received unconfirmed reports indicating that many of the fresh-tuna longliners that were previously based in Indonesia have reflagged and moved to other areas in the Indian Ocean. It is important that the Secretariat continues to receive data from these vessels.

Seventy eight longliners from India have been operating in the Indian Ocean since 2005: India reported preliminary catches for these vessels indicating that the catches were to be updated in the early future; in the mean time, the Secretariat estimated catches for these vessels using catch rates for the Taiwanese fresh-tuna longline fleet. The new catches estimated, recorded as NEI-ICE, are considered to be very uncertain.
- **Deep-freezing longline fleets:** The Secretariat re-estimated new catches for the period 1992-2006 using new information collected during 2007. These estimates remain uncertain due to the many assumptions made in estimating the total catches and species breakdown. The number of vessels operating under flags of non-reporting countries has decreased

markedly since 2001. The reason for this decrease is not fully known and revisions to the catch estimates may be undertaken when more information become available.

The catches recorded for the 14-25 longliners operating under the **Philippines** flag are considered to be incomplete as the amounts of Indian Ocean bigeye tuna imported from Philippines by Japan and other countries under the IOTC Bigeye Tuna Statistical Document Programme for 2002-05 are higher than those reported by Philippines as total catches.

- **Purse seiners:** The catches of 6 to 11 **former Soviet Union** purse seiners, operating under unknown flags in recent years, are not available for 1995-1997 and 2003-2006. Total catches and effort for 1998-2002 were reported in 2003 for this fleet but the new data did not include catch by species and type of school. Since September 2005, six of the former Soviet Union purse seiners have been operating under the flag of Thailand and one under the flag of Equatorial Guinea.

Between three and six large industrial purse seiners have been operating under the flag of **Iran** since 2001. The catches for these vessels are thought to be incomplete for some years as it is likely that only the catches within the EEZ of Iran and those unloaded in ports in Iran are available.

Catch-and-Effort (CE) data

Catch-and-effort records are available for the main fleets fishing for tropical tunas in the Indian Ocean (Figures 11-15), namely pole and line (SKJ and YFT), purse seine (SKJ, YFT and BET) and longline (BET and YFT). Some gillnet fisheries produce substantial catches of tropical tunas, but the contribution of other gears to the total catches is small.

Pole and line: Catch-and-effort statistics from the Maldives are available by species, month and atoll for 1970-1993. Only catches and effort by species, year and atoll are available for 1993-2001. Baitboat catch and effort data are not available from 2002.

Longline: Catch-and-effort statistics are available since 1952 for Japan; since 1967 for Taiwan,China² and since 1975 for Korea. Catch and effort data for other fleets is scarce or inaccurate.

The catch and effort statistics provided by Japan and Taiwan,China are generally considered to be accurate. Nevertheless, some inconsistencies were found when comparing nominal catches and catch and effort data for Taiwan,China and Japan (Figures 16-19). These would indicate that either nominal catches or catches in the CE are not accurate or that size data are incomplete.

Korean CE statistics are considered to be inaccurate as many inconsistencies have been found in the data, e.g. when comparing the catches in this database with those reported as nominal catches. The catches of tropical tunas in recent years are, however, very low.

Purse seine: Catch-and-effort statistics are complete for European-owned purse seiners and those monitored by scientists from Europe and Seychelles. Statistics are also available for other fleets including the former Soviet purse seine fleet (1998-2002; under Belize and Panama flags; 2005-06 for vessels under the Thailand flag), Mauritius and Japan. As is the case for the NC data, the CE data for the purse-seine fleet formerly under the Soviet Union flag are not considered to be accurate, especially the area fished, species composition and type of school fished information. No catch and effort data are available for the Iran purse seine fleet.

Gillnet: Few CE data are available for gillnet fisheries. This is of concern because gillnets have been used in both coastal waters and on the high seas in recent years. This refers mainly to the gillnet fisheries of Iran, Pakistan and the gillnet/longline fishery of Sri Lanka.

² Taiwan,China refers to Taiwan Province of China.

Figures 11-15: Amount of catches (NC) per gear and year for which catch and effort (CE) and size frequency (SF) data are available in the IOTC Databases

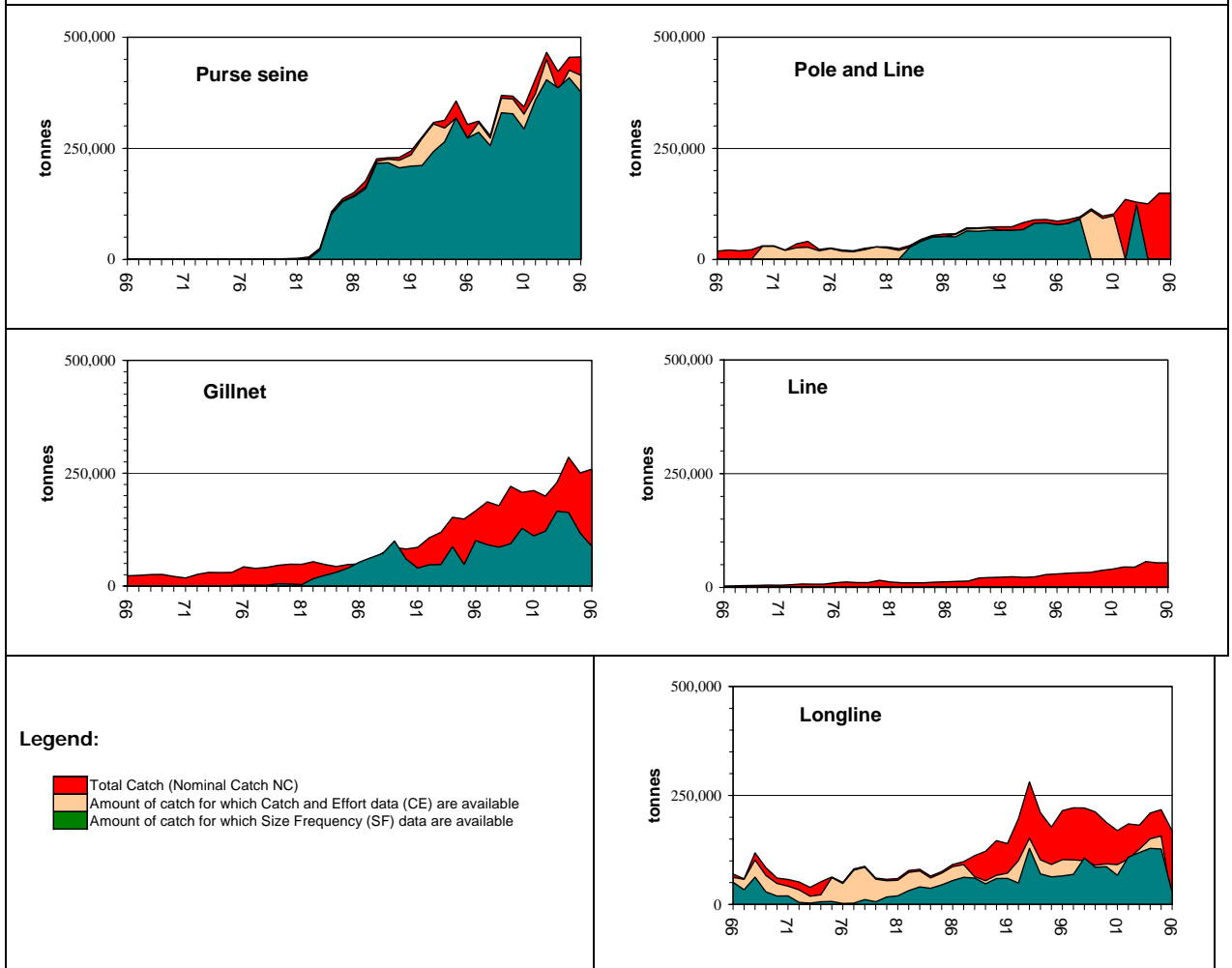


Figure 16-17: Average weights of yellowfin tuna per year estimated using available size data and catches available from the NC and CE databases and number of specimens from the CE database for the Japanese and Taiwanese longline fleets.

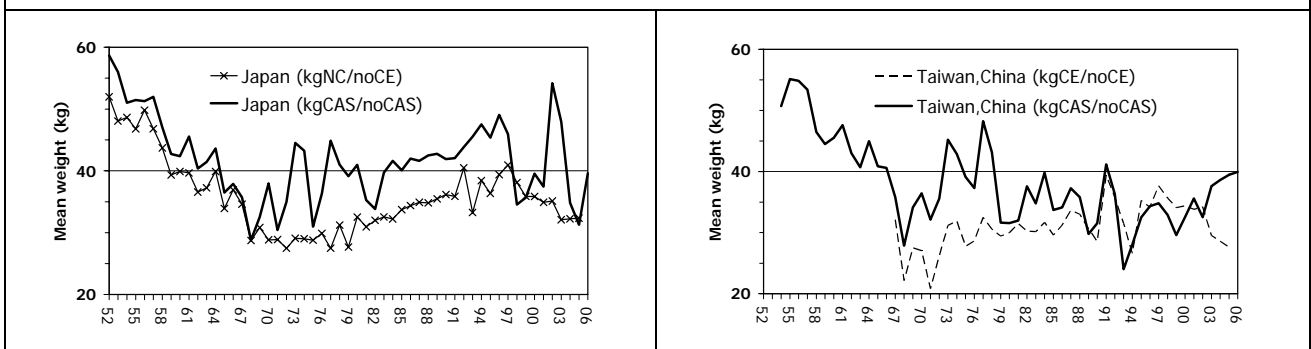
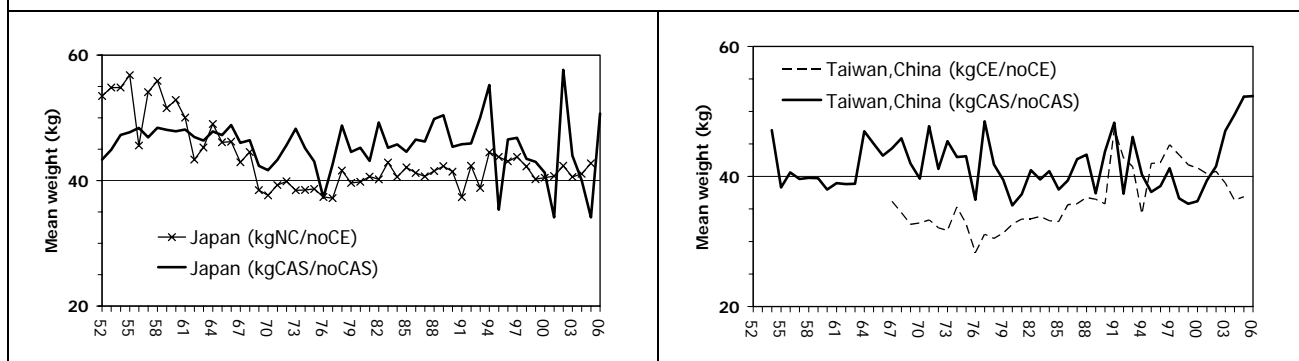


Figure 18-19: Average weights of bigeye tuna per year estimated using available size data and catches available from the NC and CE databases and number of specimens from the CE database for the Japanese (left) and Taiwanese (right) longline fleets.



Size-Frequency (SF) data

Purse seine (Figure 11): The quality of the data is considered to be good for purse seine fleets under European monitoring. Little or no data are available for Iranian, Japanese and ex-Soviet purse seiners. The size frequency statistics of Mauritian purse seiners since 1986 is complete.

Baitboat (Figure 12): The completeness and quality of the sampling on baitboat fisheries (Maldives) is considered to be good up to 1998. No data are available for 1999-2002 and since 2004.

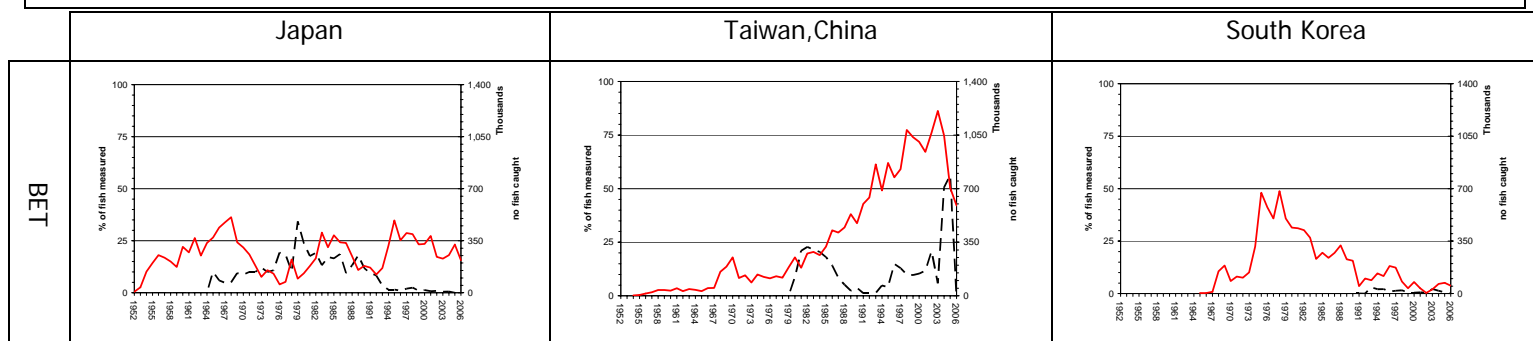
Longline (Figure 15): Only Japan has been reporting size-frequency since the beginning of the fishery. In recent years, the numbers of fish being measured is very low in relation to the total catch; furthermore they have been decreasing year by year (Figure 20-23). Coverage rates in some areas are very low. The size-frequency statistics available from Korea are inaccurate and this limits their use (Figure 22-25). The recovery of size data from port sampling of fresh tuna longline fleets operating in Thailand and Indonesia continued in 2005 and 2006. Coverage rates for the Indonesia are around 40% (number of fish). Catch-at-size tables were estimated for fresh tuna longline vessels operating in Indonesia during 2003-06 and other ports for 1998-2006.

Taiwan,China provided size data for yellowfin tuna and bigeye tuna by year, quarter and 10 degrees latitude by 20 degrees longitude areas for 1980-2005 (Figure 21-24).

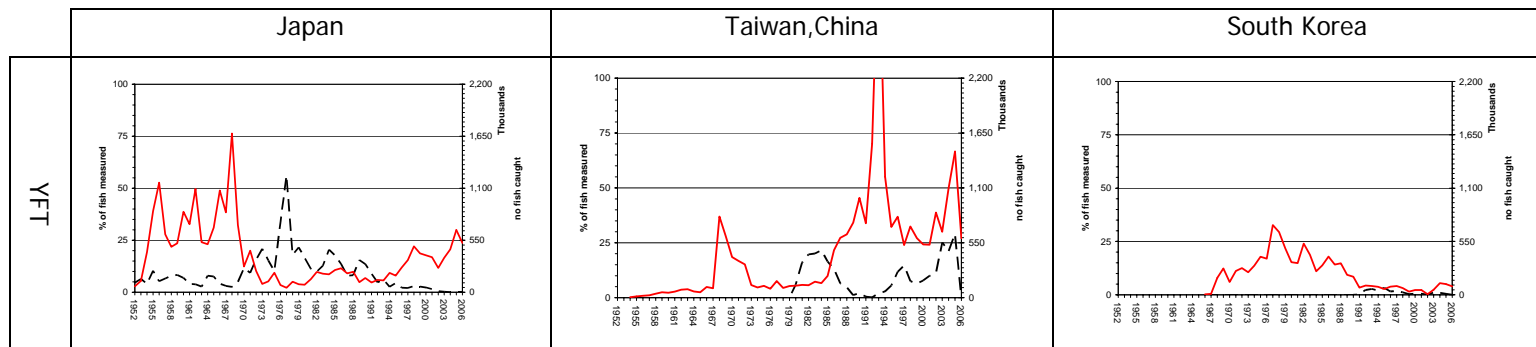
Gillnet (Figure 13): Although size data are available for some important gillnet fisheries (including Iran, Sri Lanka and Oman³) sample sizes are very low.

Other gears Few size data are available for other gears (Figure 14).

Figure 20-25: Proportion of Bigeye Tuna (above) and Yellowfin Tuna (below) measured (in number expressed as percentage, left abscissa axis) and total number of fish measured (right abscissa axis) per year for 1952-2006: Main Longline Fleets



³ Size frequency data of yellowfin tuna was collected during 2003 in Oman

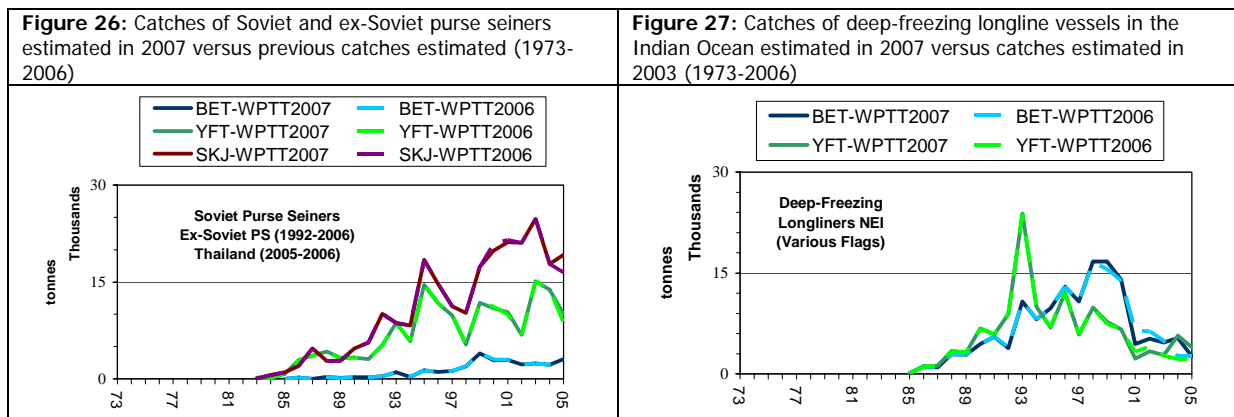


Estimation of catches of non-reporting fleets

The estimates of catches of non reporting fleets were updated in 2007:

The high number of non-reporting fleets operating in the Indian Ocean since the mid-1980s has led to large increases in the amount of catch that needs to be estimated. This reduces confidence in the catch estimates for yellowfin tuna and bigeye tuna, and to a lesser extent, skipjack tuna.

- Purse seine** (Figure 26): Catches for the six former Soviet Union purse seiners, currently under the Thailand flag, were estimated for January-August 2005-and those for the remaining purse seiner (Equatorial Guinea) for 2005-2006. Total catches were estimated using the number of vessels available, the average catches of the former Soviet Union purse seiners in previous years, and average catches available for other fleets for 2005-06. Total catches were assigned to species and type of school fished according to data available for Thailand purse seiners during the same period (2005-2006). The amount of catch that the Secretariat has to estimate for this fleet has decreased considerably in recent years. Currently only one vessel is operating under the flag of a non-reporting country.

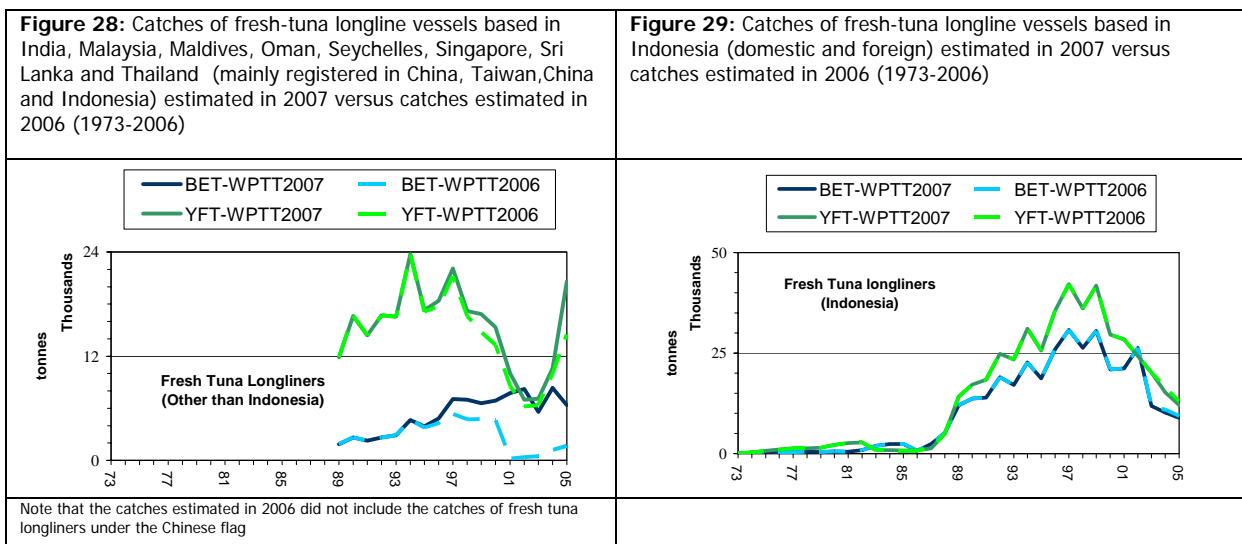


- Deep-freezing longline** (Figure 27): The catches by large longliners from several non-reporting countries were estimated using IOTC vessel records and the catch data from Taiwanese or Spanish longliners, based on the assumption that most of the vessels operate in a way similar to the longliners from Taiwan,China or Spain. The collection of new information on the non-reporting fleets during the last year, in particular the number and characteristics of longliners operating, led to improved estimates of catches. The number of vessel operating since 1999 has decreased and this has led to a marked decrease in catch levels. The reason for this decrease in the number of vessels (and catches) operating in the Indian Ocean is not fully explained. Nevertheless, this decrease is somewhat proportional to an increase in the number of vessels recorded under other flags whose catches are available, such as Philippines, Taiwan,China and the Seychelles.

- Fresh tuna longline** (Figures 28-29): Fresh tuna longline vessels, mainly from China, Taiwan, China, India and Indonesia, have been operating in the Indian Ocean since the early 1970's. The catches of these fleets were, up to 2006, estimated by the IOTC Secretariat by using information from the following three sources:
 - Catches reported from the flag countries: Although China reported total catches for its longline fleet they were not reported by gear (fresh-tuna longline or deep-freezing longline). The Secretariat estimated the catches of fresh-tuna longliners by using the total catches reported, the numbers of fresh-tuna longline vessels provided by China and catch rates for fresh-tuna and deep-freezing longlines available from other fleets.
 - Information on catches and vessel activity collected through several catch monitoring schemes implemented in the main ports of landing for these vessels, involving the IOTC-OFCF⁴ and/or institutions in the countries where the fleets are based and/or foreign institutions. This applies to Indonesia (2002 - to-date), Thailand (1998 – to-date), Sri Lanka (2002-03), Malaysia (2000-06), Oman (2004-05) and Seychelles (2000-02).
 - Information available on the number of fresh-tuna longline vessels operating in other ports or on the activity of those vessels (e.g. the number of vessel unloadings). This applies to India (2005-06), Indonesia (1973-2001), Thailand (1994-97), Sri Lanka (1990-2001; 2004-05), Malaysia (1989-99), Singapore and Maldives (recent years). The catches in these ports and years were estimated from the known/presumed levels of activity of the vessels and the average catches obtained in ports covered through sampling.

In 2006 Taiwan, China provided total catches for its longline tuna fleet operating in the Indian Ocean for the period 2000 to 2005. The catches for 2006 were provided in 2007. The catches provided are higher than those estimated by the IOTC Secretariat for most years. The new catches provided for 2001-05 were used to replace those in the IOTC database. This was done on the assumption that vessels from Taiwan, China have been operating in ports from non-reporting countries and their catches have not been accounted for in previous estimates.

The catches for fleets other than Taiwan, China for 1973-2006 and for Taiwan, China in years prior to 2001 were estimated as explained in the two bullet points above.



⁴ Overseas Fisheries Cooperation Foundation of Japan

Data related issues for tropical tunas

Areas of concern:

- Poor knowledge of the catches, effort and size-frequency from fresh tuna longline vessels, especially from Taiwan,China, before 1998, and India since 2005.
- Poor knowledge of the catches, effort and size-frequency from non-reporting fleets of deep-freezing tuna longliners, especially since the mid-1980's.
- Lack of accurate catch, effort and size-frequency data for the Indonesian longline fishery before 2002.
- Poor knowledge of the species composition and size-frequency data for former Soviet Union purse seine boats.
- Poor knowledge of the catches, effort and size-frequency from industrial purse seiners operating under the flags of Thailand and Iran.
- Scarcity of data, especially size frequency data, for the Maldives hand line, troll line, gillnet and pole and line fisheries since 1998.
- Uncertainty about the catches, mainly gillnet, hand line and troll line, by domestic boats operating in Indonesia, Yemen and Sri Lanka.

Improvements have taken place in a number of areas. These include:

A better level of reporting: New NC, CE and SF datasets have been obtained for Sri Lanka domestic fisheries and Taiwan,China and Seychelles longline fisheries. *Taiwan,China provided detailed size data for its deep-freezing longline fleet for 1980-2005.*

Revision of the IOTC databases: Several revisions have been conducted during the last year on the IOTC databases. This has led to revised NC data for some countries.

An improved Vessel Record: More information has been obtained on the number and type of vessels operating under flags of non-reporting parties. This information comes mostly from various licensing schemes in the Indian Ocean and has become an important element in the estimation of the catches of non reporting fleets.

Improved estimation of catches of non-reporting fleets: The collection of historical and current information on the landings of small fresh tuna longliners in ports in the Indian Ocean has improved the accuracy of earlier estimates. The more complete Vessel Record also permitted the estimation by flag of the catches of deep-freezing longliners. The catches of the former Soviet Union purse seiners for 1998-2002 are considered to be more accurate.

Estimation of catch-at-size for Indonesia, China, Taiwan,China, Malaysia, Maldives, Oman and other fresh tuna longline fleets: The collection of size data in Thailand, Sri Lanka and Indonesia underpins the estimates of catch-at-size for fresh tuna longliners for 1998-2006 (longliners based in ports other than Indonesia) and 2002-06 (longliners based in Indonesia).

IOTC/OFCF sampling programmes: The collection of information on the activities of fresh tuna longliners landing in Phuket and Indonesia has continued during 2006. This has led to more complete and accurate estimates of the catches by these fleets. Other valuable data collected under these programmes include length frequencies (which will allow length-length, length-weight and weight-length relationships to be updated). Size data were also obtained for Sri Lanka (skipjack tuna and yellowfin tuna) artisanal fisheries since 2005.

The current status of the data for each of the tropical tuna species is summarised as follows:

YELLOWFIN TUNA (YFT)

Retained catches are generally well known; however, catches are uncertain for:

- many artisanal fisheries, notably those from Indonesia, Sri Lanka, Yemen and Comoros
- non-reporting industrial purse seiners and longliners (NEI), longliners of India and purse seiners of Iran.

Discards are believed to be low although they are unknown for most industrial fisheries, notably industrial purse seiners.

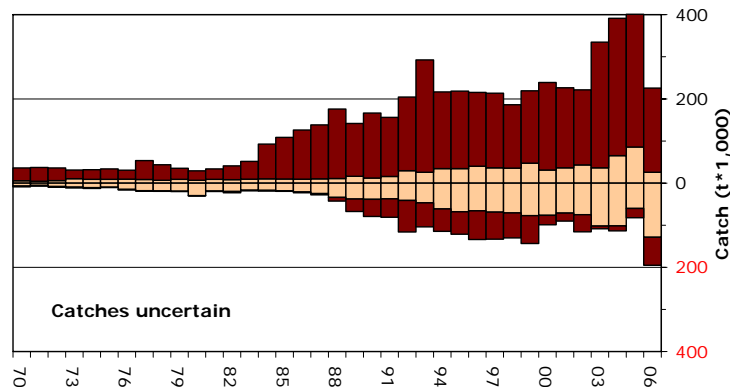


Figure. Uncertainty of annual catch estimates for yellowfin tuna. The amount of the catch below the zero-line has been categorised as uncertain according to the criteria given in the text. Light bars represent data for artisanal fleets and dark bars represent data for industrial fleets. Data as of October 2007

CPUE Series: Catch and effort series are available from various industrial and artisanal fisheries. Nevertheless, catch and effort are not available for important artisanal fisheries or they are considered to be of poor quality for the following reasons:

- poor quality effort data for the gillnet/longline fishery of Sri Lanka
- no data are available for the artisanal fisheries of Indonesia, Yemen and Comoros
- no data are available for the pole and line fishery of Maldives in recent years.

Trends in average weight can be assessed for several industrial fisheries but they are very incomplete or of poor quality for some artisanal gears, namely hand lines, troll lines, many gillnet fisheries (Yemen, Oman, Indonesia) and the pole and line fishery of Maldives in recent years.

Catch-at-Size(Age) table: This is available although the estimates are more uncertain in some years and some fisheries due to:

- size data not being available for most artisanal fisheries, notably Yemen and Indonesia (lines and gillnets), Comoros (lines) and Maldives (pole and lines) in recent years
- the paucity of size data available from industrial longliners from the late-1960s up to the mid-1980s
- the paucity of catch by area data available for some industrial fleets (NEI, Iran).

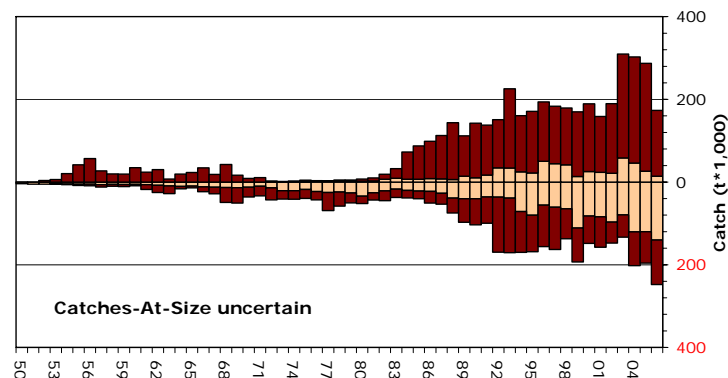


Figure. Uncertainty of catch at size data for yellowfin tuna. The amount below the zero-line indicates the amount of catch for which the estimated catch at size has been categorised as uncertain according to the criteria given in the text. Light bars represent data for artisanal fleets and dark bars represent data for industrial fleets. Data as of June 2007

BIGEYE TUNA (BET)

Retained catches are generally well known; catches are uncertain for non-reporting industrial purse seiners and longliners (NEI) and for other industrial fisheries (Philippines, Iran, Thailand).

Discards are believed to be low although they are unknown for most industrial fisheries, notably industrial purse seiners.

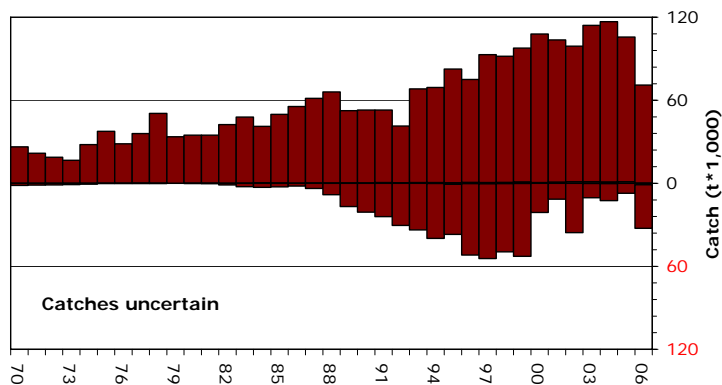


Figure. Uncertainty of annual catch estimates for bigeye tuna. The amount of the catch below the zero-line has been categorised as uncertain according to the criteria given in the text. Light bars represent data for artisanal fleets and dark bars represent data for industrial fleets. Data as of October 2007

CPUE Series: Catch and effort series are available from various industrial fisheries. Nevertheless, catch and effort are not available from some fisheries or they are considered to be of poor quality, especially throughout the 1990s for the following reasons:

- non-reporting by industrial purse seiners and longliners (NEI)
- uncertain data from significant fleets of industrial purse seiners from Iran and longliners from Philippines.

Trends in average weight can be assessed for several industrial fisheries although they are incomplete or of poor quality for most fisheries before the mid-1980s and in recent years (for the above fleets plus longliners from South Korea and Seychelles).

Catch-at-Size(Age) table: This is available but the estimates are more uncertain for some years and some fisheries due to:

- the paucity of size data available from industrial longliners before the mid-60s and from the early-1970s up to the mid-1980s
- the paucity of catch by area data available for some industrial fleets (NEI, Iran)

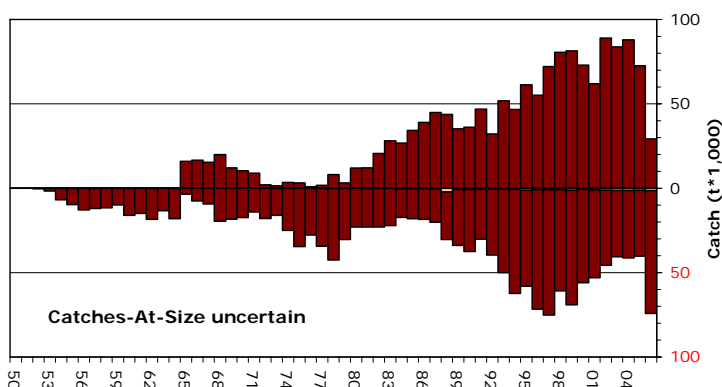


Figure. Uncertainty of catch at size data for bigeye tuna. The amount below the zero-line indicates the amount of catch for which the estimated catch at size has been categorised as uncertain according to the criteria given in the text. Light bars represent data for artisanal fleets and dark bars represent data for industrial fleets. Data as of June 2007

SKIPJACK TUNA (SKJ)

Retained catches are generally well known for industrial fisheries, uncertain for many artisanal fisheries, notably because:

- catches are not being reported by species
- uncertainty about the catches from some significant fleets including the Sri Lankan gillnet/longline fishery and the industrial purse seiners from Iran.

Discards are believed to be low although they are unknown for most industrial fisheries, notably industrial purse seiners.

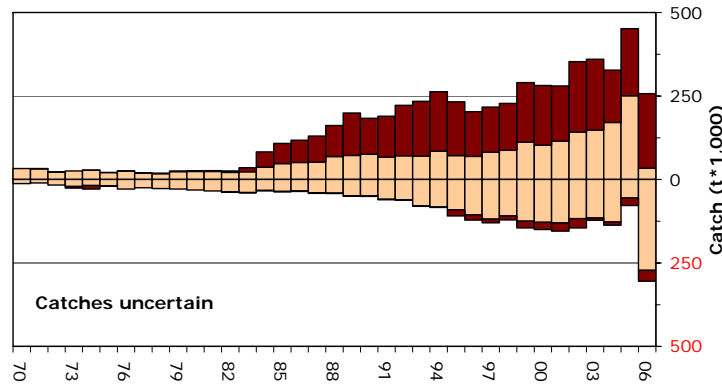


Figure. Uncertainty of annual catch estimates for skipjack tuna. The amount of the catch below the zero-line has been categorised as uncertain according to the criteria given in the text. Light bars represent data for artisanal fleets and dark bars represent data for industrial fleets. Data as of October 2007

CPUE Series: Catch and effort series are available from various industrial and artisanal fisheries. Nevertheless, catch and effort are not available from important artisanal fisheries or they are considered to be of poor quality for the following reasons:

- almost no data are available for the artisanal fisheries of Indonesia
- the poor quality effort data for the significant gillnet/longline fishery of Sri Lanka (for years before 2005)
- no data are available for the significant pole and line fishery of Maldives in recent years.

Trends in average weight cannot be assessed before the mid-1980s and are incomplete for most artisanal fisheries thereafter, namely hand lines, troll lines, many gillnet fisheries (Indonesia) and the pole and line fishery of Maldives in recent years.

Catch-at-Size(Age) table: CAS are available but the estimates are thought compromised for some years and fisheries due to:

- the lack of size data before the mid-1980s
- the paucity of size data available for some artisanal fisheries, notably most hand lines and troll lines, many gillnet fisheries (Indonesia) and the pole and line fishery of Maldives in recent years
- the lack of some biological information such as length-age keys for the Indian Ocean.

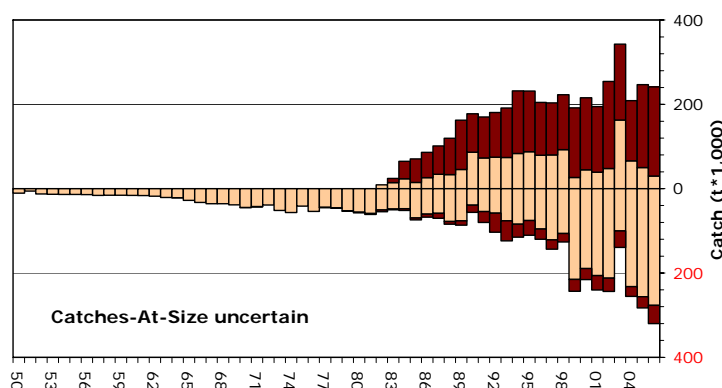


Figure. Uncertainty of catch at size data for skipjack tuna. The amount below the zero-line indicates the amount of catch for which the estimated catch at size has been categorised as uncertain according to the criteria given in the text. Light bars represent data for artisanal fleets and dark bars represent data for industrial fleets. Data as of June 2007

Table 1: Total Catches of Yellowfin Tuna (YFT), Skipjack Tuna (SKJ) and Bigeye Tuna (BET) in the Indian Ocean for the period 1957-2006 (in thousand of metric tonnes)

YFT

Gear	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	
Purse Seine																					0.0	0.2	0.1	0.1	0.3	1.2	12.6	58.2	68.8	73.4	83.8	118.6	89.8	108.7	105.4	112.9	128.4	114.4	149.4	129.7	132.2	100.4	134.8	140.3	130.0	139.0	224.1	233.0	203.7	175.3	
Baitboat	2.0	2.0	2.0	1.0	1.5	1.5	1.5	1.0	1.5		1.7	1.7	1.8	2.3	1.4	2.6	7.6	6.3	4.8	5.4	5.0	3.9	4.6	6.1	6.1	4.9	7.8	8.4	7.3	6.4	7.7	6.1	5.8	5.2	7.5	8.5	9.8	12.8	12.2	12.0	12.7	13.4	13.1	10.6	11.6	16.9	16.7	14.9	17.1	17.1	
Longline	33.1	24.5	24.6	38.3	35.6	47.7	25.4	25.3	27.7	45.7	34.0	78.6	54.0	32.4	34.4	31.5	21.7	23.5	25.4	21.9	45.4	37.0	26.9	22.8	24.4	34.5	31.1	25.5	30.5	45.2	46.9	54.9	65.2	86.0	78.8	136.7	195.6	120.5	87.6	113.9	109.3	109.3	103.7	90.0	79.3	80.2	81.0	105.0	133.4	91.3	
Gillnet	3.4	2.8	3.0	3.4	3.8	5.1	6.6	7.2	7.3	8.6	9.1	9.6	9.8	8.2	6.6	9.2	10.0	11.6	11.3	15.5	15.2	16.5	18.5	20.8	17.3	17.9	13.1	13.4	14.2	16.7	18.9	29.9	35.5	31.2	31.0	45.4	46.7	65.7	67.9	70.3	66.8	65.7	81.8	63.5	59.7	61.3	80.9	105.0	81.2	89.3	
Hand Line	0.4	0.4	0.4	0.6	0.8	0.8	1.0	1.2	1.0	1.1	1.1	1.2	1.3	1.2	1.0	1.3	2.1	1.4	1.1	1.9	1.9	2.2	2.7	5.4	2.5	3.7	2.9	2.4	3.3	3.2	3.1	2.7	8.1	9.0	9.1	6.0	5.8	6.1	7.5	7.7	7.8	8.0	7.7	8.0	8.2	17.4	15.1	7.3	20.8	20.8	
Troll Line	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.6	0.6	0.6	0.9	0.9	1.1	1.5	1.7	2.0	4.6	3.2	2.5	4.0	2.8	1.8	2.4	3.1	3.8	4.5	5.4	6.3	4.8	5.1	5.6	11.0	10.3	11.3	14.9	16.2	17.9	19.5	21.9	25.5	27.8	22.5	25.3	39.5	27.1	27.1	
Other																																																			
Total	39	30	30	44	42	55	35	36	37	57	46	92	67	45	44	46	43	44	44	47	72	63	55	59	53	64	70	111	128	149	166	218	209	245	237	321	397	331	340	350	347	316	363	338	317	337	443	505	483	421	

SKJ

Gear	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06		
Purse Seine																					0.1	0.9	0.6	1.4	2.0	4.2	11.8	45.7	60.4	66.7	79.0	92.9	126.8	108.3	122.8	151.3	163.9	179.2	178.9	149.2	145.4	150.0	193.2	196.9	189.6	238.6	218.3	165.7	222.8	255.0		
Baitboat	10.2	10.3	10.2	9.4	8.6	8.2	8.4	8.3	14.4	17.1	19.2	17.8	19.9	28.1	28.7	18.4	27.2	34.1	18.0	20.5	15.5	15.7	20.0	22.2	21.5	18.9	23.0	36.5	46.3	50.1	49.4	64.2	65.0	67.3	65.2	64.8	72.1	75.8	77.3	73.6	76.8	82.1	99.5	86.3	89.5	117.0	110.6	108.5	130.9	130.9		
Longline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Gillnet	5.1	4.4	4.5	5.5	6.5	8.1	10.7	11.4	11.7	13.8	14.5	15.5	16.0	13.1	10.9	16.6	20.2	18.2	18.8	27.1	23.6	24.7	27.4	27.3	30.7	35.9	34.5	29.6	33.4	31.8	38.5	41.7	49.5	50.4	54.4	61.6	72.3	86.3	79.8	96.1	119.2	111.9	138.9	143.9	151.7	137.8	148.4	180.3	169.3	169.3		
Hand Line	0.7	0.7	0.7	0.8	1.0	1.3	1.6	1.6	1.6	1.8	1.9	2.2	2.3	2.8	2.5	3.0	3.6	3.3	3.5	4.9	4.5	4.3	3.5	4.1	4.4	3.1	3.1	2.6	2.5	2.5	2.7	2.7	3.7	3.4	3.5	2.4	2.4	2.0	2.2	2.0	1.7	1.3	0.6	0.5	0.4	0.6	0.3	0.5	1.1	1.1		
Troll Line	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.7	0.6	0.6	0.7	0.8	1.1	1.4	0.8	0.8	1.9	2.2	2.3	1.9	2.1	2.1	2.0	2.2	2.3	2.5	4.0	4.4	4.3	3.9	3.8	3.6	3.7	3.4	3.9	3.7	2.9	3.5	3.6	4.2	3.6	9.1	5.0	5.0		
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total	16	15	15	16	16	18	21	21	28	33	36	36	38	45	43	39	52	57	41	54	45	46	53	57	61	64	75	116	145	153	172	204	249	234	250	284	315	347	342	324	347	349	435	431	435	498	482	465	530	562		

BET




Gear	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06						
Purse Seine																																																								
Baitboat																																																								
Longline	12.0	11.7	9.9	16.1	15.0	18.5	13.3	18.0	19.5	24.1	24.8	39.5	30.4	27.8	23.0	20.0	17.4	28.4	37.7	28.5	35.9	50.5	33.5	34.9	34.8	43.4	49.5	39.7	44.9	46.6	51.2	57.0	56.6	60.4	60.8	60.1	85.4	89.5	89.8	101.5	112.4	112.1	108.7	98.5	90.3	104.4	100.3	104.2	83.7	77.1						
Gillnet																																																								
Hand Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Troll Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Other																																																								
Total	12	12	10	16	15	18	13	18	20	24	25	40	30	28	23	20	18	28	38	29	36	51	34	35	35	44	50	44	52	57	65	74	69	74	77	72	102	109	119	127	147	141	151	129	115	135	124	129	113	104						

Data Catalogues

1/ Availability

(Availability of Nominal Catches, Catch and Effort and Size Frequency Statistics in the IOTC databases)

Legend: SpC Mean catches of the Species for the last five years

	Nominal catches available
	Catch and Effort data available
	Size frequency data available

I) Bigeye Tuna (BET)

Gear	67	69	71	73	75	77	79	81	83	85	87	89	91	93	95	97	99	01	03	05	Fleet	AvCatch
Purse Seine																					Spain	9.24
																					France	6.08
																					Seychelles	3.80
																					NEI-Other	2.88
																					NEI-Ex-Soviet Union	1.87
																					Belize	0.90
																					Thailand	0.87
																					Japan	0.69
																					France-Territories	0.29
																					Iran, Islamic Republic	0.22
																					Mauritius	
																					Soviet Union	
	Baitboat																					Maldives
																				Australia		
																				Tanzania		
Longline																					Taiwan,China	49.89
																					Indonesia	15.66
																					Japan	11.65
																					China	5.54
																					NEI-Deep-freezing	4.45
																					Seychelles	3.80
																					Korea, Republic of	1.60
																					Philippines	1.09
																					Belize	0.91
																					NEI-Fresh Tuna	0.58
																					Malaysia	0.32
																					Australia	0.27
																					Spain	0.26
																					France-Reunion	0.18
																					Maldives	0.18
																					South Africa	0.15
																					Thailand	0.09
																					Oman	0.06
																					Iran, Islamic Republic	0.05
																					Kenya	0.03
																					Uruguay	0.02
																					Mauritius	0.02
																					Portugal	0.01
																				France-Territories	0.01	
																				United Kingdom	0.01	
																				India	0.00	
																				Guinea	0.00	
																				NEI-Indonesia Fresh Tuna		
																				Soviet Union		
Gillnet																					Sri Lanka	0.06
																					Australia	
																					East Timor	
																					Taiwan,China	
Hand Line																					Sri Lanka	0.07
																					Comoros	0.02
																					France-Reunion	0.00
																					France-Territories	0.00
																					Australia	
																					Kenya	
																					Seychelles	
																					South Africa	
																					Tanzania	
																					Comoros	0.01
Troll Line																					Mauritius	0.01
																					France-Reunion	0.00
																					Australia	
																					France-Territories	
																					Sri Lanka	

IIa) Skipjack Tuna (SKJ)

Gear	67	69	71	73	75	77	79	81	83	85	87	89	91	93	95	97	99	01	03	05	Fleet	AvCatch
Purse Seine																					Spain	81.30
																					France	42.13
																					Seychelles	33.78
																					NEI-Other	21.75
																					NEI-Ex-Soviet Union	15.94
																					Belize	8.13
																					Thailand	4.22
																					Iran, Islamic Republic	3.53
																					Japan	2.16
																					France-Territories	2.01
																					Australia	0.81
																					Mauritius	
																					Soviet Union	
	Baitboat																					Maldives
																				India	2.68	
																				Australia		
																				Spain		
																				Indonesia		
																				Korea, Republic of		
																				Sri Lanka		
																				Madagascar		
																				Tanzania		
Longline																						Indonesia
																					Taiwan,China	0.06
																					Maldives	0.01
																					NEI-Fresh Tuna	0.01
																					Spain	0.00
																					Japan	0.00
																					NEI-Deep-freezing	0.00
																					Belize	0.00
																					India	0.00
																					Australia	
																					China	
																					United Kingdom	
																					Guinea	
																					Kenya	
																					Korea, Republic of	
																					Oman	
																					Portugal	
																					Thailand	
																					Uruguay	
																					South Africa	
																				France-Reunion		
																				Mauritius		
																				Soviet Union		
Gillnet																					Sri Lanka	63.26
																					Indonesia	46.86
																					Iran, Islamic Republic	43.06
																					Pakistan	3.48
																					India	0.34
																					Maldives	0.17
																					Yemen	0.11
																					Oman	0.10
																					Tanzania	0.05
																					Jordan	0.05
																					Kenya	0.03
																					Djibouti	0.00
																					East Timor	0.00
																					Australia	0.00
																					Qatar	
																					Bahrain	
																					Seychelles	
																					Taiwan,China	
Gear	67	69	71	73	75	77	79	81	83	85	87	89	91	93	95	97	99	01	03	05	Fleet	AvCatch

IIb) Skipjack Tuna (SKJ)

Gear	67	69	71	73	75	77	79	81	83	85	87	89	91	93	95	97	99	01	03	05	Fleet	AvCatch		
Hand Line																					Comoros	0.15		
																					France-Territories	0.15		
																					India	0.12		
																					Maldives	0.10		
																					Sri Lanka	0.03		
																					Indonesia	0.03		
																					Kenya	0.00		
																					France-Reunion	0.00		
																					Australia	0.00		
																							UK-Territories	0.00
																				Seychelles	0.00			
																					South Africa	0.00		
																					Bangladesh	0.00		
																					Iran, Islamic Republic	0.00		
																					Tanzania	0.00		
	Troll Line																					Comoros	2.76	
																				Maldives	1.80			
																				France-Territories	0.32			
																				Mauritius	0.15			
																				France-Reunion	0.07			
																			India	0.01				
																				Jordan	0.01			
																		Australia	0.00					
																				Indonesia	0.00			
																				Sri Lanka	0.00			
																				Seychelles	0.00			
Other																					Australia	0.00		
																					India	0.00		
Gear	67	69	71	73	75	77	79	81	83	85	87	89	91	93	95	97	99	01	03	05	Fleet	AvCatch		

IIIa) Yellowfin Tuna (YFT)

Gear	67	69	71	73	75	77	79	81	83	85	87	89	91	93	95	97	99	01	03	05	Fleet	AvCatch
Purse Seine																					Spain	67.68
																					France	50.90
																					Seychelles	29.62
																					NEI-Other	18.28
																					NEI-Ex-Soviet Union	9.55
																					Iran, Islamic Republic	6.74
																					Belize	3.02
																					France-Territories	2.22
																					Thailand	1.27
																					Japan	0.58
																					Australia	
																					Mauritius	
																					Soviet Union	
Baitboat																					Maldives	14.58
																					India	0.84
																					Australia	
																					Spain	
																					Indonesia	
																					Sri Lanka	
																					Madagascar	
																					Tanzania	
Longline																					Taiwan, China	41.45
																					Indonesia	20.02
																					Japan	16.36
																					NEI-Deep-freezing	3.60
																					Seychelles	2.74
																					China	2.73
																					Korea, Republic of	2.33
																					NEI-Fresh Tuna	1.90
																					Philippines	1.42
																					Malaysia	0.89
																					Belize	0.56
																					Iran, Islamic Republic	0.43
																					France-Reunion	0.41
																					India	0.39
																					Australia	0.35
																					South Africa	0.19
																					Oman	0.14
																					Maldives	0.12
																					Thailand	0.11
																					Spain	0.08
																					Portugal	0.05
																					Guinea	0.04
																					Uruguay	0.03
																					Mauritius	0.03
																					France-Territories	0.01
																					United Kingdom	0.00
																					Senegal	0.00
																					Kenya	
NEI-Indonesia Fresh Tuna																						
Pakistan																						
Soviet Union																						

IIIb) Yellowfin Tuna (YFT)

Gear	67	69	71	73	75	77	79	81	83	85	87	89	91	93	95	97	99	01	03	05	Fleet	AvCatch	
Gillnet																						Sri Lanka	29.16
																						Iran, Islamic Republic	28.37
																						Oman	12.47
																						Pakistan	3.89
																						Indonesia	2.37
																						India	0.95
																						Yemen	0.16
																						Maldives	0.11
																						Tanzania	0.07
																						Kenya	0.04
																						Djibouti	0.00
																						Jordan	0.00
																						Australia	0.00
																						Qatar	0.00
																						East Timor	0.00
																						Bahrain	0.00
																						Taiwan,China	0.00
Hand Line																						Yemen	9.50
																						Comoros	1.73
																						Maldives	1.63
																						India	0.51
																						France-Territories	0.22
																						Sri Lanka	0.06
																						France-Reunion	0.04
																						South Africa	0.04
																						UK-Territories	0.03
																						Kenya	0.02
																						Seychelles	0.01
																						Indonesia	0.00
																						East Timor	0.00
																						Australia	0.00
																						Bangladesh	0.00
																						Tanzania	0.00
	Troll Line																						Yemen
																					Comoros	4.22	
																					Maldives	2.59	
																					Tanzania	0.69	
																					Mauritius	0.65	
																					Iran, Islamic Republic	0.53	
																					France-Reunion	0.23	
																					France-Territories	0.19	
																					India	0.17	
																					Kenya	0.12	
																					Australia	0.00	
																					Jordan	0.00	
																					Indonesia	0.00	
																					East Timor	0.00	
																					Sri Lanka	0.00	
																					Seychelles	0.00	