STATUS OF IOTC DATABASES FOR TROPICAL TUNAS

IOTC Secretariat

ABSTRACT

This document reviews the status of the information available on tropical tunas in the databases at the IOTC Secretariat. The review covers data on nominal catches, catch-and-effort, and size-frequency data.

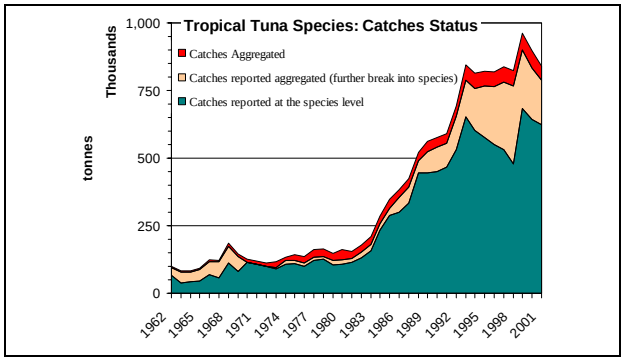
NOMINAL CATCH (NC) DATA

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

The Secretariat conducted several reviews of the NC database during 2002. These revisions led to slight changes in the estimates of catches (not lower or higher than 10% of previous estimates) of the three tropical tuna species, especially since the mid-eighties.

Although the quality of the information on the three tropical tunas is considered in general to be fairly good, the completeness and accuracy of the records are compromised by:

- **Unreported catches**: several countries were not collecting fishery statistics, especially in years prior to the early seventies, and others have not reported their statistics to IOTC. In most cases, the catches of tropical tunas in those countries were probably minor. Nevertheless, the catches of some important longline fleets are unknown, as it is the case with the foreign longliners operating in Maldives.
- **Underestimated catches**: catches of tunas and tuna-like species are sometimes reported aggregated[1]. When possible, the Secretariat estimates the species and gear composition of these aggregates but this cannot always be done reliably as the accuracy depends on the assumptions made during the estimation process.



In addition, catches in several Indian Ocean coastal countries are probably underestimated as sampled landings are not raised to total catch. This is especially true in the case of Indonesia, Yemen and other coastal countries with important catches of tropical tunas.

Uncertainty in the catches may occur in the following cases:

- **Fresh tuna longline fleets**: Although the catches of fresh tuna longline ships based in different ports of the Indian Ocean were re-estimated from data coming from past or recent sampling schemes operated, the accuracy of the estimates is still far from complete, especially in the case of fleets operating from ports not covered by these schemes or past catches estimated on the basis of recent estimates, very far in time.
  - **Indonesia**: The catch estimates are thought less accurate up to the mid-nineties due to lack of detailed information on the total catches and distribution of the different species in the catches.
  - **Sri Lanka**: The catch series was estimated mainly on the basis of information coming from other ports due to the unavailability of detailed information from the country.
  - **Thailand and Malaysia:** Although the catches series in both countries are thought much more accurate as regards the total catches, this is not the case regarding the distribution of species in the catch, especially in years far from 2000, the first in which catches were estimated from data issuing from sampling.
- **Deep-freezing longline fleets**: Recent estimates of catches of deep-freezing fleets operating under different non-reporting flags, conducted by the IOTC, were possible thanks to an improvement in the number and quality of vessels in the IOTC Vessel Record, especially in years prior to 1998. Nevertheless, the catches are thought not too accurate due to the many assumptions made in estimating the total catches and species breakdown. A dramatic decrease in the number of vessels operating under flags of non-reporting countries was recorded in 2001. The reason for this decrease is not fully known and changes in the catch estimates are likely to occur as more information become available.
- **Ex-Soviet purse seiners**: The catches of ex-Soviet purse seiners, operating under the flags of Panama and

[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.

Belize in recent years, have not been submitted to the IOTC since 1995. The catches estimated since that year and, in particular, the species allocation, are likely to be less accurate than those of previous years.

CATCH-AND-EFFORT (CE) DATA

The Secretariat informed that the implementation of validation and verification processes and the preparation and computerization of data recorded under heterogeneous spatial-temporal strata continued during 2001.

Catch-and-effort records are available for the main fleets fishing for tropical tunas in the Indian Ocean, namely baitboat (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 very small, such that the lack of CE data is not important.

Catch-and-effort statistics from the Maldives are available since 1970. Data have been reported by species, month and atoll from 1970 to 1992 but are only available by species and month since 1993.

Catch-and-effort statistics are available for the main longline fisheries, since 1952 for Japan, since 1967 for Taiwan,China[2] and since 1975 for Korea. The statistics provided by Japan and Taiwan,China are in general considered accurate. Nevertheless, the inconsistencies found during the validation of data records for some years, involving the Taiwan,China data for the period 1990-92, are still unsolved. The Japanese catch-and-effort data series (1950-2001) was replaced by new estimates that took into account the whole of the IOTC Area, on the contrary of previous estimates only accounting for the FAO areas 51 and 57. Only slight changes in the catches of tropical tunas were noted.

Korean CE statistics are thought to be highly inaccurate. Many inconsistencies were found in the data, when comparing the catches in this database with those reported as nominal catches, for instance. The Secretariat recommends that this dataset not be used until these issues are resolved.

Catch-and-effort statistics are complete for European-owned purse seiners and those monitored by European scientists, as well as those from Seychelles. Statistics are also available for other countries including Mauritius, Japan and Iran. As is the case for the NC data, the CE data for the purse-seine fleet formerly under the Russian flag are inaccurate and, at this time, are only available to IOTC for short periods of the operation of this fleet.

SIZE-FREQUENCY (SF) DATA

The quality of the data is thought to be good for fleets under European monitoring, apart from the species and size composition for 1997-2000, which are likely to be less accurate due to problems in the sampling on those vessels reported to the Permanent Working Party on Data Collection and Statistics by the scientists responsible. No or scarce data is available for Iranian, Japanese and ex-Soviet purse seiners. The size frequency statistics of Mauritian purse seiners is complete since 1986. Bait boat fisheries have also been reporting size-frequency statistics to IOTC, for which quality is thought good.

For longline fisheries, however, only Japan has been reporting size-frequency data since the beginning of the fishery. In recent years, the number of specimens measured is very low in relation to the total catch and has been decreasing year by year. The size-frequency statistics available from the two other main longline fleets are either very incomplete (Taiwan,China for which only four years are available) or inaccurate (Korea), which invalidates their use. The recovery of size data from port sampling regarding fresh tuna longline fleets operating in Phuket, Penang, Sri Lanka and, recently Indonesia, continued in 2002 and 2003, with many records input to the SF database.

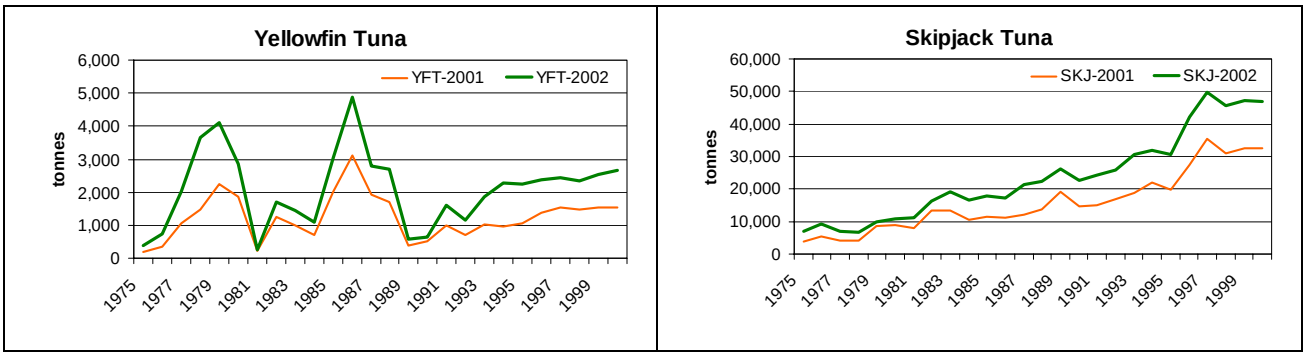
The availability of size frequency statistics for gears other than pole and line, purse seine and longline is very low. Nevertheless, it is worth mention the recovery of Indonesian, Sri Lankan and Omani length frequency statistics referring to gillnet and other fisheries in these countries.

Estimation of catches of non-reporting fleets

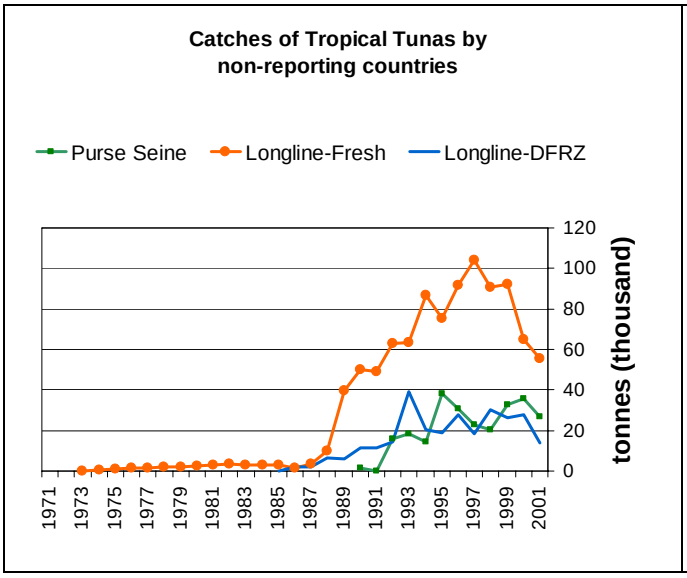
The estimates of catches of non reporting fleets were updated in 2002 thanks to new information available during the last year:

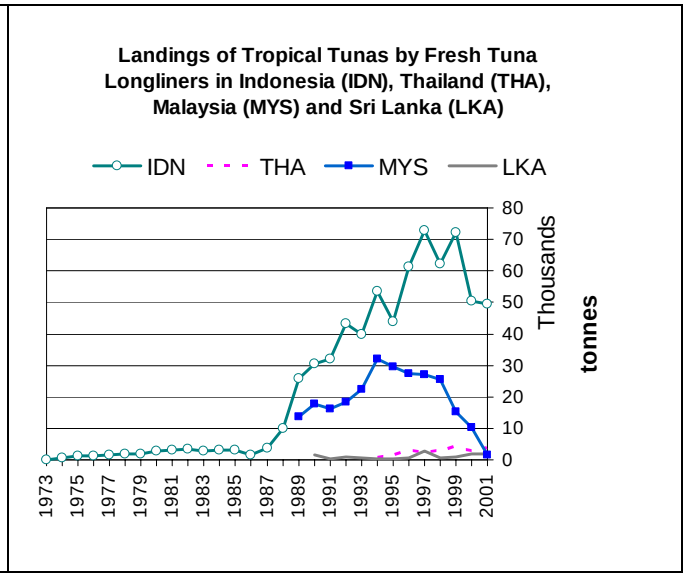
- **Indonesia:** The changes in the estimates originated in:
  - Re-estimation of longline catches: The new catches estimated represent only slight increases in the catches of tropical tunas (that compensate for a decrease in the estimates of Southern bluefin tuna), with new catches estimated for 2000 and 2001. The number of ships and catches estimated for recent years, averaging 70,000 tons, situate Indonesia among the most important fishing fleets in the Indian Ocean, second only to the Taiwanese fleet.
  - Re-estimation of artisanal catches: The catches of artisanal fleets in Indonesia were estimated since 1975, according to new data reported by Indonesia to the FAO. The new reports considered the new FAO boundaries, now fully consistent with the IOTC eastern boundary. The catches of tropical tunas, especially skipjack tuna, increased considerably in relation to previous estimates. Recent catches of tropical tunas under artisanal gears amount to around 60,000 tons (figures below).

[2] Taiwan, China refers to Taiwan province of China.



- **Other non-reporting fleets** (NEI): The increase in the number of non-reporting fleets in recent times has led to dramatic increases in the catches estimated, reducing in this way the quality of the data gathered regarding the yellowfin tuna, bigeye tuna and, less significantly, skipjack tuna.
  - **Purse seine:** The catches of ex-Soviet purse seiners, operating under the flags of Panama and Belize, needed to be estimated since 1995 due to non-reporting. These catches were estimated on the basis of the number of purse seiners operating, previous catches reported and data coming from other purse seine fleets (European Community). Recent catches estimated are around 30,000 tons.
  - **Fresh tuna longline**: The catches of fresh tuna longliners were estimated according to the port where the different fleets were based. Most of the catches estimated are from Taiwanese longliners according to the information available.
    - **Indonesia**: The catches of foreign fresh tuna longliners based in Indonesian ports were estimated on the basis of catches of domestic vessels. The catches estimated refer to the period 1986-99 with highest catches estimated in the early nineties (around 30,000 tons). No foreign fresh tuna longliners have been operating in Indonesia since 1999.
    - **Thailand**: The catches of fresh tuna longliners from Taiwan,China and Indonesia unloaded to processing plants in Phuket were estimated according to the data collected through the AFDEC (Andaman Sea Fisheries Research and Development Centre)-OFCF (Overseas Fisheries Cooperation Foundation of Japan)-IOTC Sampling Program. Recent catches are around 3,000 tons.
    - **Malaysia**: The catches of fresh tuna longliners based in Malaysia were estimated on the basis of previous data recorded (IPTP Sampling Program) and new estimates from FRI (Fisheries Research Institute of Penang). The 1989-2000 estimates ranged from 10,000 to 35,000 tons with a dramatic drop in the catches unloaded in Penang noted in 2001 (around 2,000 tons).
    - **Sri Lanka**: The catches of fresh tuna longliners unloading to processing plants in Sri Lanka were estimated on the basis of previous data collected by NARA (National Aquatic Resources Research and Development Agency) in Colombo and estimates from Phuket and Penang sampling. Catches ranging from 300 to 3,500 tons were estimated for the period 1990-2001.
    - **Maldives:** The catches of fresh tuna longliners were not estimated due to lack of reliable information on their numbers and activity.
    - **Other Fleets:** The catches of fresh tuna longliners operating in Seychelles and South Africa were submitted during 2002 and replace previous estimates.





Deep-freezing longline: The catches of large longliners from several non-reporting countries were estimated according to the number of vessels estimated from the IOTC vessel record and the catches of Taiwanese longliners, on the assumption that most of the vessels operated as the longliners from Taiwan,China. The collection of new information regarding these non-reporting fleets during the last year, especially concerning the number of longliners operating, led to better estimates of catches. A decrease in the number of vessel recorded operated during 2001 led to a dramatic decrease in the catches estimated, from 50,000 tons in 2000 to 25,000 tons in 2001. The reason for this decrease in the number of vessels (and catches) operating in the Indian Ocean is not fully known. Nevertheless, this decrease is somewhat proportional to an increase in the number of vessels recorded operating under flags of reporting countries, as Philippines and the Seychelles.

Data related issues for tropical tunas

A number of problem areas were identified in the data situation for tropical tunas:

- Poor knowledge of the catches, effort and size-frequency from fresh tuna longline vessels, especially from Taiwan,China and several non-reporting fleets.
- Poor knowledge of the catches, effort and size-frequency from non-reporting fleets of deep-freezing tuna longliners, especially since the mid-eighties.
- Lack of accurate catch, effort and size-frequency data for the Indonesian longline fishery in recent years.
- Poor knowledge of the catches and lack of effort and size-frequency data for ex-Soviet purse seine boats flying flags of convenience in recent years.

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 from several countries as for South Africa and Seychelles longline fisheries.

Revision of the IOTC databases: Several revisions have been conducted during the last year on the IOTC databases. This has led to new datasets being input, especially regarding CE and SF statistics (Indonesia, Sri lanka) and to new series of 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.

Recovery of historical activity and size data from processing plants: The collection of historical information from operators in different ports of the Indian Ocean has continued since last year. Some 250,000 individual fish weight records by species have been retrieved to date for 1998 to 2002.

IOTC/OFCF sampling programmes: The collection of information on the activities of fresh tuna longliners landing in Phuket, Penang and Sri Lanka has continued during 2002. This has led to more complete and accurate estimates of catches of these fleets. Other valuable data collected in the scope of these programmes refer to length frequencies which will allow length-length, length-weight and weight-length relationships to be established.

Plan of Action in Indonesia: A large scale operation involving several local and foreign institutions was initiated in April 2002 in Indonesia. The primary objective of this multi-lateral cooperation is building the necessary capabilities in the country, so as to allow Indonesia to generate good quality statistics in the near future. Sampling of landings of fresh tuna longliners operating in this country

started in June 2002 , with more than 2,000 sampling conducted (160,000 monitored) between June 2002 and March 2003, with coverage levels ranging from 20% to 30% of the catches unloaded by longliners in Indonesia.

Japan NC and CE: New estimates of catches of Japanese longline vessels for 1950-1969 were conducted during 2002 on the basis of new information reported by Japan. New CE data was also submitted for 1950-2001 to replace previous estimates that did not consider the IOTC boundaries but the FAO ones.

Indonesia NC: The NC for 1975-2001 was replaced by new estimates that took into account the IOTC boundaries in the East.

Taiwan,China NC: The catches of Taiwanese longliners were updated during 2002 with new catches added for the period 1954-1965 and 1966-1978 catches updated.

The status of the current data situation for each of the species can be summarised as follows:

YELLOWFIN AND BIGEYE TUNA

NC data: Relatively well known for most purse-seine fisheries and the main longline fleets (Japan, Korea and Taiwan,China). Catches of non-reporting longline and purse seine fleets are still uncertain, although they are believed more accurate than past catches estimated. Artisanal catches are uncertain, although they are not considered large, with the possible exception of gillnet/longline and other coastal fleets where the catches are reported under "other species" groups, especially for early years.

CE data: Well known in the purse-seine fisheries and the main longline operations (Japan, Korea and Taiwan,China). Nevertheless, the Korean data are thought inaccurate. No catch-and-effort statistics are available for non-reporting longline and purse seine vessels.

SF data: Data for the period 1997-2000 from the EU PS sampling is considered less accurate. Sampling coverage from Japan and Korea is low in recent years. The only data available regarding non-reporting fleets are from sampling in Phuket, Penang, Sri Lanka and Indonesia. No SF data are available from Taiwanese vessels since 1989. Little information is available on important artisanal catches (e.g. Oman, Pakistan, Yemen and Comoros).

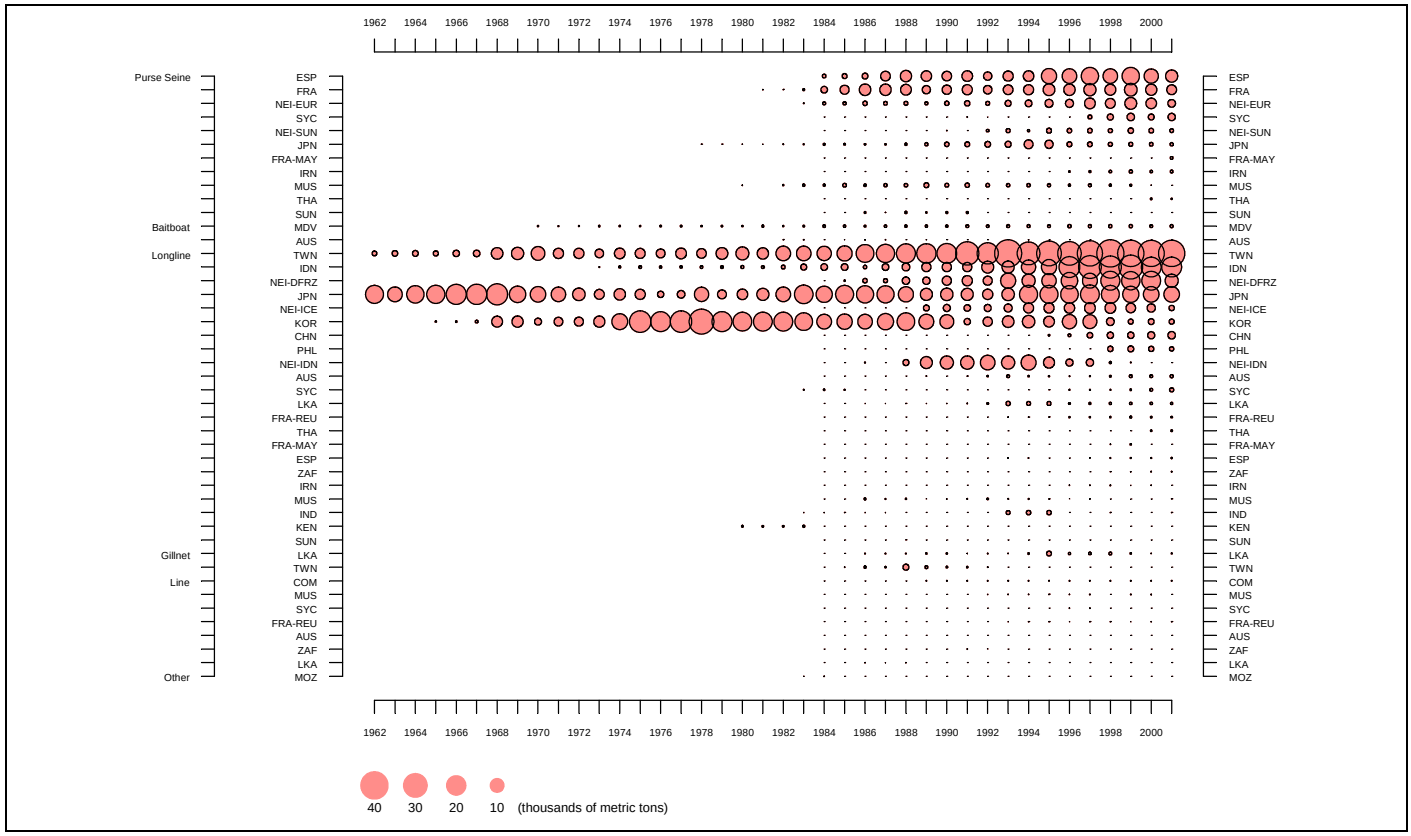
SKIPJACK TUNA

NC data: Relatively well known for most purse-seine fisheries. Data are available for the important artisanal fishery in Maldives. Artisanal components (not well known) are important for this species. In several coastal countries the catches are not reported by gear (Indonesia).

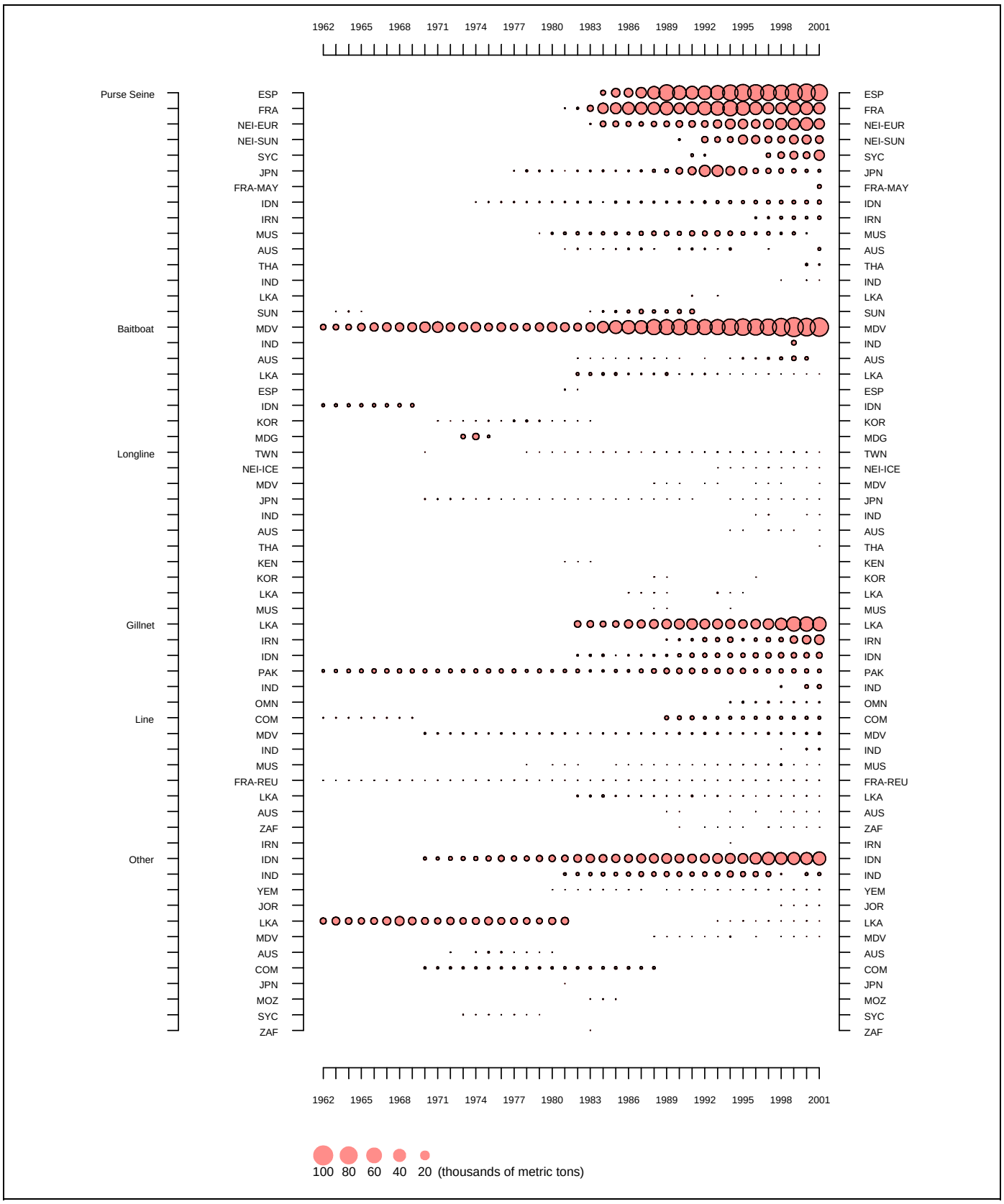
CE data: Well known in the purse-seine and baitboat fisheries. No or scarce and inaccurate catch-and-effort statistics are available for other gears.

SF data: Available for reporting purse seine fleets (1984-2002), Maldivian baitboats (1983-1998) and some gillnet fisheries and years (Pakistan, Iran, Indonesia and Sri Lanka).

Bigeye Tuna



Skipjack Tuna



Yellowfin Tuna