

REVIEW OF THE STATISTICAL DATA AND FISHERY TRENDS FOR ALBACORE

PREPARED BY: IOTC SECRETARIAT, 2 JULY 2012

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PURPOSE

To provide the Working Party on Temperate Tunas (WPTmT) with a review of the status of the information available on albacore in the databases at the IOTC Secretariat as of June 2012, as well as a range of fishery indicators, including catch and effort trends, for fisheries catching albacore in the IOTC area of competence. It covers data on nominal catches, catch-and-effort, and size-frequency.

BACKGROUND

Prior to each WPTmT meeting the Secretariat develops a series of maps, figures and tables that highlight historical and emerging trends in the fisheries data held by the Secretariat. This information is used during each WPTmT meeting to inform discussions around stock assessment and in developing advice to the Scientific Committee.

This document summarises the standing of a range of information received by the secretariat for albacore, in accordance with IOTC Resolution 10/02 *Mandatory statistical requirements for IOTC Members and Cooperating non-Contracting Parties (CPC's)*³, for the period 1950–2010.

The document describes the progress achieved in relation to the collection and verification of data and identifies problem areas as assessed from the information available.

The document also provides a range of fishery indicators, including catch and effort trends, for fisheries catching albacore in the IOTC area of competence (Appendix I).

The report covers the following areas:

- Overview
- Main issues relating to the data available on albacore
- Overview of albacore fisheries in the Indian Ocean:
 - Catch trends
 - Status of fisheries statistics for albacore.

Major data categories covered by the report

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 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; and data reported by other parties on the activity of vessels (IOTC Resolution 10/08; IOTC Resolution 05/03; IOTC Resolution 11/03; IOTC Resolution 12/05; IOTC Resolution 12/07)).

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

Length frequency data: individual body lengths of IOTC species per fleet, year, gear, fishing mode, quarter and 5 degrees square areas.

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³ This Resolution superseded IOTC Resolutions 98/01, 05/01 and 08/01

MAIN ISSUES IDENTIFIED RELATING TO THE STATISTICS OF ALBACORE

The following list is provided by the Secretariat for the consideration of the WPTmT. The list covers the main issues which the Secretariat considers to negatively affect the quality of the statistics available at the IOTC, by type of dataset and fishery.

1. Catch-and-Effort data from Industrial Fisheries:

- **Longline** fishery of **Indonesia**: The catches of albacore estimated for the longline fishery of Indonesia account for 32% of the total catches of albacore in the Indian Ocean in recent years (average catch 2006–10). While Indonesia has reported total catches of albacore around 7,700 t in recent years (average 2005–09), the catches available from alternative sources are markedly higher, and were used to derive the IOTC estimates, amounting to around 13,300 t for the same period. To date, the Secretariat has not received catch-and-effort data for this fishery.
- **Fresh-tuna longline** fishery of **Taiwan,China**: The catches of albacore estimated for the fresh-tuna longline fishery of Taiwan,China account for 27% of the total catches of albacore in the Indian Ocean in recent years (average catch 2006–10). Although the Secretariat has received catch-and-effort data for this fishery in recent years, time-area coverage is still very low.
- **Longline** fisheries of **India, Malaysia, Oman, and Philippines**: The catches of albacore estimated for the longline fisheries of India, Malaysia, Oman, and Philippines are uncertain, with current estimates accounting for 2% of the total catches of albacore in the Indian Ocean in recent years (average catch 2006–10). None of these countries are reporting catch-and-effort data as per the IOTC standards.
- **Drifting gillnet** fisheries of **Iran and Pakistan**: Both Iran and Pakistan have reported nil catches of albacore for their fisheries. To date, the Secretariat has not received catch-and-effort data for these fisheries which compromises the ability of the IOTC Secretariat to assess the amount of gillnet effort exerted by these fisheries in areas where catches of albacore may occur.

2. Size data from All Fisheries:

- Driftnet of Taiwan,China: No size data available over the entire period of activity of the fishery (1982–92).
- **Longline** fishery of **Indonesia**: Indonesia has reported size frequency data for its fresh-tuna longline fishery in recent years. However, the samples cannot be fully disaggregated by month and fishing area (5x5 grid) and refer mostly to the component of the catch that is unloaded fresh. The quality of the samples in the IOTC database is for this reason uncertain.
- **Fresh-tuna longline** fishery of **Taiwan,China**: Taiwan,China provided length frequency data of albacore only for three months in 2010, and therefore coverage remains low.
- **Longline** fishery of **Japan**: The number of samples reported and total number of fish sampled for the longline fishery of Japan since 2000 has been very low.
- Longline fisheries of **India, Malaysia, Oman, and Philippines**: To date, none of these countries has reported size frequency data of albacore.

3. Biological data:

- Industrial **longline** fisheries, in particular **Taiwan,China, Indonesia, and Japan**: The IOTC Secretariat had to use length-age keys, length-weight keys, and processed weight-live weight keys for albacore from other oceans due to the general paucity of biological data available from the fisheries indicated.

STATUS OF FISHERIES STATISTICS FOR ALBACORE

Albacore (ALB) – Fisheries and catch trends

Albacore are currently caught almost exclusively using drifting longlines (98%) (Table 1; Fig. 1), and South of 10°S (Table 2; Fig. 2) with remaining catches recorded using purse seines and other gears. Catches of albacore were relatively stable until the mid-1980s, except for high catches recorded in 1973 and 1974 (Fig. 1). The catches increased markedly during the mid-1980's due to the use of drifting gillnets by Taiwan, China (Fig. 3), with total catches in excess of 30,000 t. The drifting gillnet fleet targeted juvenile albacore in the southern Indian Ocean (30°S to 40°S). In 1992 the United Nations worldwide ban on the use of drifting gillnets effectively closed this gillnet fishery.

Following the removal of the drifting gillnet fleet, catches dropped to less than 20,000 t by 1993 (Figs. 1, 3). However, catches more than doubled over the period from 1993 (less than 20,000 t) to 2001 (44,000 t). Since 2001, catches have been almost exclusively taken by drifting longlines (Figs. 1, 3, 4). Record catches of albacore were reported in 2007, at around 43,000 t, and again in 2008, at 44,000 t. Catches for 2009 are estimated to be approximately 39,000 t, while preliminary catches for 2010 amount to 42,968 t (Table 1).

TABLE 1. Albacore: Best scientific estimates of the catches of albacore (*Thunnus alalunga*) by gear and main fleets [or type of fishery] by decade (1950–2000) and year (2001–2010), in tonnes. Data as of June 2012. Catches by decade represent the average annual catch, noting that some gears were not used for all years (refer to Fig. 1).

Fishery	By decade (average)						By year (last ten years)									
	1950s	1960s	1970s	1980s	1990s	2000s	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
DN				5,823	3,735											
LL	3,715	17,233	16,903	15,214	21,876	19,901	38,664	29,999	17,819	15,721	15,774	13,696	11,001	10,837	11,749	17,834
FLL			80	314	1,328	14,940	3,724	3,918	6,908	15,201	15,454	14,383	30,616	31,194	25,206	23,538
PS				203	1,683	920	1,281	772	1,496	232	164	1,548	725	1,424	392	207
OT	6	9	26	68	63	441	186	152	144	163	176	381	599	989	1457	1389
Total	3,721	17,242	17,009	21,622	28,685	36,202	43,855	34,841	26,367	31,317	31,568	30,008	42,941	44,444	38,804	42,968

Fisheries: Driftnet (DN; Taiwan, China); Freezing-longline (LL); Fresh-tuna longline (FLL); Purse seine (PS); Other gears nei (OT).

TABLE 2. Albacore: Best scientific estimates of the catches of albacore (*Thunnus alalunga*) by fishing area for the period 1950–2009 (in metric tons). Data as of June 2012.

Area	By decade (average)						By year (last ten years)									
	1950s	1960s	1970s	1980s	1990s	2000s	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
N	69	135	207	55	549	2,229	700	821	742	1,151	1,589	2,452	6,870	4,636	3,237	471
S	3,652	17,107	16,803	21,567	28,135	33,972	43,155	34,021	25,625	30,167	29,979	27,556	36,071	39,809	35,567	42,496
Total	3,721	17,242	17,010	21,622	28,684	36,201	43,855	34,842	26,367	31,318	31,568	30,008	42,941	44,445	38,804	42,967

Areas: North of 10°S (N); South of 10°S (S)

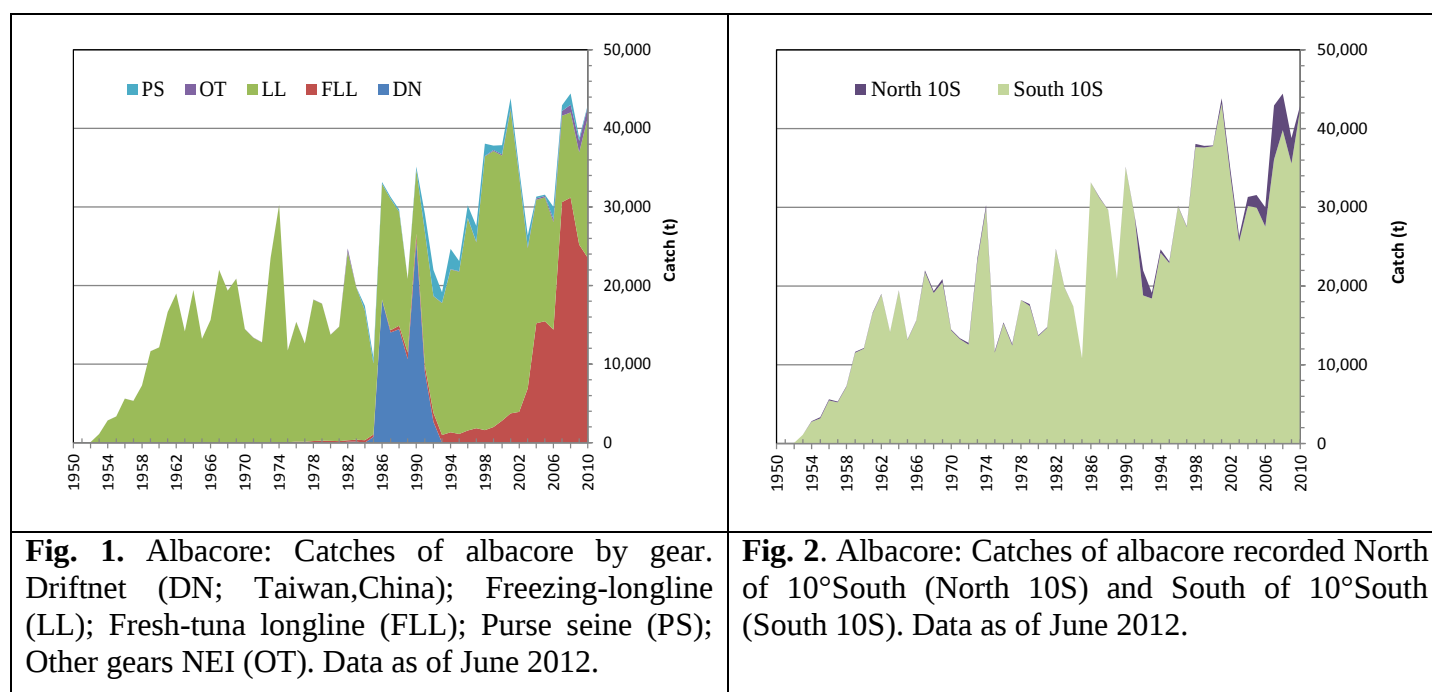


Fig. 2. Albacore: Catches of albacore recorded North of 10°South (North 10S) and South of 10°South (South 10S). Data as of June 2012.

Catches of albacore in recent years have come almost exclusively from vessels flagged in Indonesia and Taiwan,China, although the catches of albacore reported for the fresh tuna longline fishery of Indonesia have increased considerably since 2003 to around 17,000 t (Fig. 3), which represents approximately 32% of the total catches of albacore in the Indian Ocean.

Longliners from Japan and Taiwan,China have been operating in the Indian Ocean since the early 1950s (Fig. 3). Although the Japanese albacore catch ranged from 8,000 t to 18,000 t in the period 1959 to 1969, in 1972, catches rapidly decreased to around 1,000 t due to a change in the target species, mainly to southern bluefin tuna and bigeye tuna. Albacore became a bycatch species for the Japanese fleet with catches between 200 t and 2,500 t. In recent years the Japanese albacore catch has been around 2,000 to 6,000 t (Fig. 3).

In contrast to the Japanese longliners, catches by Taiwan,China longliners increased steadily from the 1950's to average around 10,000 t by the mid-1970s. Between 1998 and 2002 catches ranged between 21,500 t to 26,900 t, equating to just over 60% of the total Indian Ocean albacore catch. Between 2003 and 2010 the albacore catches by Taiwan,China longliners have been between 10,000 and 18,000 t, with catches appearing to be on the increase in recent years. There has been a shift in the proportion of catches of albacore by deep-freezing and fresh-tuna longliners in recent years, with increasing catches of fresh-tuna (72% of the total catches for 2008–10) as opposed to deep-freezing longliners (Table 1; Fig. 1).

While most of the catches of albacore have traditionally come from the southwest Indian Ocean, in recent years a larger proportion of the catch has come from the southern and eastern Indian Ocean (Table 2; Figs. 5, 6). The relative increase in catches in the eastern Indian Ocean since the early 2000's is mostly due to increased activity of fresh-tuna longliners from Taiwan,China and Indonesia. In the western Indian Ocean, the catches of albacore mostly result from the activities of deep-freezing longliners and purse seiners. One consequence of Somali maritime piracy in the western tropical Indian Ocean in recent years has been the movement of part of the deep-freezing longline fleets from this area, for which the target species were tropical tunas or swordfish, to operate in southern waters of the Indian Ocean (Fig. 6) which has led to increased catches of albacore by some longline fleets, in particular vessels from China, Taiwan,China and Japan (Fig. 4).

Fleets of oceanic gillnet vessels from Iran and Pakistan and gillnet and longline vessels from Sri Lanka have extended their area of operation in recent years, to operate on the high seas closer to the equator. The lack of catch-and-effort data from these fleets makes it impossible to assess whether they are operating in areas where catches of juvenile albacore are likely to occur.

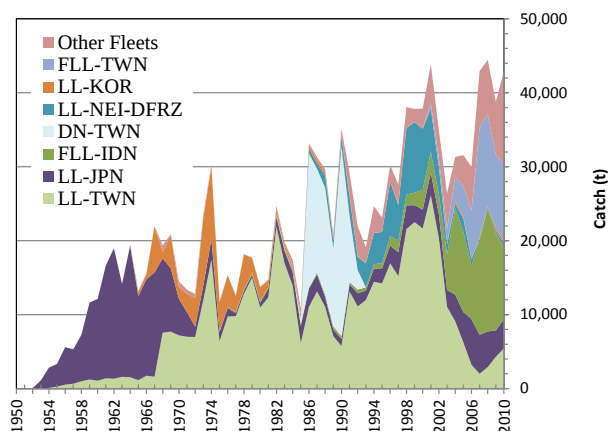
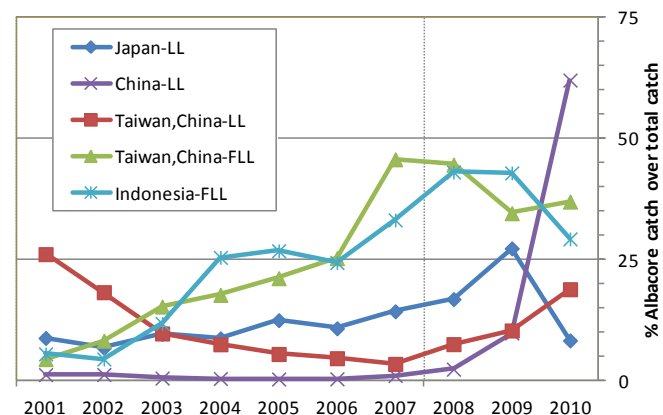


Fig. 3. Albacore: Catches of albacore by fleet recorded in the IOTC Database (1950–2010). Data as of June 2012.

Freezing Longlines of Taiwan,China (LL-TWN), Japan (LL-JPN), Rep. of Korea (LL-KOR), and other nei fleets (LL-NEI-DFRZ); Fresh-tuna longlines of Indonesia (FLL-IDN), and Taiwan,China (FLL-TWN); Driftnets of Taiwan,China (DN-TWN); all other fleets combined (Other Fleets).



The dotted vertical line corresponds to the onset of maritime piracy in the western tropical Indian Ocean

Fig. 4. Albacore: Proportion that the catches of albacore made out of the total combined catches of all species, per year, for the major longline fisheries in the Indian Ocean (2001–10). Data as of June 2012.

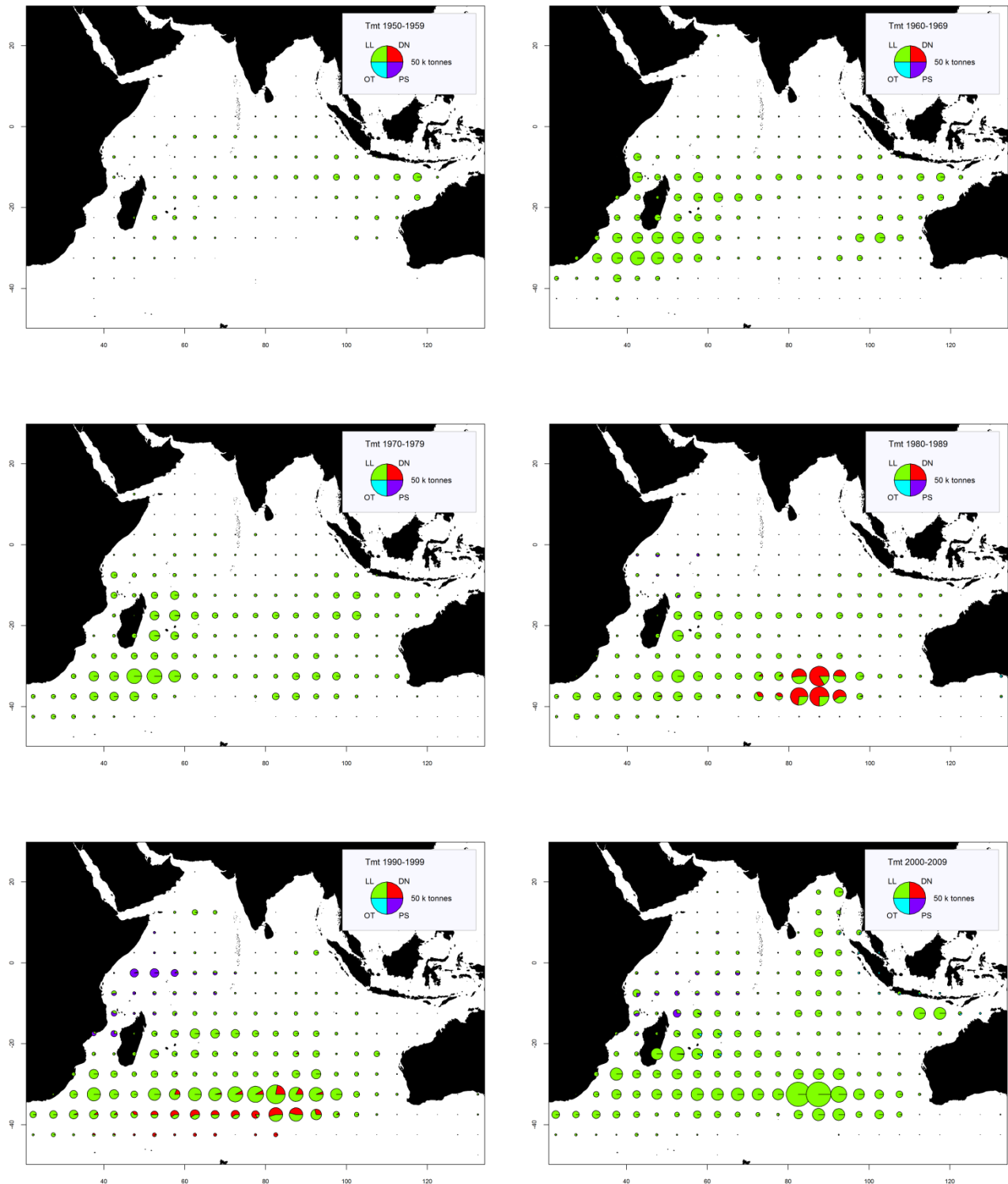


Fig. 5a-f. Albacore: Time-area catches (total combined in tonnes) of albacore estimated for the period 1950-2010, by decade and type of gear.

Longline (LL, green), Driftnet (DN, red), Purse seine (PS, purple), Other fleets (OT, blue)

Time-area catches are not available for all fleets; catches for those were assigned by 5x5 square and month using information from other fleets. Data as of June 2012.

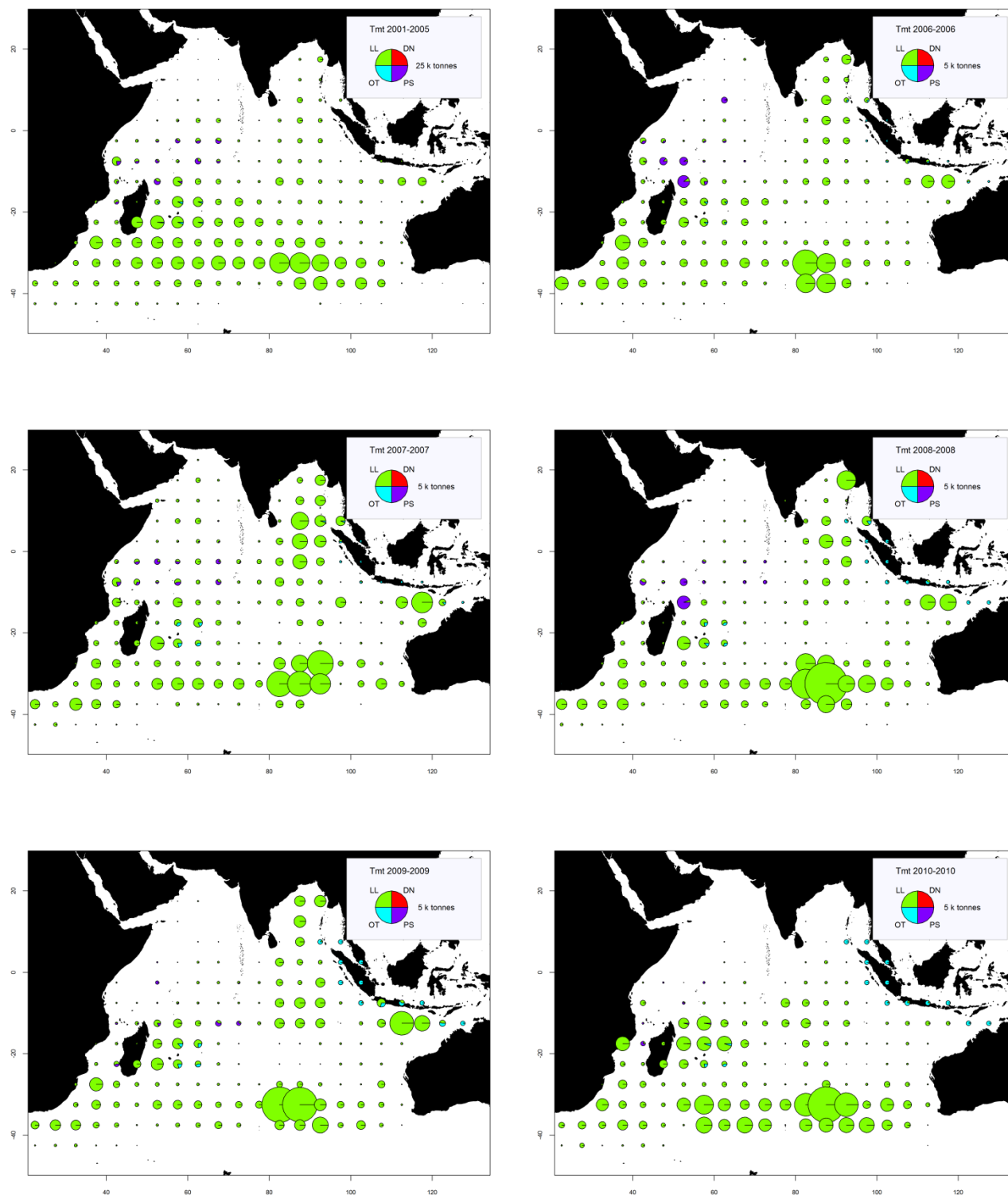


Fig. 6a–f. Albacore: Time-area catches (total combined in tonnes) of albacore estimated for the period 2001–05 by type of gear and for 2006–10, by year and type of gear.

Longline (LL, green), Driftnet (DN, red), Purse seine (PS, purple), Other fleets (OT, blue)

Time-area catches are not available for all fleets; catches for those were assigned by 5x5 square and month using information from other fleets. Data as of June 2012.

Albacore (ALB) – Status of Fisheries Statistics at the IOTC

While retained catches were fairly well known until the early-1990s (Fig. 7), the quality of catch estimates since that time has been compromised due to poor catch reports from some fleets, in particular:

- Longliners of Indonesia and Malaysia: To date, Indonesia and Malaysia have reported incomplete catches of albacore for their longline fleets, as they do not monitor activities of longliners under their flags based outside of their territories (e.g. Mauritius, Sri Lanka, and Thailand). In addition, in recent years Indonesia has reported catches of albacore for fresh-tuna longliners under its flag that are in contradiction with the amounts of albacore recorded from alternative sources, including data on exports of albacore from Bali, and data from canning factories under the ISSF scheme. The new catches of albacore estimated by the IOTC Secretariat using the above sources are around 14,000 t (average 2006–10), well above those reported by the flag countries (8,000 t).
- Fleets using gillnets on the high seas, in particular Iran, Pakistan and Sri Lanka: Catches are likely to be less than 1000 t.
- Non-reporting industrial longliners (NEI): Refers to catches from longliners operating under flags of non-reporting countries. While the catches were moderately high during the 1990s, they have not exceeded 2000 t in recent years.

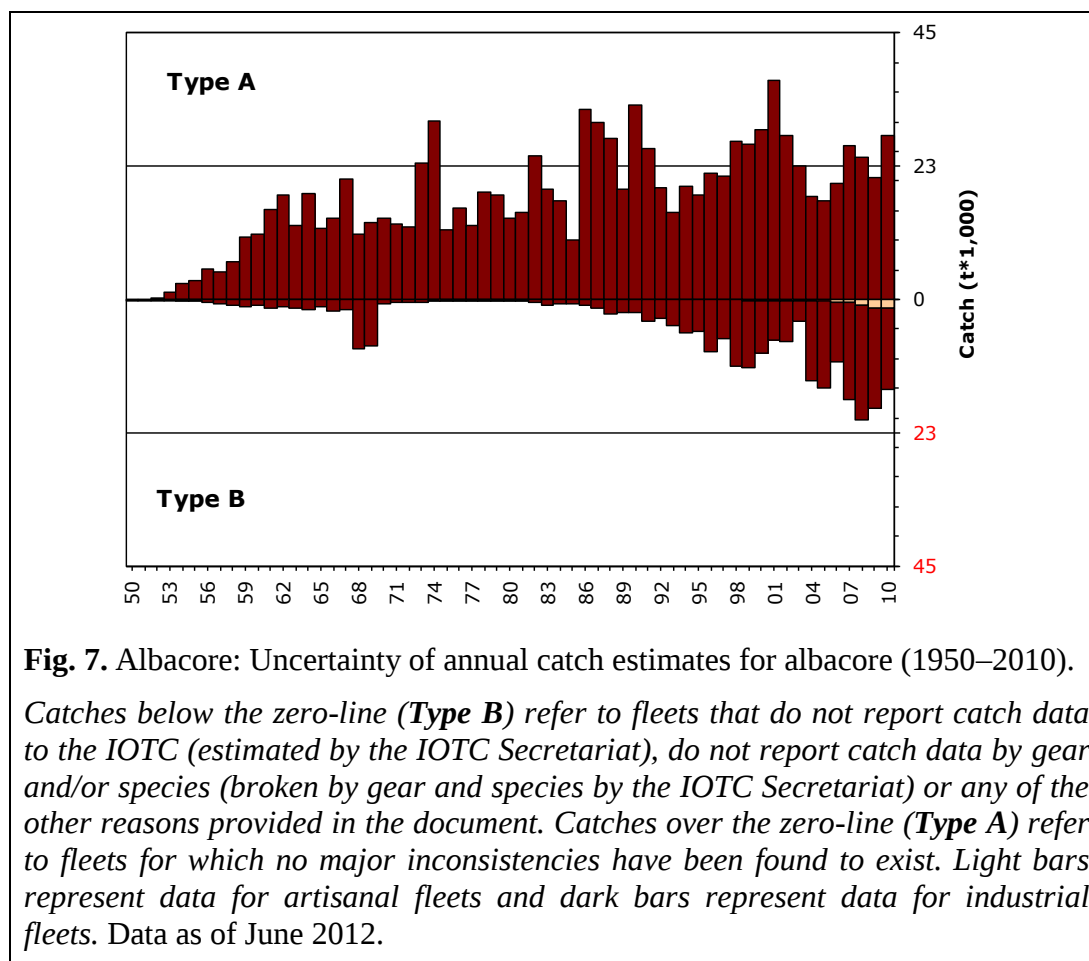
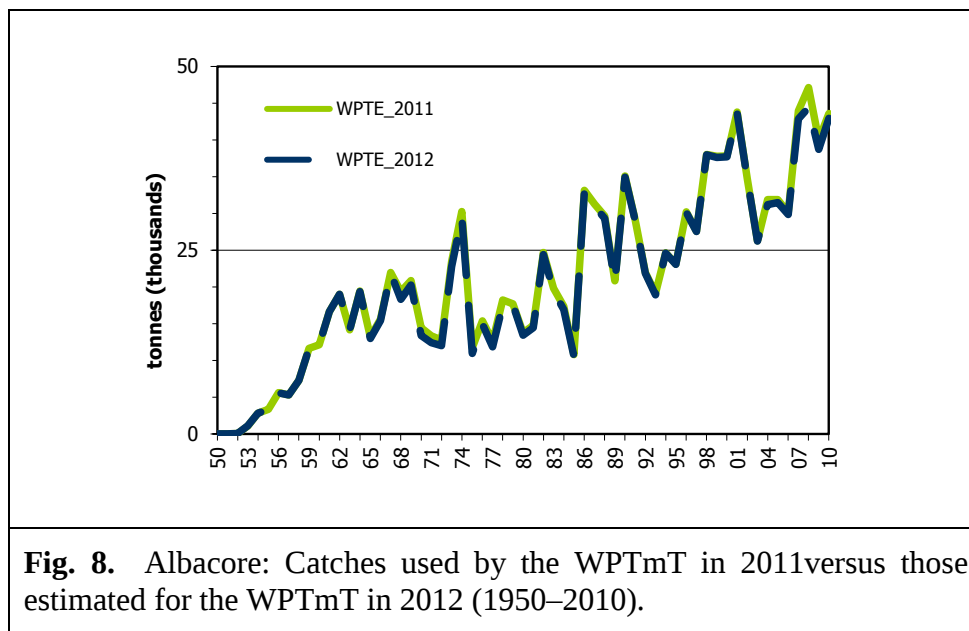


Fig. 7. Albacore: Uncertainty of annual catch estimates for albacore (1950–2010).

Catches below the zero-line (Type B) refer to fleets that do not report catch data to the IOTC (estimated by the IOTC Secretariat), do not report catch data by gear and/or species (broken by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document. Catches over the zero-line (Type A) refer to fleets for which no major inconsistencies have been found to exist. Light bars represent data for artisanal fleets and dark bars represent data for industrial fleets. Data as of June 2012.

Levels of **discards** are believed to be low although they are unknown for industrial fisheries other than European (EU) purse seiners (2003–07).

Changes to the catch series: There have not been significant changes to the catches of albacore since the WPTmT in 2011 (Fig. 8).



CPUE Series: Catch-and-effort series are available from various industrial fisheries (Fig. 9). Nevertheless, catch-and-effort are not available from some fisheries or they are considered to be of poor quality, especially during the last decade, for the following reasons:

- uncertain data from significant fleets of longliners, including India, Indonesia, Malaysia, Oman, and Philippines;
- no data for fresh-tuna longliners flagged in Taiwan, China during 1990–2006 and poor coverage the following years (2007–10);
- non-reporting by industrial purse seiners and longliners (NEI).

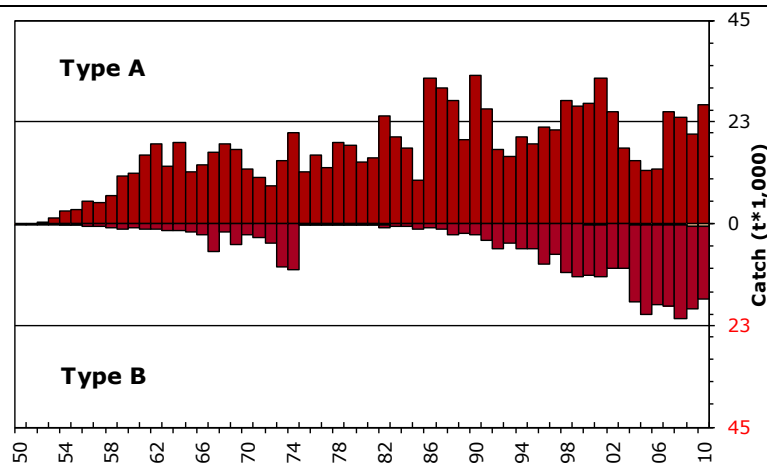


Fig. 9. Albacore: Uncertainty of time-area catches for albacore (1950–2010).

Catches below the zero-line (**Type B**) refer to fleets that do not report catch-and-effort data to the IOTC, do not report catch-and-effort data by gear and/or species or any of the other reasons provided in the document. Catches over the zero-line (**Type A**) refer to fleets for which no major inconsistencies have been found to exist. Light bars represent data for artisanal fleets and dark bars represent data for industrial fleets. Data as of June 2012.

The **size frequency data** for the Taiwanese deep-freezing longline fishery for the period 1980–2009 is available. In general, the amount of catch for which size data for the species are available before 1980 is still very low. The data for the Japanese longline fleet is available; however, the number of specimens measured per stratum has been decreasing in recent years. Few data are available for the other fleets.

- Trends in **average weight** can be assessed for several industrial fisheries although they are incomplete or of poor quality for most fisheries before 1980, between 1986 and 1991, and in recent years, due to the lack of length samples for the fleets referred to above (Fig. 10).
- Catch-at-Size(Age) tables are available but the estimates are highly uncertain for some periods and fisheries (Fig. 10) including:
 - all industrial longline fleets before the mid-60s, from the early-1970s up to the early-1980s and most fleets in recent years, in particular fresh-tuna longliners;
 - the complete lack of size samples from the driftnet fishery of Taiwan,China over the entire fishing period (1982–92)
 - the paucity of catch by area data available for some industrial fleets (Taiwan,China, NEI, India and Indonesia).

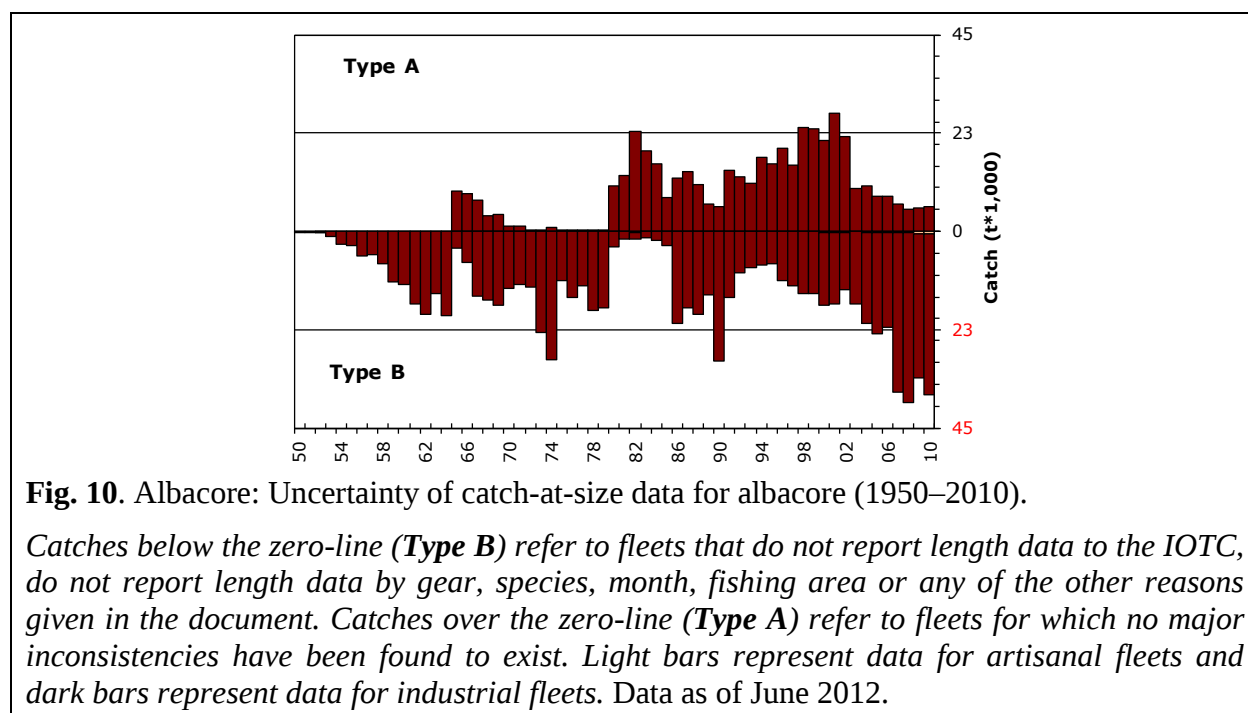


Fig. 10. Albacore: Uncertainty of catch-at-size data for albacore (1950–2010).

Catches below the zero-line (Type B) refer to fleets that do not report length data to the IOTC, do not report length data by gear, species, month, fishing area or any of the other reasons given in the document. Catches over the zero-line (Type A) refer to fleets for which no major inconsistencies have been found to exist. Light bars represent data for artisanal fleets and dark bars represent data for industrial fleets. Data as of June 2012.

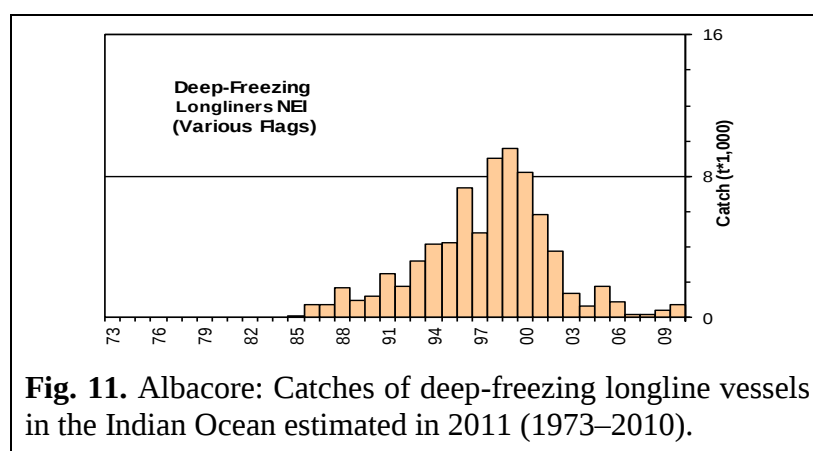
Albacore (ALB) – Estimation of catches of non-reporting fleets

The estimates of catches of non-reporting fleets were updated in 2012. The high number of non-reporting fleets operating in the Indian Ocean since the mid-1980's has led to large increases in the amount of catch that needs to be estimated. This reduces confidence in the catch estimates for albacore.

- **Purse seine:** 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 2005–06. 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 (2005–06). The amount of catch that the Secretariat

has to estimate for this fleet has decreased considerably in recent years. It is thought that there are no longer purse seiners operating under flags of non-reporting countries. The catches of albacore estimated for this component have never been above 170 t.

- **Deep-freezing longline** (Fig. 11): The catches by large longliners from several non-reporting countries were estimated using IOTC vessel records and the catch data from Taiwan, China, Japanese or Spanish longliners, based on the assumption that most of the vessels operate in a way similar to the longliners from these countries. 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, such as Philippines, Taiwan, China, the Seychelles and, recently, Oman, India and Indonesia. The catches recorded for India and Philippines are considered uncertain and probably do not account for all the albacore caught by vessels operating under these flags.



- **Fresh tuna longline** (Figs. 12, 13, 14): Fresh tuna longline vessels, mainly from China, Taiwan, China, India, Malaysia, Belize, 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, before 2006 they were not reported by gear (fresh-tuna longline or deep-freezing longline). The Secretariat estimated the catches of fresh-tuna longliners for this period 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 (Fig. 12). This applies to Indonesia (2002 - to-date; Figs. 13, 14), 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 (2004–10), Indonesia (1973–2001), Thailand (1994–97), Sri Lanka (1990–2001; 2004–05), Malaysia (1989–99), Singapore, Maldives and Yemen (recent years). The catches in these ports and years

⁴ Overseas Fisheries Cooperation Foundation of Japan

were estimated from the known/presumed levels of activity of the vessels and the average catches obtained in ports covered through sampling.

- Market data, including exports of frozen Albacore recorded in Indonesia and imports of Albacore for canning, provided through ISSF. This applies to Indonesia (2003–10) and Malaysia (2009–10).

In 2006 Taiwan,China provided total catches for its longline tuna fleet operating in the Indian Ocean for the period 2000 to 2005. Since then, Taiwan,China has provided catches regularly. 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 1973–2010 and for Taiwan,China in years prior to 2001 were estimated as explained in the two bullet points above.

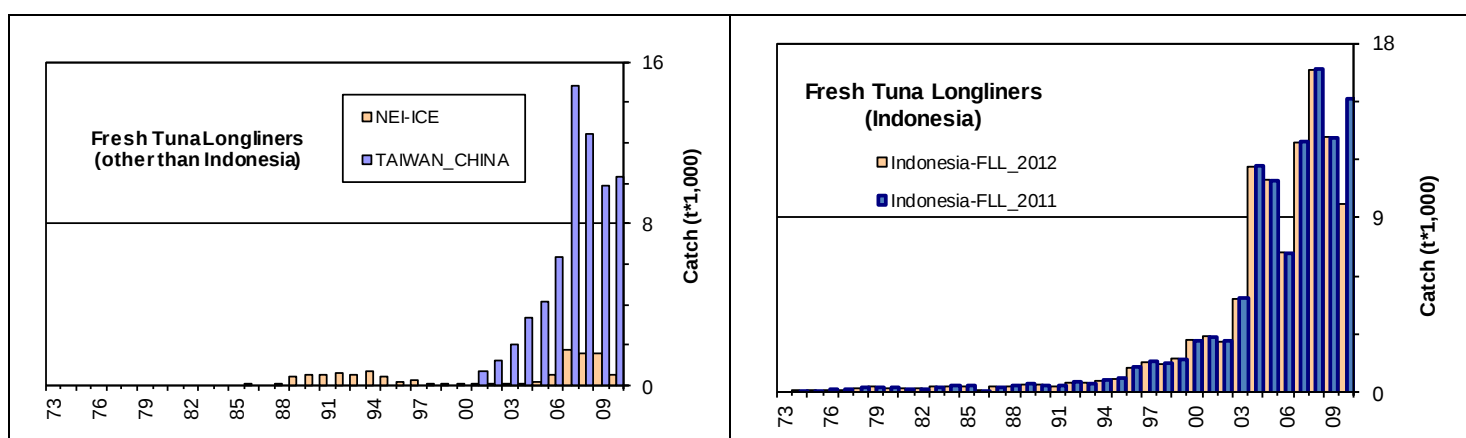


Fig. 12. Albacore: Catches of fresh-tuna longline vessels not based in Indonesia (mainly registered in China, Taiwan,China and Indonesia) estimated in 2011 (1989–2010).

Fig. 13. Albacore: Catches of fresh-tuna longline vessels based in Indonesia (domestic and foreign) estimated in 2011 (1973–2010) versus catches estimated in 2012 (1973–2010).

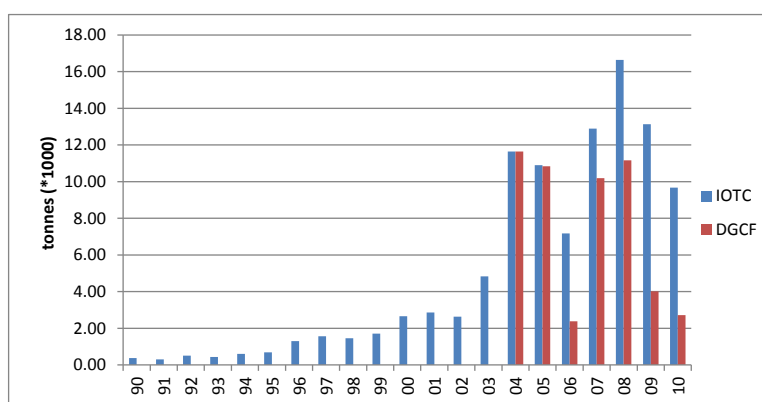


Fig. 14. Albacore: Catch of albacore officially reported by Indonesia as compared with the catches estimated by the IOTC Secretariat using the information referred to in this section (1973–2010).

APPENDIX I

REVIEW OF FISHERIES TRENDS FOR ALBACORE

1. EFFORT

a) Longline

Effort exerted by **LONGLINE** fleets in the Indian Ocean, in millions (M) of hooks set, by decade and main fleet:

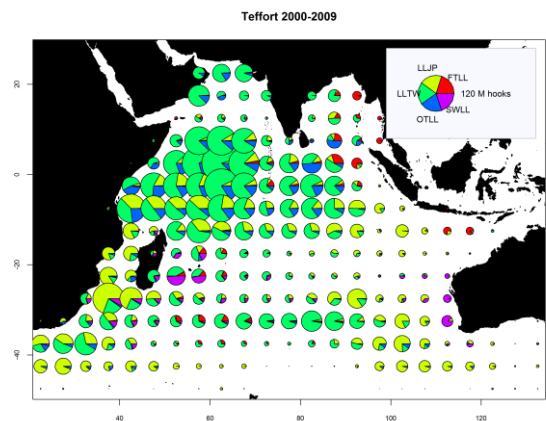
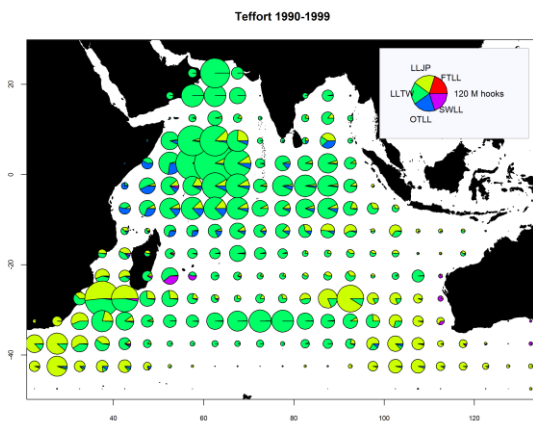
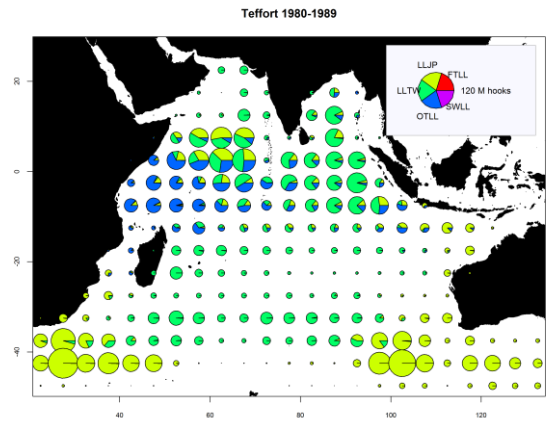
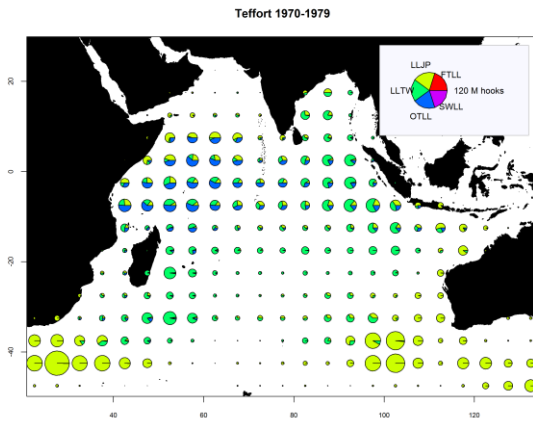
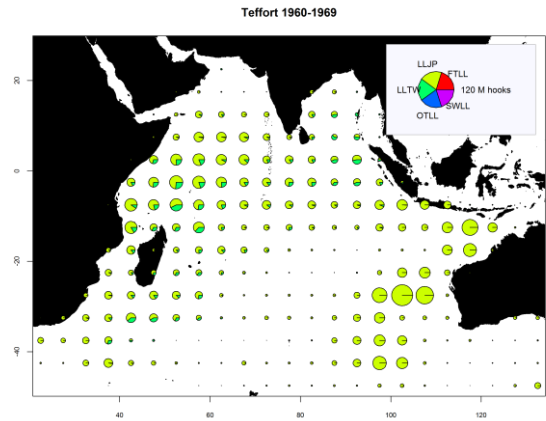
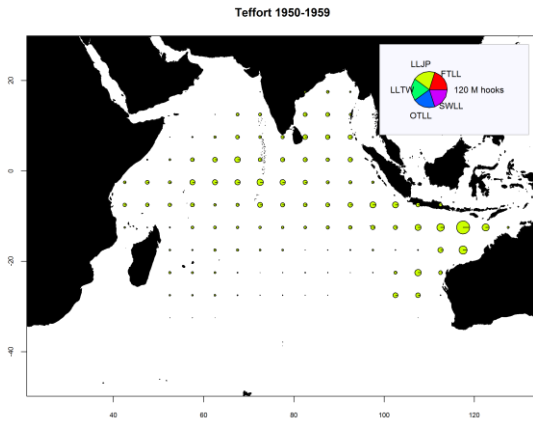
LLJP (light green): deep-freezing longliners from Japan

LLTW (dark green): deep-freezing longliners from Taiwan,China

SWLL (turquoise): swordfish longliners (Australia, EU, Mauritius, Seychelles and other fleets)

FTLL (red) : fresh-tuna longliners (China, Taiwan,China and other fleets)

OTLL (blue): Longliners from other fleets (includes Belize, China, Philippines, Seychelles, South Africa, South Korea and various other fleets)



Effort exerted by LONGLINE fleets in the Indian Ocean, in millions (M) of hooks set, for 2001-05 and 2006-10, by year, and main fleet:

LLJP (light green): deep-freezing longliners from Japan

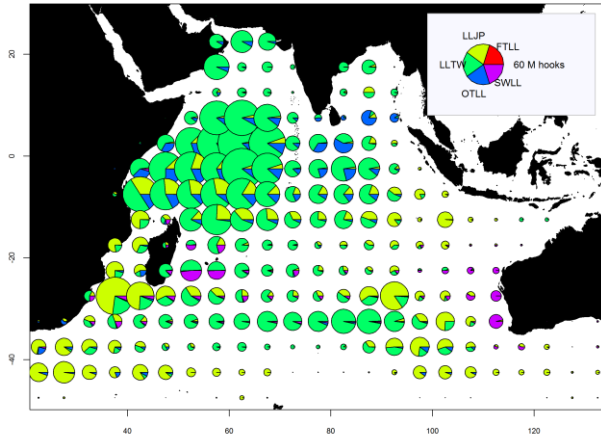
LLTW (dark green): deep-freezing longliners from Taiwan,China

SWLL (turquoise): swordfish longliners (Australia, EU, Mauritius, Seychelles and other fleets)

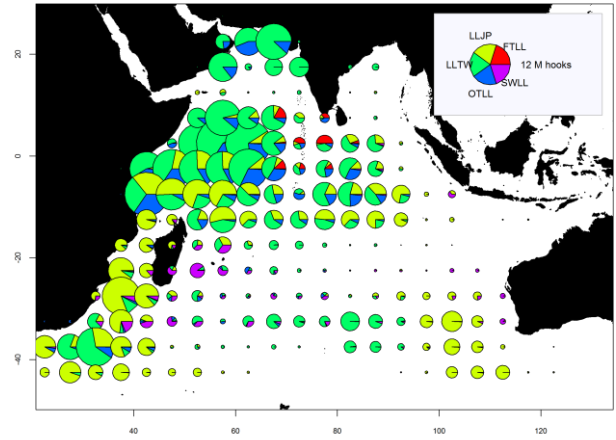
FTLL (red) : fresh-tuna longliners (China, Taiwan,China and other fleets)

OTLL (blue): Longliners from other fleets (includes Belize, China, Philippines, Seychelles, South Africa, South Korea and various other fleets)

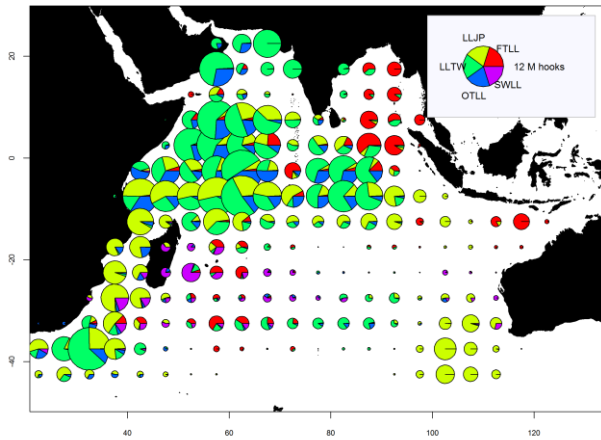
Teffort 2001-2005



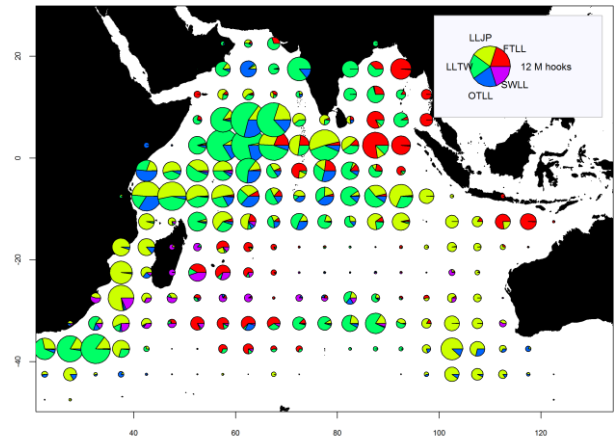
Teffort 2006-2006



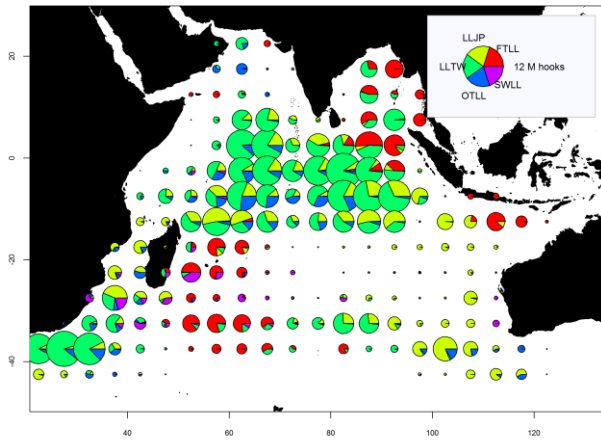
Teffort 2007-2007



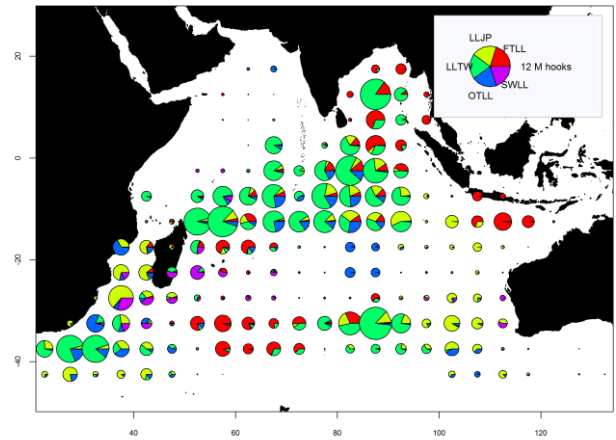
Teffort 2008-2008



Teffort 2009-2009

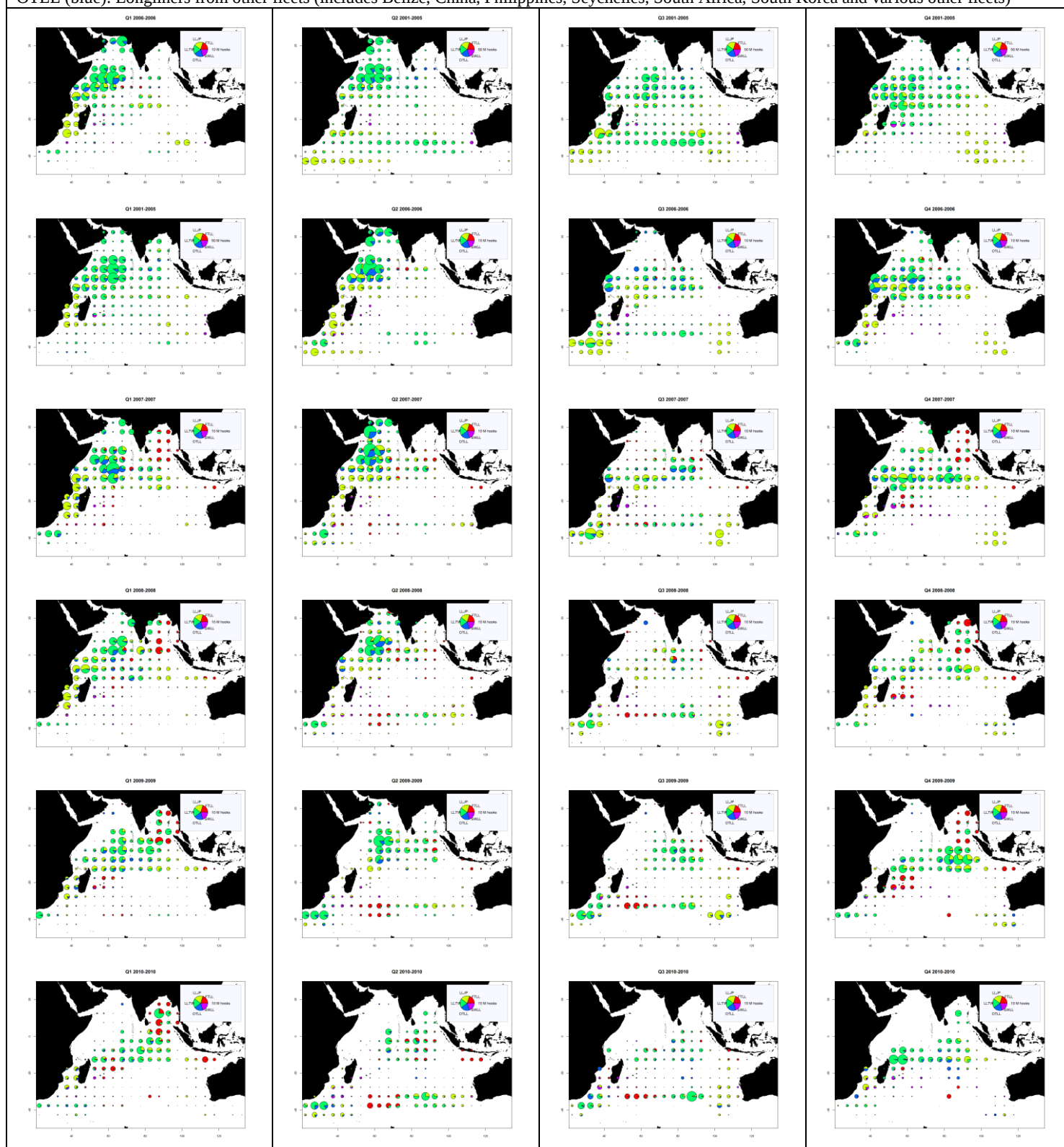


Teffort 2010-2010



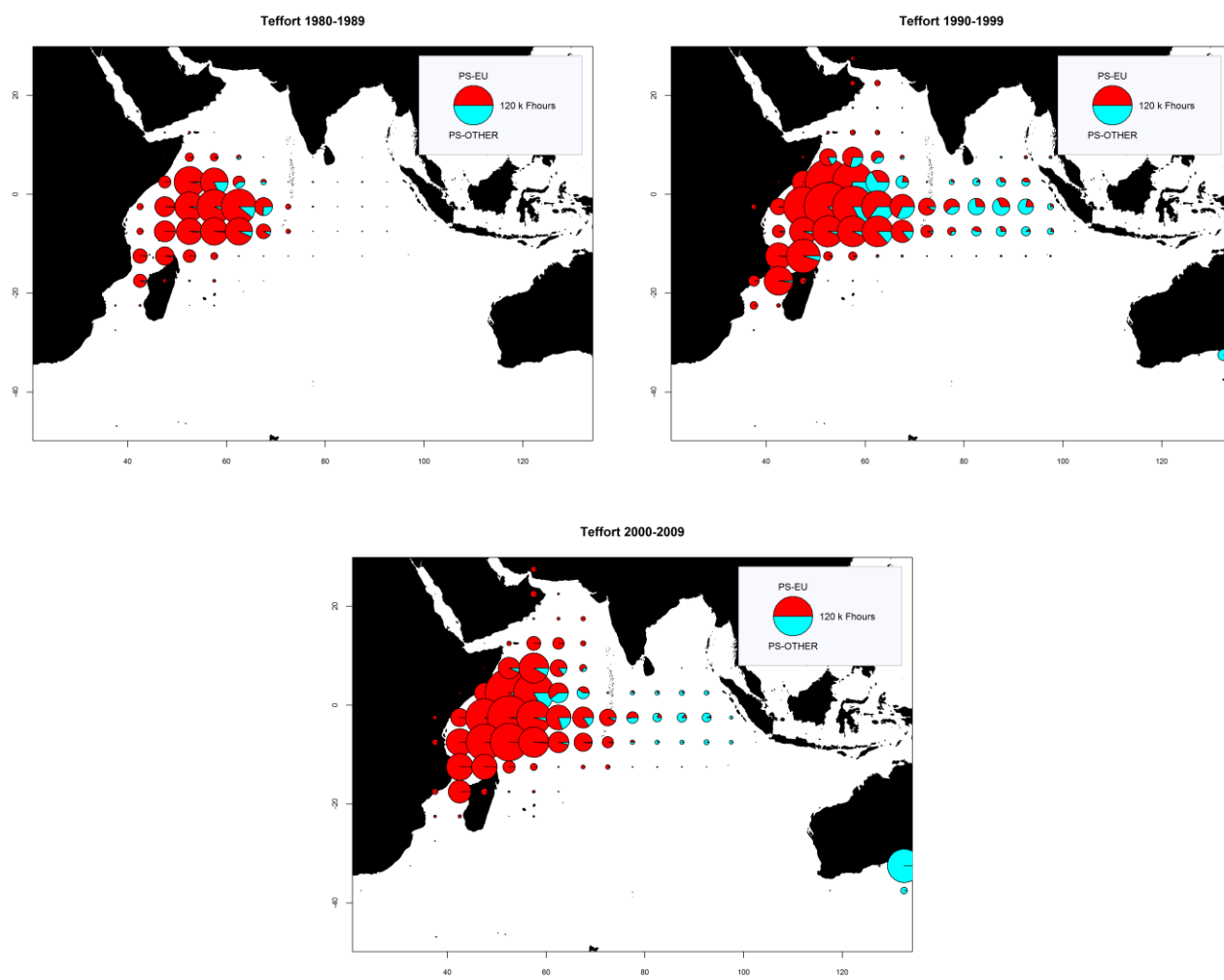
Effort exerted by **LONGLINE** fleets in the Indian Ocean, in millions (M) of hooks set, for 2001-05 and 2006-10, by year, quarter, and main fleet:

LLJP (light green): deep-freezing longliners from Japan
 LLTW (dark green): deep-freezing longliners from Taiwan,China
 SWLL (turquoise): swordfish longliners (Australia, EU, Mauritius, Seychelles and other fleets)
 FTLL (red) : fresh-tuna longliners (China, Taiwan,China and other fleets)
 OTLL (blue): Longliners from other fleets (includes Belize, China, Philippines, Seychelles, South Africa, South Korea and various other fleets)



b) *Purse seine*

Effort exerted by industrial PURSE SEINE fleets in the Indian Ocean, in thousands (k) of fishing hours (Fhours), by decade and main fleet:
 PS-EU (red): Industrial purse seiners monitored by the EU and Seychelles (operating under flags of EU countries, Seychelles and other flags)
 PS-OTHER (green): Industrial purse seiners from other fleets (includes Japan, Mauritius and purse seiners of Soviet origin)
 (excludes effort data for purse seiners of Iran and Thailand)

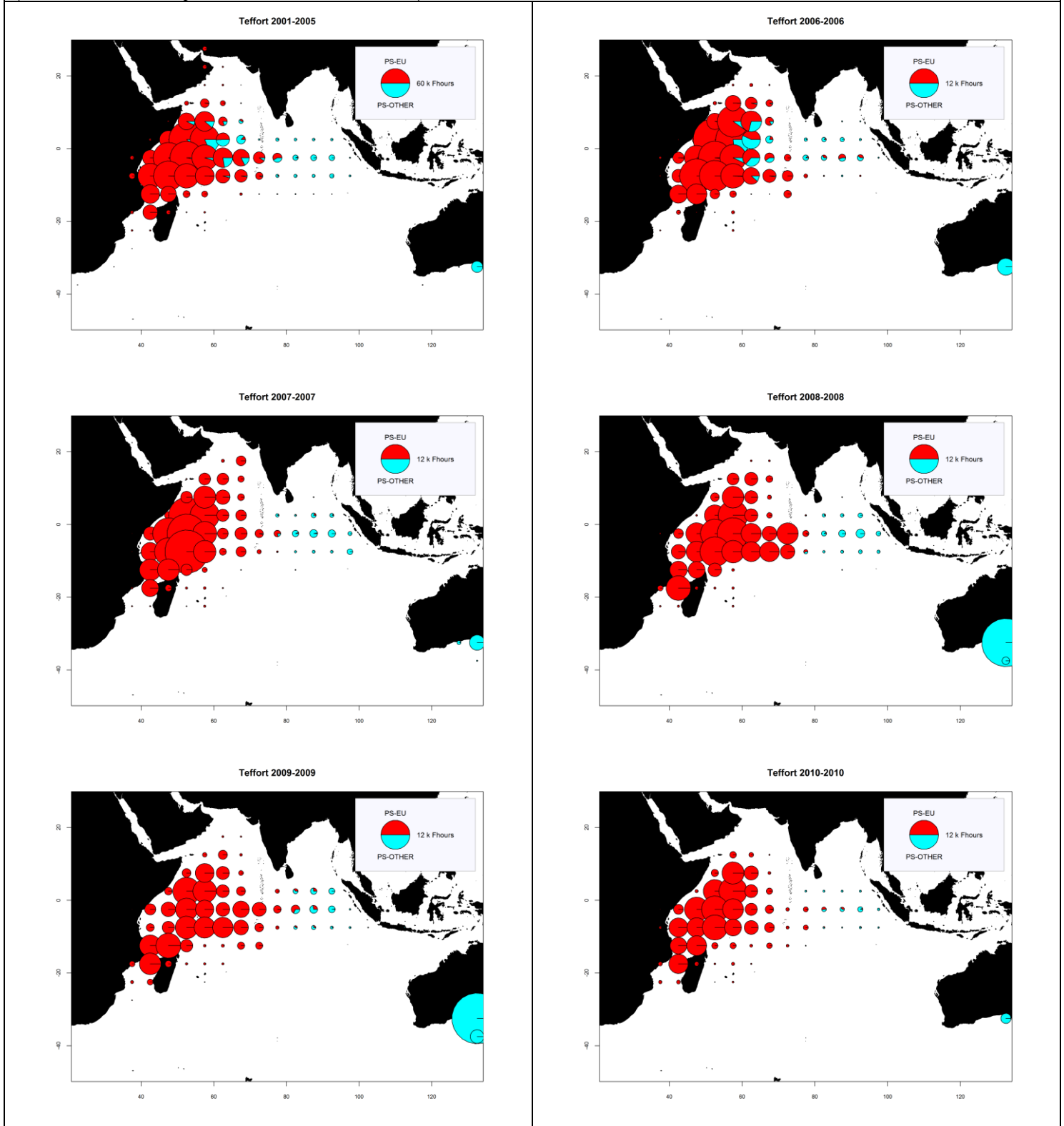


Effort exerted by industrial PURSE SEINE fleets in the Indian Ocean, in thousands (k) of fishing hours (Fhours), for 2000-04 and 2005-09, by year, and main fleet:

PS-EU (red): Industrial purse seiners monitored by the EU and Seychelles (operating under flags of EU countries, Seychelles and other flags)

PS-OTHER (green): Industrial purse seiners from other fleets (includes Japan, Mauritius and purse seiners of Soviet origin)

(excludes effort data for purse seiners of Iran and Thailand)



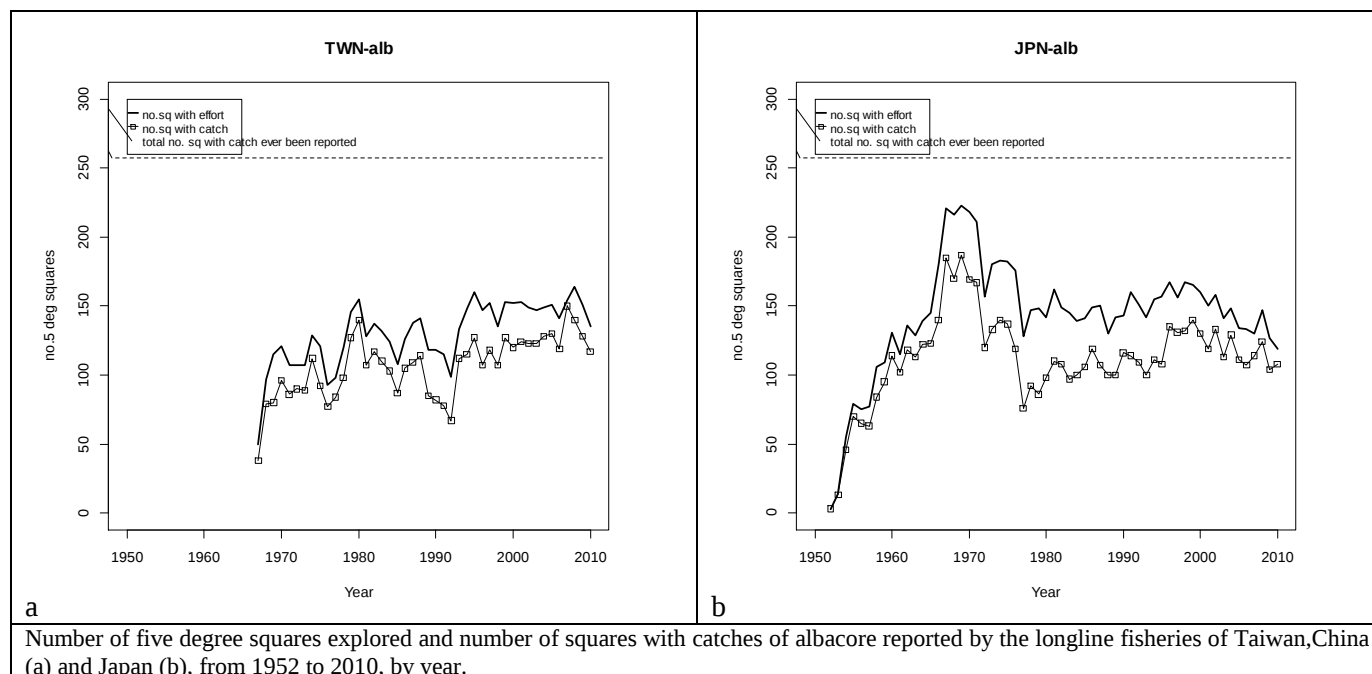
Effort exerted by industrial PURSE SEINE fleets in the Indian Ocean, in thousands (k) of fishing hours (Fhours), for 2001-05 and 2006-10, by year, quarter, and main fleet:

PS-EU (red): Industrial purse seiners monitored by the EU and Seychelles (operating under flags of EU countries, Seychelles and other flags)

PS-OTHER (green): Industrial purse seiners from other fleets (includes Japan, Mauritius and purse seiners of Soviet origin)

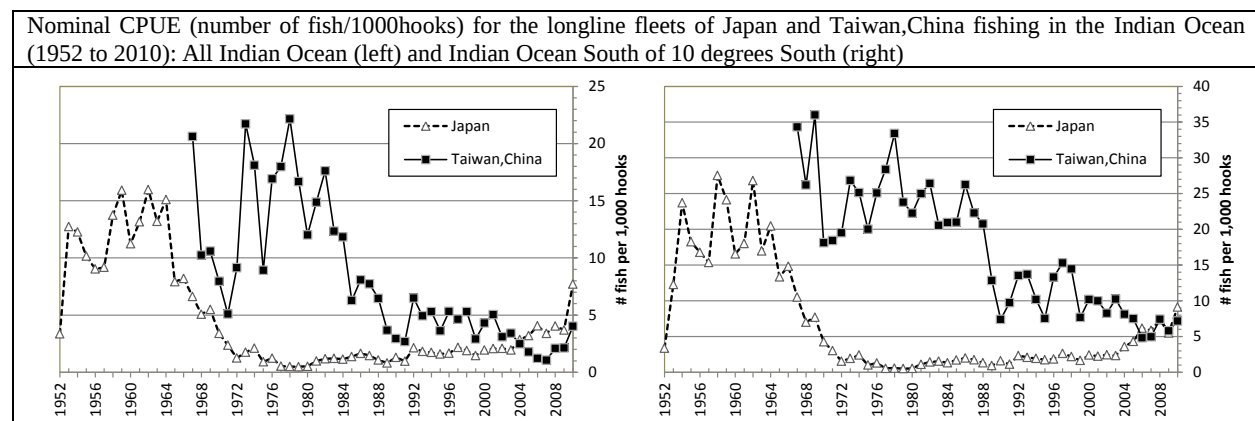
(excludes effort data for purse seiners of Iran)



c) *Squares fished*

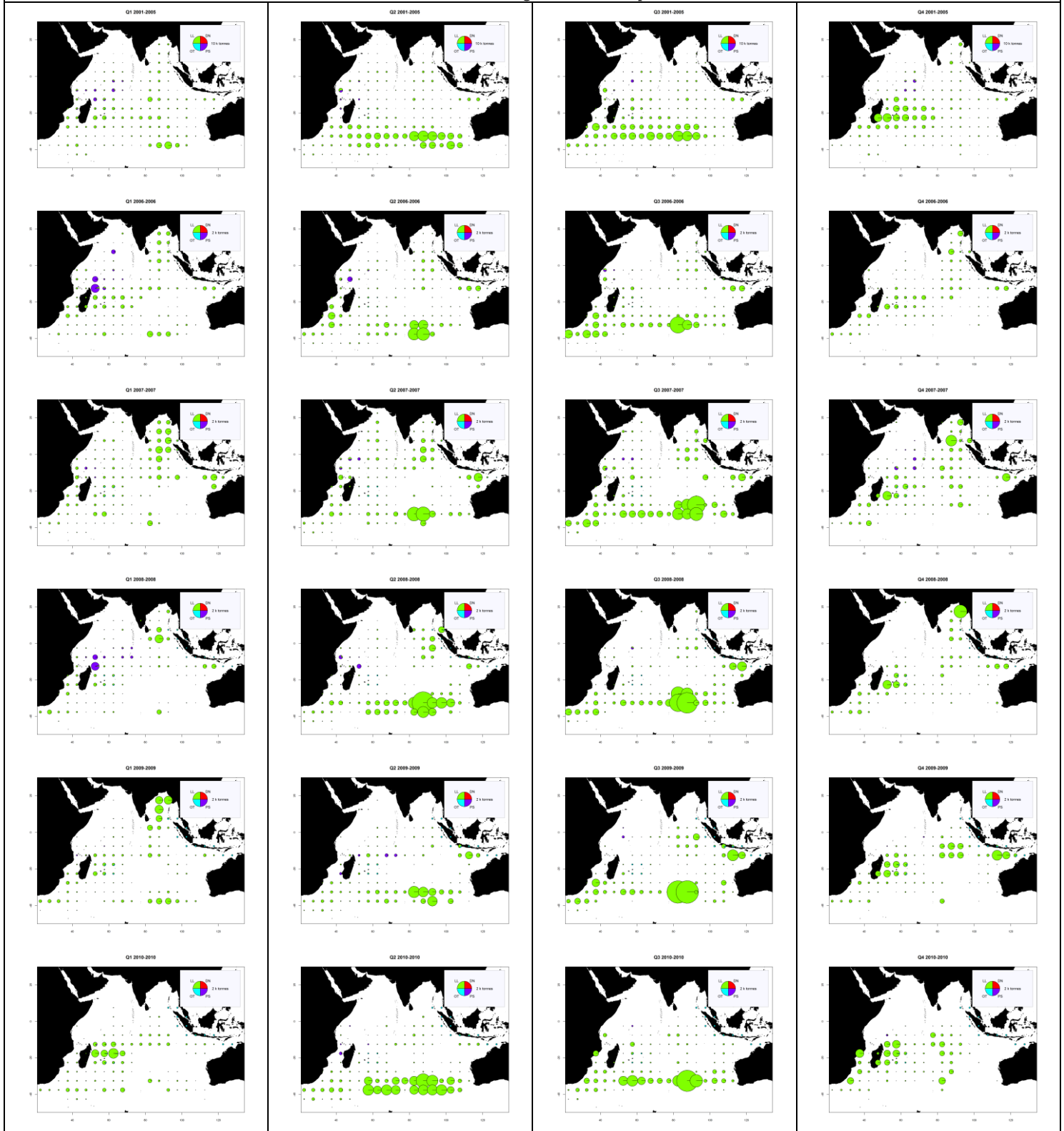
2. CATCHES & CATCH RATES

a. Catch rates

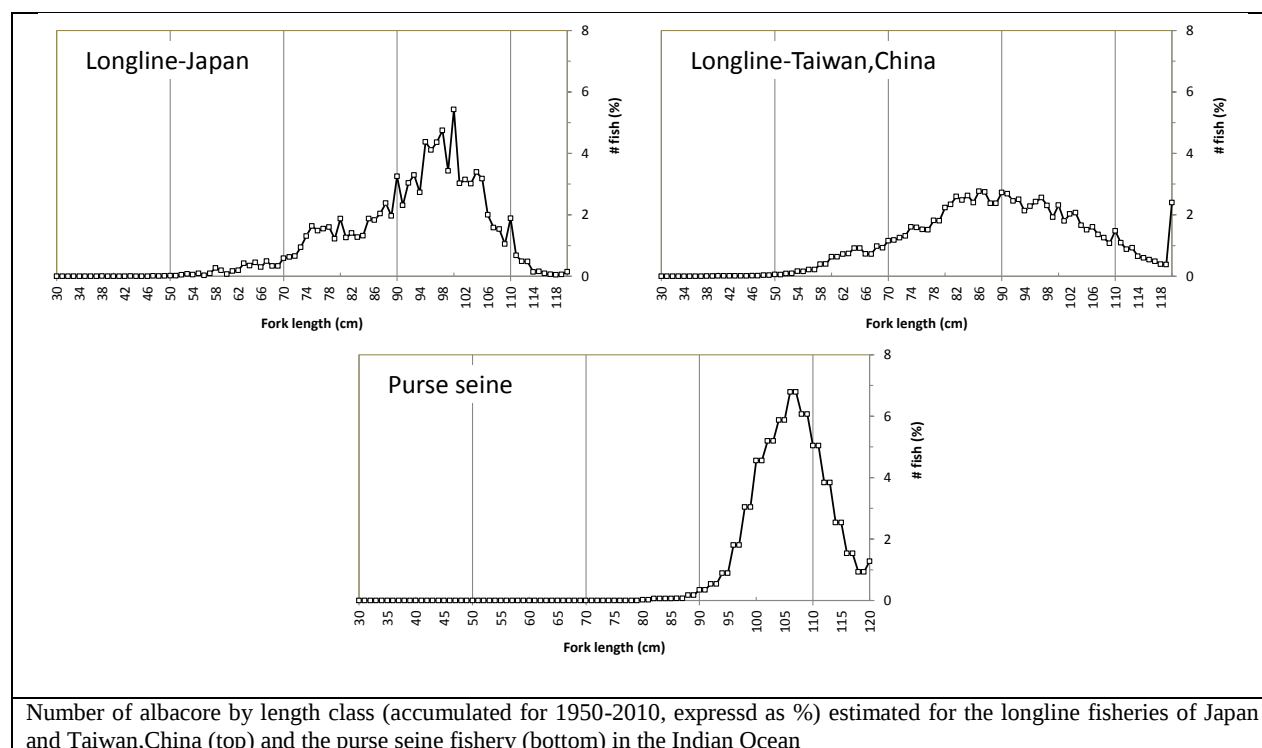
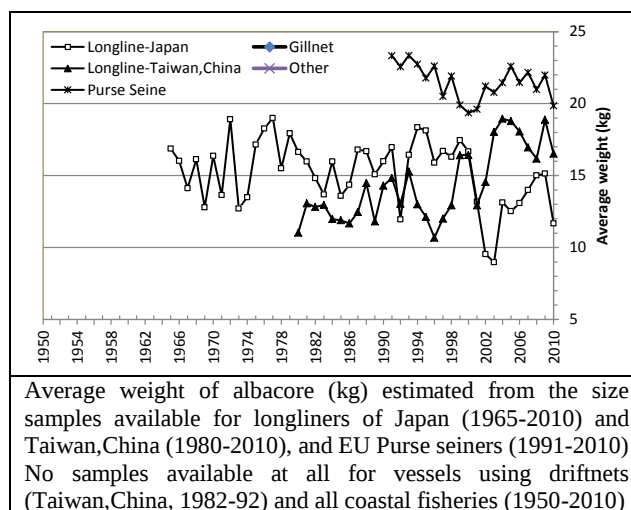


b. Recent catches

Time-area catches (total combined in tonnes) of ALBACORE estimated for 2001-05 and 2006-10, by year, and quarter:
 Longline (LL, red): deep-freezing longliners from Japan, Taiwan, China, EU, Seychelles, South Korea, and other fleets.
 Purse seine (PS, blue): industrial tuna purse seiners from EU, Iran, I.R., Japan, Seychelles, Thailand and other fleets.
 Other fleets (OTHR, green): other fleets, especially small-scale fisheries operating in coastal waters.
 Time-area catches are not available for all fleets; catches of fresh-tuna longliners are not represented.



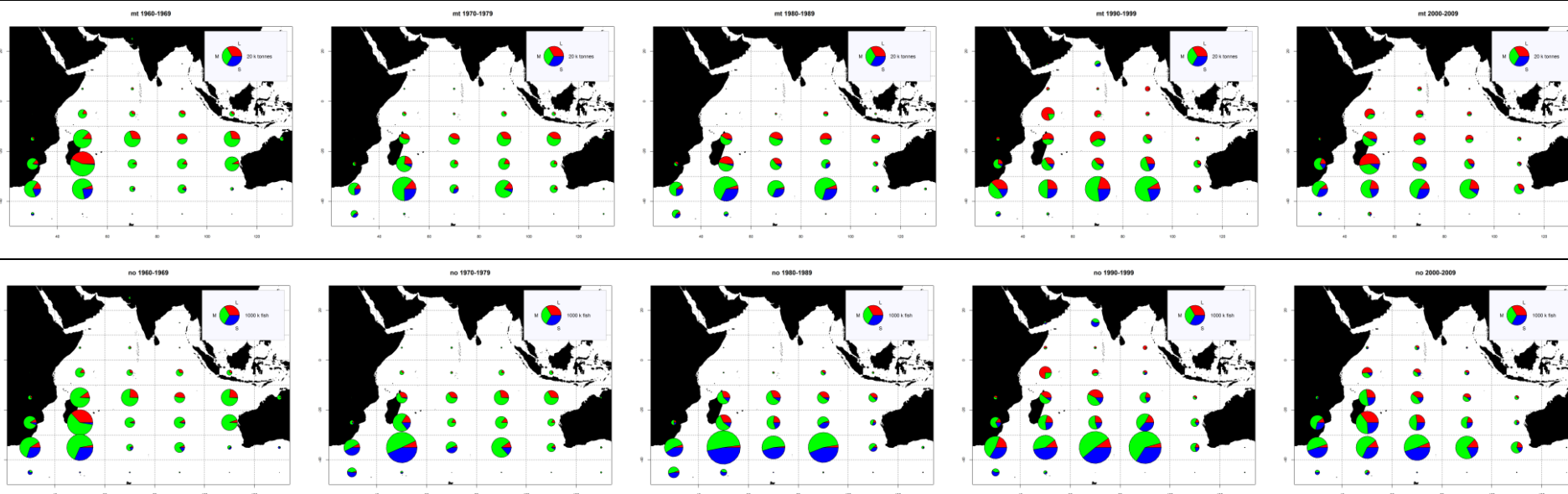
3. AVERAGE WEIGHTS AND SIZE



Albacore (ALB): Catch per size class

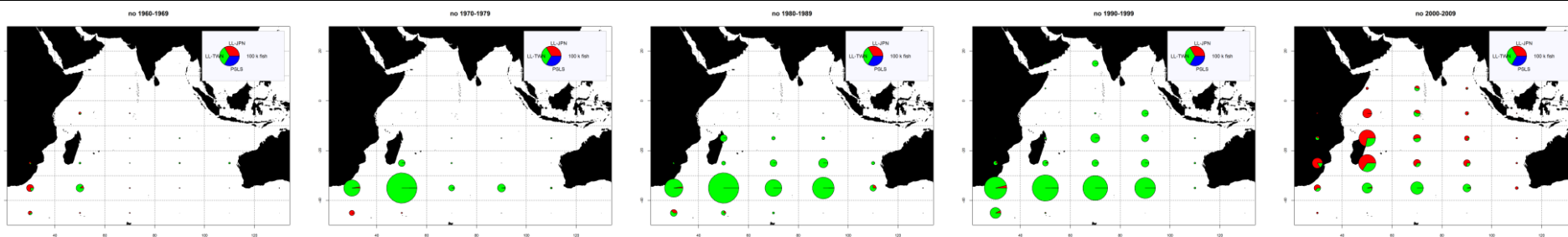
Total catches of ALBACORE (ALB) in weight (top) and number (bottom) derived from the catch-at-size of purse seine and longline fisheries for 1960-2009. Catches are presented by decade, 10 latitude by 20 longitude area and size class, including:

- **Large size (Red):** Catches of ALB for which the weight estimated is 20kg or greater
- **Medium size (Green):** Catches of ALB for which the weight estimated is between 10kg and 20kg
- **Small size (Blue):** Catches of ALB for which the weight estimated is under 10kg



Total catches of ALBACORE (ALB) of very small size (under 5kg), in number, derived from the catch-at-size of purse seine and longline fisheries for 1960-2009. Catches are presented by decade, 10 latitude by 20 longitude area and fishery, including:

- **PSLS (Blue):** Industrial purse seiners on associated schools (e.g. FAD)
- **LL-JPN (Red):** Industrial longliners of Japan, Korea, and Thailand
- **LL-TWN (Green):** Industrial longliners of Taiwan, China and other countries

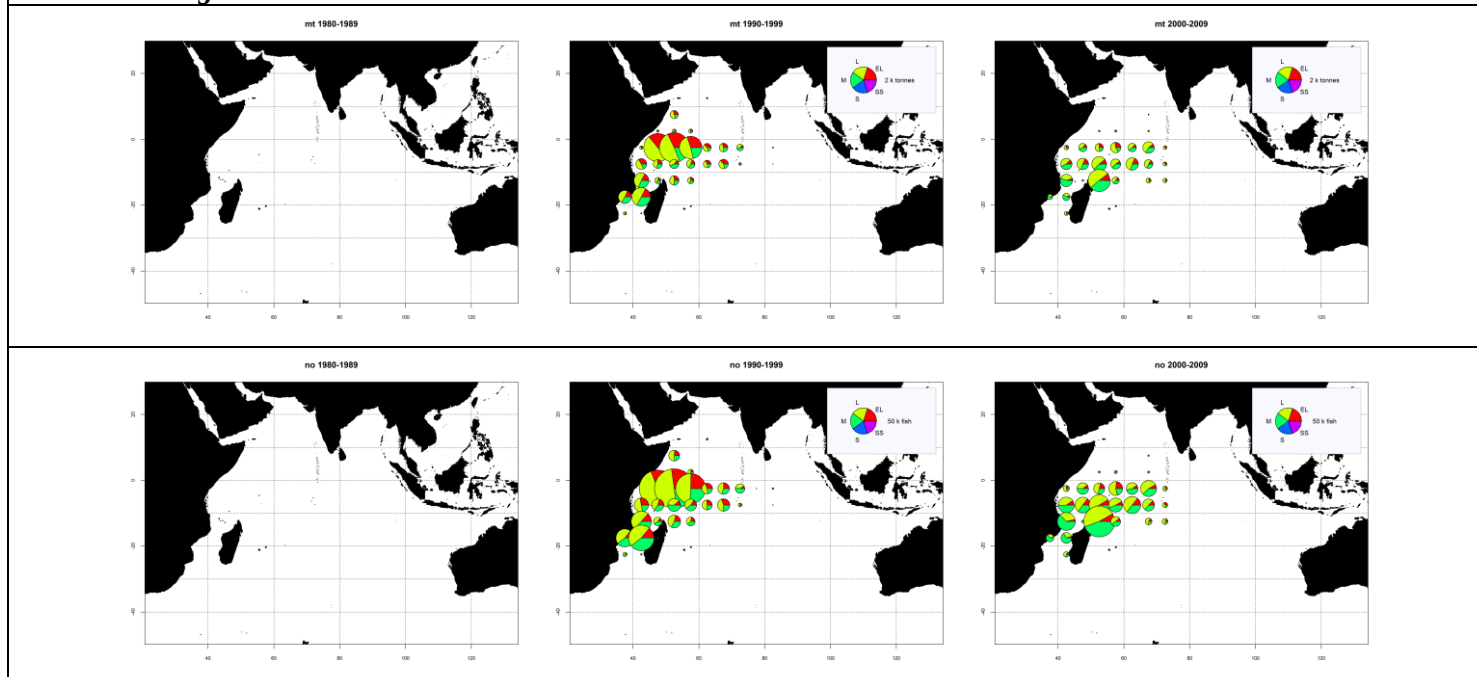


Albacore (ALB): Catch by size class by fishery

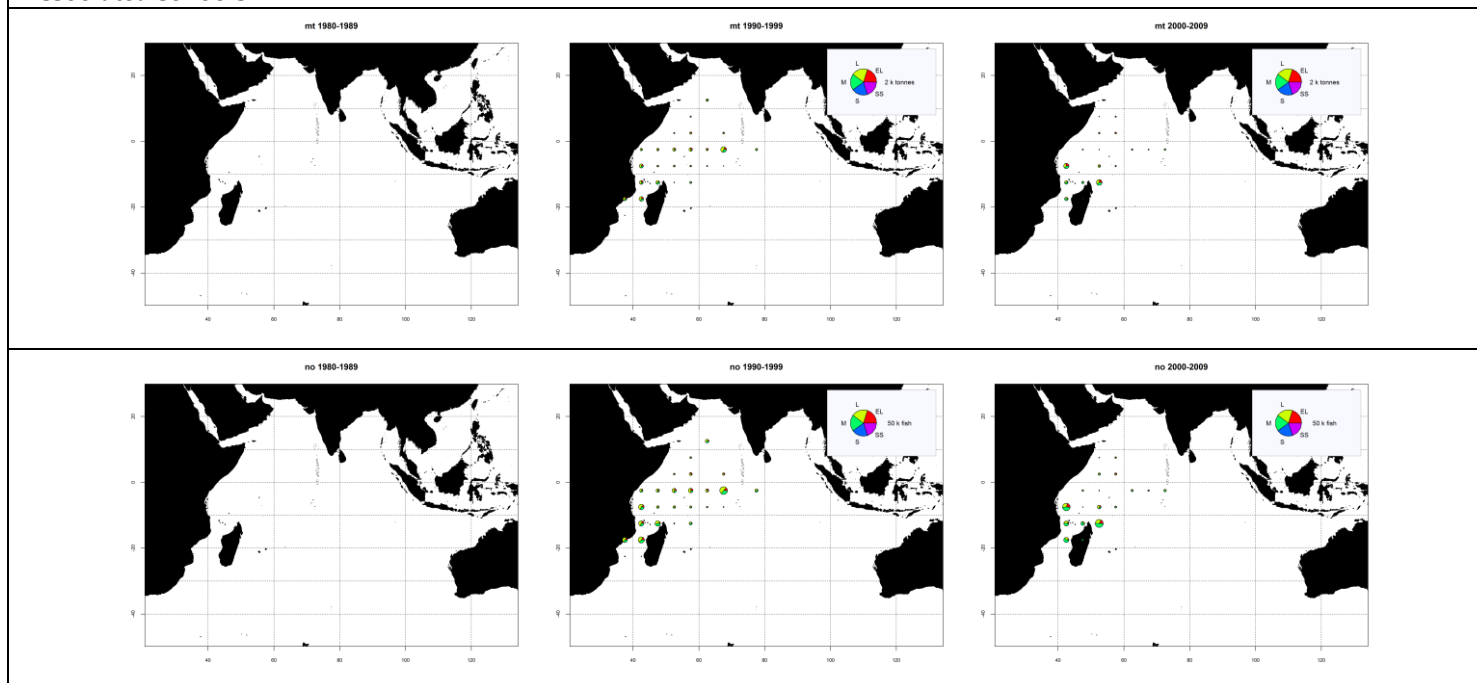
Total catches of ALBACORE (ALB) in weight (top) and number (bottom) derived from the catch-at-size of industrial purse seiners on free-swimming schools (top two rows; PSFS) and associated schools (bottom two rows; PSLs) for 1980-2009. Catches are presented by decade, 10 latitude by 20 longitude area and size class, including:

- **Very small size (SS; purple):** Catches of ALB for which the weight estimated is under 5kg
- **Small size (S; blue):** Catches of ALB for which the weight estimated is between 5 and 10kg
- **Medium size (M; green):** Catches of ALB for which the weight estimated is between 10kg and 20kg
- **Large size (L; yellow):** Catches of ALB for which the weight estimated is between 20kg and 25kg
- **Very large size (EL; red):** Catches of ALB for which the weight estimated is 25kg or greater

Free-swimming schools



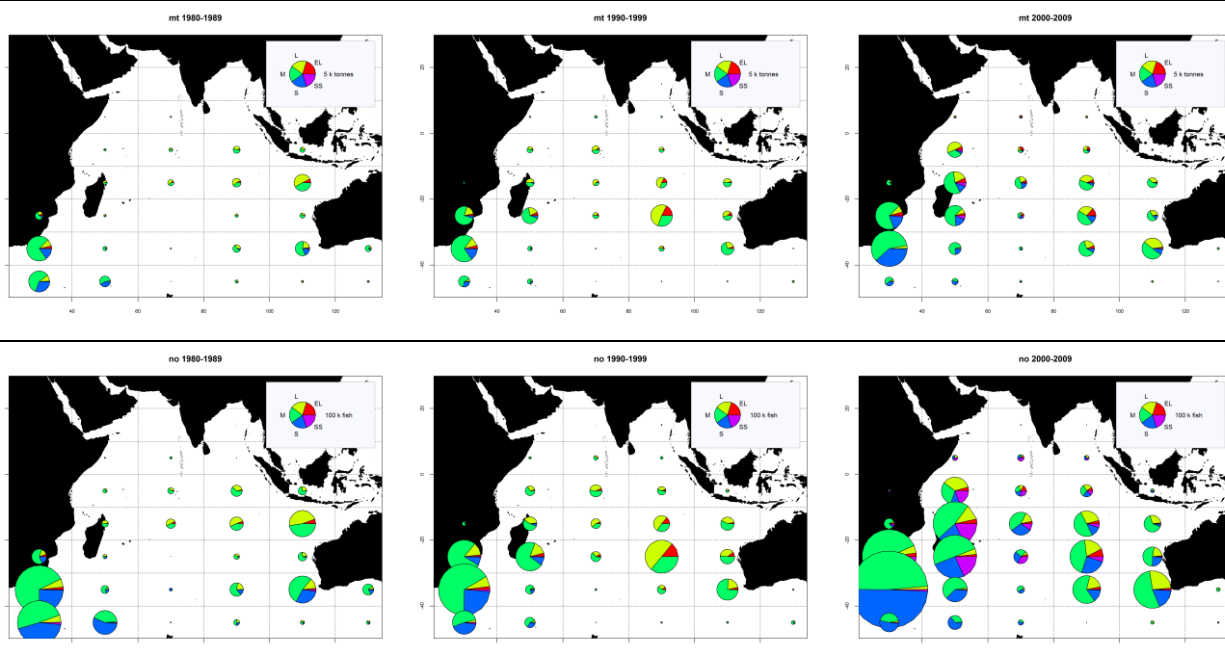
Associated schools



Total catches of ALBACORE (ALB) in weight (top) and number (bottom) derived from the catch-at-size of industrial longliners of Japan (top two rows) and Taiwan,China (bottom two rows) for 1980-2009. Catches are presented by decade, 10 latitude by 20 longitude area and size class, including:

- **Very small size (SS; purple):** Catches of ALB for which the weight estimated is under 5kg
- **Small size (S; blue):** Catches of ALB for which the weight estimated is between 5 and 10kg
- **Medium size (M; green):** Catches of ALB for which the weight estimated is between 10kg and 20kg
- **Large size (L; yellow):** Catches of ALB for which the weight estimated is between 20kg and 25kg
- **Very large size (EL; red):** Catches of ALB for which the weight estimated is 25kg or greater

Longline Japan



Longline Taiwan,China

