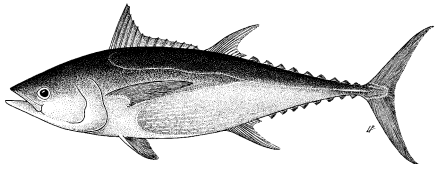
DRAFT EXECUTIVE SUMMARY: LONGTAIL TUNA

Indian Ocean Tuna Commission
Commission des Thons de l'Océan Indien
iotc ctoi



Status of the Indian Ocean longtail tuna (LOT: *Thunnus tonggol*) resource

TABLE 1. Longtail tuna: Status of longtail tuna (*Thunnus tonggol*) in the Indian Ocean.

Area[1]	Indicators		2015 stock status determination
Indian Ocean	Catch[2] 2014: Average catch[2] 2010–2014:	147,587 t 158,393 t	
	MSY (1,000 t) (80% CI): F_{MSY} (80% CI): B_{MSY} (1,000 t) (80% CI): F_{2013}/F_{MSY} (80% CI): B_{2013}/B_{MSY} (80% CI): B_{2013}/B_0 (80% CI):	122 (106–173) 0.55 (0.48–0.78) 221 (189–323) 1.43 (0.58–3.12) 1.01 (0.53–1.71) 0.41(n.a.)	

[1]Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence.
[2]Nominal catches represent those estimated by the IOTC Secretariat. If these data are not reported by CPCs, the IOTC Secretariat estimates 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; data reported by other parties on the activity of vessels; and data collected through sampling at the landing place or at sea by scientific observers.

Colour key	Stock overfished($SB_{year}/SB_{MSY}< 1$)	Stock not overfished ($SB_{year}/SB_{MSY}\geq 1$)
Stock subject to overfishing($F_{year}/F_{MSY}> 1$)		
Stock not subject to overfishing ($F_{year}/F_{MSY}\leq 1$)		
Not assessed/Uncertain		

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. **Surplus production models (**ASPIC) Analysis indicate that the stock is being exploited at a rate that exceeded F_{MSY} in recent years (Fig. 1). Whether a four quadrant stock structure of catches in the Indian Ocean or a one stock assumption is used in the analysis, the conclusions remain the same as far as optimal yields are concerned. In previous years, analysis conducted on the NWIO with a Surplus Production Model (ASPIC) also indicated that the stock is subject to overfishing in the NWIO, and could be overfished. The approach used here applies a more traditional method of stock assessment by using CPUE series from Oman, Thailand, and Australia. However, most of these are from fisheries accounting a small proportion of the IO catch, and this approach needs to be further improved by developing indices of abundance using catch and effort series from I.R. Iran and Indonesia, as well as length composition data from some fisheries. Based on the ASPIC runs and the OCOM results examined, the weight of evidence suggests that the estimated values of current biomass are near the estimated abundance to produce B_{MSY} in 2013, and that fishing mortality has exceeded F_{MSY} values in recent years, the stock is considered to be **not overfished**, but **subject to overfishing** (Table 1; Fig. 1).

Outlook. There remains considerable uncertainty about stock structure and about the total catches in the Indian Ocean. The continued increase of annual catches for longtail tuna in recent years has further increased the pressure on the Indian Ocean stock as a whole. The apparent fidelity of longtail tuna to particular areas/regions is a matter for concern as overfishing in these areas can lead to localised depletion. Research emphasis on improving indicators and exploration of stock structure and stock assessment approaches for more traditional models for fisheries management are warranted. There is a continued high to very high risk of exceeding MSY-based reference points by 2016, even if catches are reduced to 90% of the current (2013) levels (100% risk that $B_{2016}<B_{MSY}$, and 87% risk that $F_{2016}>F_{MSY}$) (Table 2).

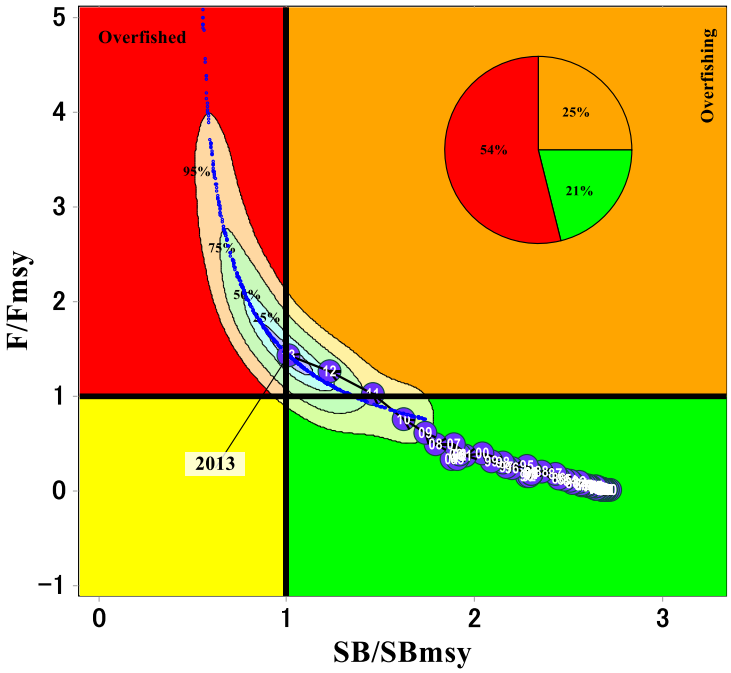


Fig. 1. Longtail tuna. Kobe plot of the longtail tuna in the Indian Ocean (1950–2013) with uncertinty around the 2013 point and compostions of uncertainties in terms of 4 phases (colours) of the Kobe plots (pie chart).

TABLE 2. Longtail tuna ASPIC aggregated Indian Ocean assessment Kobe II Strategy Matrix. Probability (percentage) of violating the MSY-based target for nine constant catch projections (2013 +20%,+10%, -10%, - 20%, -30% projected for 3 and 10 years).

Reference point and projection timeframe	**Alternative catch projections (relative to 2013) and weighted probability (%) scenarios that violate reference points**					
	70% (111,519 t)	80% (127,450 t)	90% (143,382 t)	100% (159,313 t)	110% (175,244 t	120% (191,176 t)
$B_{2016} < B_{MSY}$	56	66	100	100	100	100
$F_{2016} > F_{MSY}$	53	71	87	100	n.a.	100
$B_{2023} < B_{MSY}$	76	100	100	100	100	100
$F_{2023} > F_{MSY}$	82	89	96	100	n.a.	100

The following should be noted:

- The Maximum Sustainable Yield estimate of 122,000 t is likely being exceeded in recent years and so catch levels should be stabilised or reduced in future to prevent the stocks becoming overfished.
- Reconstruction of the catch history needs to occur, as do annual catches submitted to the IOTC Secretariat.
- Improvement in data collection and reporting is required to assess the stock using more traditional stock assessment techniques.
- Given the rapid increase in longtail tuna catch in recent years, some measures need to be taken to slow or reduce catches in the Indian Ocean (**Table 2**).
- Improvement in data collection and reporting is required to assess the stock status, primarily abundance index series from I.R. Iran, Oman and Indonesia.

Limit reference points: The Commission has not adopted limit reference points for any of the neritic tunas under its mandate.

APPENDIX I

SUPPORTING INFORMATION

(Information collated from reports of the Working Party on Neritic Tunas and other sources as cited)

CONSERVATION AND MANAGEMENT MEASURES

Longtail tuna (*Thunnus tonggol*) in the Indian Ocean is currently subject to a number of Conservation and Management Measures adopted by the Commission:

- Resolution 15/01 *on the recording of catch and effort by fishing vessels in the IOTC area of competence*
- Resolution 15/02 *mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating non-Contracting Parties (CPCs)*
- Resolution 14/05 *concerning a record of licensed foreign vessels fishing for IOTC species in the IOTC area of competence and access agreement information*
- Resolution 12/11 *on the implementation of a limitation of fishing capacity of Contracting Parties and Cooperating Non-Contracting Parties*
- Resolution 10/08 *concerning a record of active vessels fishing for tunas and swordfish in the IOTC area*

FISHERIES INDICATORS

Longtail tuna: General

Longtail tuna (*Thunnus tonggol*) is an oceanic species that forms schools of varying sizes. It is most abundant over areas of broad continental shelf. **Table 3** outlines some key life history parameters relevant for management.

TABLE 3. Longtail tuna: Biology of Indian Ocean longtail tuna (*Thunnus tonggol*).

Parameter	Description
Range and stock structure	An oceanic species that forms schools of varying sizes. It is most abundant over areas of broad continental shelf. Feeds on a variety of fish, cephalopods, and crustaceans, particularly stomatopod larvae and prawns. No information is available on the stock structure of longtail tuna in the Indian Ocean.
Longevity	~20 years
Maturity (50%)	**Age**: n.a.; females n.a. males n.a. **Size:** females and males ~40 cm FL (Pacific Ocean).
Spawning season	The spawning season varies according to location. Off the west coast of Thailand there are two distinct spawning seasons: January-April and August-September.
Size (length and weight)	Maximum: Females and males 145 cm FL; weight 35.9 kgs. Most common size in Indian Ocean ranges 40–70 cm. Grows rapidly to reach 40–46 cm in FL by age 1.

n.a. = not available. Sources: Chang et al. 2001, Froese & Pauly 2009, Griffiths et al. 2010a, b, Kaymaran et al. 2011

Longtail tuna – Fisheries and catch trends

- Main fisheries: longtail tuna are caught mainly using gillnets and, to a lesser extent, coastal purse seine nets and trolling (**Table 4**; **Fig. 2**).
- Main fleets (i.e., highest catches in recent years):

  Nearly half of catches of longtail in the Indian Ocean are accounted for by I.R. Iran (gillnet) (44%), followed by Indonesia (gillnet, trolling) (16%), Malaysia (coastal purse seine) (9%) and Pakistan (gillnet) (8%) (**Fig.3**).
- Retained catch trends:

  Estimates catches of longtail tuna have increased steadily from the mid-1950s, reaching around 15,000t in the mid-1970's, over 35,000t by the mid-1980's, and more than 96,000 t in 2000. Between 2000 and 2005, catches declined, but have since recovered and reached the highest levels recorded – over 170,000 t in 2011.

  Since 2009 I.R. Iran has reported large increases catches of longtail tuna in coastal waters in the Arabian Sea, as a result of the threat of piracy and displacement of fishing effort (and change of targeting) by gillnet vessels formerly operating in the North-West Indian Ocean.

- Discard levels**:** are thought to be very low, although estimates of discards are unknown for most fisheries.

Changes to the catch series**:** no major changes to the catch series of longtail tuna since WPNT in 2014.

TABLE 4. Longtail tuna: Best scientific estimates of the catches of longtail tuna by type of fishery for the period 1950–2014 (in metric tonnes) (data as of November 2015).

Fishery	By decade (average)						By year (last ten years)									
	1950s	1960s	1970s	1980s	1990s	2000s	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Purse seine	55	204	1,012	4,863	10,933	17,719	12,388	16,128	23,838	18,885	20,649	16,531	26,062	25,222	17,665	11,743
Gillnet	2,969	6,227	10,026	25,839	41,648	63,485	52,092	59,802	68,398	69,708	87,159	105,094	121,671	114,426	113,134	108,210
Line	549	808	1,564	4,349	5,016	9,502	10,268	9,514	11,929	11,206	12,494	12,977	15,295	25,759	20,705	22,695
Other	0	0	125	1,090	1,992	3,732	3,751	3,638	5,686	5,460	5,300	6,513	8,467	9,073	5,787	4,939
Total	**3,573**	**7,239**	**12,727**	**36,141**	**59,590**	**94,437**	**78,498**	**89,081**	**109,851**	**105,260**	**125,601**	**141,115**	**171,495**	**174,480**	**157,291**	**147,587**

The size of longtail tunas taken by the Indian Ocean fisheries typically ranges between 20 and 100 cm depending on the type of gear used, season and location. The fisheries operating in the Andaman Sea (coastal purse seines and trolling) tend to catch longtail tuna of small size (20–45cm) while the gillnet fisheries of Iran and Pakistan (Arabian Sea) catch larger specimens (50–100cm).

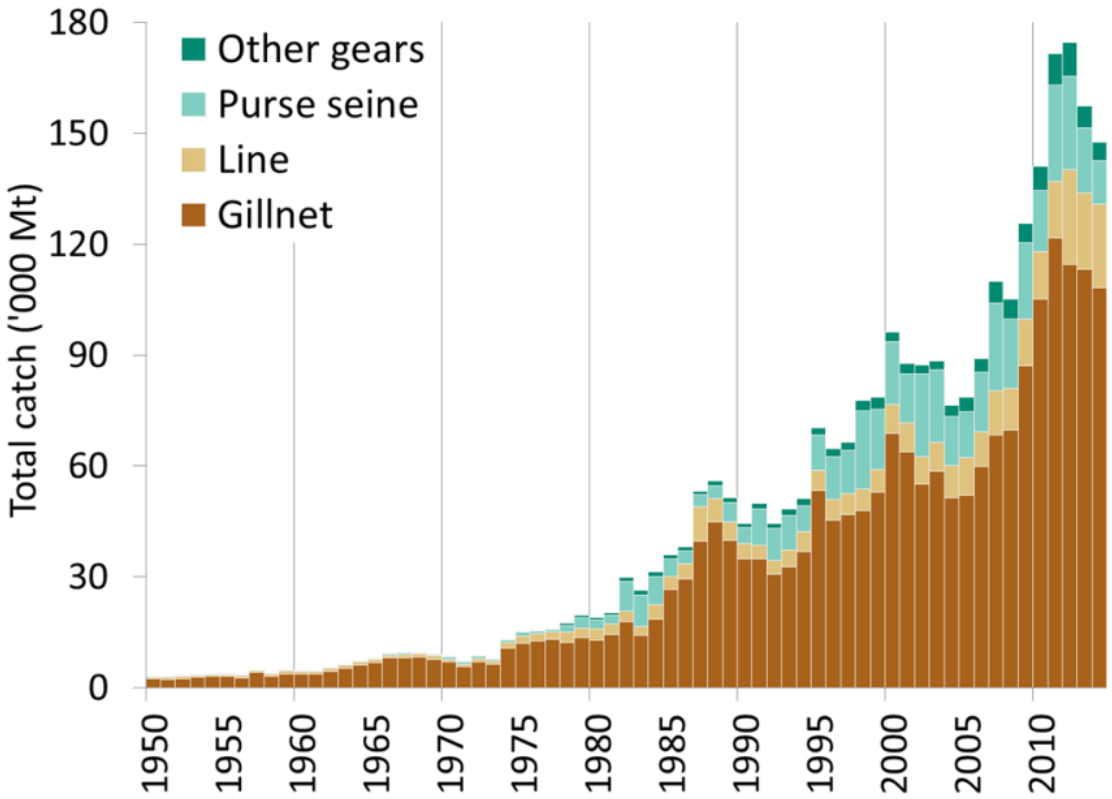


Fig. 2. Longtail tuna: Annual catches by gear recorded in the IOTC Database (1950–2014) (data as of November 2015).

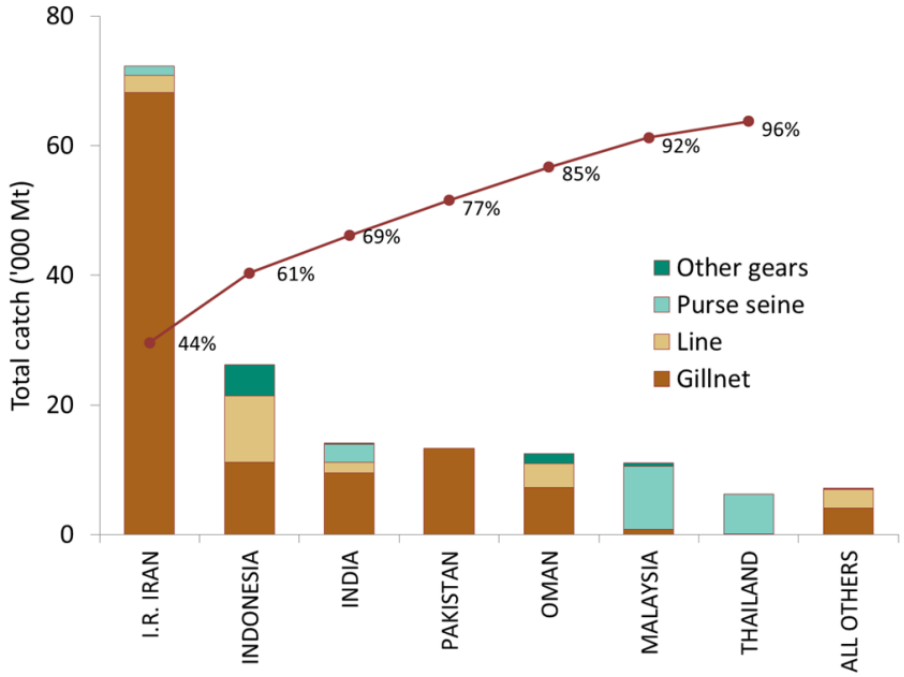


Fig. 3. Longtail tuna: Average catches in the Indian Ocean over the period 2011–14, by country. Countries are ordered from left to right, according to the importance of catches of longtail reported. The red line indicates the (cumulative) proportion of catches of longtail tuna for the countries concerned, over the total combined catches of this species reported from all countries and fisheries (data as of November 2015).

Longtail tuna: uncertainty of catches

Retained catches for longtail tuna were derived from incomplete information, and are therefore uncertain (Fig. 4), notably for the following fisheries:

- Artisanal fisheries of Indonesia: Indonesia did not report catches of longtail tuna by species or by gear for 1950–2004; catches of longtail tuna, kawakawa and other species were reported as aggregated for this period. In the past, the IOTC Secretariat used the catches reported since 2005 to break the aggregates for 1950–2004, by gear and species. However, a recent review by the IOTC Secretariat conducted by an independent consultant in 2012 indicated that catches of longtail tuna had been severely overestimated by Indonesia. While the new catches estimated for the longtail tuna in Indonesia remain uncertain, the new figures are considered more reliable than those existing in the past.
- Artisanal fisheries of India and Oman: Although these countries report catches of longtail tuna, until recently the catches have not been reported by gear. The IOTC Secretariat used alternative information to assign the catches reported by Oman by gear. The catches of India were also reviewed by the independent consultant in 2012 and assigned by gear on the basis of official reports and information from various alternative sources.
- Artisanal fisheries of Myanmar and Somalia: None of these countries have ever reported catches of longtail tuna to the IOTC Secretariat. While catch levels are unknown they are unlikely to be substantial.
- Other artisanal fisheries: The IOTC Secretariat had to estimate catches of longtail tuna for the artisanal fisheries of Yemen (no data reported to the IOTC Secretariat) and until recently Malaysia (with catches of the main neritic tunas aggregated and reported as longtail).

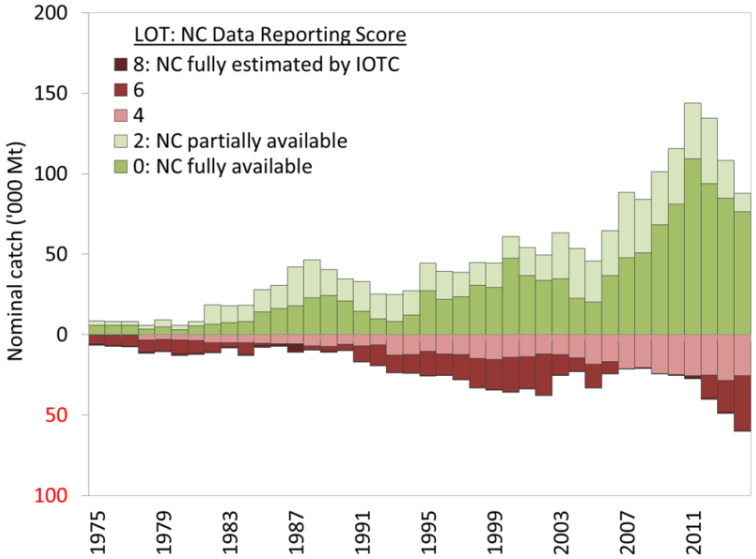


Fig. 4. Longtail tuna: Nominal catch; uncertainty of annual catch estimates (1950–2012). Catches are assessed against IOTC reporting standards, where a score of 0 indicates catches that are fully reported according to IOTC standards; catches assigned a score of between 2 – 6 do not report catch data fully by gear and/or species (i.e. partially adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; catches with a score of 8 refer to fleets that do not report catch data to the IOTC (estimated by the IOTC Secretariat) (data as of November 2015).

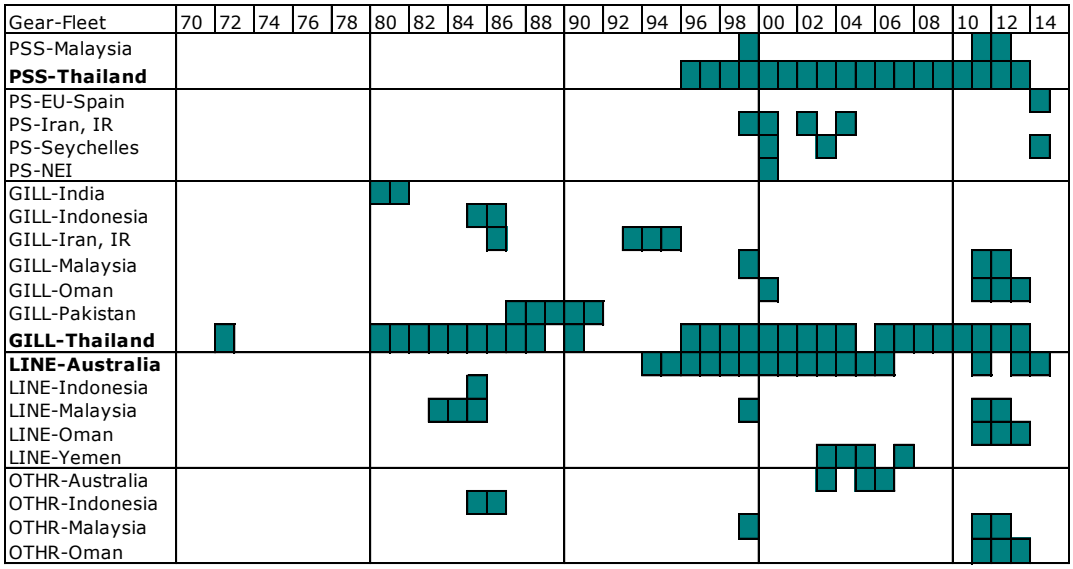
Longtail tuna – Effort trends

- Availability: Effort trends are unknown for longtail tuna in the Indian Ocean due to a lack of catch-and-effort data.

Longtail tuna – Catch–per–unit–effort (CPUE) trends

- Availability: highly incomplete, with data available for only short periods of time and selected fisheries (**Table 5**).
- Main CPUE series available: Thailand coastal purse seine and gillnet vessels (i.e., available over 10 years (Fig. 5).

TABLE 5. Longtail tuna: Availability of catch-and-effort series, by fishery and year (1970–2014)[1]. Note that no catch-and-effort are available between 1950–1971.



[1] Note that the above list is not exhaustive, showing only the fisheries for which catch-and-effort are available in the IOTC database. In addition, catch-and-effort may not be available for all months for years shown in the table for each fishery.

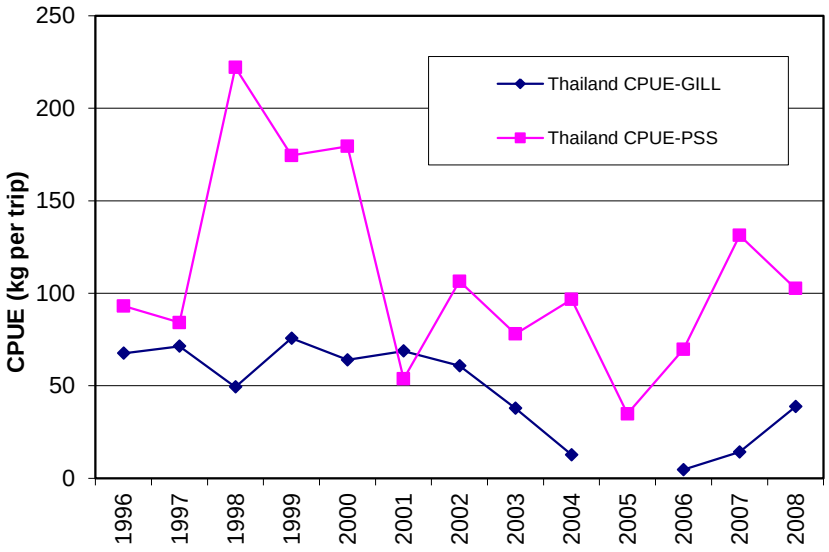


Fig. 5. Longtail tuna: Nominal CPUE series for gillnet (GILL) and coastal purse seine (PSS) fisheries of Thailand derived from the available catches and effort data (1996–2008).

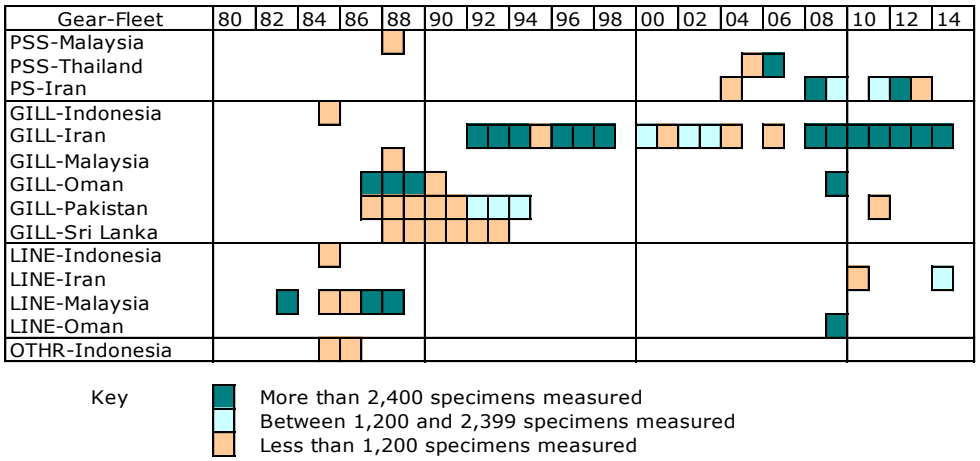
Longtail tuna – Fish size or age trends (e.g. by length, weight, sex and/or maturity)

- Sizes: longtail tunas taken by Indian Ocean fisheries typically range between 20 – 100 cm depending on the type of gear used, season and location (**Table 6**). Fisheries operating in the Andaman Sea (coastal purse seines and trolling) tend to catch smaller sized longtail tuna (e.g., 20–45cm), while gillnet fisheries of I.R. Iran and Pakistan (Arabian Sea) catch larger specimens (e.g. 50–100cm).
- Size frequency data**:** highly incomplete, with data available only for selected fisheries.

  Main sources for size samples: I.R. Iran (gillnet) and Oman (gillnet).

  Length distributions derived from data available for gillnet fisheries are shown in **Fig. 6**. Total numbers of samples, across all years, are also well below the minimum sampling standard of 1 fish per tonne of catch recommended by the IOTC Secretariat to reliably assess changes in average weight.
- Catch-at-Size (Age) table: Not available, due to lack of size samples and uncertainty over the reliability of retained catch estimates.
- Sex ratio data: have not been provided to the Secretariat by CPCs.

TABLE 6. Longtail tuna: Availability of length frequency data, by fishery and year (1980–2014)[2]. Note that no length frequency data are available at all for 1950–1982.



[2] Note that the above list is not exhaustive, showing only the fisheries for which size data are available in the IOTC database. In addition, size data may not be available for all months for years shown in the table for each fishery.

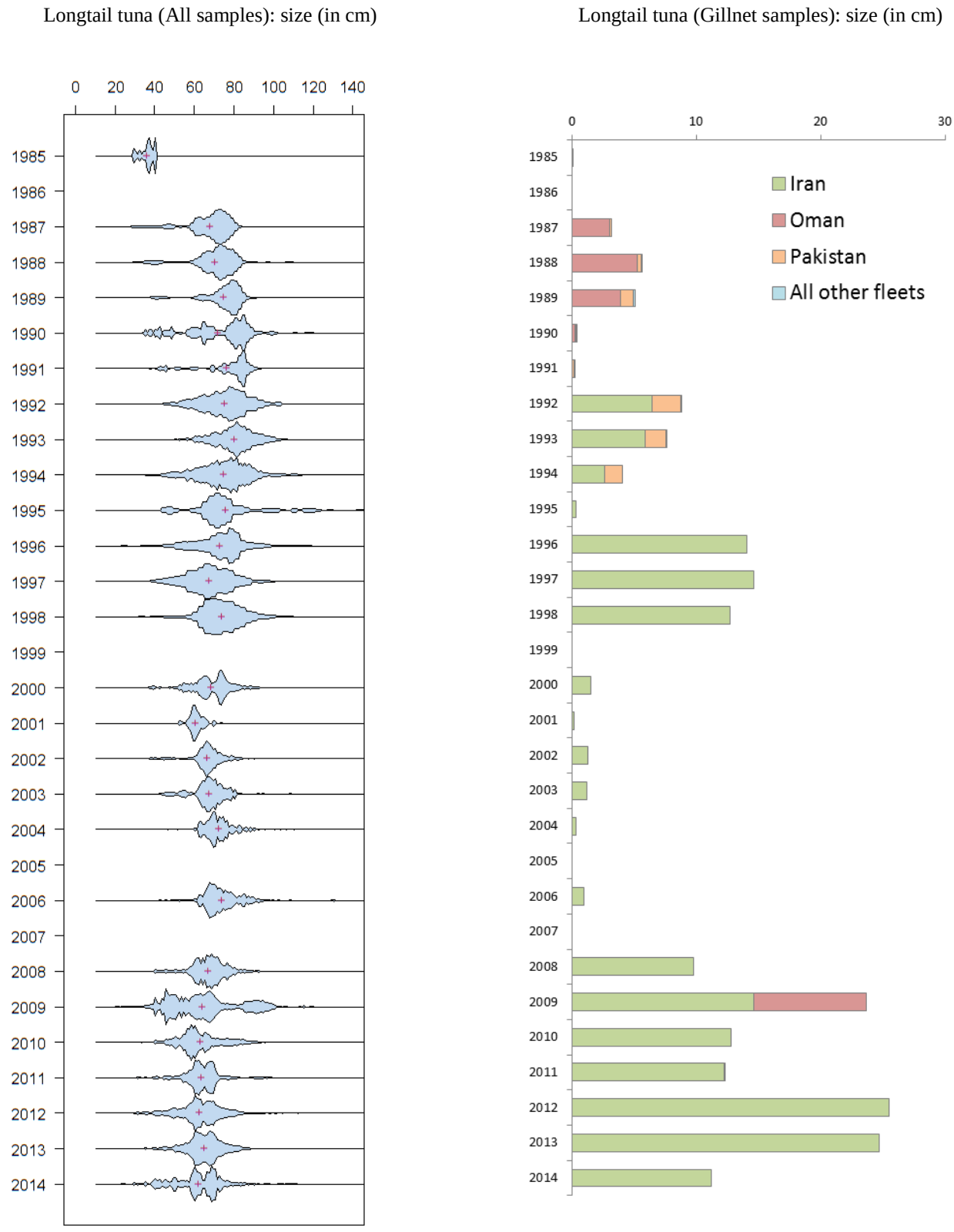


Fig. 6. Longtail tuna: Left - longtail tuna (gillnet fisheries): Length frequency distributions (total amount of fish measured by 1cm length class) derived from data available at the IOTC Secretariat. Right - number of longtail tuna specimens (gillnet fisheries) sampled for lengths, by fleet and year.

STOCK ASSESSMENT

Three assessment approaches were applied to Longtail tuna in 2015, a traditional Catch-MSY model, an Optimised Catch Only Method (OCOM) and a Surplus Production Model (ASPIC). The trajectories for all approaches were all fairly similar and gave similar estimates of MSY. For reporting and stock status advice the ASPIC model was used (**Table 7**). The approach makes use of more of the available data, including a range of standardised and nominal CPUE series. This model used standardised CPUE series, including one for Oman, as well as nominal CPUE series for the Thailand gillnet, purse seine and Australian handline fleets due to lack of standardised series available for these fleets, however these still form a relatively low proportion of the total Indian Ocean Longtail tuna catch. These series need to be developed in other countries and for the other neritic tuna species.

TABLE 7. Longtail tuna (*Thunnus tonggol*) key management quantities from the ASPIC stock assessment.

Management Quantity	Aggregate Indian Ocean
Most recent catch estimate (1,000 t) (2014)	146,881
Mean catch over last 5 years (1,000 t) (2010–2014)	157,337
MSY (1,000 t)	122 (106–173)
Current Data Period (catch)	1950–2013
CPUE	GILL (Andaman Sea, Thailand) (1998-2010) GILL (Oman) (2001–2012) (2002–2013) PS (Andaman Sea, Thailand) (1998–2010) HANDLINE (Australia) (2001–2013)
F_{MSY} (80%CI)	0.55 (0.48–0.78)
Bmsy (1,000 t) (80%CI)	221 (189–323)
$F_{2013}/F_{(MSY)}$ (80% CI)	1.43 (0.58–3.12)
B_{2013}/B_{MSY} (80% CI)	1.01 (0.53–1.71)
B_{2013}/B_{1950} (80%CI)	0.41(n.a.)
Most recent catch estimate (1,000 t) (2013)	159
Mean catch over last 5 years (1,000 t) (2009–2013)	142
MSY (1,000 t)	122 (106–173)

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