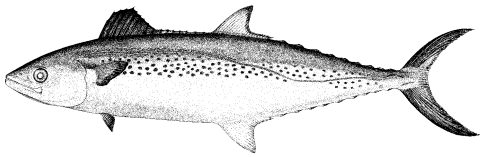
DRAFT: EXECUTIVE SUMMARY: INDO-PACIFIC KING MACKEREL

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



Status of the Indian Ocean Indo-Pacific king mackerel (GUT: *Scomberomorus guttatus*) resource

TABLE 1. Indo-Pacific king mackerel: Status of Indo-Pacific king mackerel (*Scomberomorus guttatus*) in the Indian Ocean

Area[1]	Indicators		2014 stock status determination
Indian Ocean	Catch[2] 2013: Average catch[2] 2009–2013:	44,363 t 45,447 t	
	MSY: F_{MSY}: B_{MSY}: F_{2012}/F_{MSY}: SB_{2012}/SB_{MSY}: SB_{2012}/SB_0:	unknown unknown unknown unknown unknown unknown	

[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. No quantitative stock assessment is currently available for Indo-Pacific king mackerel in the Indian Ocean, and due to a lack of fishery data for several gears, only preliminary stock indicators can be used. Aspects of the fisheries for Indo-Pacific king mackerel combined with the lack of data on which to base a more formal assessment are a cause for considerable concern. Stock status in relation to the Commission's B_{MSY} and F_{MSY} target reference points remains **uncertain** (Table 1), indicating that a precautionary approach to the management of Indo-Pacific king mackerel should be applied.

Outlook. Total annual catches for Indo-Pacific king mackerel have stabilised over the past five years at around 47,000 t. There is insufficient information to evaluate the effect that this level of catch, or an increase in catch may have on the resource. Research emphasis on improving indicators and exploration of stock structure and stock assessment approaches for data poor fisheries should be considered a high priority for this species. The following should be noted:

- The Maximum Sustainable Yield estimate for the whole Indian Ocean is unknown.
- Data collection and reporting urgently need to be improved.
- Reconstruction of the catch history needs to occur before a reliable assessment can be attempted.
- 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

Indo-Pacific king mackerel (*Scomberomorus guttatus*) in the Indian Ocean is currently subject to a number of Conservation and Management Measures adopted by the Commission:

- Resolution 13/03 on the recording of catch and effort by fishing vessels in the IOTC area of competence
- 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 10/02 *mandatory statistical requirements for IOTC Members and Cooperating non-Contracting Parties (CPC's)*
- Resolution 10/08 *concerning a record of active vessels fishing for tunas and swordfish in the IOTC area*

FISHERIES INDICATORS

Indo-Pacific king mackerel: General

The Indo-Pacific king mackerel (*Scomberomorus guttatus*) is a migratory species that forms small schools and inhabits coastal waters, sometimes entering estuarine areas. Table 2 outlines some key life history parameters relevant for management.

TABLE 2. Indo-Pacific king mackerel: Biology of Indian Ocean Indo-Pacific king mackerel (*Scomberomorus guttatus*)

Parameter	Description
Range and stock structure	A migratory species that forms small schools and inhabits coastal waters, sometimes entering estuarine areas. It is found in waters from the Persian Gulf, India and Sri Lanka, Southeast Asia, as far north as the Sea of Japan. The Indo-Pacific king mackerel feeds mainly on small schooling fishes (e.g. sardines and anchovies), squids and crustaceans. No information is available on the stock structure of Indo-Pacific king mackerel stock structure in Indian Ocean.
Longevity	n.a.
Maturity (50%)	**Age**: 1–2 years; females n.a. males n.a. **Size:** females and males ~40–52 cm FL.
Spawning season	Based on the occurrence of ripe females and the size of maturing eggs, spawning probably occurs from March to July in southern India and in May in Thailand waters. Fecundity increases with age in the Indian waters, ranging from around 400,000 eggs at age 2 years to over one million eggs at age 4 years.
Size (length and weight)	Maximum: Females and males 76 cm FL; weight n.a.

n.a. = not available. Sources: Froese & Pauly 2009

Indo-Pacific king mackerel – Fisheries and catch trends

The Indo-Pacific king mackerel[1] is mostly caught by gillnet fisheries in the Indian Ocean but significant numbers are also caught trolling (Table 3, Fig. 1). The catch estimates for Indo-Pacific king mackerel were derived from very small amounts of information and are therefore highly uncertain[2].

[1] Hereinafter referred to as King mackerel.

[2] The uncertainty in the catch estimates has been assessed by the Secretariat and is based on the amount of processing required to account for the presence of conflicting catch reports, the level of aggregation of the catches by species and or gear, and the occurrence of non-reporting fisheries for which catches had to be estimated.

TABLE 3. Indo-Pacific king mackerel: Best scientific estimates of the catches of Indo-Pacific king mackerel by type of fishery for the period 1950–2013 (in metric tonnes). (Data as of October 2014)

Fishery	By decade (average)						By year (last ten years)									
	1950s	1960s	1970s	1980s	1990s	2000s	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Purse seine	0	0	34	584	772	938	786	768	720	1,109	1,239	1,605	1,116	1,236	1,089	1,166
Gillnet	4,213	6,747	13,532	16,555	21,251	23,345	21,837	20,031	20,744	27,278	31,074	31,887	25,975	28,046	27,336	28,710
Line	404	500	1,184	1,877	2,286	2,669	2,345	2,530	2,190	3,264	3,452	3,980	3,174	3,395	3,420	3,285
Other	13	21	48	3,879	5,103	9,352	8,159	8,334	8,208	10,872	11,929	15,733	11,543	12,336	11,003	11,201
Total	**4,630**	**7,268**	**14,798**	**22,895**	**29,411**	**36,304**	**33,127**	**31,663**	**31,862**	**42,523**	**47,694**	**53,206**	**41,808**	**45,012**	**42,847**	**44,363**

The catches provided in Table 3 are based on the information available at the IOTC Secretariat and the following observations on the catches cannot currently be verified. Estimated catches have increased steadily since the mid 1960's, reaching around 24,000 t in the late 1970's and over 30,000 t by the mid-1990's when catches remained stable until around 2006. Since the late-2000s catches have increased sharply, to over 40,000 t, with the highest catches recorded in 2009 at around 53,000 t.

In recent years, the countries attributed with the highest catches are India (36%) and Indonesia (31%) and, to a lesser extent, Iran and Myanmar (19%) (Fig. 2), which account for over 85% of the total catches of king mackerel. Catches of king mackerel in the eastern Indian Ocean have been higher in recent years.

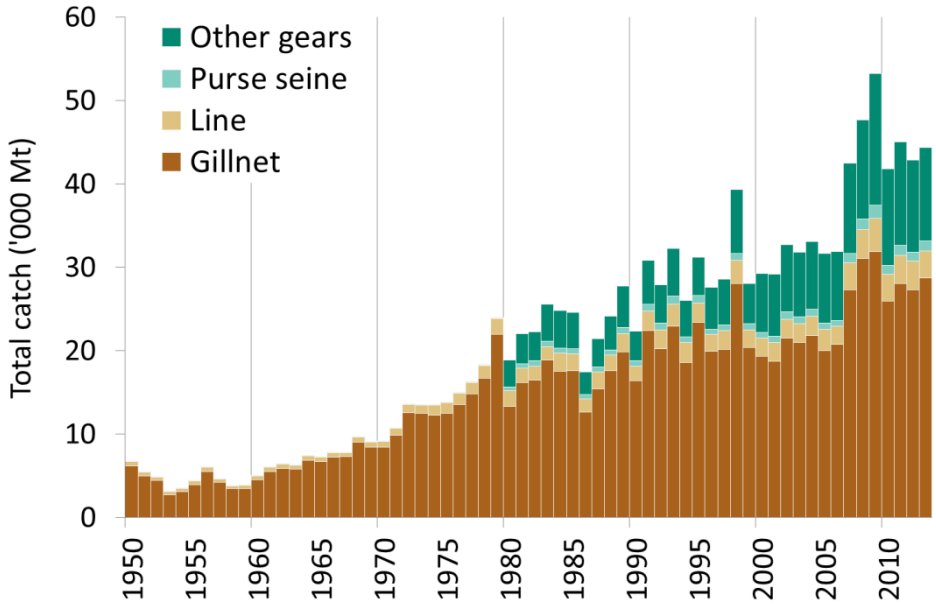


Fig. 1. Indo-Pacific king mackerel: Annual catches of Indo-Pacific king mackerel by gear recorded in the IOTC database (1950–2013). (Data as of October 2014)

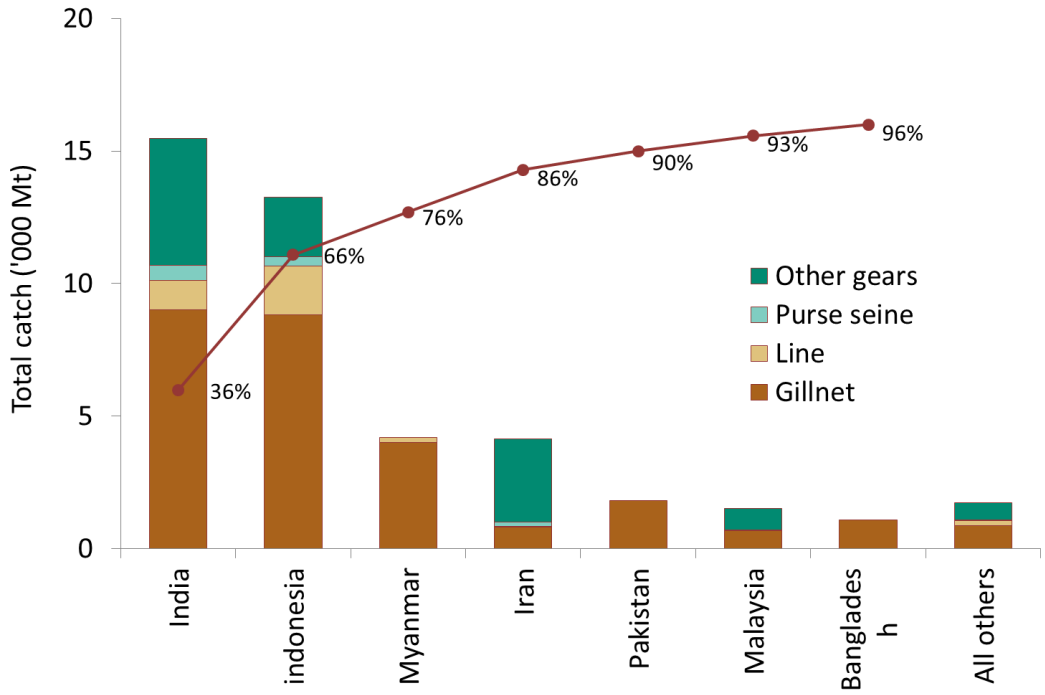


Fig. 2. Indo-Pacific king mackerel: Average catches in the Indian Ocean over the period 2010–12, by country. Countries are ordered from left to right, according to the importance of catches of Indo-Pacific king mackerel reported. The red line indicates the (cumulative) proportion of catches of Indo-Pacific king mackerel for the countries concerned, over the total combined catches of this species reported from all countries and fisheries. (Data as of October 2014)

Indo-Pacific king mackerel – Uncertainty of catches

Retained catches are highly uncertain (Fig. 3) for all fisheries due to:

- Aggregation: Indo-Pacific king mackerels are usually not reported by species being aggregated with narrow-barred Spanish mackerel or, less frequently, other small tuna species.
- Mislabelling: Indo-Pacific king mackerels are usually mislabelled as narrow-barred Spanish mackerel, their catches reported under the latter species.
- Underreporting: the catches of Indo-Pacific king mackerel may be not reported for some fisheries catching them as a bycatch.

It is for the above reasons that the catches of Indo-Pacific king mackerel in the IOTC database are thought to represent only a small fraction of the total catches of this species in the Indian Ocean.

- Discard levels are believed to be low although they are unknown for most fisheries.
- Changes to the catch series: There have not been significant changes to the catches of Indo-Pacific king mackerel since the WPNT in 2013.

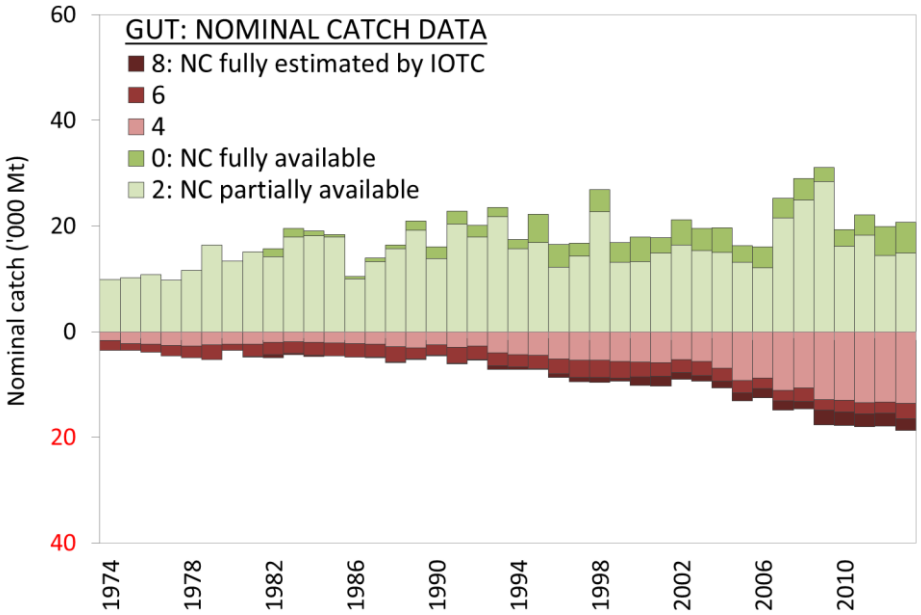


Fig. 3. Indo-Pacific king mackerel: uncertainty of annual catch estimates (1950–2013). Catches are assessed against IOTC reporting standards, where a score of 0 indicates catches that are fully reported according to IOTC standards; catches assigned a score of between 2 – 6 do not report catch data fully 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 October 2014)

Indo-Pacific king mackerel – Effort trends

Effort trends are unknown for Indo-Pacific King mackerel in the Indian Ocean.

Indo-Pacific king mackerel – Catch–per–unit–effort (CPUE) trends

Catch-and-effort series are not available for most fisheries and, when available, they refer to very short periods (Table 4). This makes it impossible to derive any meaningful CPUE from the existing data.

TABLE 4. Indo-Pacific king mackerel: Availability of catches and effort series, by fishery and year (1970–2012)[3]. Note that no catches and effort are available at all for 1950–85

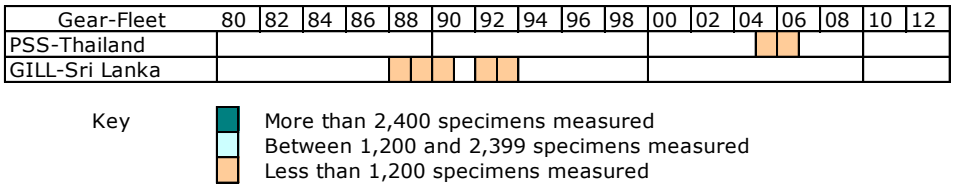
Gear-Fleet	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	00	02	04	06	08	10	12
PSS-Indonesia									■													
LINE-South Africa																		■				
LINE-Yemen																			■			

Indo-Pacific king mackerel – Fish size or age trends (e.g. by length, weight, sex and/or maturity)

- Trends in average weight cannot be assessed for most fisheries. Samples of Indo-Pacific king mackerel are only available for the coastal purse seiners of Thailand and gillnets of Sri Lanka but they refer to very short periods and the numbers sampled are very small (Table 5).
- Catch-at-Size data are not available for the Indo-Pacific king mackerel due to the paucity of size data available from most fleets (Table 5) and the uncertain status of the catches for this species (Fig. 3).
- Sex ratio data have not been provided to the Secretariat by CPCs.

[3] Note that the above list is not exhaustive, showing only the fisheries for which catches and effort are available in the IOTC database. Furthermore, when available catches and effort may not be available throughout the year existing only for short periods

TABLE 5. Indo-Pacific king mackerel: Availability of length frequency data, by fishery and year (1980–2012)[4]. Note that no length frequency data are available at all for 1950–82).



STOCK ASSESSMENT

No quantitative stock assessment for Indo-Pacific king mackerel in the Indian Ocean is known to exist and no such assessment has been undertaken by the IOTC Working Party on Neritic Tunas. Further work must be undertaken to derive stock indicators for this species, because in the absence of a quantitative stock assessment, such indicators represent the only means to monitor the status of the stock and assess the impacts of fishing (Table 6).

TABLE 6. Indo-Pacific king mackerel (*Scomberomorus guttatus*) stock status summary

Management Quantity	**Aggregate Indian Ocean**
2013 catch estimate	44,363 t
Mean catch from 2009–2013	45,447 t
MSY (80% CI)	unknown
Data period used in assessment	–
F_{MSY}	–
B_{MSY}	–
F_{2012}/F_{MSY} (80% CI)	–
B_{2012}/B_{MSY} (80% CI)	–
SB_{2012}/SB_{MSY}	–
B_{2012}/B_0 (80% CI)	–
SB_{2012}/SB_0	–
$B_{2012}/B_{0,\ F=0}$	–
$SB_{2012}/SB_{0,\ F=0}$	–

LITERATURE CITED

Froese R, Pauly DE (2009) FishBase, version 02/2009, FishBase Consortium, www.fishbase.org

[4] Note that the above list is not exhaustive, showing only the fisheries for which size data are available in the IOTC database. Furthermore, when available size data may not be available throughout the year existing only for short periods