

**EXECUTIVE SUMMARY: STATUS OF THE INDIAN OCEAN INDO-PACIFIC SAILFISH
(*ISTIOPHORUS PLATYPTERUS*) RESOURCE**

TABLE 1. Status of Indo-Pacific sailfish (*Istiophorus platypterus*) in the Indian Ocean.

Area ¹	Indicators – 2011 assessment	2011 stock status determination
		2010 ²
Indian Ocean	Catch 2010: 25,498 t Average catch 2006–2010: 22,151 t MSY (range): unknown F_{2010}/F_{MSY} (range): unknown SB_{2010}/SB_{MSY} (range): unknown SB_{2010}/SB_0 (range): unknown	Uncertain

¹Boundaries for the Indian Ocean = IOTC area of competence

²The stock status refers to the most recent years' data used for the assessment.

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. No quantitative stock assessment is currently available for Indo-Pacific sailfish in the Indian Ocean, and due to a lack of fishery data for several gears, only preliminary stock indicators can be used. Therefore stock status remains *uncertain* (Table 1). However, aspects of the biology, productivity and fisheries for this species combined with the lack of data on which to base a more formal assessment are a cause for considerable concern. Research emphasis on improving indicators and exploration of stock assessment approaches for data poor fisheries are warranted.

Outlook. The decrease in longline catch and effort in recent years has lowered the pressure on the Indian Ocean stock as a whole, however there is not sufficient information to evaluate the effect this will have on the resource.

The Scientific Committee considers the following:

- the Maximum Sustainable Yield estimate for the whole Indian Ocean is unknown.
- annual catches of Indo-Pacific sailfish urgently need to be reviewed.
- improvement in data collection and reporting is required to assess the stock.

SUPPORTING INFORMATION

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

CONSERVATION AND MANAGEMENT MEASURES

Indo-Pacific sailfish (*Istiophorus platypterus*) in the Indian Ocean is currently subject to a number of conservation and management measures adopted by the Commission, although none are species specific:

- Resolution 08/04 concerning the recording of catch by longline fishing vessels in the IOTC area.
- Resolution 09/02 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 10/03 concerning the recording of catch by fishing vessels in the IOTC area.
- Resolution 10/08 concerning a record of active vessels fishing for tunas and swordfish in the IOTC area.
- Recommendation 11/06 Concerning the Recording of Catch by Fishing Vessels in the IOTC Area of Competence.

FISHERIES INDICATORS

General

Indo-Pacific sailfish (*Istiophorus platypterus*) is a large oceanic apex predator that inhabits tropical and subtropical Indo-Pacific oceans. Table 2 outlines some key life history parameters relevant for management. There is limited reliable information on the catches of this species and no information on the stock structure or growth and mortality in the Indian Ocean.

TABLE 2. Biology of Indian Ocean Indo-Pacific sailfish (*Istiophorus platypterus*).

Parameter	Description
Range and stock structure	Found throughout the tropical and subtropical regions of the Pacific and the Indian Oceans. It is mainly found in surface waters above the thermocline, close to coasts and islands in depths from 0 to 200 m. Indo-Pacific sailfish is a highly migratory species and renowned for its speed and (by recreational fishers) for its jumping behaviour — one individual has been reported swimming at speeds in excess of 110 km/h over short periods. The stock structure of Indo-Pacific sailfish in the Indian Oceans is uncertain. No information on stock structure is currently available in the Indian Ocean; thus for the purposes of assessment, one pan-ocean stock is assumed. However, spatial heterogeneity in stock indicators (catch-per-unit-effort trends) for other billfish species indicates that there is potential for localised depletion.
Longevity	Females: 11–13 years; Males: 7–8 years
Maturity (50%)	Age: females n.a.; males n.a. Size: females n.a.; males n.a.
Spawning season	Spawning in Indian waters occurs between December to June with a peak in February and June.
Size (length and weight)	Maximum: 350 cm FL and weight 100 kg total weight. The Indo-Pacific sailfish is one of the smallest-sized billfish species, but is relatively fast growing. Individuals may grow to over 3 m and up to 100kg, and live to around 7 years. Young fish grow very quickly in length then put on weight later in life. Sexual dimorphism in size, growth rates and size and age at maturity—females reach larger sizes, grow faster and mature later than males. Females: 300 cm lower-jaw FL, 50+ kg total weight; Males: 200 cm lower-jaw FL, 40+ kg total weight in the Indian Ocean. Recruitment into the fishery: varies by fishing method. The average weight of fish caught in the Kenyan sports fishery is ~25 kgs whole weight.

n.a. = not available. SOURCES: Nakamura (1985); Speare (2003); Hoolihan (2006); Sun et al. (2007); Froese & Pauly (2009); Ndegwa and Herrera (2011)

Catch trends

Indo-Pacific sailfish is caught mainly under gillnets (78%) with remaining catches recorded under troll and hand lines (15%), longlines (7%) or other gears (Fig. 1). The minimum average annual catch estimated for the period 2006 to 2010 is around 22,151 t. In recent years, the countries attributed with the highest catches of Indo-Pacific sailfish are situated in the Arabian Sea (India, Iran, Pakistan and Sri Lanka). Smaller catches are reported for line fishers in Comoros and Mauritius and by Indonesia longliners. This species is also a popular catch for sport fisheries (e.g. Kenya, Mauritius, Seychelles).

Catches of Indo-Pacific sailfish greatly increased since the mid-1980's in response to the development of a gillnet/longline fishery in Sri Lanka (Fig. 2) and, especially, the extension in the area of operation of Iranian gillnet vessels to areas beyond the EEZ of I.R. Iran. The catches of Iranian gillnets (Fig. 2) increased dramatically, more than six-fold, after the late 1990's, from the values averaging 2,000 t in the late 1980's to a maximum of 12,600 t in 2005.

Catches of Indo-Pacific sailfish under drifting longlines and other gears do not show any specific trends in recent years, with total catches amounting to about 5,000 t. However, it is likely that longline fleets under report catches of this species due to its little commercial value. In recent years, deep-freezing longliners from Japan have reported catches of Indo-Pacific sailfish in the central western Indian Ocean, between Sri Lanka and the Maldives and the Mozambique Channel (Fig. 3).

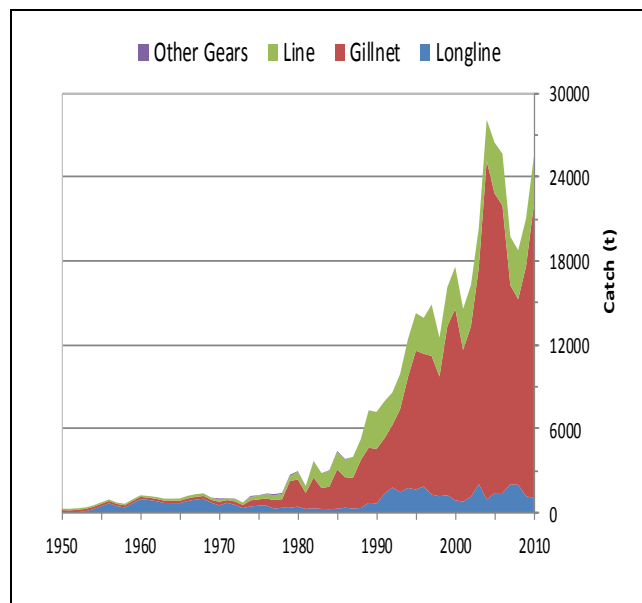


Fig. 1. Catches of Indo-Pacific sailfish per gear and year recorded in the IOTC Database (1960–2010).

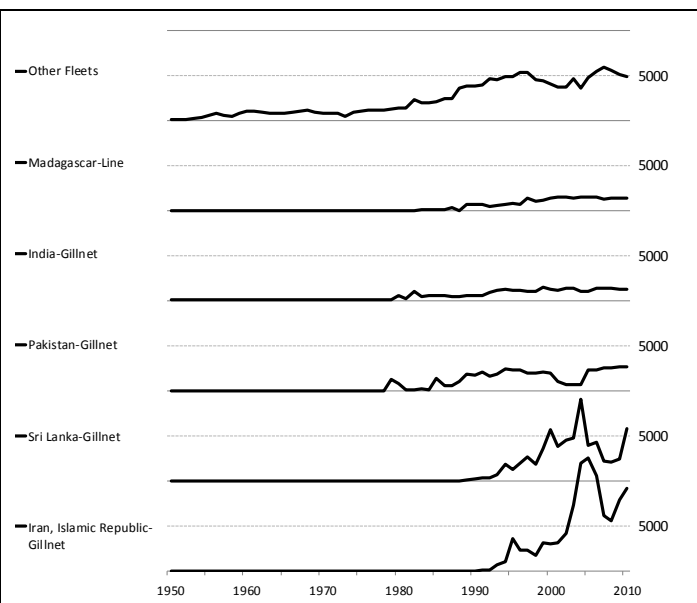


Fig. 2. Catches of Indo-Pacific sailfish by fleet recorded in the IOTC Database (1960–2010).

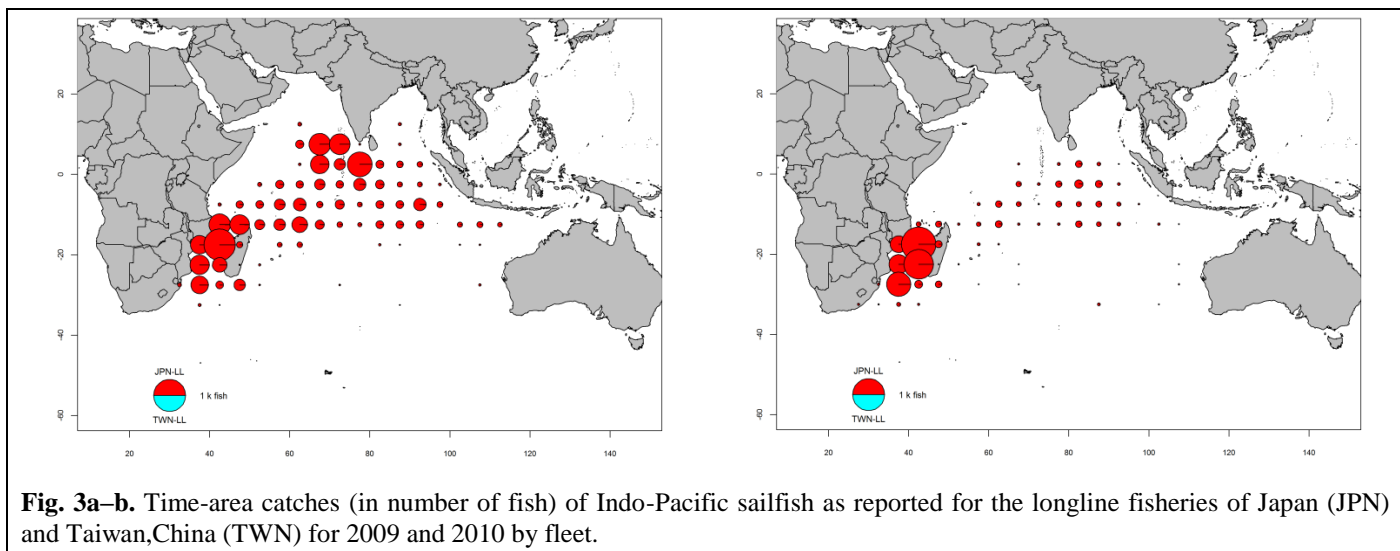


Fig. 3a–b. Time-area catches (in number of fish) of Indo-Pacific sailfish as reported for the longline fisheries of Japan (JPN) and Taiwan,China (TWN) for 2009 and 2010 by fleet.

TABLE 3. Best scientific estimates of the catches of Indo-Pacific sailfish by type of fishery for the period 1950–2009 (in metric tonnes). Data as of October 2011.

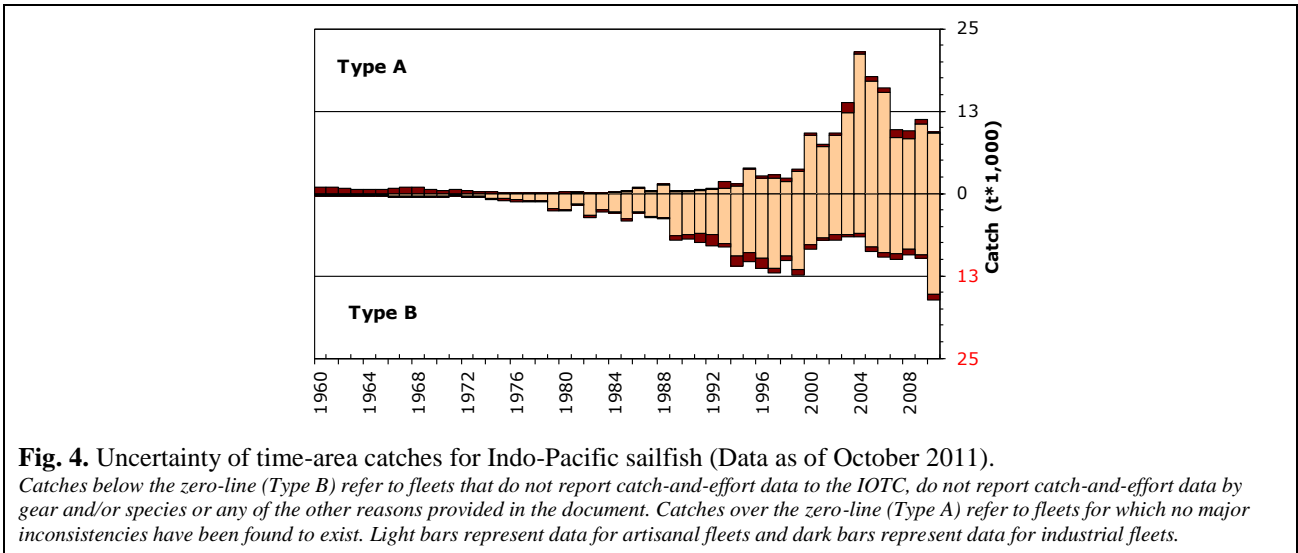
Fishery	By decade (average)						By year (last ten years)									
	1950s	1960s	1970s	1980s	1990s	2000s	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Longline	299	819	450	343	1425	876	785	1,135	2,035	926	1,393	1,399	2,021	1,985	1,176	1,032
Gillnet	164	176	544	2,296	7,621	13,708	10,849	12,197	15,525	24,246	21,453	20,572	14,254	13,285	16,441	21,034
Line	106	155	259	1,260	2,739	3,010	2,947	2,954	2,842	2,947	3,635	3,714	3,474	3,500	3,427	3,429
Other	1	1	50	25	3	2	2	2	2	2	2	2	2	2	2	2
Total	570	1,151	1,302	3,924	11,787	17,596	14,583	16,288	20,404	28,120	26,482	25,687	19,751	18,773	21,047	25,498

Uncertainty of time–area catches

Minimum catch estimates have been derived from very small amounts of information and are therefore highly uncertain. Unlike the other billfish, Indo-Pacific sailfish are probably more reliably identified because of the large and distinctive first dorsal fin that runs most of the length of the body.

Retained catches are poorly known for most fisheries (Fig. 4) due to:

- Catch reports often refer to total catches of all three marlin species combined; catches by species are estimated by the Secretariat for some artisanal (gillnet/longline fishery of Sri Lanka and artisanal fisheries of India, Iran and Pakistan) and industrial (longliners of Indonesia and Philippines) fisheries.
- Catches likely to be incomplete for some artisanal fisheries (gillnets of Pakistan, pole and lines of Maldives) due to under-reporting.
- Catches are likely to be incomplete for industrial fisheries for which the Indo-Pacific sailfish is not a target species.
- A lack of catch data for most sport fisheries.
- Changes to the catch series: There have not been significant changes to the catches of Indo-Pacific sailfish since 2010. The changes recorded in recent years originated in a review (by the Secretariat) of the catches reported by Indonesia, resulting in catches slightly lower than those reported by Indonesia.
- Discards are unknown for most industrial fisheries, mainly longliners (for which they are presumed to be moderate-high).



Effort trends

Total effort from longline vessels flagged to Japan, Taiwan, China and EU, Spain by five degree square grid from 2007 to 2010 are provided in Fig. 5, and total effort from purse seine vessels flagged to the EU and Seychelles (operating under flags of EU countries, Seychelles and other flags), and others, by five degree square grid and main fleets, for the years 2007 to 2010 are provided in Fig. 6.

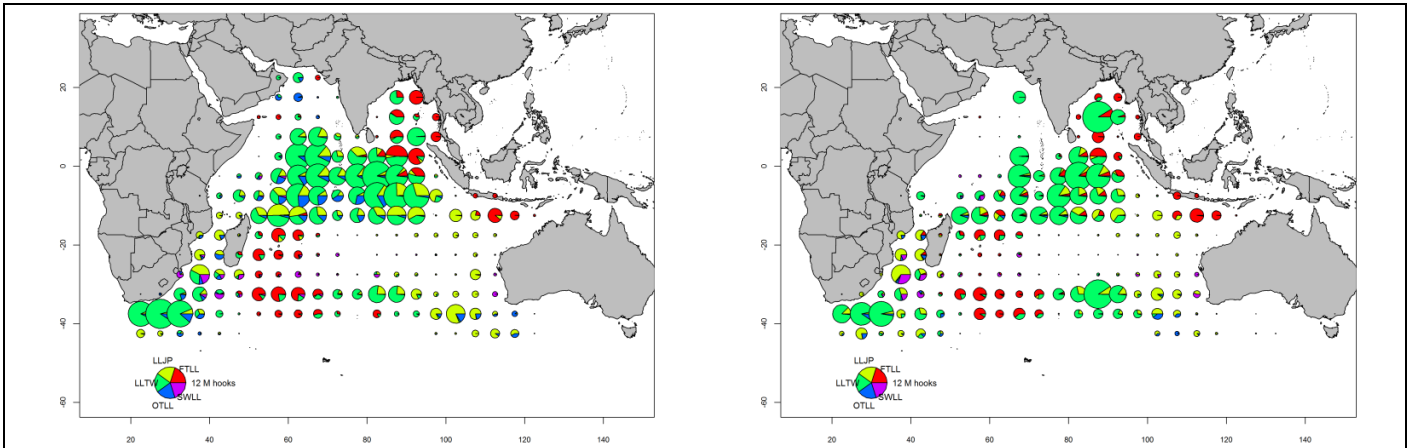


Fig. 5. Number of hooks set (millions) from longline vessels by five degree square grid and main fleets, for the years 2009 (left) and 2010 (right) (Data as of August 2011).

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, Rep. of Korea and various other fleets)

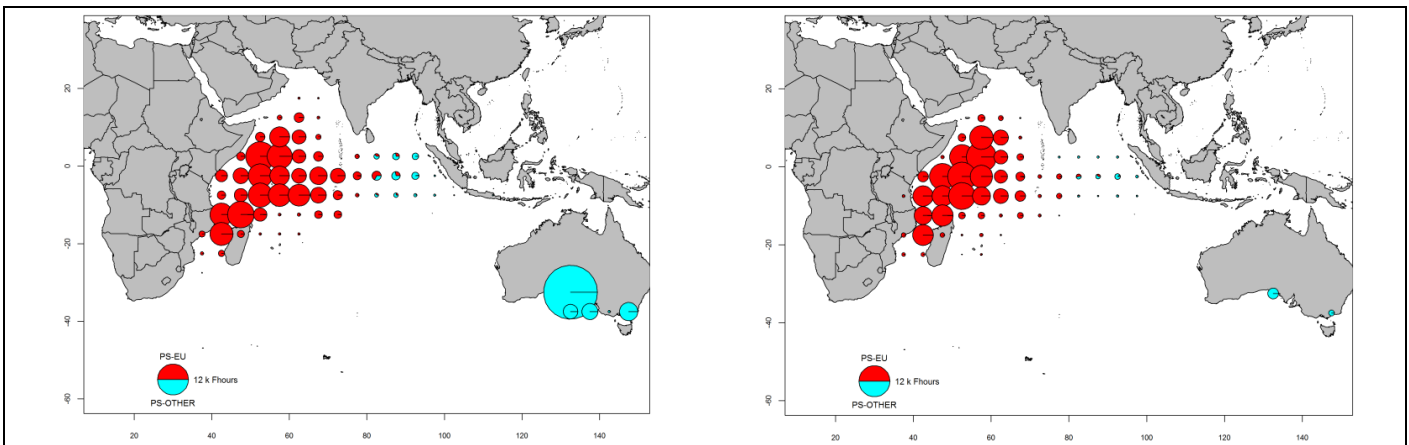


Fig. 6. Number of hours of fishing (Fhours) from purse seine vessels by 5 degree square grid and main fleets, for the years 2009 (left) and 2010 (right) (Data as of August 2011).

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)

Catch-per-unit-effort (CPUE) trends

Standardised and nominal CPUE series have not yet been developed. No catch and effort data are available from sports fisheries, other than for partial data from the sports fisheries of Kenya; or other artisanal (gillnet fisheries of I.R. Iran and Pakistan, gillnet/longlines of Sri Lanka, gillnets of Indonesia) or industrial fisheries (NEI longliners and all purse seiners).

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

Average fish weight can only be assessed for the longline fishery of Japan since 1970 and Taiwan, China since 1980. The number of specimens measured on Japanese longliners in recent years is, however, very low. Furthermore, the specimens discarded might be not accounted for in industrial fisheries, where they are presumed to be of lower size (possible bias of existing samples).

Catch-at-Size(Age) tables have not been built for this species due to a lack of information reported by CPCs. Fish size is derived from various length and weight information, however the reliability of the size data is reduced when relatively few fish out of the total catch are measured.

Sex ratio data have not been provided to the Secretariat by CPCs.

STOCK ASSESSMENT

No quantitative stock assessment for striped marlin in the Indian Ocean is known to exist and no such assessment has been undertaken by the IOTC Working Party on Billfish. However, a preliminary estimation of stock indicators was attempted on the longline catch and effort datasets from Japan and Taiwan, China that represent the best available information. Nominal CPUE exhibited declines since the beginning of the fishery in two major fishing grounds (West Equatorial and north-west Australia) (Figs. 7 and 8) and catches in the initial core areas have also decreased substantially. However, there is considerable uncertainty about the degree to which these indicators represent abundance as factors such as changes in targeting practices, discarding practices, fishing grounds and management practices are likely to interact in the depicted trends. Further work must be undertaken to derive additional 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 4. Indo-Pacific sailfish (*Istiophorus platypterus*) stock status summary.

Management Quantity	Aggregate Indian Ocean
2010 catch estimate (1000 t)	25.5
Mean catch from 2006–2010 (1000 t)	22.2
MSY (1000 t) (80% CI)	unknown
Data period used in assessment	–
F_{2010}/F_{MSY} (80% CI)	–
B_{2010}/B_{MSY} (80% CI)	–
SB_{2010}/SB_{MSY}	–
B_{2010}/B_{1980} (80% CI)	–
SB_{2010}/SB_{1980}	–
$B_{2010}/B_{1980, F=0}$	–
$SB_{2010}/SB_{1980, F=0}$	–

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- Froese R & Pauly DE, 2009. FishBase, version 02/2009, FishBase Consortium, <www.fishbase.org>.
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