



REVIEW OF THE STATISTICAL DATA AVAILABLE FOR INDIAN OCEAN INDO-PACIFIC SAILFISH (1950-2021)

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Abstract

The document provides an overview of the consolidated knowledge about fisheries catching Indo-Pacific sailfish (*Istiophorus platypterus*) in the Indian Ocean since the early 1950s based on a range of data sets collected by the Contracting Parties and Cooperating Non-Contracting Parties (CPCs) of the IOTC and curated by the IOTC Secretariat. The available fisheries statistics indicate that Indo-Pacific sailfish are mostly caught by artisanal fisheries using gillnets and a combination of longlines, trolling lines, and handlines operated in coastal areas. Total catches of Indo-Pacific sailfish have steadily increased since the 1980s to exceed 32,000 t during 2017-2018, before decreasing to 28,700 t in 2020. However, in 2021, catches increased to 37,600 t. Information available on discarding practices of Indo-Pacific sailfish in industrial fisheries indicates that discard levels are small in large-scale longline and purse seine fisheries and individuals generally discarded dead at sea. Discarding in coastal fisheries interacting with the species is poorly known but considered to be small. Information available on the spatial distribution of catch and effort has substantially improved over the last decade but remains limited, half of the total catch lacking accurate data on fishing grounds in 2020. Catches of Indo-Pacific sailfish are mainly located along the coasts of I.R. Iran, Pakistan, Oman, India, Sri Lanka and Tanzania, although the catch levels for this latter CPC are largely unknown. The reporting of size-frequency data has also improved over the last decade but remains very limited for most fisheries.

Keywords: billfish | Indo-Pacific sailfish | Indian Ocean | tuna fisheries

Introduction

The overarching objective of this paper is to provide participants in the 20th Session of the IOTC Working Party on Billfish ([WPB20](#)) with a review of the status of the information available on Indian Ocean Indo-Pacific sailfish (*Istiophorus platypterus*) through the analysis of temporal and spatial trends in catches and their main recent features, as well as an assessment of the reporting quality of the data sets. A full description of the data collated and curated by the Secretariat is available in IOTC ([2023](#)).

Total retained (nominal) catch

Historical trends (1950-2021)

Overall, total reported catches of Indo-Pacific sailfish show a marked increase from the early 1980s until today (**Fig. 1a**), with a peak in annual catches recorded in 2021 at around 38,000 t and slightly decreasing catches reported for 2019 and 2020.

Historical trends of Indo-Pacific sailfish catches indicate the species as predominant in its group (together with swordfish) with a contribution to over 30% of total billfish catches in the Indian Ocean. Furthermore, due to the tendency of the species to inhabit shallower waters ([Nakamura 1985](#)), the fraction of catches reported by artisanal fisheries is consistently higher than what reported for other billfish species (**Fig. 1b**). Nevertheless, the development of longline fisheries in the mid-1950s increased catches of billfish species in general, and sailfish in particular, as did the drastic development of gillnet fisheries from the 1980s onward (**Table 1**) in several coastal countries ([Maldeniya et al. 1995](#), [Hornby et al. 2014](#)).

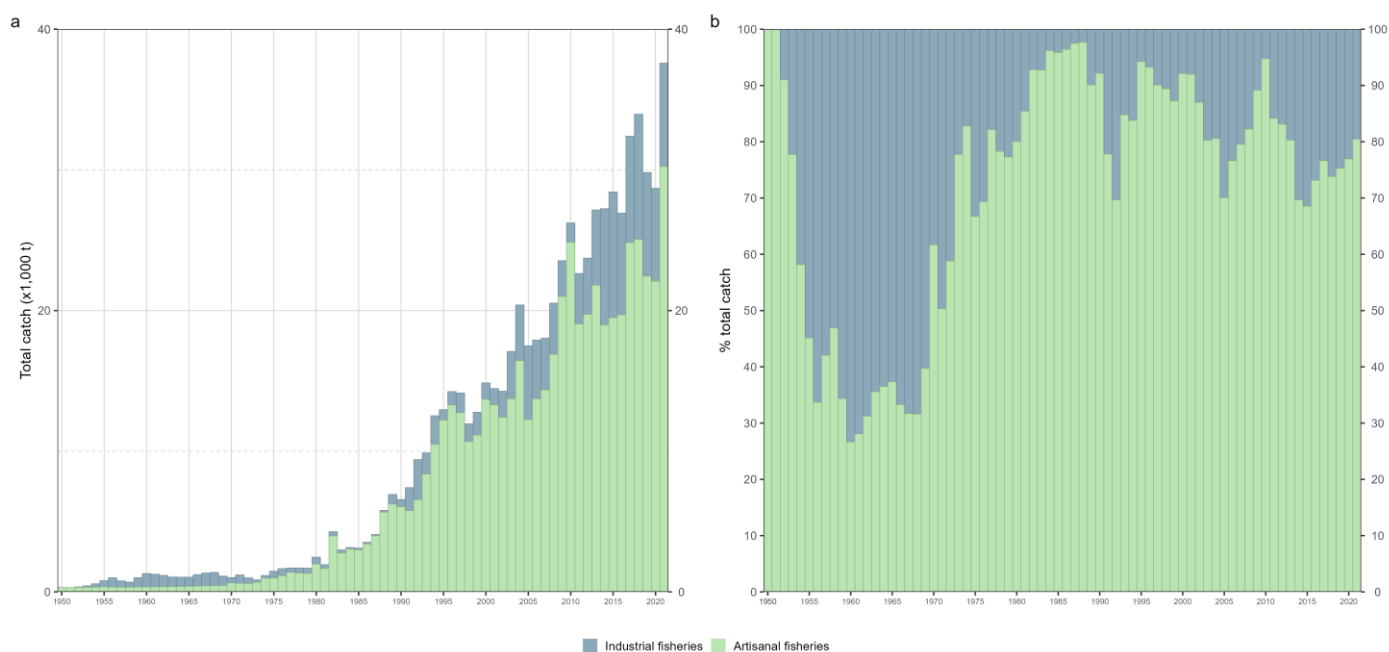


Figure 1: Annual time series of cumulative retained absolute (a) and relative (b) catches (metric tonnes; t) of Indo-Pacific sailfish by type of fishery for the period 1950-2021. Data source: [best scientific estimates of retained catches](#)

The relative proportions of catches of Indo-Pacific sailfish by fishery changed over the years, with both artisanal and industrial gillnets contributing the highest proportion from 1980s onward (reaching around 72 % of total catches in recent years), line fisheries (coastal longline, trolling and handline) increasing their contribution between mid-1970s and mid-1990s before stabilizing to around 23 % of total reported catches in recent years, and proportions from longline fisheries strongly declining between 1970 and 1990, when catches of the species caught by swordfish-targeting longliners began to increase again (**Fig. 2b** and **Table 1**). There are also reports of Indo-Pacific sailfish catches from purse seine (1980-2021) and baitboat fisheries (1970-1974 and 2015-2020), although very low in absolute terms at less than 100 t per year in the periods concerned.

Table 1: Mean annual retained catches (metric tonnes; t) of Indo-Pacific sailfish by decade and fishery for the period 1950-2019. The background intensity color of each cell is directly proportional to the catch level. Data source: [best scientific estimates of retained catches](#)

Fishery	1950s	1960s	1970s	1980s	1990s	2000s	2010s
Purse seine Other	0	0	2	23	40	81	202
Longline Other	0	0	0	19	488	1,127	517
Longline Fresh	0	0	17	69	711	991	636
Longline Deep-freezing	297	804	368	187	615	345	382
Line Coastal longline	61	61	66	367	678	1,499	3,457
Line Trolling	79	122	217	560	1,099	1,652	1,553
Line Handline	31	31	144	500	721	798	1,313
Baitboat	0	0	29	0	0	0	34
Gillnet	165	181	504	2,082	6,834	11,363	19,746
Other	0	0	2	22	2	4	14
Total	633	1,197	1,348	3,830	11,187	17,860	27,854

Table 2: Annual retained catches (metric tonnes; t) of Indo-Pacific sailfish by fishery for the period 2012-2021. The background intensity color of each cell is directly proportional to the catch level. Data source: [best scientific estimates of retained catches](#)

Fishery	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Purse seine Other	173	202	183	178	170	419	170	184	273	229
Longline Other	931	1,061	236	67	110	69	56	58	30	29
Longline Fresh	412	944	1,010	545	504	714	822	1,194	625	355
Longline Deep-freezing	387	122	283	510	1,160	297	377	289	235	227
Line Coastal longline	2,185	2,236	2,924	4,380	3,215	5,587	4,694	3,705	2,369	2,696
Line Trolling	1,285	1,330	1,373	1,480	2,114	1,619	1,383	2,019	3,559	2,510
Line Handline	1,593	1,979	389	778	1,346	1,455	1,054	1,613	1,769	2,066
Baitboat	0	81	0	130	48	26	11	40	32	0
Gillnet	16,757	19,191	20,837	20,358	18,254	22,192	25,344	20,704	19,770	29,465
Other	9	10	8	8	8	20	46	13	28	11
Total	23,732	27,155	27,244	28,434	26,928	32,398	33,958	29,819	28,691	37,587

Industrial longline (deep-freezing) and coastal fisheries are known to be catching Indo-Pacific sailfish since the 1950s, with the Japanese fleet operating in the western Indian Ocean being the major contributor to the former component (since the mid-1950s) and Omani, Malagasy, and Indian fisheries being the major contributors to the latter, starting from the 1970s.

It is also assumed that vessels from Taiwan, China operating in the western Indian Ocean during the 1980s had substantial catches of sailfish, although these were reported to the IOTC as aggregates of billfish species ([Campbell &](#)

[Tuck 1998](#)), therefore explaining the low catches of sailfish recorded during a period of time that saw substantial increases in the number of active longline vessels.

Indo-Pacific sailfish catches were also influenced by the development of gillnet fisheries in Sri Lanka ([Maldeniya et al. 1995](#)) and Pakistan ([Hornby et al. 2014](#)) during the 1980s. Moreover, the contribution of coastal longline fisheries to Indo-Pacific sailfish catches gradually increased from the 2000s, with average annual catches almost doubling between the 2000s and 2010s (**Fig. 3** and **Table 1**).

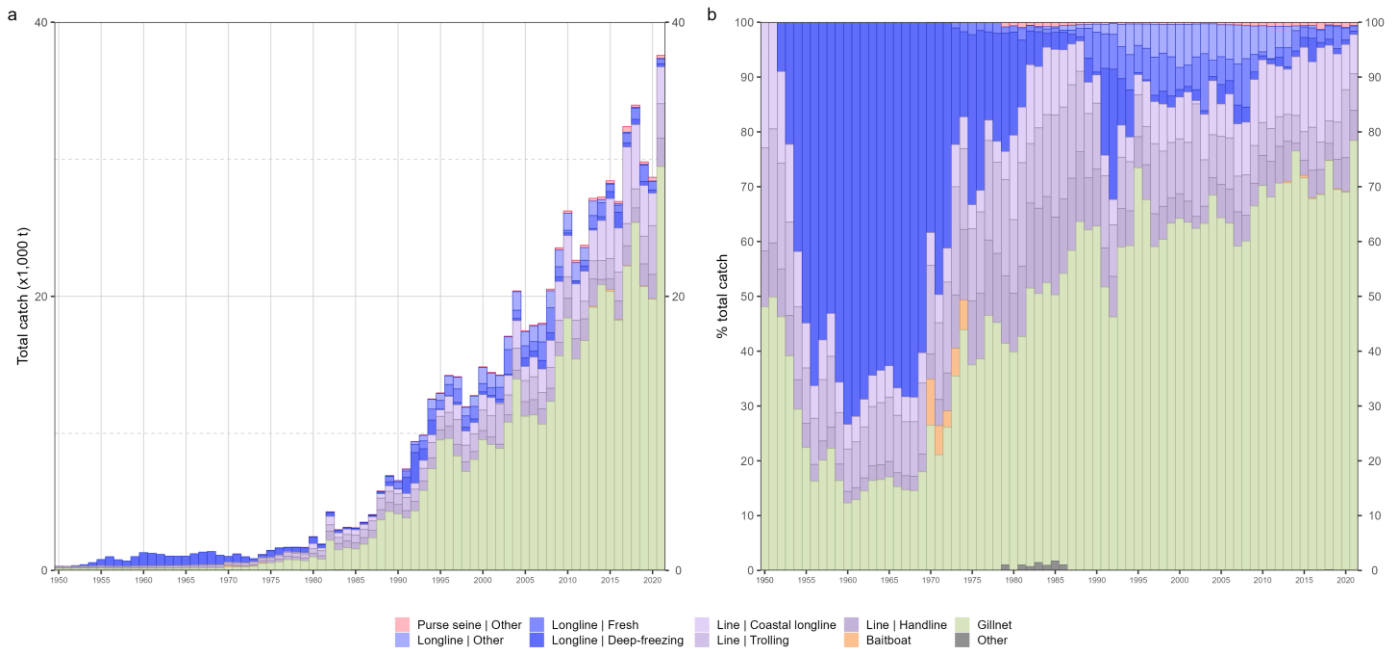


Figure 2: Annual time series of cumulative retained absolute (a) and relative (b) catches (metric tonnes; t) of Indo-Pacific sailfish by fishery for the period 1950-2021. Data source: [best scientific estimates of retained catches](#)

In 2017 Pakistan fully revised their time series of gillnet catches for the period 1987-2016 based on information collected through the WWF crew-based data collection programme, although without major improvements on the species composition of billfish catches ([IOTC 2019](#), [Moazzam 2019](#)). This required the IOTC Secretariat to post-process all catches of aggregated billfish species from the gillnet fisheries of Pakistan, which in the years between mid-1980s and mid-1990s were in turn all assigned to Indo-Pacific sailfish (*Istiophorus platypterus*).

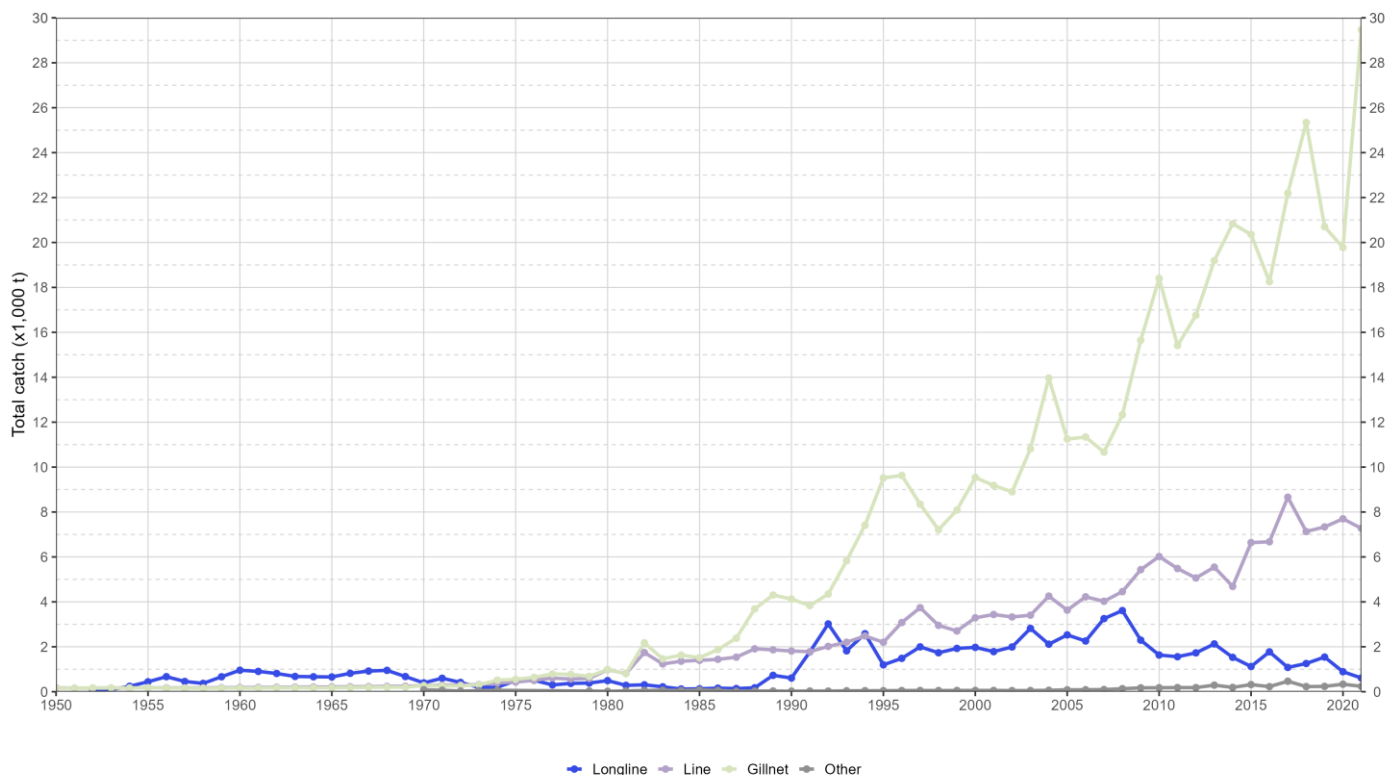


Figure 3: Annual time series of retained catches (metric tonnes; t) of Indo-Pacific sailfish by fishery group for the period 1950-2021. Data source: [best scientific estimates of retained catches](#)

Main fishery features (2017-2021)

In recent years (2017-2021), gillnet fisheries contributed to 72.3% of Indo-Pacific sailfish catch, followed by *coastal* line fisheries (combining coastal longline, troll line and handline fisheries) with 23.4%, fresh longline fisheries with 2.3%, deep-freezing longline fisheries with 0.9% and purse seine fisheries with 0.8% (Table 3).

With regards to purse seine fisheries, the vast majority of catches of Indo-Pacific sailfish is reported by the coastal purse seiners of Indonesia and by the ringnets of Sri Lanka, although the latter reached non-negligible levels only in 2017 when approximately 200 t of the species were recorded, in total, for the fishery.

Very limited information on retained catches of Indo-Pacific sailfish for industrial purse seine fisheries has been reported to the Secretariat through the retained catch data form (1-RC) while information from the ROS indicates that some Indo-Pacific sailfish may be caught in these fisheries and retained or discarded at sea (see section [Discard levels](#)).

Table 3: Mean annual catches (metric tonnes; t) of Indo-Pacific sailfish by fishery between 2017 and 2021. Data source: [best scientific estimates of retained catches](#)

Fishery	Fishery code	Catch	Percentage
Gillnet	GN	23,495	72.3
Line Coastal longline	LIC	3,810	11.7
Line Trolling	LIT	2,218	6.8
Line Handline	LIH	1,591	4.9
Longline Fresh	LLF	742	2.3
Longline Deep-freezing	LLD	285	0.9
Purse seine Other	PSOT	255	0.8
Longline Other	LLO	48	0.1
Other	OT	24	0.1
Baitboat	BB	22	0.1

Catches of Indo-Pacific sailfish are highly concentrated, as it takes just five countries to reach ~85% of the average 2017-2021 total annual catch levels (**Fig. 4**). In particular, the gillnet fisheries of I.R. Iran account for 37% of the total Indo-Pacific sailfish catches, of which 52% are reported by I.R. Iran as caught by larger vessels that can operate in areas beyond national jurisdiction. India, Tanzania, Sri Lanka and Pakistan also reported substantial amounts of Indo-Pacific sailfish caught with a variety of coastal and offshore fisheries that include gillnet, line, and longline, contributing to 45% of the total catch reported between 2017 and 2021 (**Fig. 4**).

Besides Sri Lanka, the other major longline fleet reporting significant average catches of Indo-Pacific sailfish in recent years is the one from Taiwan, China (including both fresh and deep-freezing longliners) which contributed to around 1.2% of average annual catches for the species.

Finally, it is important to recall that catch levels of Indo-Pacific sailfish reported by Pakistan for years prior to 2018 are the result of the disaggregation process adopted by the IOTC Secretariat to break down catches originally reported by the CPC as a generic aggregate of billfish species.

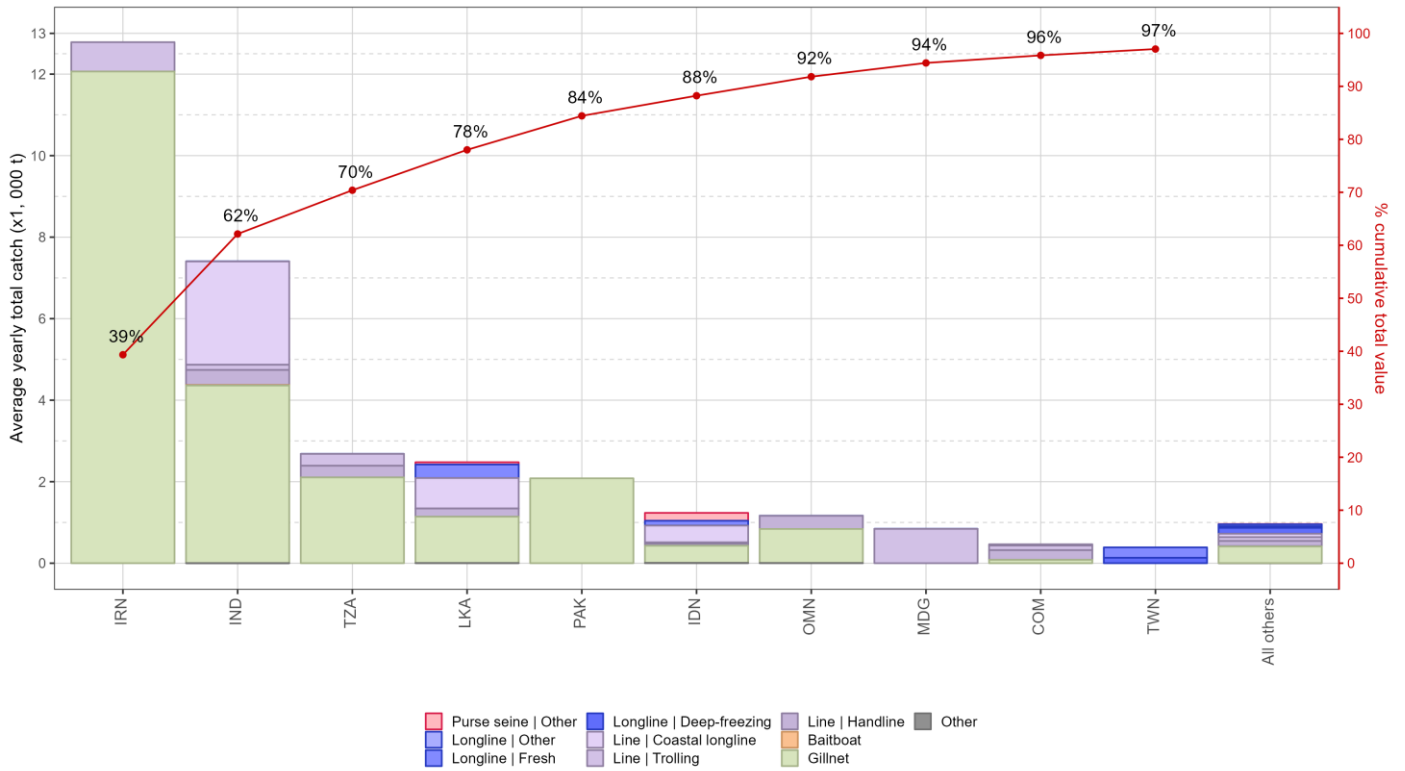


Figure 4: Mean annual catches (metric tonnes; t) of Indo-Pacific sailfish by fleet and fishery between 2017 and 2021, with indication of cumulative catches by fleet. Data source: [best scientific estimates of retained catches](#)

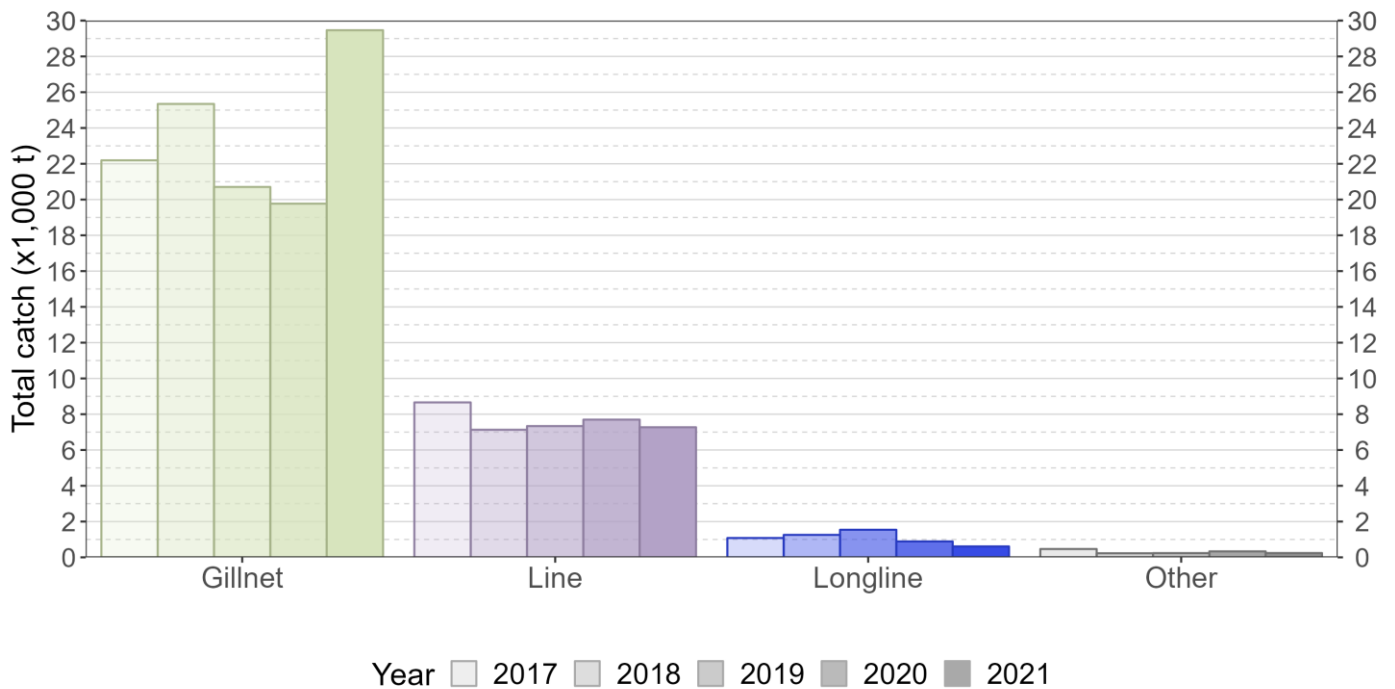


Figure 5: Annual catch (metric tonnes; t) trends of Indo-Pacific sailfish by fishery group between 2017 and 2021. Data source: [best scientific estimates of retained catches](#)

Annual catches of Indo-Pacific sailfish by fishery group show that *line*, *longline* and *other* fisheries reported stable catches since 2016, as opposed to *gillnet* fisheries which recorded an overall increase between 2016 and 2018 followed by a decrease in 2019 and 2020, which brought catches back to levels comparable to those of 2016. However, in 2021 catches increased by 49% (Fig. 5). Catches from industrial longline fisheries are generally declining after a period of relative stability, when not of increasing catch trends, as is the case of Sri Lanka until 2019 (Fig. 6b).

On a fishery-specific basis, gillnet catches are prominently accounted for by gillnetters from I.R. Iran, followed by India, Pakistan and Tanzania. India also dominates catches of Indo-Pacific sailfish from line-related fisheries, although the overall trend is decreasing in recent years, and Indonesia appears as the major source of catches for the species reported by fisheries of *other* types (Fig. 5). A few outliers exist, and concern in particular catches reported in 2016 by the *other* fisheries of Sri Lanka and by the industrial longliners of India (the latter only available in 2016), and in 2019 by the *other* fisheries of Indonesia, which show particularly high catches of the species compared to other years in the same period (Fig. 6a-b).

It is important to recall that the relative stability of catches from *gillnet* and *line* fisheries is a direct consequence of the repetition in annual catch levels for Tanzania (Fig. 6c-d) and Madagascar (Fig. 6c) due to non-reporting of catches for these fleet segments by the concerned CPCs, which adds significant uncertainties in overall catch levels for the species. Additional uncertainties are introduced by significant reporting of aggregated billfish and marlin catches by several fisheries of India in 2019 and 2020, which required explicit disaggregation of catch records by the Secretariat in order to produce species-specific catches (including Indo-Pacific sailfish) for these two years.

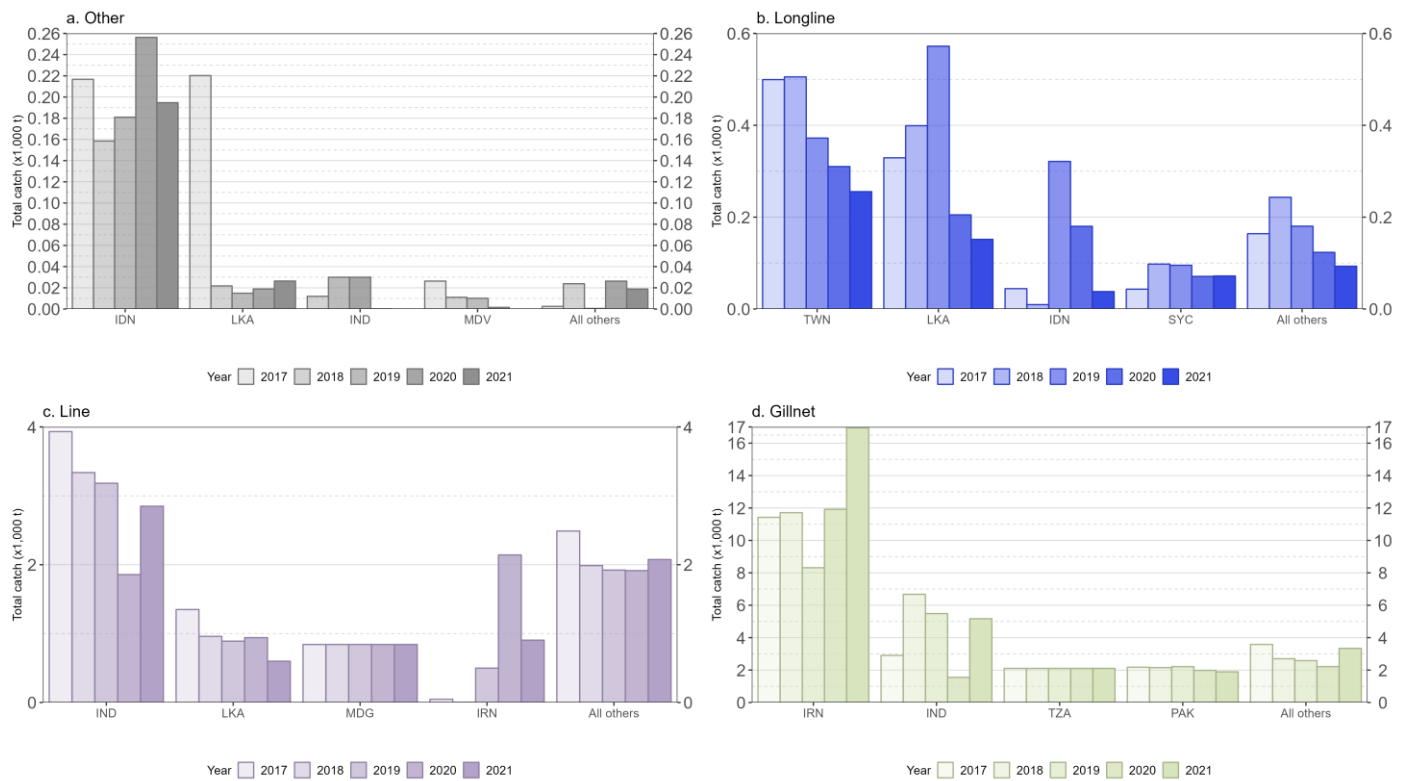


Figure 6: Annual catch (metric tonnes; t) trends of Indo-Pacific sailfish by fishery group and fleet between 2017 and 2021. Data source: [best scientific estimates of retained catches](#)

Changes from previous Working Party

There was no significant data revision between the Working Parties on Billfish held in 2022 (WPB20) and 2023 (WPB21) which could impact the historical catch trend of Indo-Pacific sailfish. However, the disaggregation of marlin and billfish aggregated catches, which relies on proxy fleets and years, slightly altered past data estimated for Indo-Pacific sailfish (**Fig. 7**). In particular, changes were due to (i) the revision of catches for Iranian fisheries between 2011 and 2021, (ii) updates in the data collated from the [FAO global capture production database](#) for non-CPC coastal states (United Arab Emirates, Jordan, Yemen), which are used in absence of data reported to the Secretariat, (iii) revised Indonesian catch data estimated by the Secretariat for 2017, and (iv) updated catches for Kenya (see [Appendix II](#) for additional details on the most important changes in retained catches recorded in recent years).

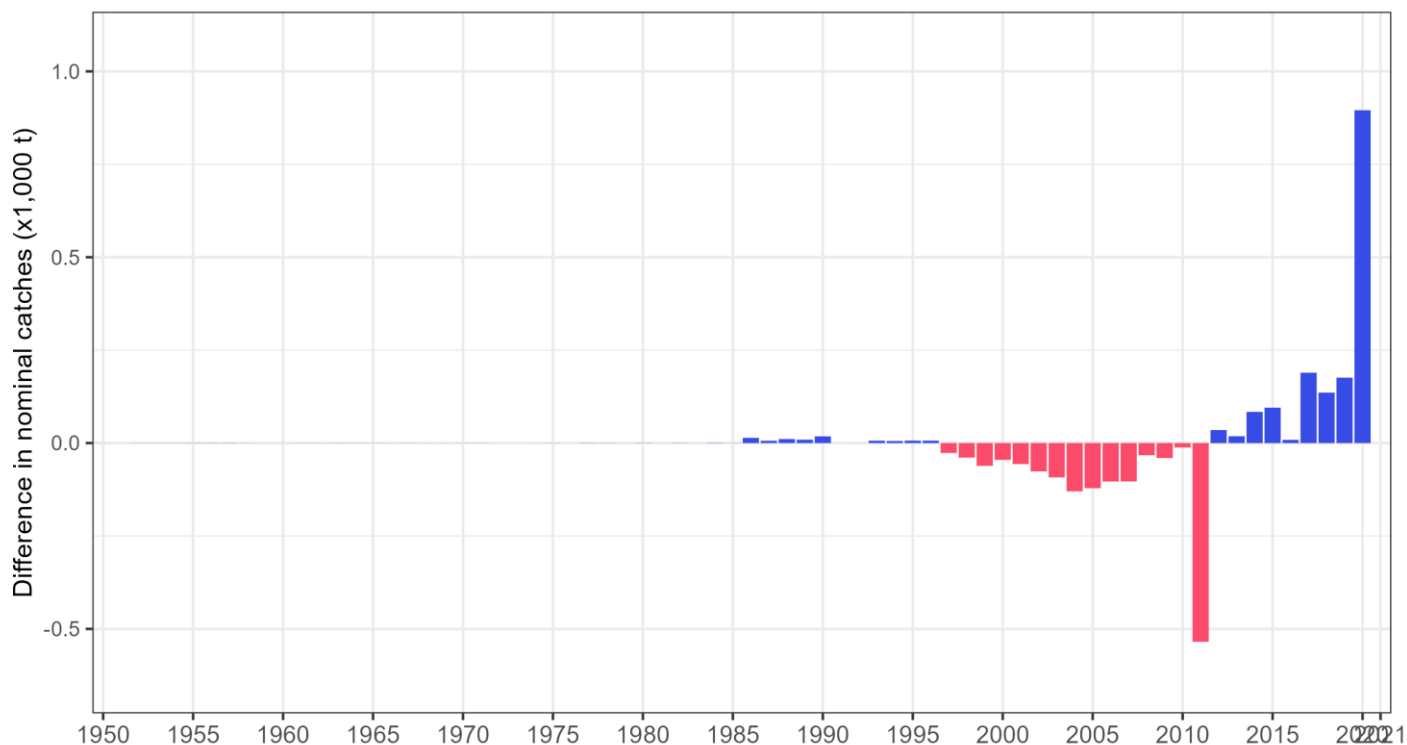


Figure 7: Differences in the available best scientific estimates of retained catches (metric tonnes; t) of Indo-Pacific sailfish between this WPB and its previous session ([WPB20](#) meeting held in September 2022)

Uncertainties in retained catch data

Uncertainties in Indo-Pacific sailfish catches are generally more relevant than with other billfish species, due to the higher proportion of catches originating from coastal fisheries for which the species is thought to have been often under-reported in the past.

The quality of retained catches is quite variable, with a marked drop starting in 1970 before reaching satisfactory levels again in 2010, when important coastal fisheries such as those from I.R. Iran and Sri Lanka started improving the quality of the data by providing detailed catches of billfish species for their major fisheries.

Overall there are marked uncertainties in the catch of industrial fisheries, as in the 1990s several industrial longline fisheries (mostly those operating fresh tuna longliners) were not reporting catch data to the IOTC Secretariat. Hence, most of the catches were estimated using proxy fleets and recorded as *not elsewhere identified* (NEI) ([Herrera 2002](#)) therefore explaining the very low quality scores of industrial fisheries for the period, which were often below the estimated quality level of artisanal fisheries. Furthermore, the lack of information at species level reduced the accuracy of the data available for Indo-Pacific sailfish (**Fig. 8**).

Around 14% of retained catches of Indo-Pacific sailfish is considered uncertain in 2021 (**Fig. 8**), and it predominantly consists of re-estimated catches for coastal fisheries, including non-reporting ones (e.g., line fisheries of Madagascar and Tanzania, gillnet fisheries of Tanzania).

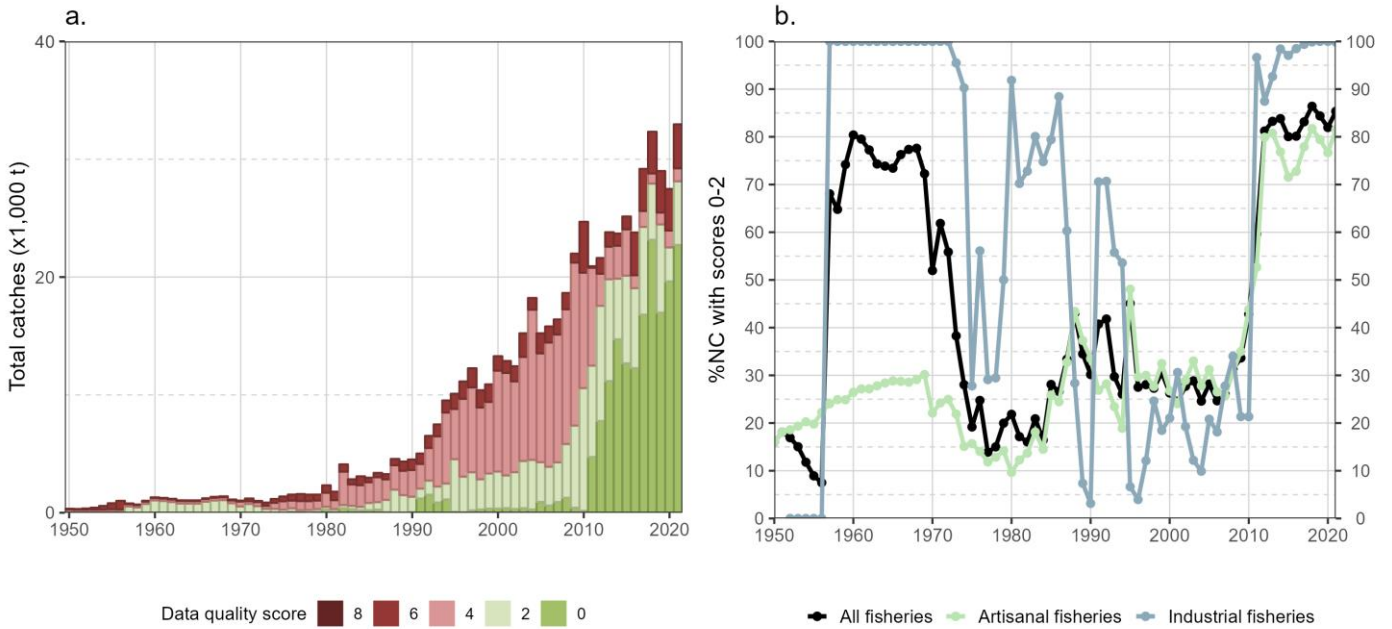


Figure 8: (a) Annual retained catches (metric tonnes; t) of Indo-Pacific sailfish estimated by quality score and (b) percentage of total retained catches fully/partially reported to the IOTC Secretariat for all fisheries and by type of fishery, in the period 1950-2021

Discard levels

Information collected from scientific observers at sea through the ROS suggests that Indo-Pacific sailfish is more often discarded in large-scale purse seine than longline fisheries. The size composition of the catch shows that the species may be discarded at all sizes in purse seine fisheries, while little-to-no size data for discarded Indo-Pacific sailfish are available from longline fisheries (Fig. 9).

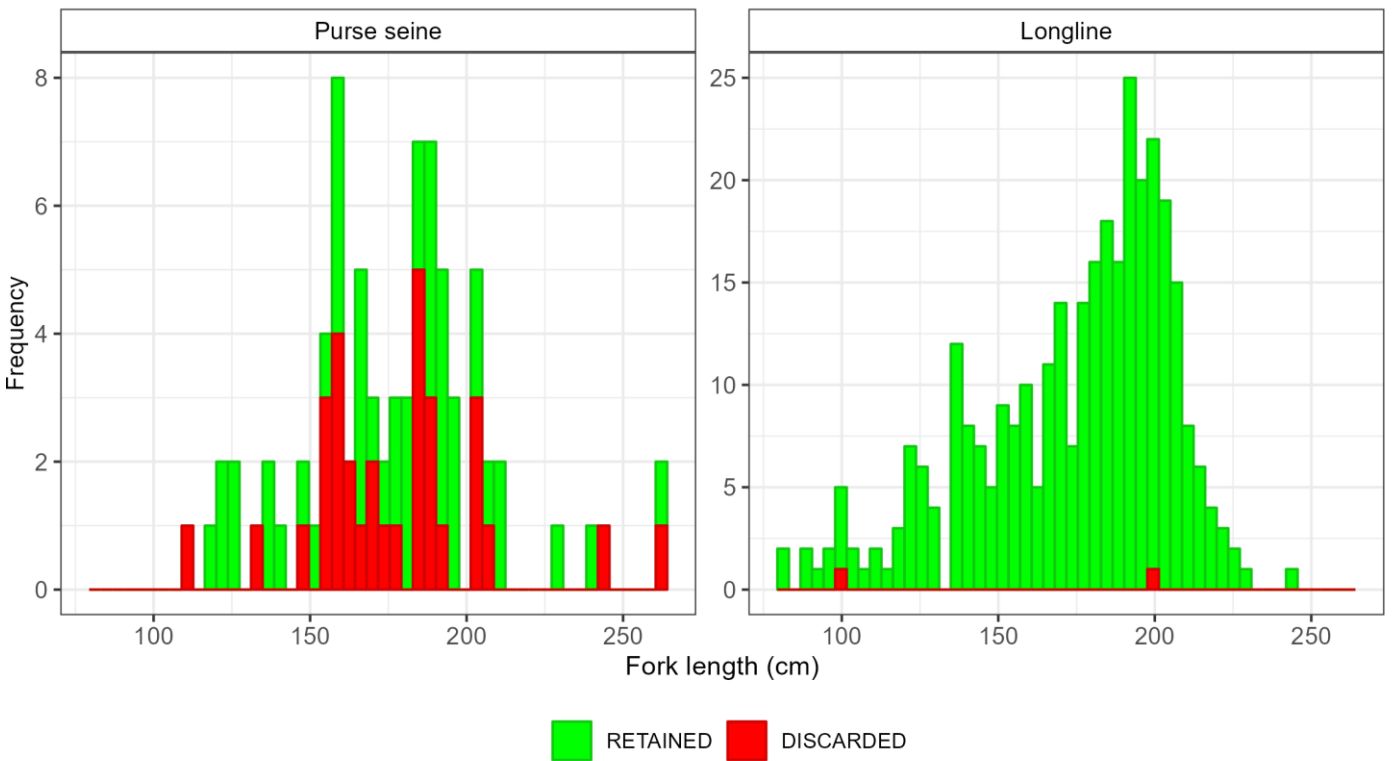


Figure 9: Size (fork length; cm) frequency distribution of Indo-Pacific sailfish retained and discarded at sea in purse seine and longline fisheries as available in the ROS regional database

Information collected on the condition (i.e., individual released *dead* or *alive*) suggests that the very large majority of the fish do not survive when discarded at sea, whatever the fishery group or fishing ground.

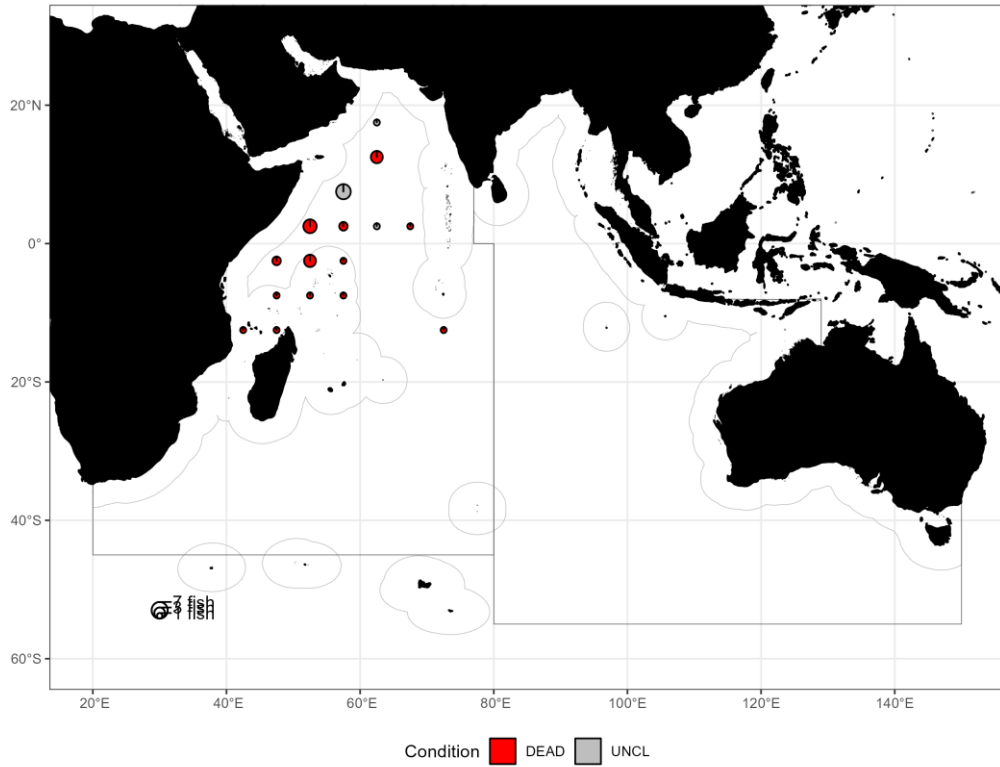


Figure 10: Distribution of Indo-Pacific sailfish discarded at sea in the western Indian Ocean purse seine fisheries with information on condition as available in the ROS regional database

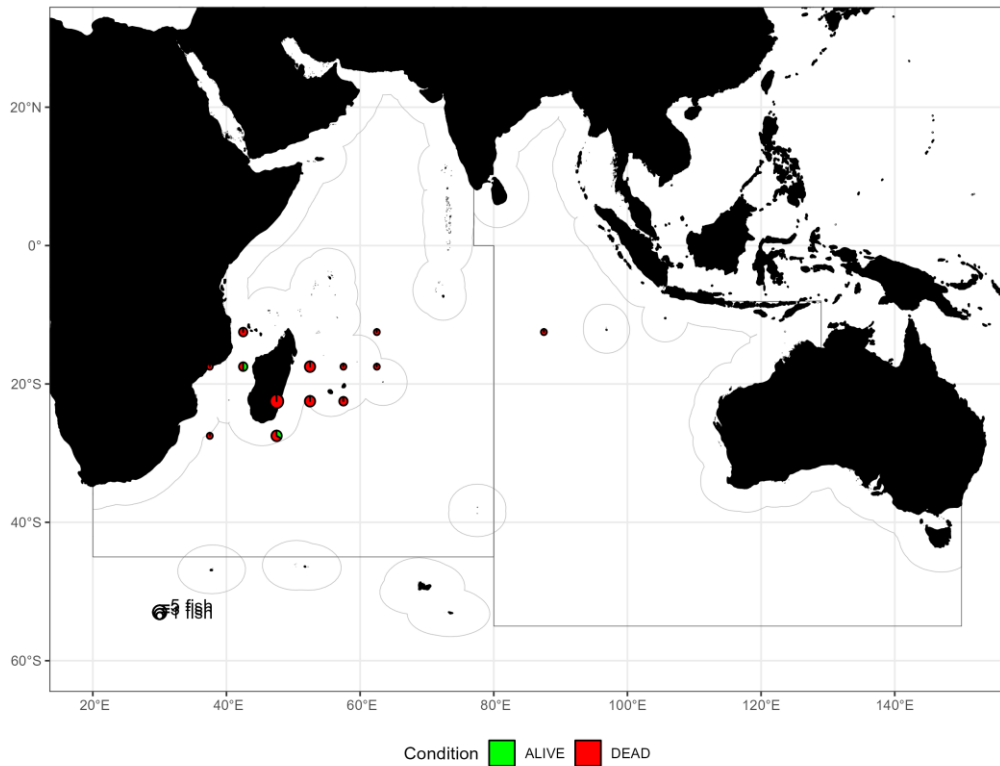


Figure 11: Distribution of Indo-Pacific sailfish discarded at sea in the Indian Ocean longline fisheries with information on condition as available in the ROS regional database

Geo-referenced catch

Spatial distribution of catches

Geo-referenced catches by fishery and decade (1950-2009)

In the past, geo-referenced catches of Indo-Pacific sailfish were generally available for the major industrial longline fisheries operating in the Indian Ocean. The distribution of the catch indicates that - from the 1970s to the 1990s - these were mostly occurring in equatorial waters both in the western and eastern Indian Ocean, as well as in the bay of Bengal (Fig. 12a-b). Starting with the 2000s, evidence of increased catches from longline vessels begun to appear in the Southwest Indian Ocean and in the Mozambique channel in particular (Fig. 12c-d). Between 1970 and 1989 most of the available geo-referenced catches of Indo-Pacific sailfish originated from Korean longliners, with Japanese longliners becoming predominant between 1990 and 2009. In the 2010s, longline catches appear to be more concentrated in the southwestern Indian Ocean and Mozambique channel, with information from Seychellois and Chinese longliners beginning to be reported in tropical areas of the western Indian Ocean, mostly south of the equatorial line.

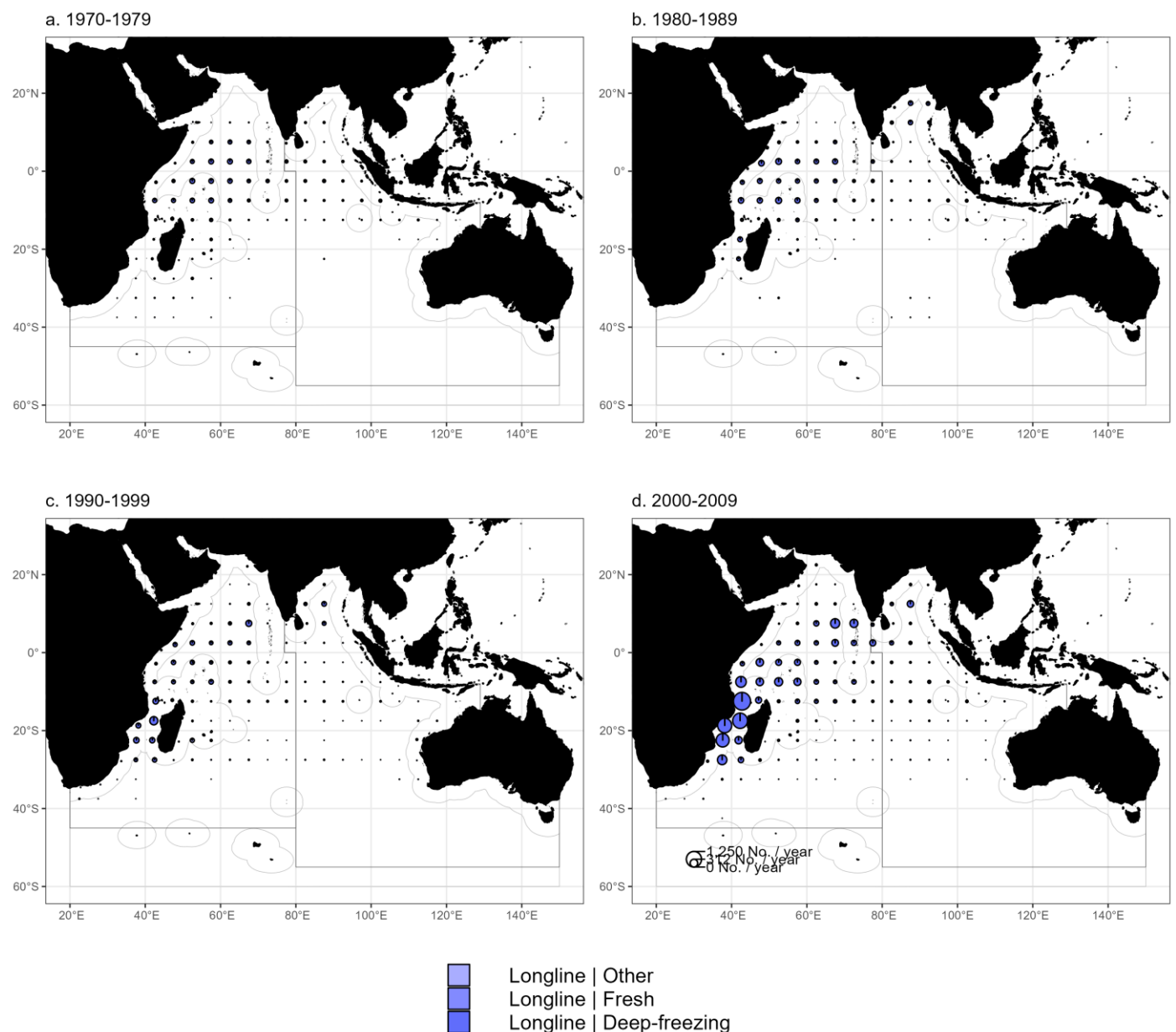


Figure 12: Mean annual time-area catches in numbers of Indo-Pacific sailfish, by decade, 5x5 grid, and fishery. Data source: [time-area catches](#)

Geo-referenced catches by fishery, last years (2017-2021) and decade (2010-2019)

The quality of the geo-referenced catches reported to the Secretariat has substantially improved in recent years, and spatial information on fishing activities is now available for most industrial and coastal fisheries. Geo-referenced catches in weight indicate high catch levels in the northern Arabian sea, in the areas of national jurisdiction of Sri Lanka and in the Mozambique channel for both line and gillnet fisheries (Fig. 13), while catches from longline fisheries (in number) remain high in the western Indian Ocean (particularly in the Mozambique Channel) and in temperate waters of both the eastern and western Indian Ocean (Fig. 14).

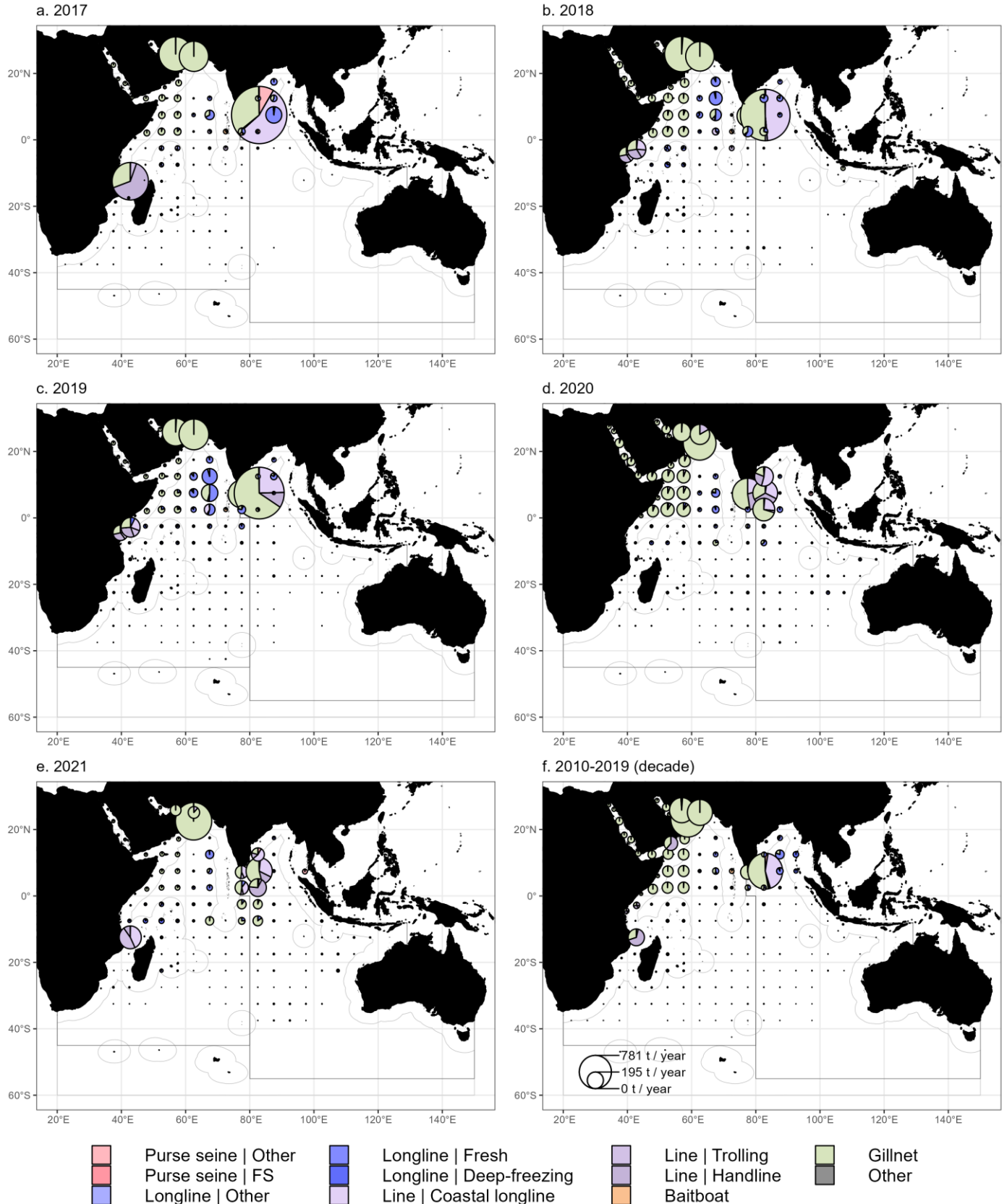


Figure 13: Mean annual time-area catches in weight (metric tonnes; t) of Indo-Pacific sailfish, by year / decade, 5x5 grid, and fishery. Data source: [time-area catches](#)

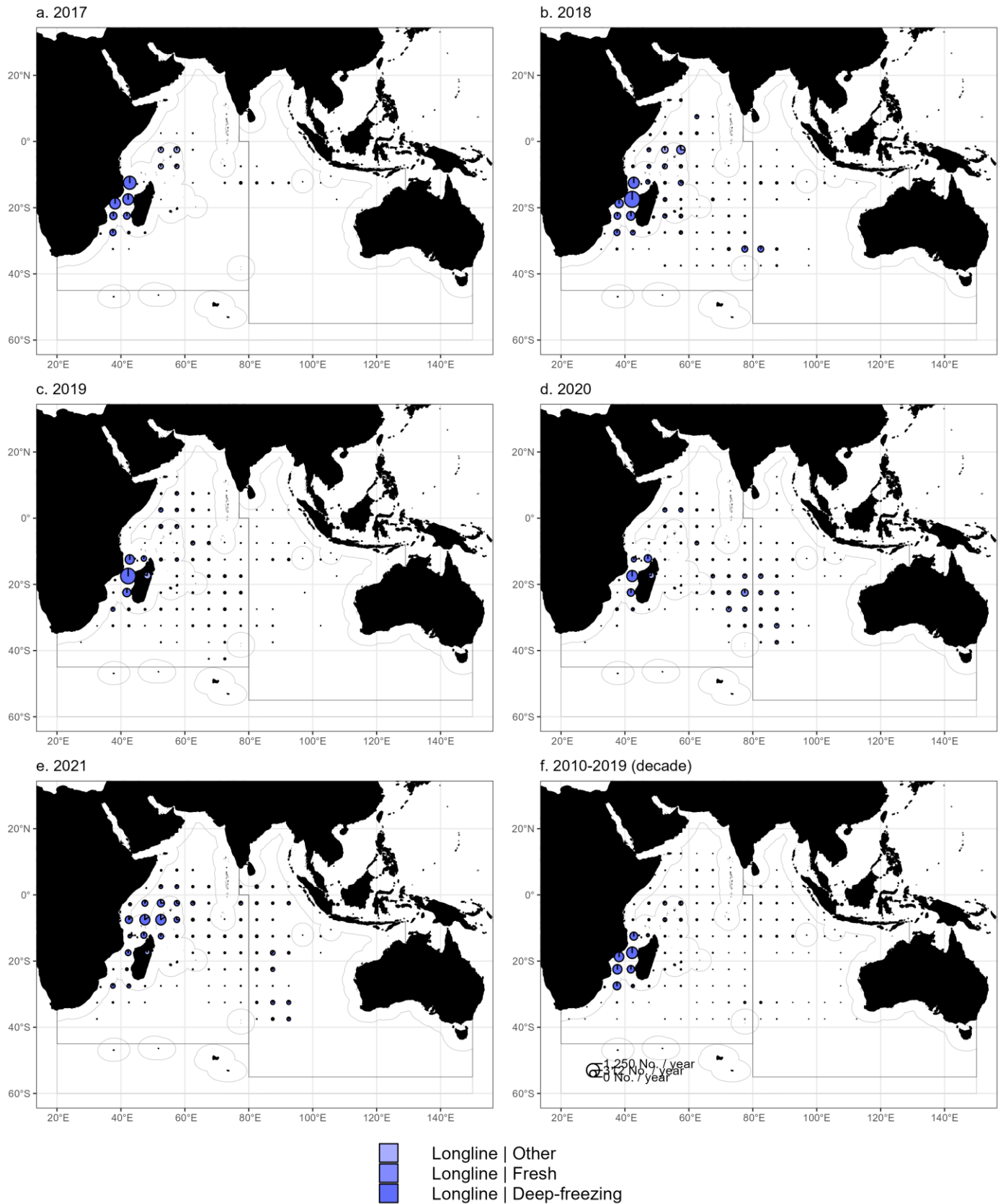


Figure 14: Mean annual time-area catches in numbers of Indo-Pacific sailfish, by year / decade, 5x5 grid, and fishery. Data source: [time-area catches](#)

Uncertainties in catch and effort data

Uncertainties in geo-referenced catch and effort data of Indo-Pacific sailfish are higher than those for total retained catch data, as catch and effort data for artisanal fisheries were only available from Sri Lanka prior to 2007 and the quality and completeness of data reported from industrial longline fleets is generally mediocre and extremely variable for the years between 1975 and 2010 (Fig. 15). Besides the limited extent of the data reported to the Secretariat, additional issues have been identified for the catch and effort records available for the species:

- data from Iranian fisheries have only become available since 2007, although not fully reported by IOTC standard;
- data for the main fisheries of Indonesia are not available prior to 2018, and appear characterized by a low coverage for all fisheries;
- data for the longline fisheries of China are not available prior to 2018;
- no data available for the longline fisheries of Taiwan,China;
- most industrial longline fisheries report catch and effort in numbers, although these appear to be low in the period 1970s to 2000s.

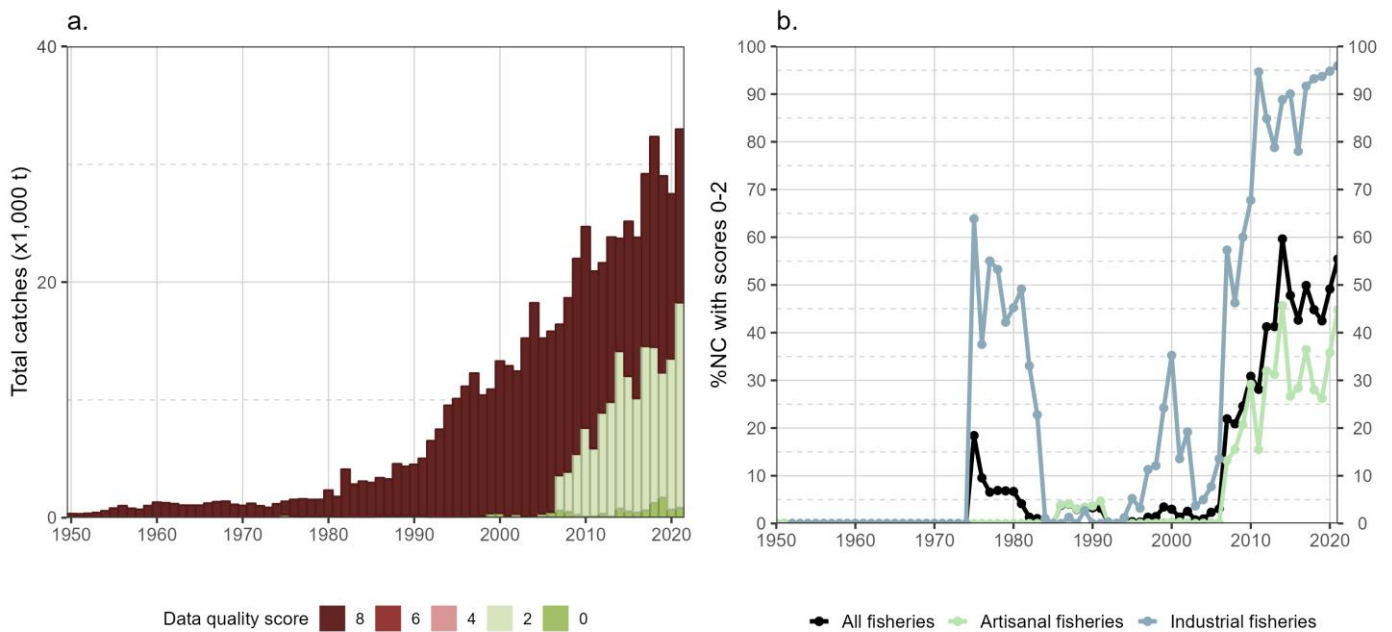


Figure 15: (a) Annual retained catches (metric tonnes; t) of Indo-Pacific sailfish estimated by quality score and (b) percentage of total retained catches for which geo-referenced catches were reported to the IOTC Secretariat in agreement with the requirements of Res. 15/02 for all fisheries and by type of fishery in the period 1950-2021

Size composition of the catch

Samples availability

By fishery group

The availability of size-frequency samples for Indo-Pacific sailfish varies greatly over time and between fishery groups and fleets. A significant number of samples is available for the industrial longline fisheries, mainly recorded by Japanese vessels between 1960 and 1985 and from 2010 onwards (**Fig. 16**). A large number of size samples for Indo-Pacific sailfish was also collected by the gillnet fishery of Sri Lanka through the IPTP sampling programme conducted between 1988 and 2005. In recent years, however, size samples of Indo-Pacific sailfish are predominantly reported by longline fisheries (and namely those from Taiwan, China, Japan, EU, Portugal, and Sri Lanka), by gillnet fisheries (Sri Lanka) and to a lesser extent by line fisheries (Sri Lanka and Indonesia).

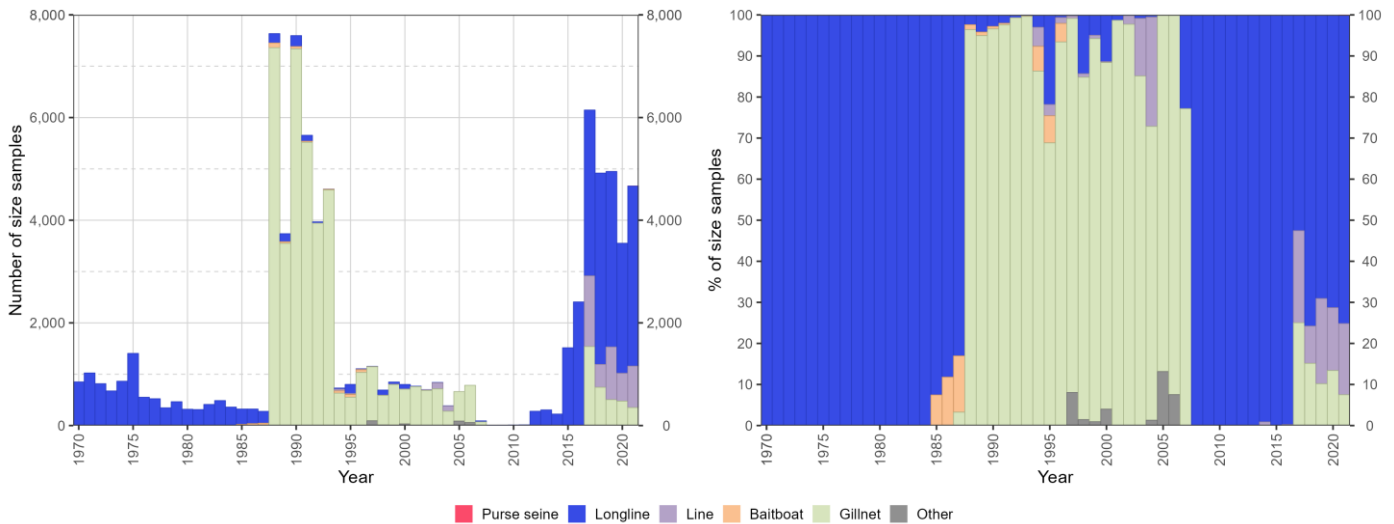


Figure 16: Availability of Indo-Pacific sailfish size-frequency data as absolute number of samples (left) and relative number of samples (right) per year and fishery group. Data source: [standardized size-frequency dataset](#)

Purse seine fisheries

Overall, only a negligible fraction of the size samples of Indo-Pacific sailfish available at the Secretariat has been collected from purse seine fisheries. The spatial extent of the size samples available for these fisheries in recent years is extremely limited (**Fig. 17**) with additional size samples that have been collected for both retained and discarded individuals by scientific observers onboard large-scale purse seiners (see section [Discards](#)).

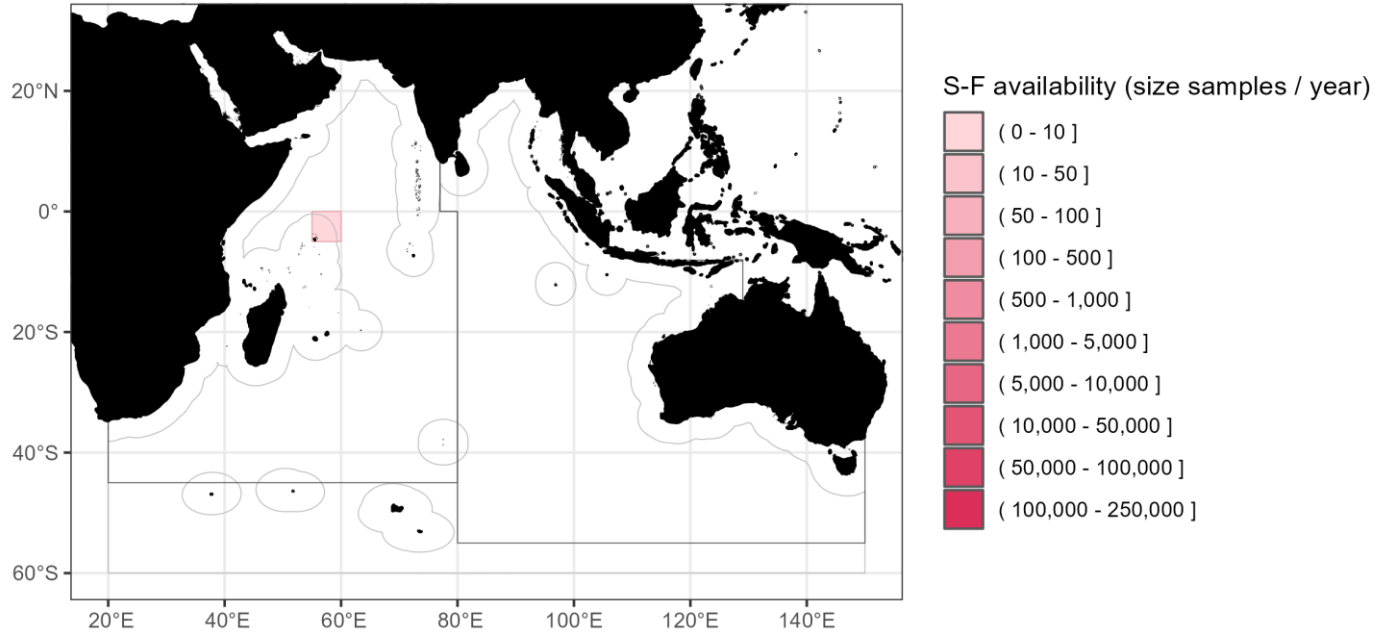


Figure 17: Spatial distribution (average number of samples per grid per year) of available Indo-Pacific sailfish size-frequency data for purse seine fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

Longline fisheries

Longline fisheries provide a large number of Indo-Pacific sailfish samples, which are of particular interest considering the decline in catches for these fisheries recorded in recent years. Longliners from Taiwan, China sampled on average 2,500 fish per year between 2016 and 2020, followed by longliners from Japan, with an average of 200 sampled individuals, and although at low numbers, samples of the species are continuously reported by the longline fisheries of Korea and EU, Portugal. Data for Sri Lankan industrial longliners are also available from 2019 onwards. Overall, size-frequency data are generally collected by fishermen, recorded in the logbook, and additionally by scientific observers on board.

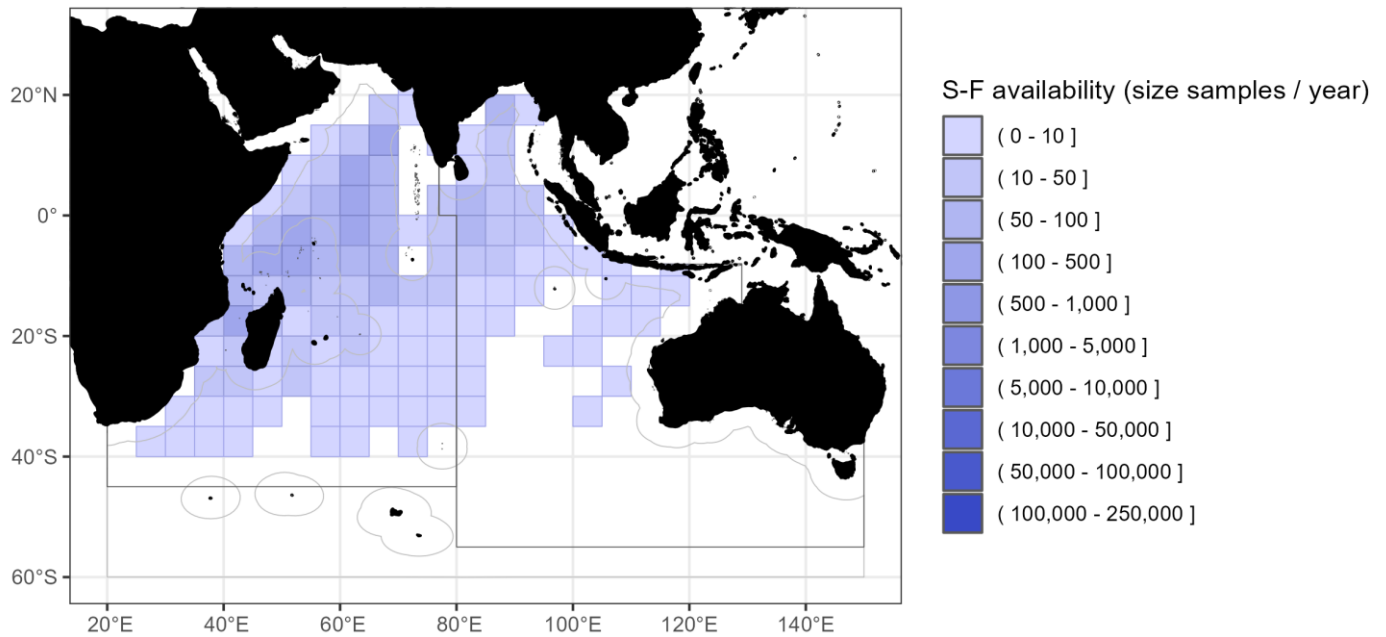


Figure 18: Spatial distribution (average number of samples per grid per year) of available Indo-Pacific sailfish size-frequency data for longline fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

Gillnet fisheries

Gillnet fisheries collected substantial samples of Indo-Pacific sailfish during the years of activity of the IPTP sampling programme (1988-2003). In recent years (2017-2020), and notwithstanding the large amount of catches regularly reported for the species by the gillnet fisheries of several IOTC coastal states, size samples of Indo-Pacific sailfish are only available from the gillnet fishery of Sri Lanka.

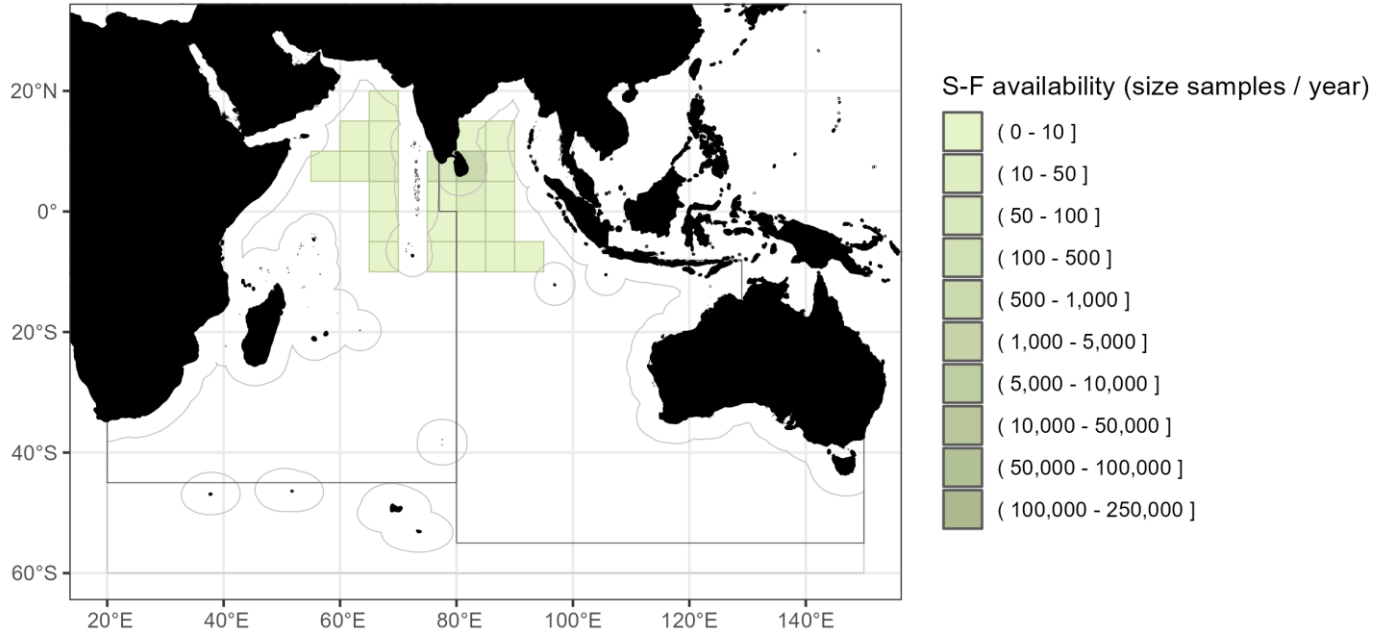


Figure 19: Spatial distribution (average number of samples per grid per year) of available Indo-Pacific sailfish size-frequency data for gillnet fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

Line fisheries

Indo-Pacific sailfish are increasingly caught by line fisheries, including those operating with coastal longlines which represent the source of the majority of samples available for the *line* fishery group. In recent years, sample of Indo-Pacific sailfish from line fisheries become available in most fishing areas, such as the areas of national jurisdiction of Sri Lanka, Reunion island, Mozambique, and also in the eastern Indian Ocean, collected in Indonesian coastal line fisheries.

It is assumed that size samples for the species are regularly collected in the context of recreational fisheries, especially in the western Indian Ocean, although this information is seldom made available to the Secretariat. Most of the Indo-Pacific sailfish interacted with by these fisheries are caught on a tag-and-release basis ([Billfish foundation](#)).

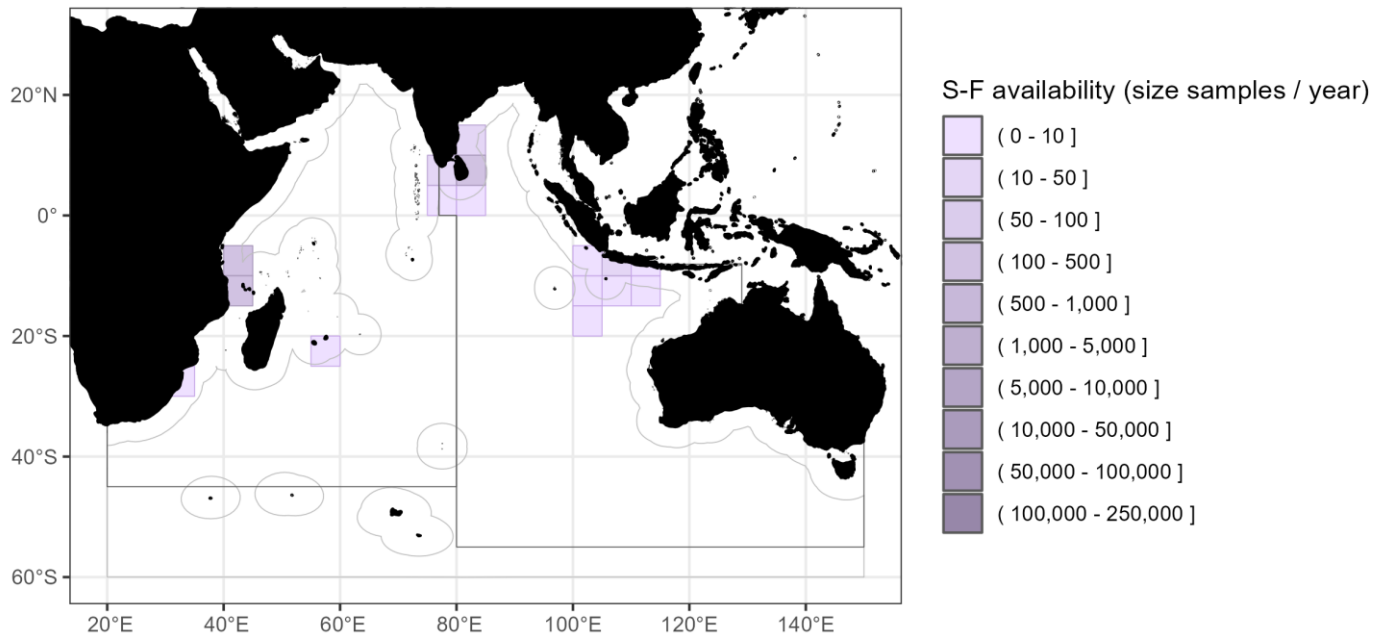


Figure 20: Spatial distribution (average number of samples per grid per year) of available Indo-Pacific sailfish size-frequency data for line fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

By fishery

Longline fisheries

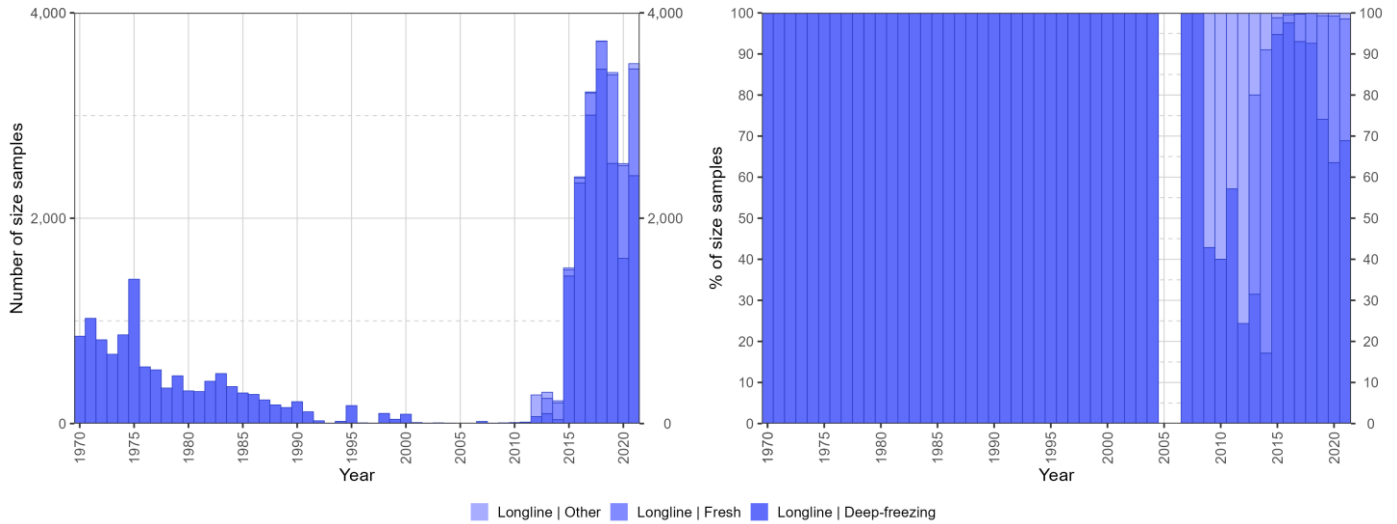


Figure 21: Availability of Indo-Pacific sailfish size-frequency data as absolute number of samples per year in longline fisheries. Data source: [standardized size-frequency dataset](#)

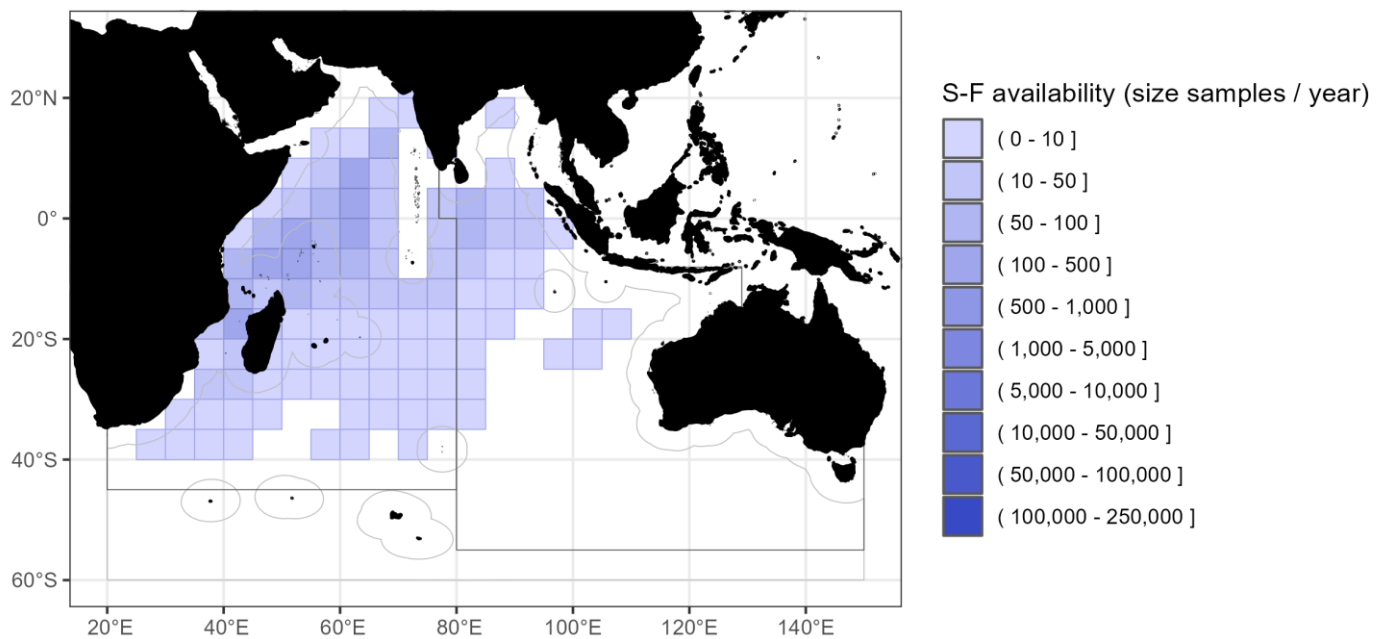


Figure 22: Spatial distribution (average number of samples per grid per year) of available Indo-Pacific sailfish size-frequency data by longline (deep-freezing longline) fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

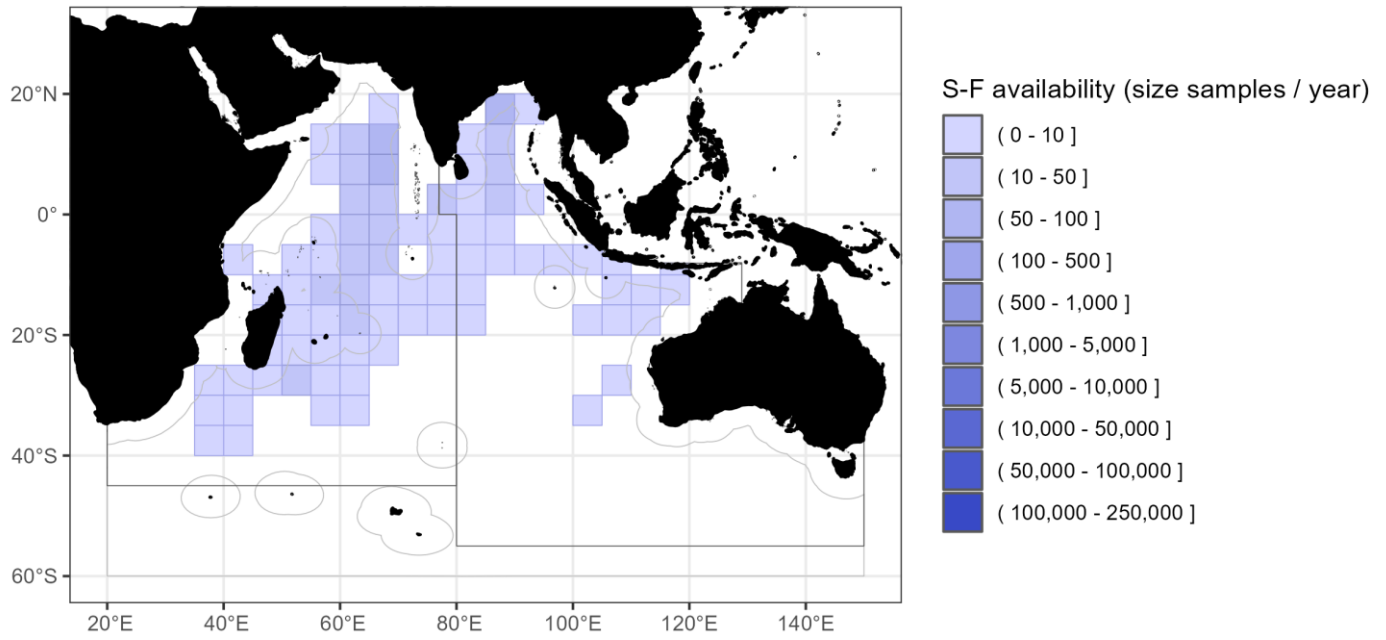


Figure 23: Spatial distribution (average number of samples per grid per year) of available Indo-Pacific sailfish size-frequency data by longline (fresh longline) fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

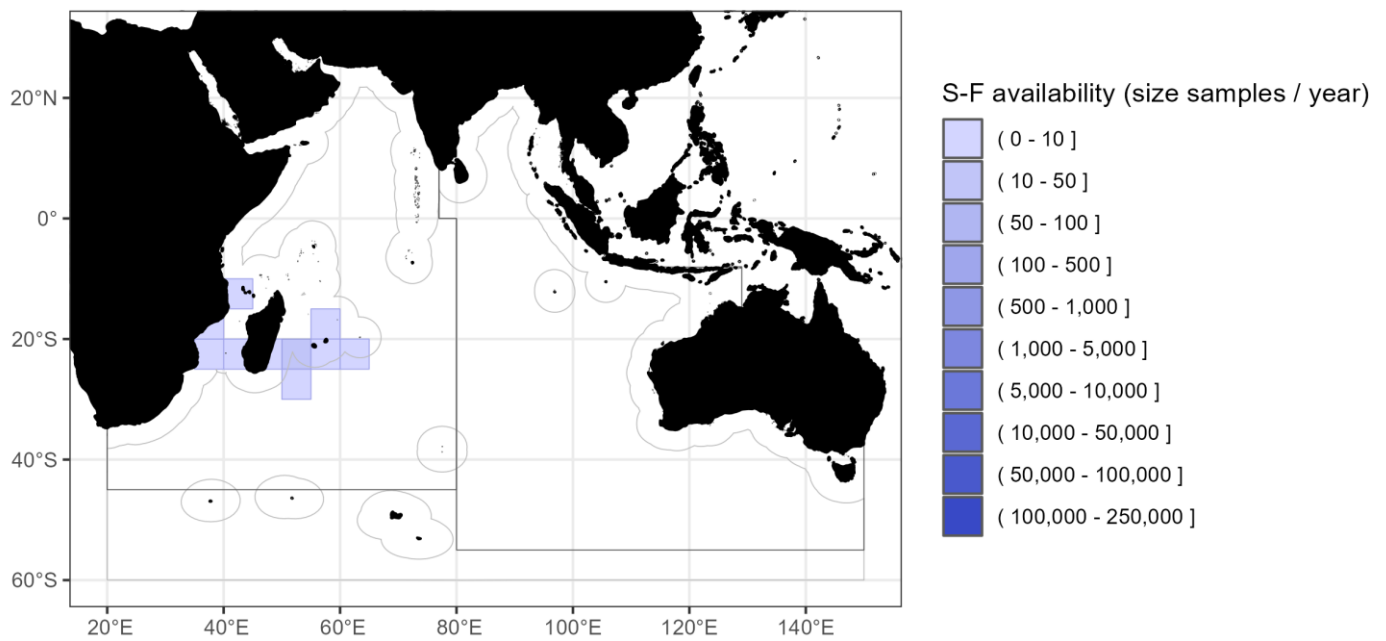


Figure 24: Spatial distribution (average number of samples per grid per year) of available Indo-Pacific sailfish size-frequency data by longline (other longline) fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

Gillnet fisheries

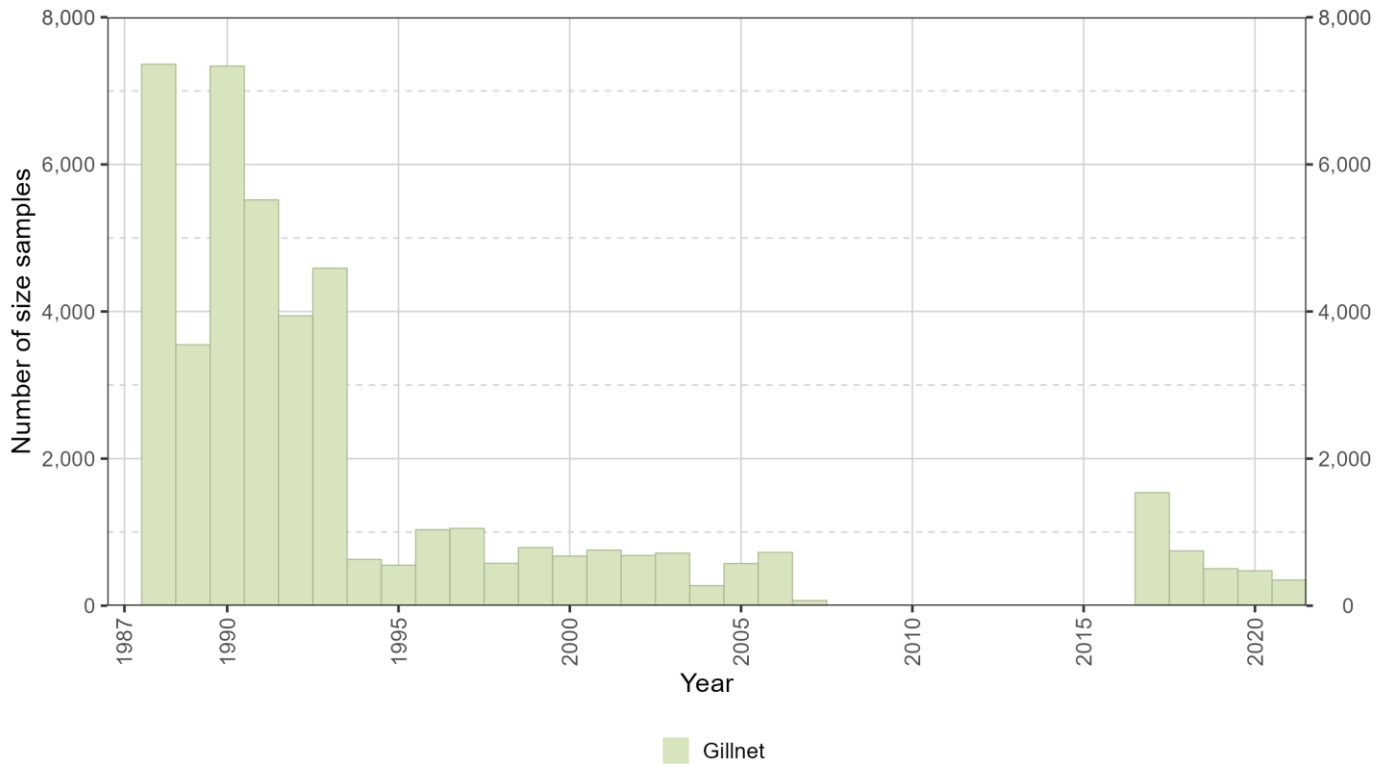


Figure 25: Availability of Indo-Pacific sailfish size-frequency data as absolute number of samples per year in gillnet fisheries. Data source: [standardized size-frequency dataset](#)

Line fisheries

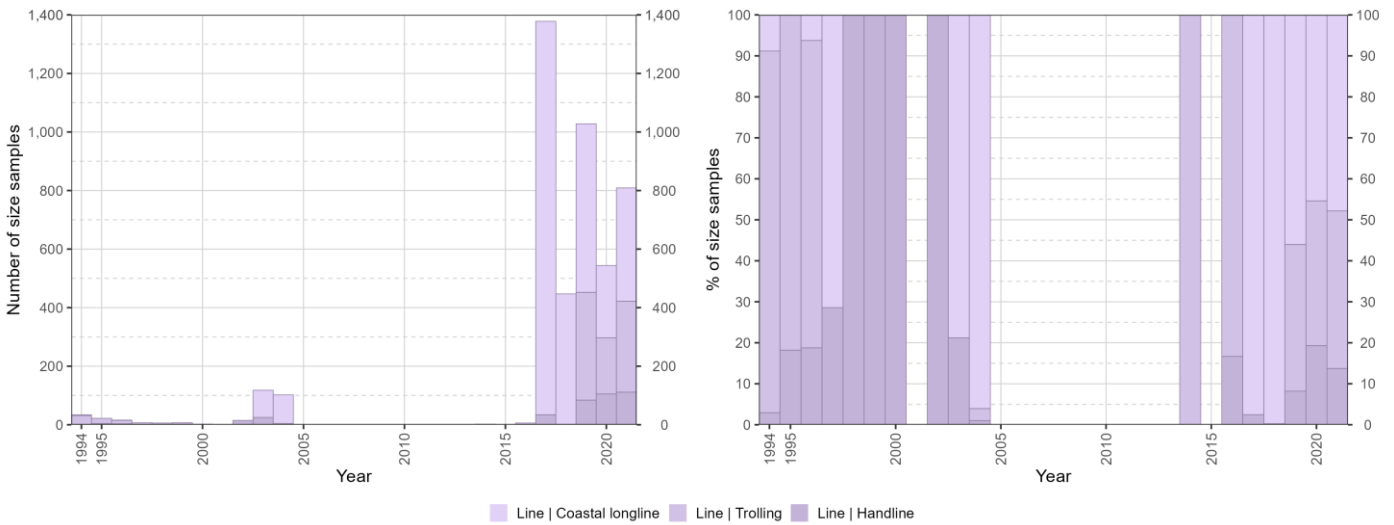


Figure 26: Availability of Indo-Pacific sailfish size-frequency data as absolute number of samples (left) and relative number of samples (right) per year and line fishery type. Data source: [standardized size-frequency dataset](#)

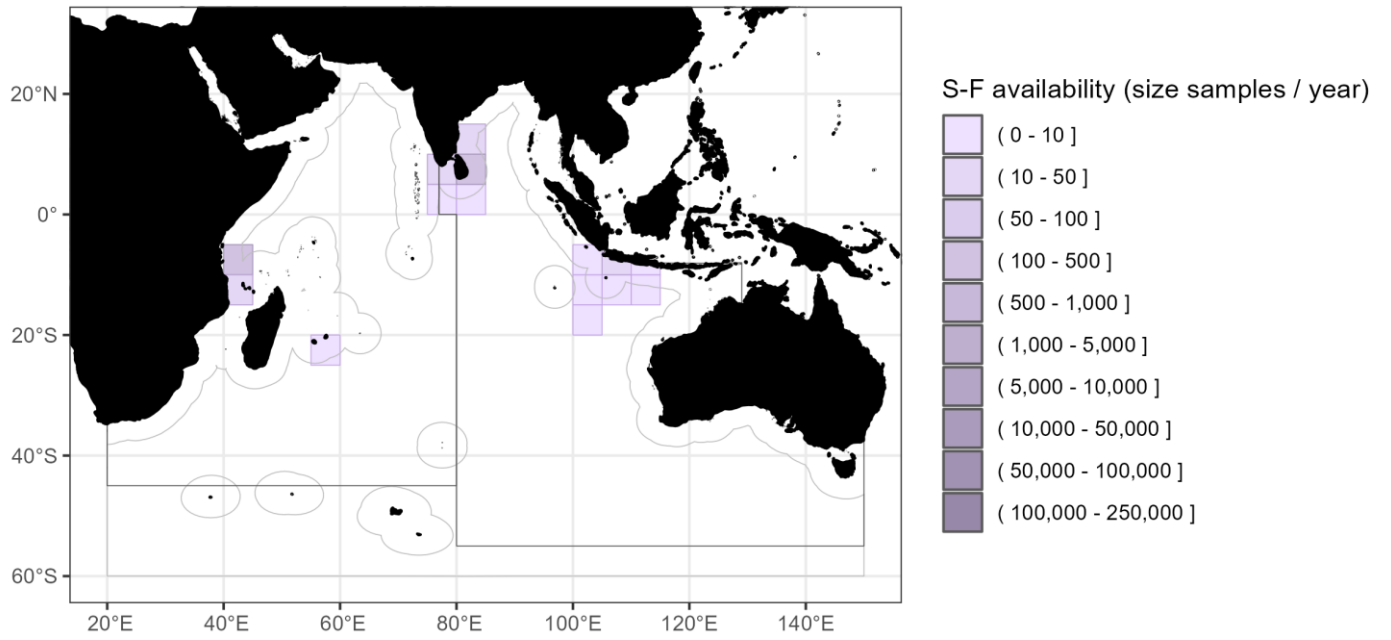


Figure 27: Spatial distribution (average number of samples per grid per year) of available Indo-Pacific sailfish size-frequency data by line (coastal longline) fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

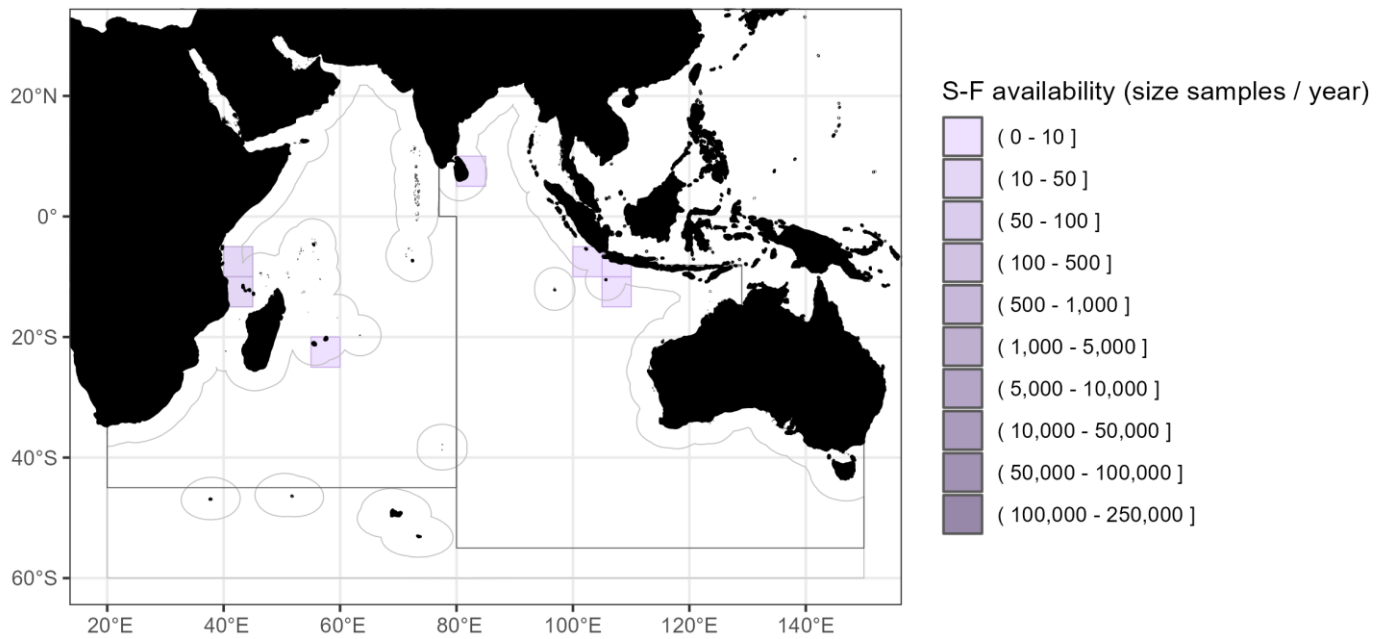


Figure 28: Spatial distribution (average number of samples per grid per year) of available Indo-Pacific sailfish size-frequency data by line (handline) fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

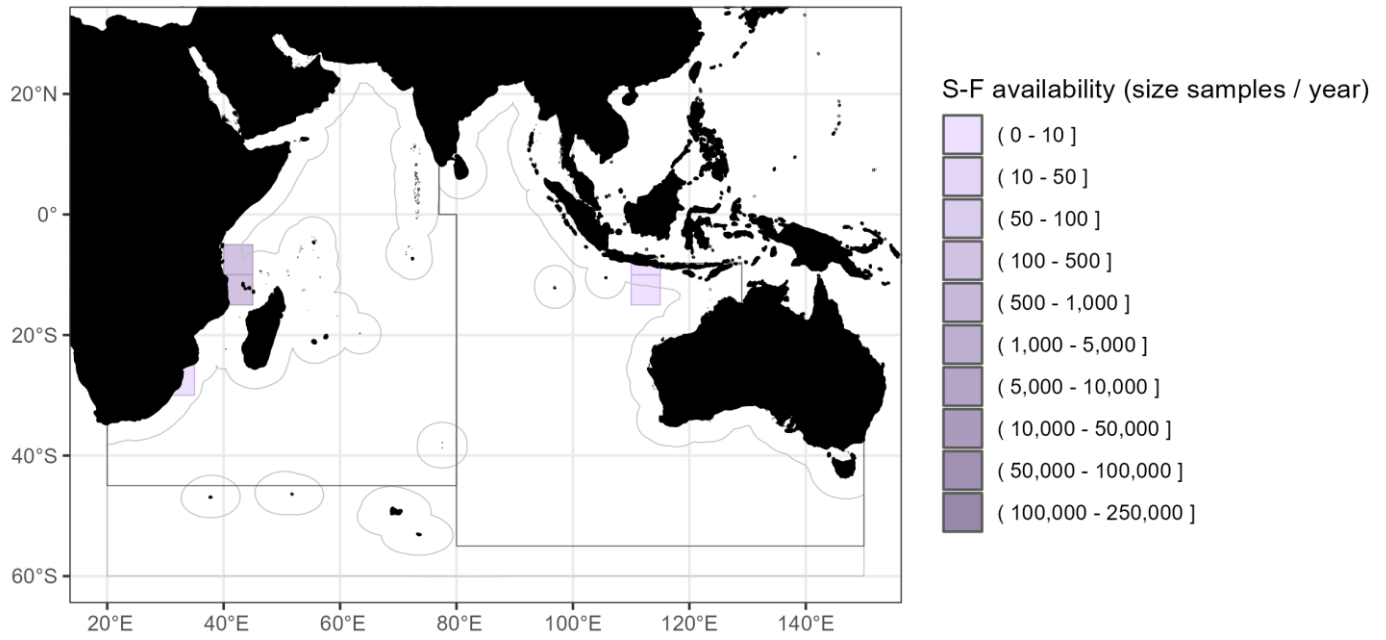


Figure 29: Spatial distribution (average number of samples per grid per year) of available Indo-Pacific sailfish size-frequency data by line (trolling) fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

Other fisheries

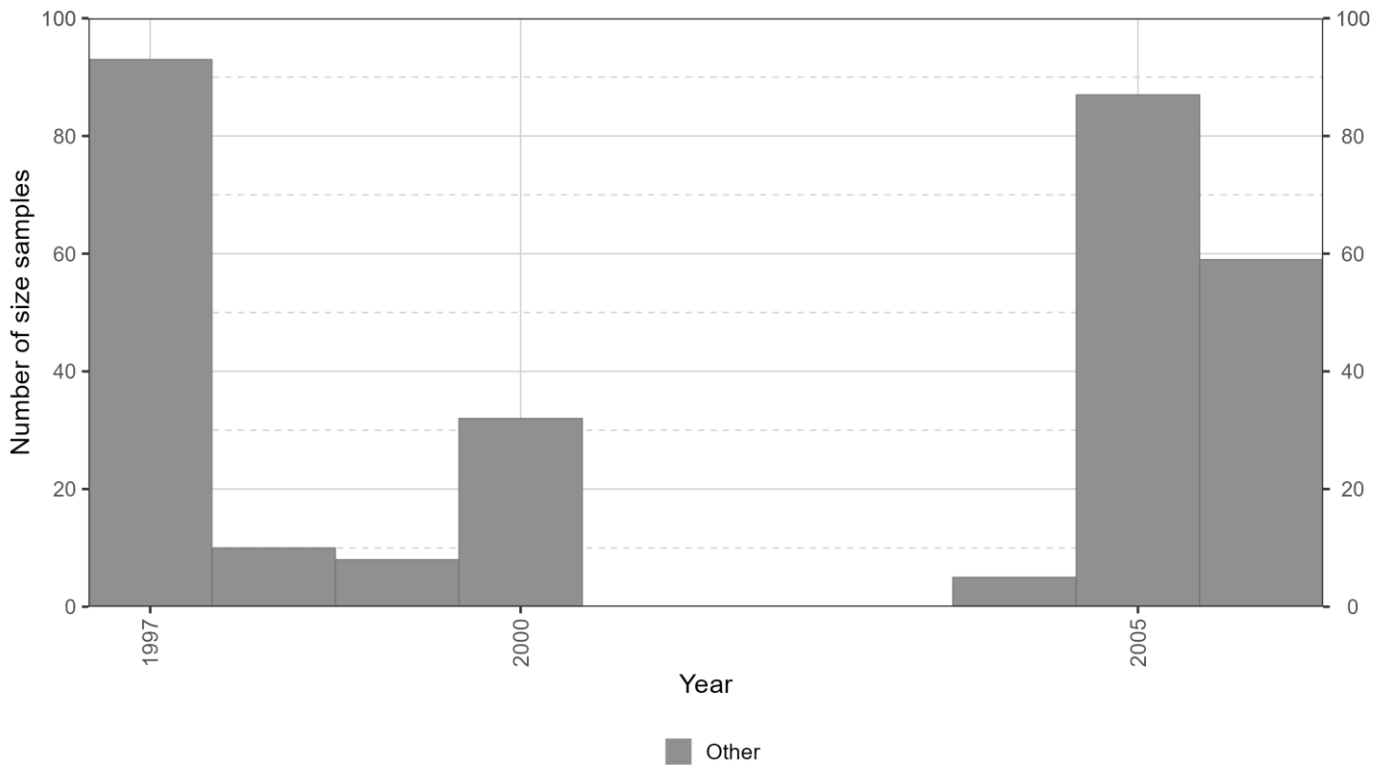


Figure 30: Availability of Indo-Pacific sailfish size-frequency data as absolute number of samples (left) and relative number of samples (right) per year and 'other' fishery type. Data source: [standardized size-frequency dataset](#)

Temporal patterns and trends in size distributions

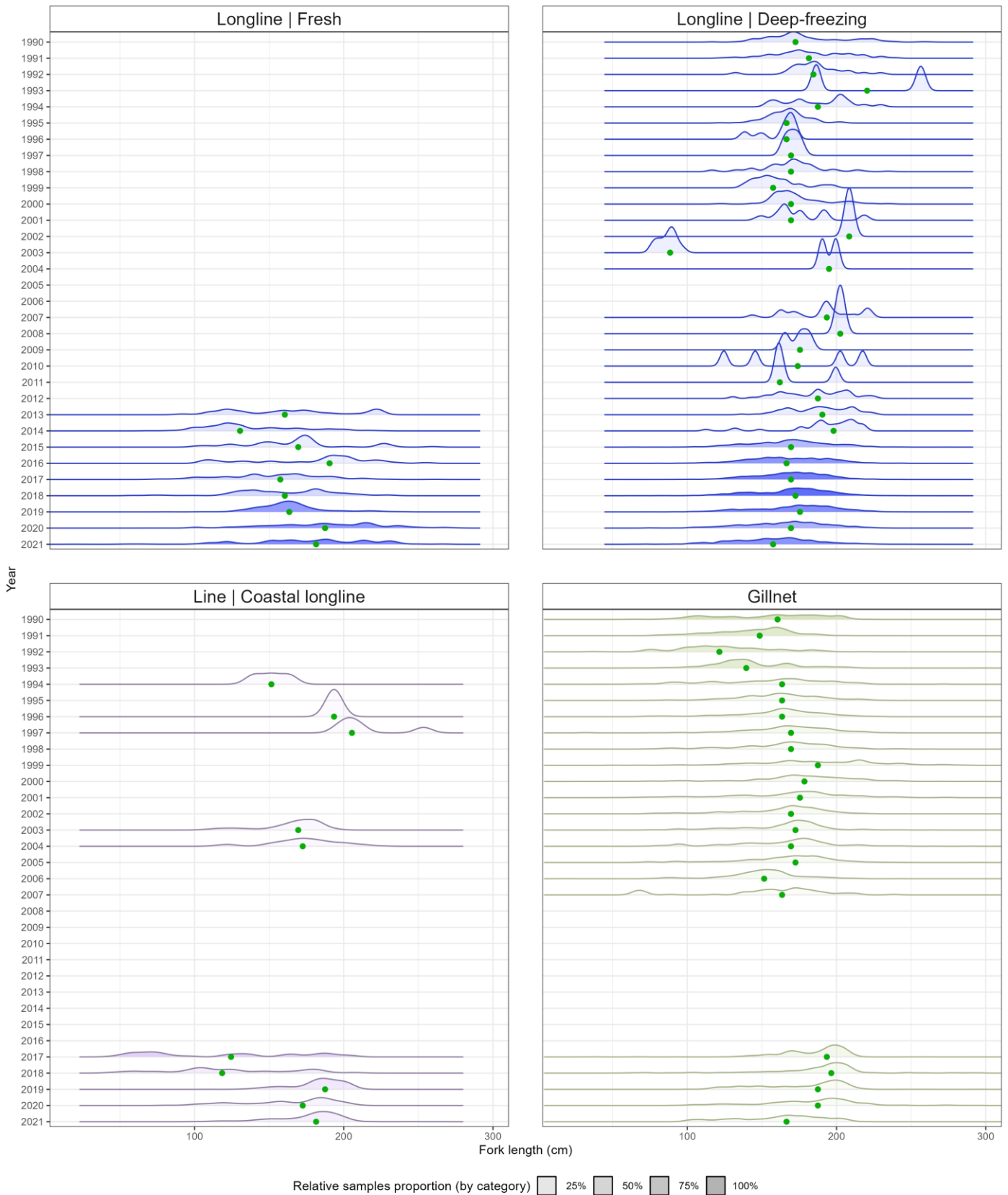


Figure 31: Relative size distribution (fork length; cm) of Indo-Pacific sailfish caught in purse seine (Other) and gillnet fisheries. Other = no information provided on school association. Fill intensity is proportional to the number of samples recorded for the year, while the green dot corresponds to the median value. Data source: [standardized size-frequency dataset](#)

Size distribution by fishery and fleet

Longline fisheries

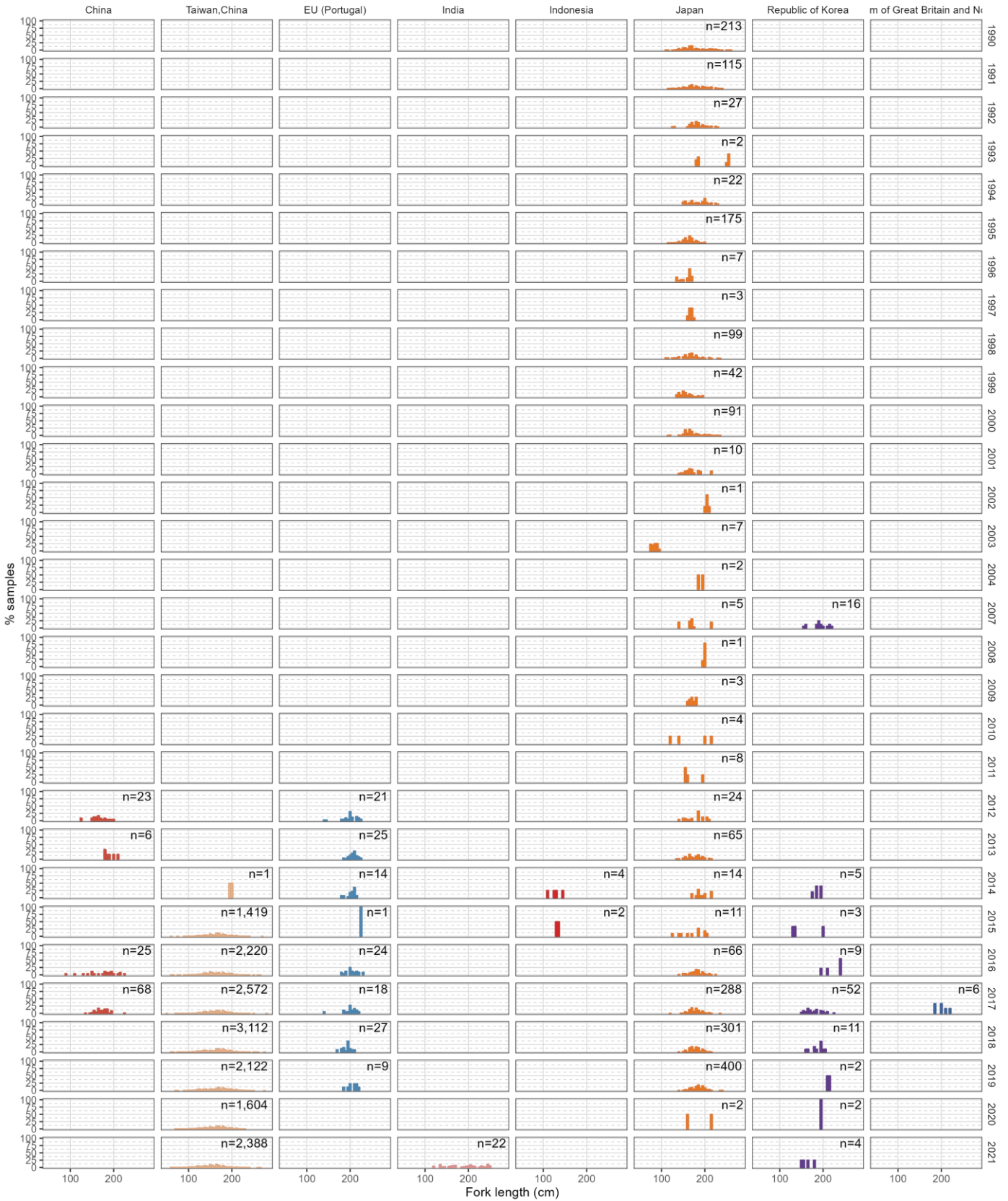


Figure 32: Relative size distribution of Indo-Pacific sailfish (fork length; cm) recorded for deep-freezing longline fisheries by year and main fleet. Data source: [standardized size-frequency dataset](#)

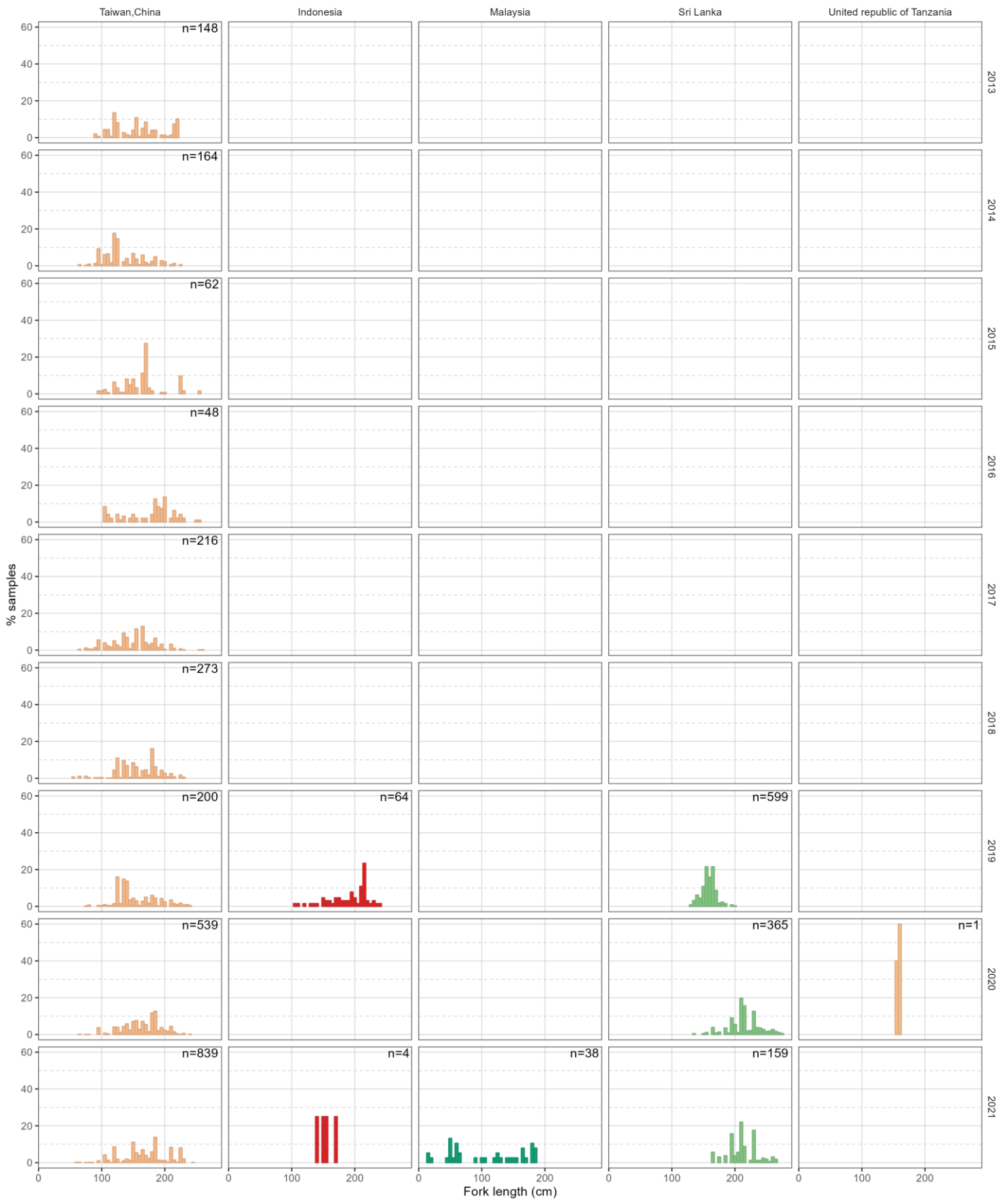


Figure 33: Relative size distribution of Indo-Pacific sailfish (fork length; cm) recorded for fresh longline fisheries by year and main fleet. Data source: [standardized size-frequency dataset](#)

Gillnet fisheries

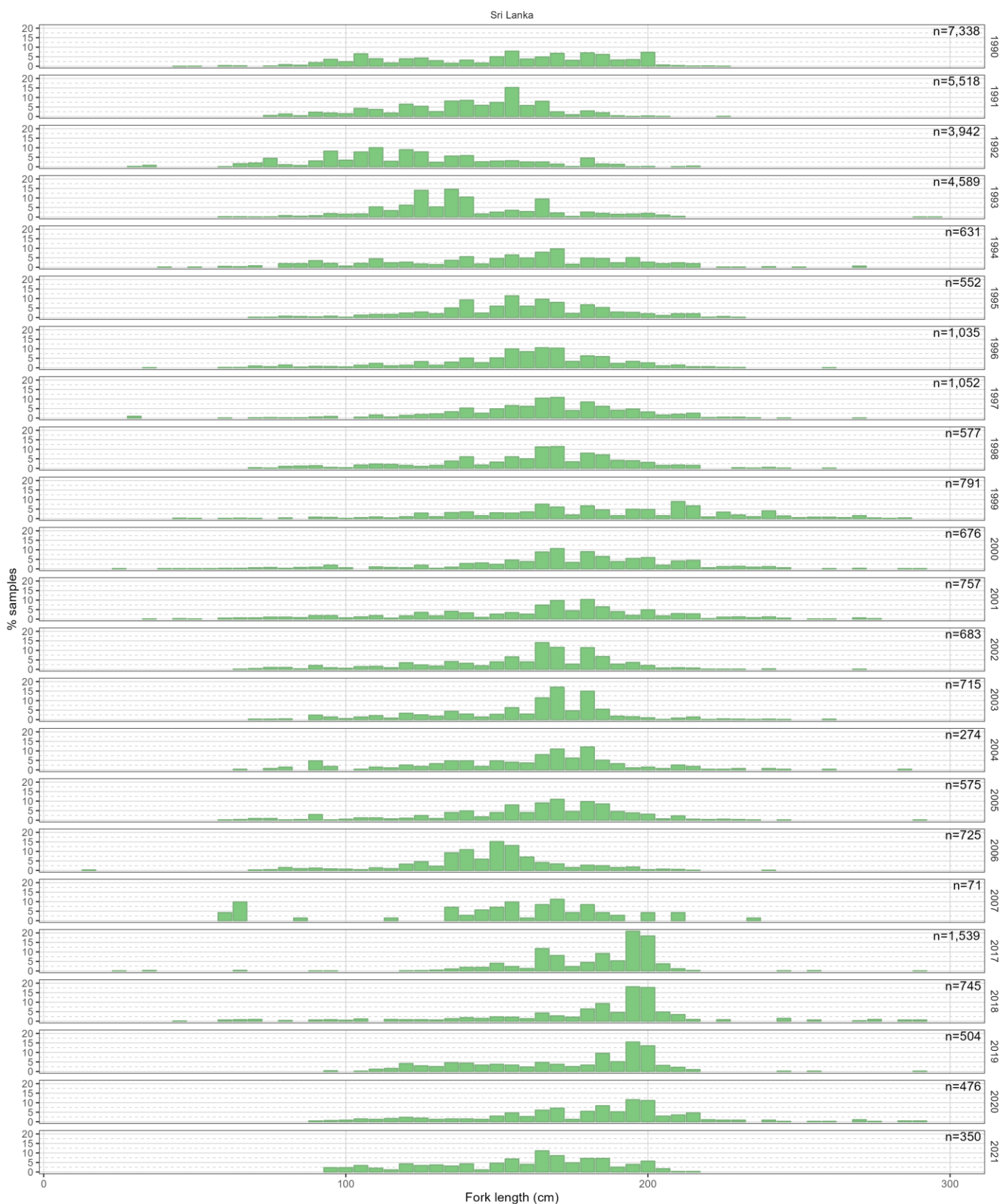


Figure 34: Relative size distribution of Indo-Pacific sailfish (fork length; cm) recorded for gillnet fisheries by year and main fleet. Data source: [standardized size-frequency dataset](#)

Line fisheries

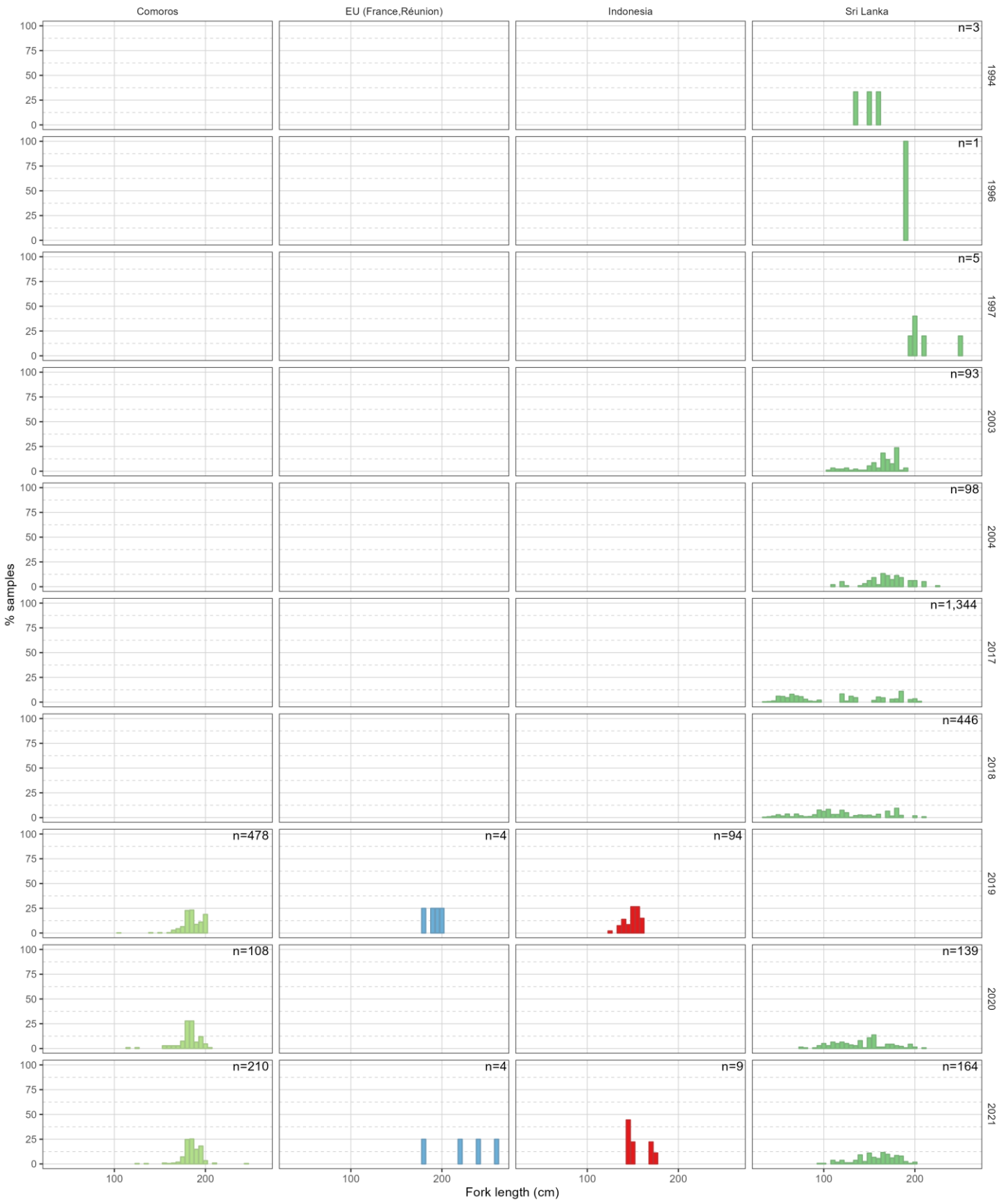


Figure 35: Relative size distribution of Indo-Pacific sailfish (fork length; cm) recorded for line fisheries (coastal longline) by year and main fleet. Data source: [standardized size-frequency dataset](#)

Uncertainties in size-frequency data

Size-frequency data are characterized by the lowest quality among the primary data sets that have to be reported to the Secretariat. As previously indicated (see section [Size composition of the catch](#)) few size data are available for Indo-

Pacific sailfish overall, and while retained catch data are already available since the mid-1950s size-frequency data have only become available from the 1970s for industrial longline fisheries.

Contrarily to what happens in the case of other billfish species, the increase in longline fishing activities from the 1980s did not result in an increase in sampling of size data for Indo-Pacific sailfish, which in the period 1988-2006 was mostly measured in the context of gillnet fisheries initially under the supervision of the IPTP sampling programme. Notwithstanding this, the overall quality of size-frequency data recorded for Indo-Pacific sailfish by the gillnet fisheries operating in this period is still low due to the non-standard reporting of the spatial information for the samples, which is an issue also affecting the overall quality of longline fisheries sampling data at the beginning of the available time series.

The quality of size data from industrial fisheries further declined between 1990 and 2007 when some fleets stopped collecting size data, and in particular some non reporting fleets or fleets operating with both fresh and deep-freezing longline vessels (Fig. 36).

Overall, there is little-to-no size-frequency sample of Indo-Pacific sailfish that is deemed to be of good quality until 2007, when strata covering around 10% of total reported catches for the species begun to be sampled regularly and according to IOTC standards (Fig. 36b). In recent years, Sri Lanka, Indonesia and Reunion improved the quality of the size-frequency data submitted to the Secretariat, as did some industrial longline fisheries that benefited from on-board scientific observers to collect samples of the species (e.g., Taiwan,China).

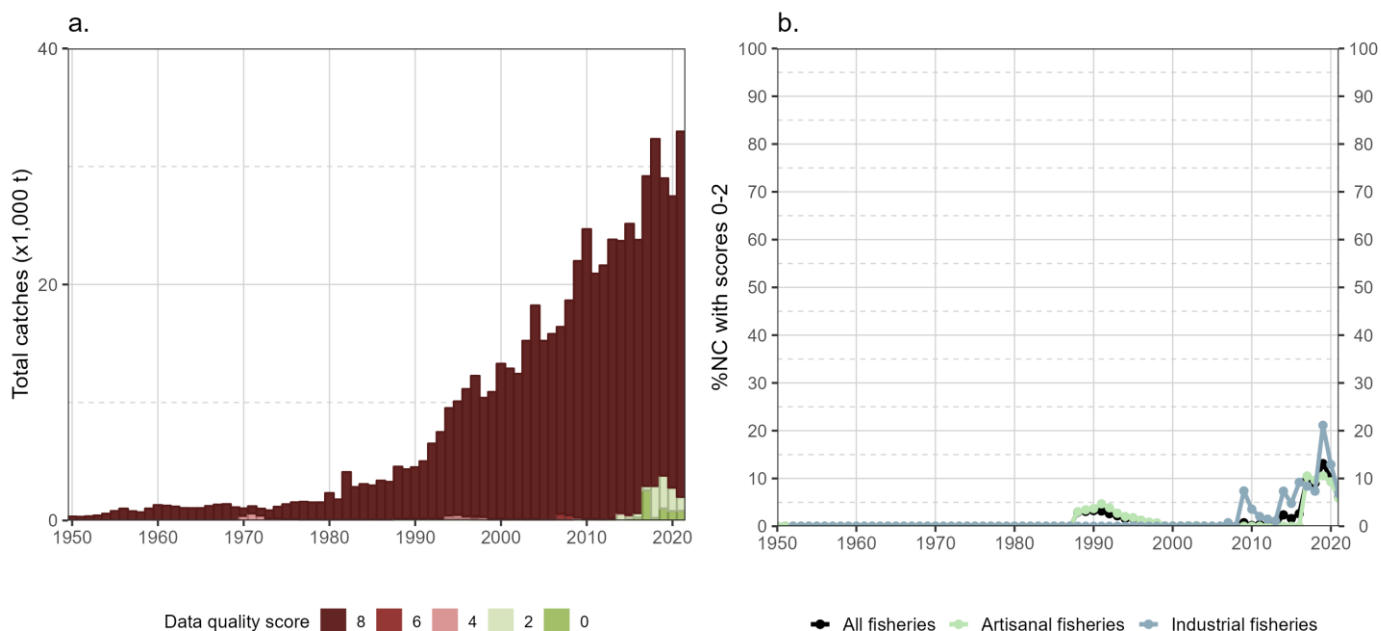


Figure 36: (a) Annual retained catches (metric tonnes; t) of Indo-Pacific sailfish estimated by quality score and percentage of total retained catches for which geo-referenced size-frequency data were reported to the IOTC Secretariat in agreement with the requirements of Res. 15/02 (lines with dots) for all fisheries and by type of fishery in the period 1950–2021

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Appendices

Appendix I: Taxonomy

Rank	Taxon
Kingdom	<i>Animalia</i>
Subkingdom	<i>Bilateria</i>
Infrakingdom	<i>Deuterostomia</i>
Phylum	<i>Chordata</i>
Subphylum	<i>Vertebrata</i>
Infraphylum	<i>Gnathostomata</i>
Superclass	<i>Actinopterygii</i>
Class	<i>Teleostei</i>
Superorder	<i>Acanthopterygii</i>
Order	<i>Perciformes</i>
Suborder	<i>Xiphoidei</i>
Family	<i>Istiophoridae</i>
Genus	<i>Istiophorus</i>
Species	<i>Istiophorus platypterus</i>

Appendix II: Changes in best scientific estimates of retained catches from previous WPB

Estimates of retained catches available for Indo-Pacific sailfish at the 21st session of the Working Party on Billfish (WPB21) show small changes relative to the time series available at the WPB20 as only minimal updates to past data occurred in the meantime. In particular, (i) I.R. Iran updated their historical (2011-2020) time series of catches for all fisheries (coastal, offshore); (ii) Indonesia 2017 total catch were re-estimated to match the total reported catches; (iii) Pakistan, Jordan and United Arab Emirates, reflect the consequence of new data affecting the results of catch disaggregation for IOTC species aggregates (e.g., BILL) regularly performed by the IOTC Secretariat as part of the process producing the IOTC best scientific estimates; and (iv) updates of Kenya catches for the fisheries based on data new available (**Table 4**).

Table 4: Changes in best scientific estimates of annual retained catches (metric tonnes; t) of Indo-Pacific sailfish by year, fleet, fishery group and main Indian Ocean area between 2017 and 2020, limited to absolute values higher than 10 t

Year	Fleet	Fishery group	Area	Current (t)	Previous (t)	Difference (t)
2020	ARE	Gillnet	Western Indian Ocean	43	61	-18
	IRN	Gillnet	Western Indian Ocean	11,919	11,798	121
		Line	Western Indian Ocean	2,142	1,071	1,071
	JOR	Gillnet	Western Indian Ocean	23	0	23
	KEN	Gillnet	Western Indian Ocean	58	121	-62
		Line	Western Indian Ocean	65	305	-241
2019	ARE	Gillnet	Western Indian Ocean	49	61	-12
	IRN	Gillnet	Western Indian Ocean	8,314	8,562	-248
		Line	Western Indian Ocean	499	82	418
	JOR	Gillnet	Western Indian Ocean	31	0	30
	JPN	Longline	Western Indian Ocean	33	48	-15
2018	ARE	Gillnet	Western Indian Ocean	43	61	-18
	IRN	Gillnet	Western Indian Ocean	11,710	11,604	107
	JOR	Gillnet	Western Indian Ocean	45	0	45
2017	IDN	Gillnet	Eastern Indian Ocean	486	390	97
		Line	Eastern Indian Ocean	572	458	114
		Purse seine	Eastern Indian Ocean	207	166	41
	IRN	Gillnet	Western Indian Ocean	11,423	11,487	-64
	JOR	Gillnet	Western Indian Ocean	44	0	43
	PAK	Gillnet	Western Indian Ocean	2,177	2,229	-53