



REVIEW OF THE STATISTICAL DATA AVAILABLE FOR INDIAN OCEAN BLACK MARLIN (1950-2021)

Author: [IOTC Secretariat](#)

Abstract

The document provides an overview of the consolidated knowledge about fisheries catching black marlin (*Istiompax indica*) 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 show a major decline in black marlin catch since the mid-2010s after an increasing trend over several decades. While catches were mostly reported for industrial longline fisheries prior to the 1980s, the contribution of coastal fisheries has steadily increased since then to represent more than 63% of the total black marlin catch in 2021. The recent decline in total catch is explained by the decrease in catch from large-scale longline fisheries which started since 2008 combined with the reduction in catches from small longline fisheries from Sri Lanka and India. Information available on discarding practices of black marlin in industrial fisheries indicates that discard levels are small in longline fisheries while black marlins are more often discarded in large-scale purse seine fisheries, although in small quantities. Discarding in coastal fisheries interacting with the species is poorly known but considered to be negligible. Information available on the spatial distribution of catch and effort has substantially improved over the last decade and shows that black marlins are mostly caught in the northwestern part of the Indian Ocean, with important catches reported along the coasts of the Arabian Sea, India, and Sri Lanka. The reporting of size-frequency data has slightly improved over the last decade but remains very limited for most artisanal and industrial fisheries.

Keywords: billfish | black marlin | Indian Ocean | tuna fisheries

Introduction

Black marlin (*Istiompax indica*) is a species of marlin that occurs in tropical and subtropical waters throughout the Pacific and Indian Oceans. Information available from tuna Regional Fisheries Management Organisations (tRFMOs) shows a steady increasing trend of the global black marlin catch between the mid-1970s and 2016 when it reached a maximum reported value of about 24,000 t (Fig. 1a). Since then, catches substantially declined and amounted to around 16,000 t in 2021. The Indian Ocean represents the main fishing grounds of black marlin and contributed to 86% of the global catch in recent years (Fig. 1b).

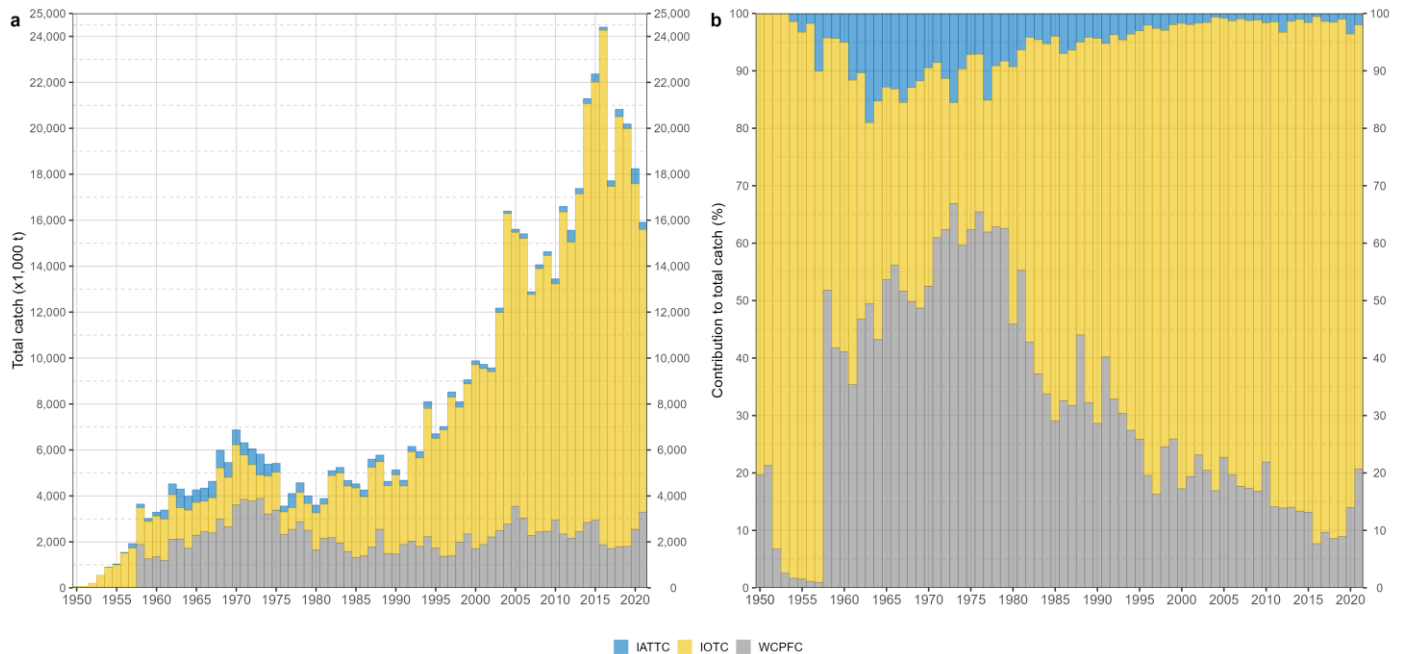


Figure 1: Annual time series of cumulative retained catches (metric tonnes; t) of black marlin by tuna Regional Fisheries Management Organisation for the period 1950-2021. IATTC = [Inter-American Tropical Tuna Commission](#); IOTC = [Indian Ocean Tuna Commission](#); WCPFC = [Western & Central Pacific Fisheries Commission](#). Source: [Global Tuna Atlas](#)

The overarching objective of this paper is to provide participants at the data preparatory meeting of the 21st Session of the IOTC Working Party on Billfish ([WPB21](#)) with a review of the status of the information available on black marlin, in the Indian Ocean through 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)

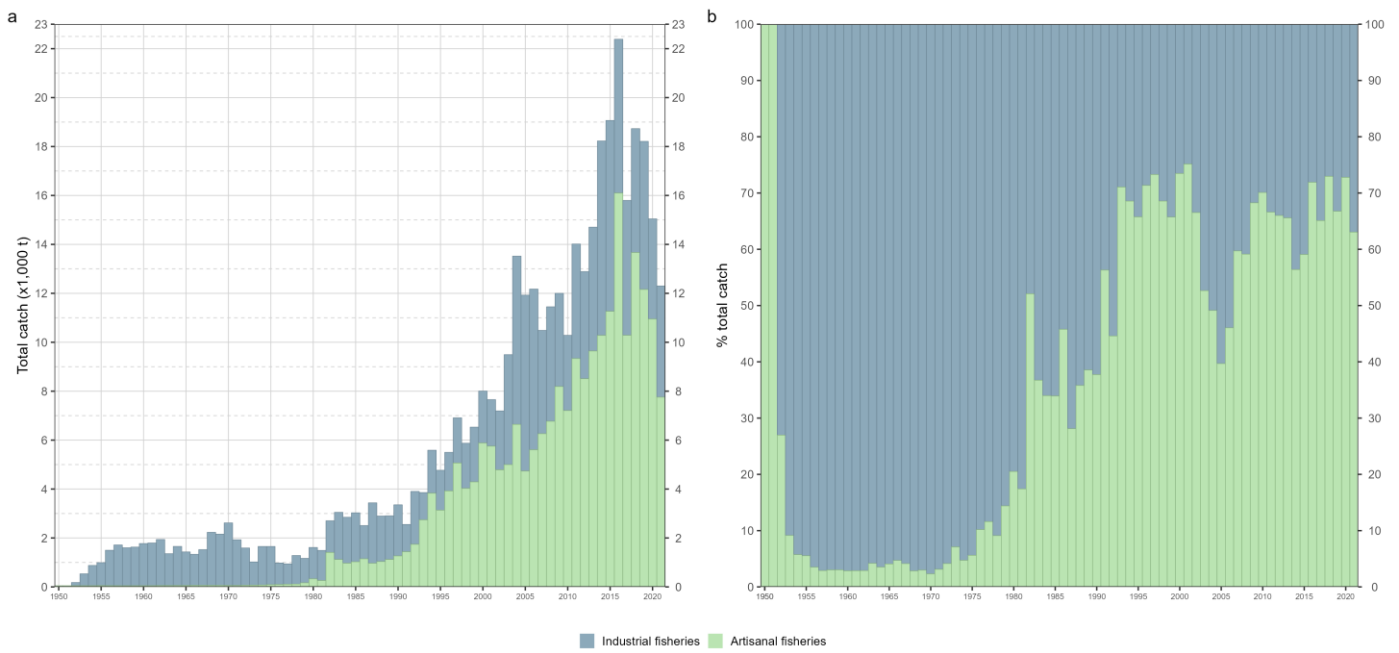


Figure 2: Annual time series of cumulative retained absolute (a) and relative (b) catches (metric tonnes; t) of black marlin by type of fishery for the period 1950-2021. Data source: [best scientific estimates of retained catches](#)

Table 1: Best scientific estimates of average annual retained catches (metric tonnes; t) of black marlin 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 | 4 | 65 | 96 | 193 | 477 |
| Longline Other | 0 | 0 | 0 | 30 | 866 | 1,809 | 692 |
| Longline Fresh | 0 | 0 | 24 | 55 | 596 | 1,236 | 1,165 |
| Longline Deep-freezing | 862 | 1,661 | 1,367 | 1,650 | 954 | 724 | 842 |
| Line Coastal longline | 16 | 15 | 21 | 163 | 302 | 705 | 3,577 |
| Line Trolling | 8 | 11 | 20 | 25 | 59 | 120 | 332 |
| Line Handline | 1 | 1 | 1 | 259 | 361 | 198 | 539 |
| Baitboat | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Gillnet | 26 | 31 | 44 | 368 | 1,634 | 5,372 | 8,733 |
| Other | 0 | 0 | 2 | 32 | 17 | 33 | 73 |
| Total | 912 | 1,719 | 1,483 | 2,648 | 4,884 | 10,390 | 16,431 |

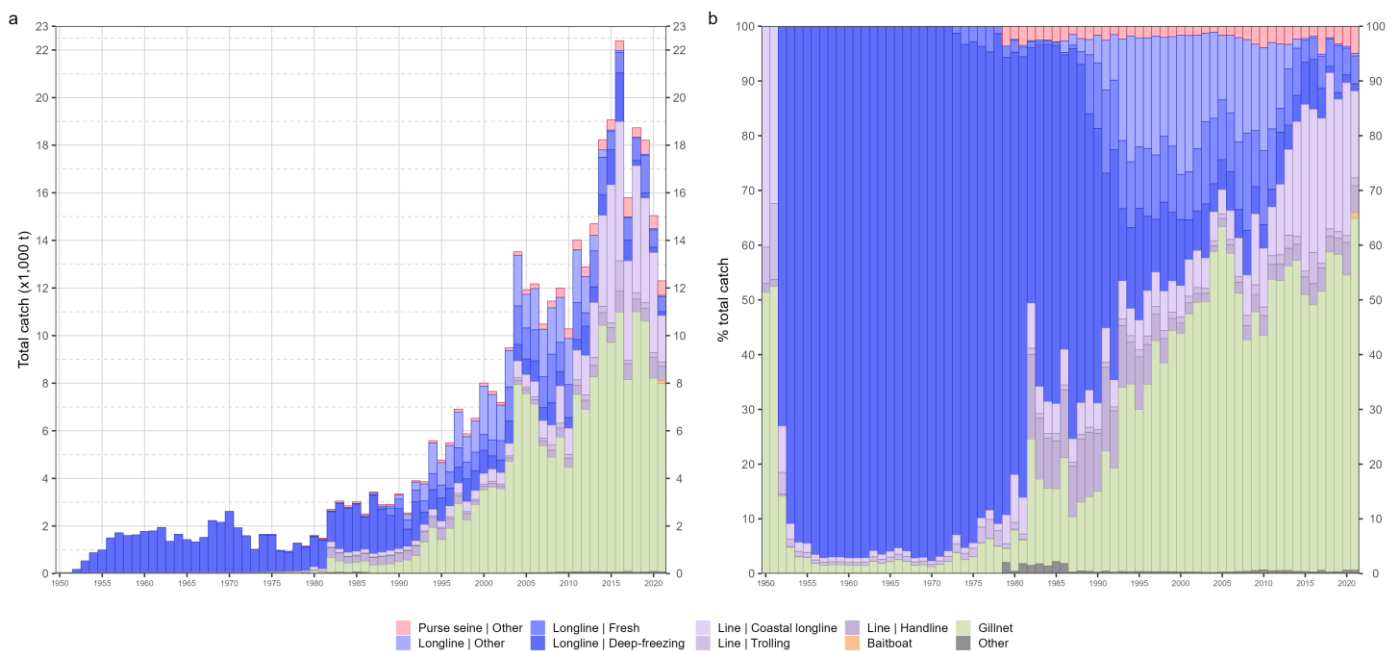


Figure 3: Annual time series of cumulative retained absolute (a) and relative (b) catches (metric tonnes; t) of black marlin by fishery for the period 1950-2021. Data source: [best scientific estimates of retained catches](#)

Table 2: Best scientific estimates of annual retained catches (metric tonnes; t) of black marlin 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 | 416 | 486 | 428 | 429 | 406 | 806 | 393 | 589 | 555 | 611 |
| Longline Other | 1,516 | 661 | 304 | 60 | 73 | 55 | 48 | 54 | 50 | 57 |
| Longline Fresh | 562 | 1,510 | 1,572 | 770 | 874 | 932 | 932 | 1,566 | 730 | 627 |

| Fishery | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|--------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Longline Deep-freezing | 1,223 | 653 | 866 | 1,461 | 2,038 | 858 | 216 | 218 | 215 | 161 |
| Line Coastal longline | 1,666 | 2,307 | 3,830 | 5,809 | 5,857 | 4,191 | 5,347 | 4,406 | 4,201 | 1,954 |
| Line Trolling | 219 | 351 | 263 | 203 | 1,275 | 138 | 261 | 224 | 194 | 174 |
| Line Handline | 387 | 473 | 535 | 615 | 872 | 673 | 530 | 539 | 887 | 597 |
| Baitboat | 0 | 0 | 0 | 6 | 5 | 0 | 1 | 0 | 1 | 140 |
| Gillnet | 6,827 | 8,180 | 10,355 | 9,640 | 10,917 | 8,051 | 10,948 | 10,551 | 8,117 | 7,907 |
| Other | 72 | 84 | 74 | 73 | 69 | 94 | 55 | 64 | 94 | 75 |
| Total | 12,888 | 14,704 | 18,228 | 19,066 | 22,386 | 15,798 | 18,732 | 18,211 | 15,044 | 12,301 |

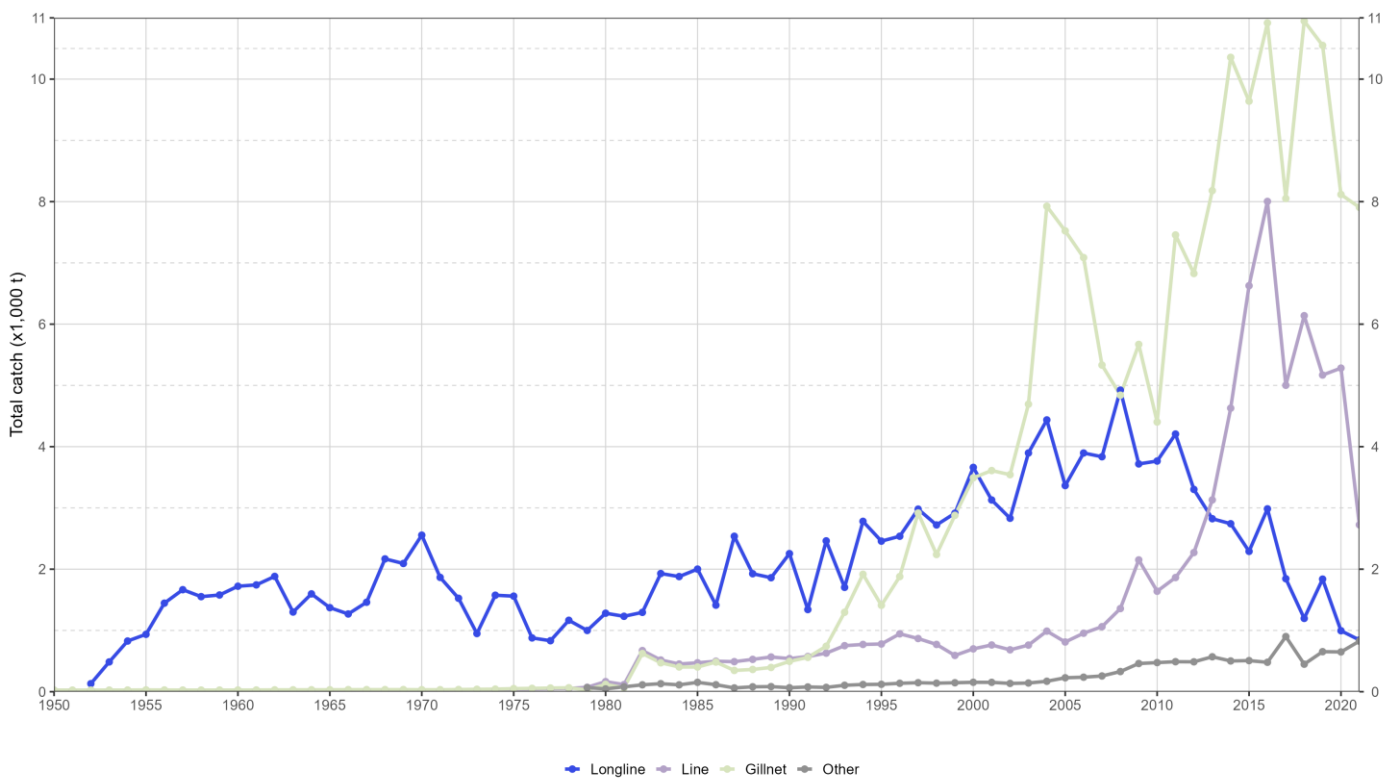


Figure 4: Annual time series of total retained catches (metric tonnes; t) of black marlin by fishery group for the period 1950-2021. Data source: [best scientific estimates of retained catches](#)

Main fishery features (2017-2021)

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

| Fishery | Fishery code | Catch | Percentage |
|--------------------------|--------------|-------|------------|
| Gillnet | GN | 9,115 | 56.9 |
| Line Coastal longline | LIC | 4,020 | 25.1 |
| Longline Fresh | LLF | 957 | 6.0 |
| Line Handline | LIH | 645 | 4.0 |
| Purse seine Other | PSOT | 591 | 3.7 |
| Longline Deep-freezing | LLD | 333 | 2.1 |
| Line Trolling | LIT | 198 | 1.2 |
| Other | OT | 76 | 0.5 |
| Longline Other | LLO | 53 | 0.3 |
| Baitboat | BB | 28 | 0.2 |

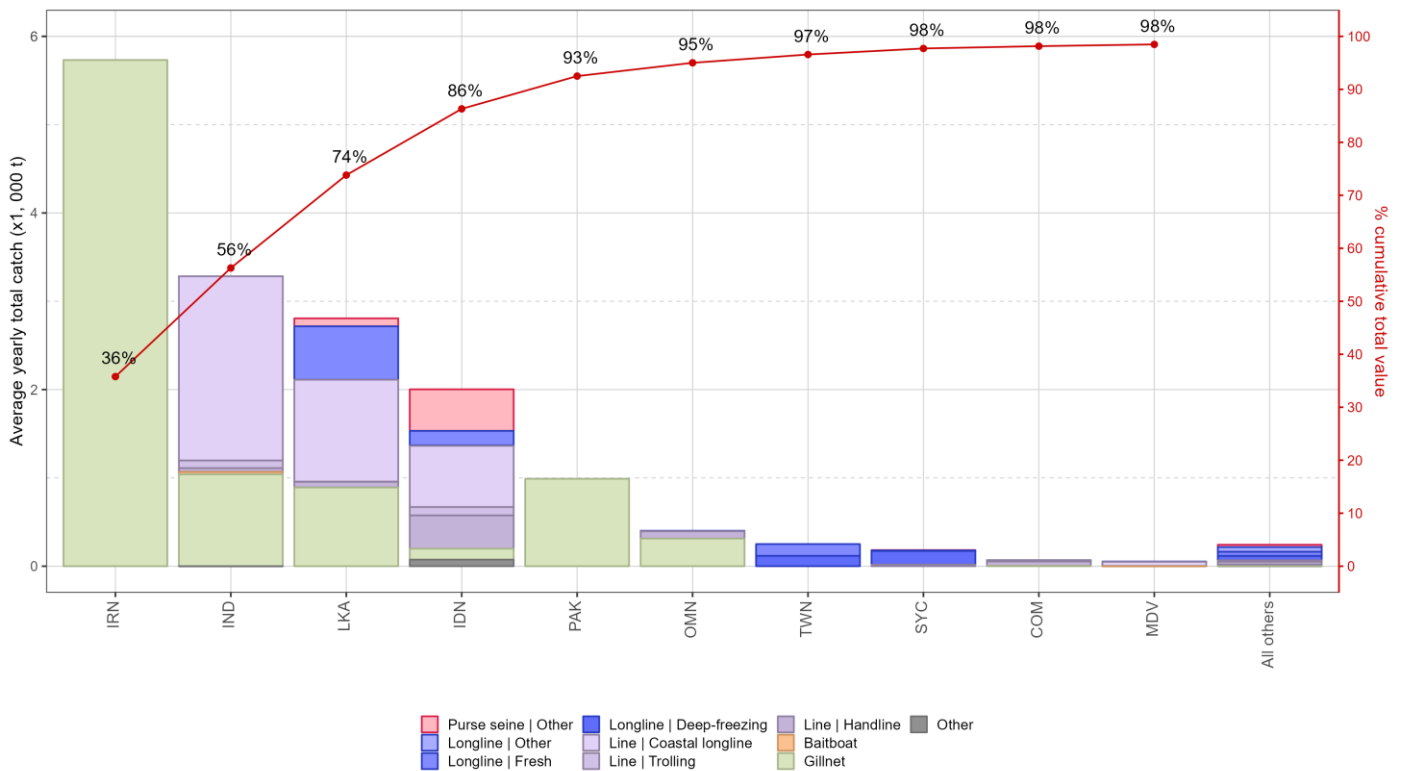


Figure 5: Mean annual catches (metric tonnes; t) of black marlin by fleet and fishery between 2017 and 2021, with indication of cumulative catches by fleet. Data source: [best scientific estimates of retained catches](#)

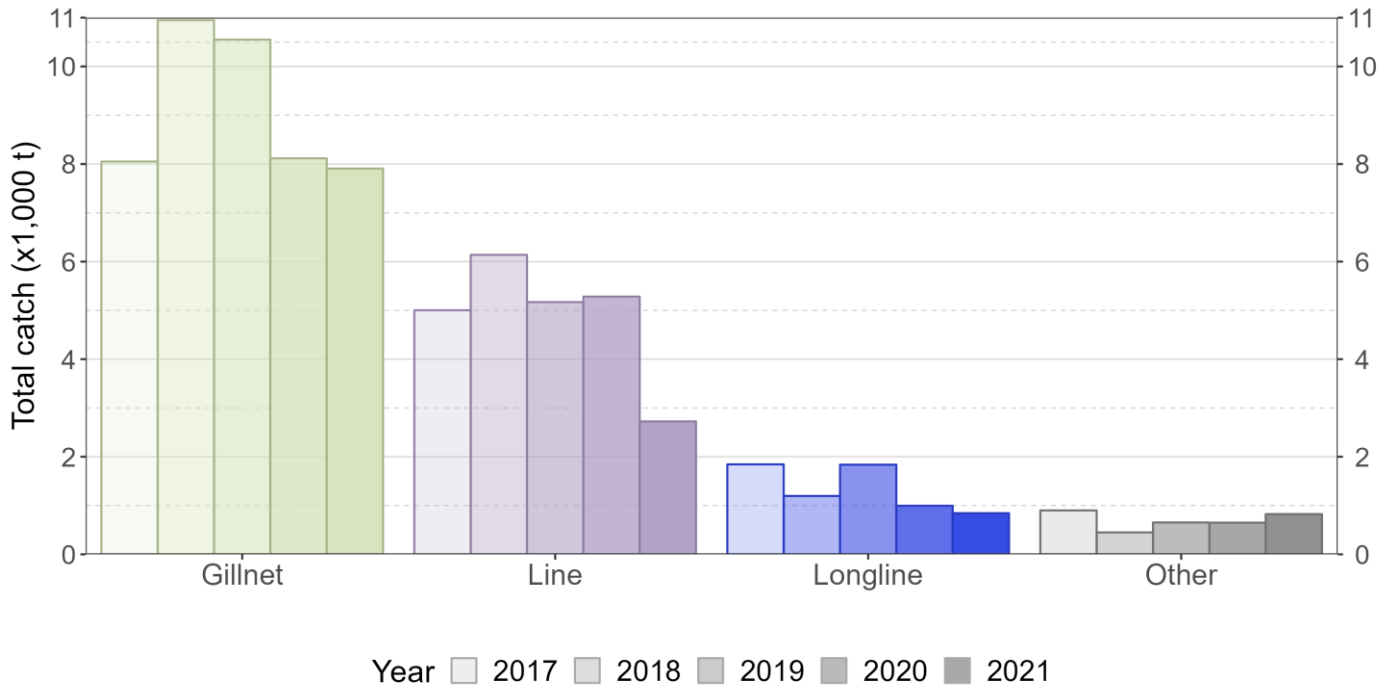


Figure 6: Annual catch (metric tonnes; t) trends of black marlin by fishery group between 2017 and 2021. Data source: [best scientific estimates of retained catches](#)

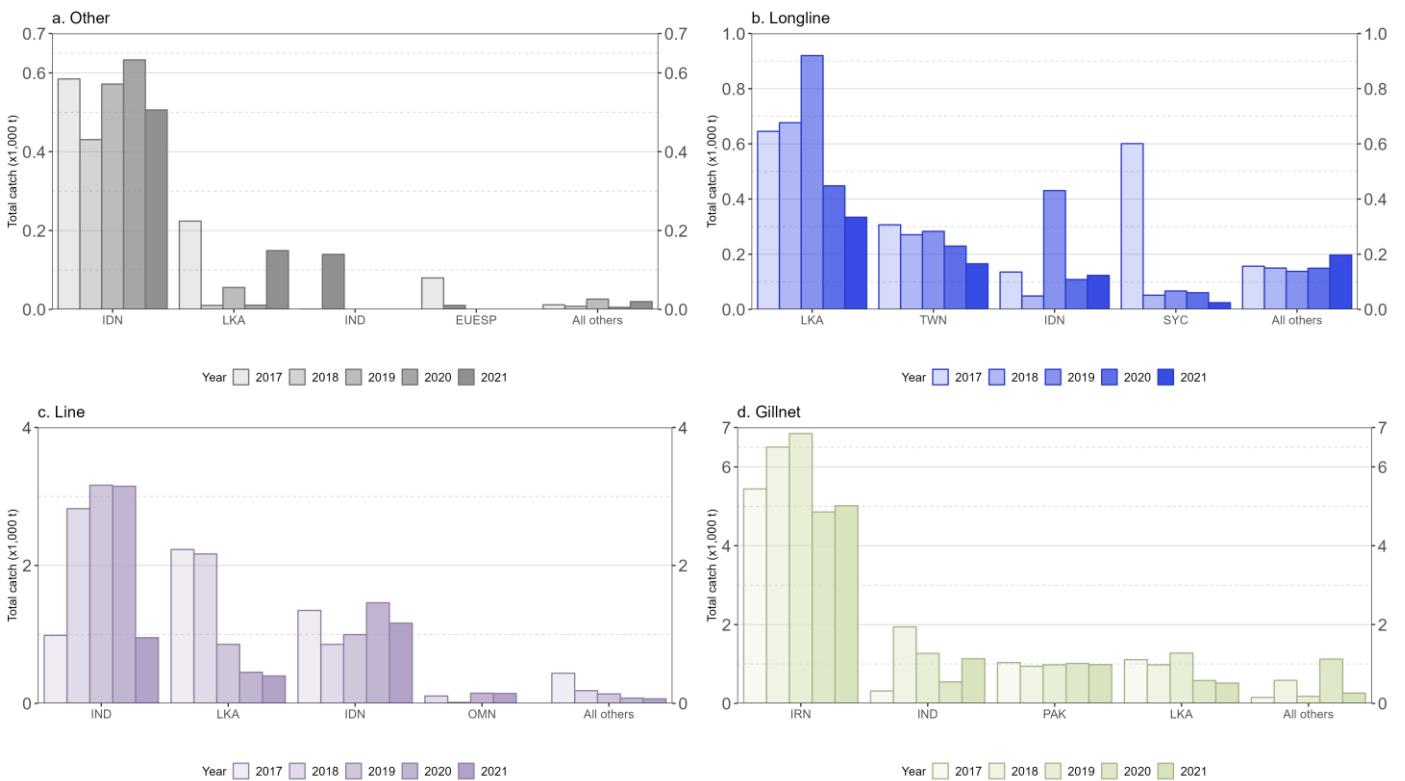


Figure 7: Annual catch (metric tonnes; t) trends of black marlin by fishery group and fleet between 2017 and 2021. Data source: [best scientific estimates of retained catches](#)

Changes from previous WPB

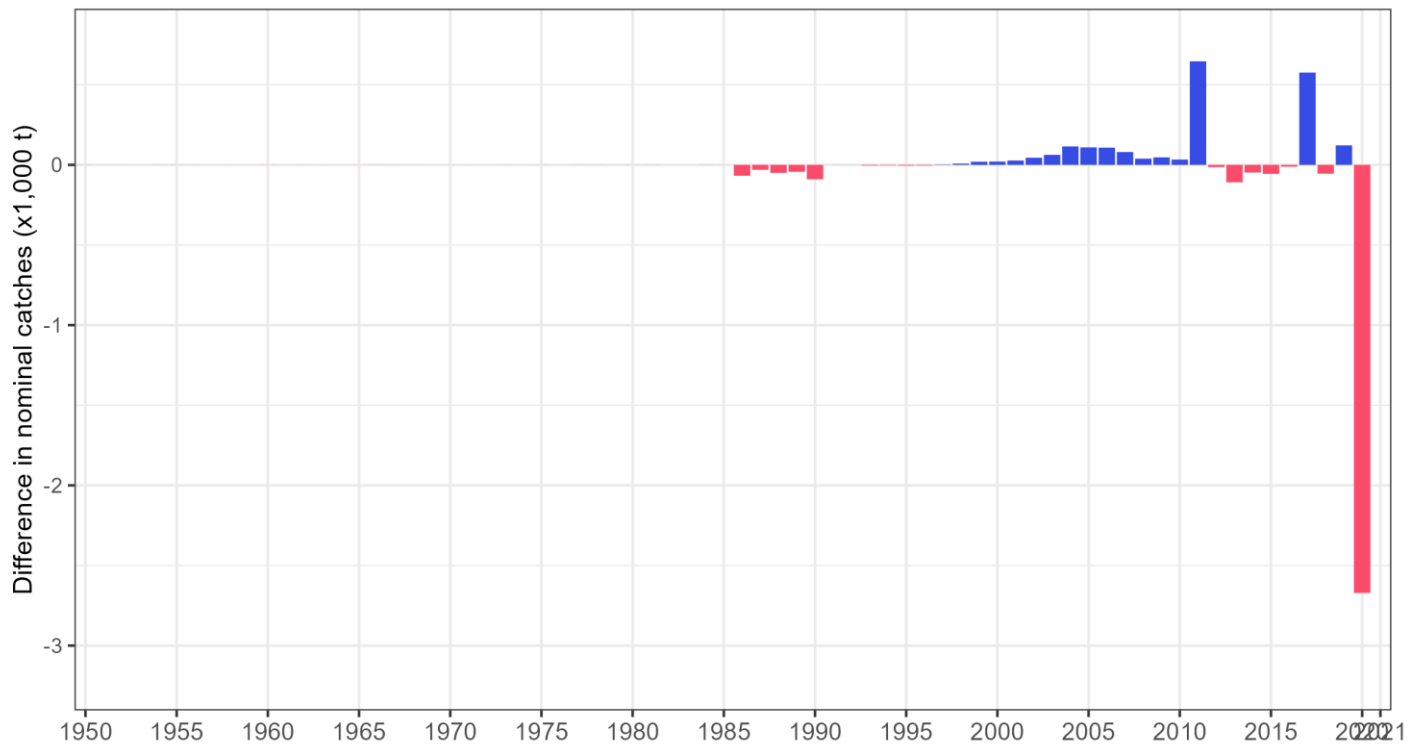


Figure 8: Differences in the available best scientific estimates of retained catches (metric tonnes; t) of black marlin between this WPB and its previous session ([WPB20](#) meeting held in September 2022)

Uncertainties in retained (nominal) catch data

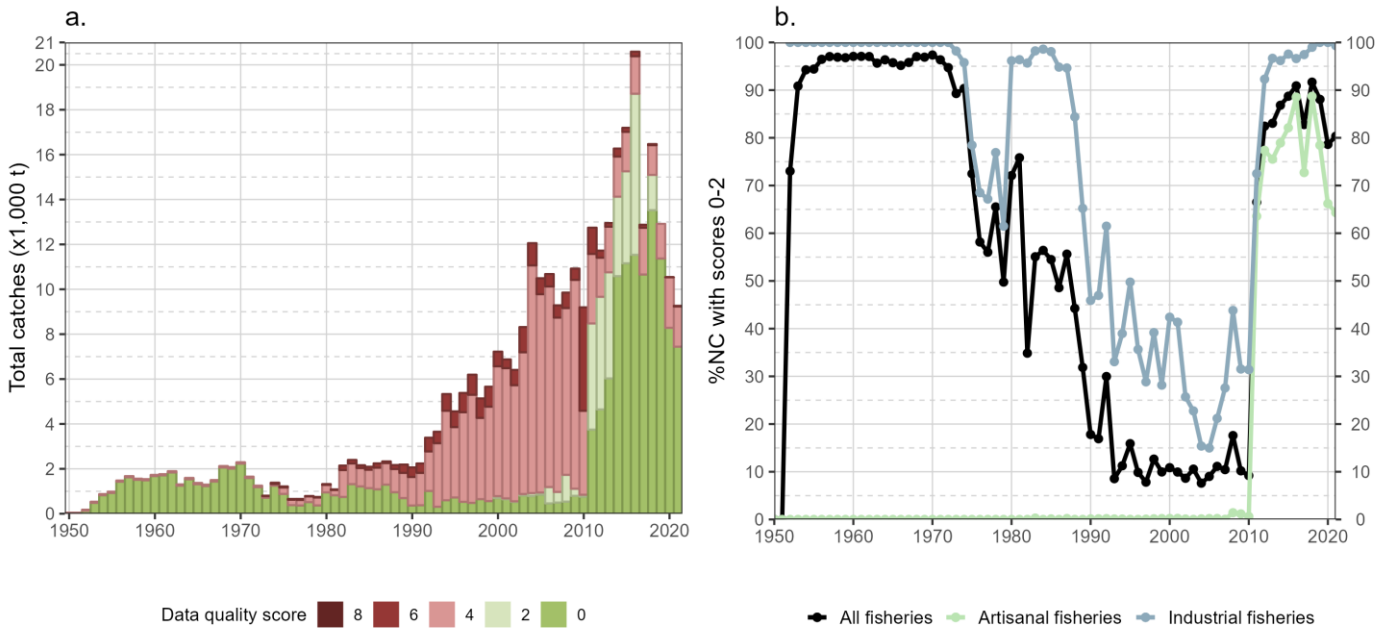


Figure 9: (a) Annual retained catches (metric tonnes; t) of black marlin estimated by quality score and (b) percentage of total retained catches fully or partially reported to the IOTC Secretariat for all fisheries and by type of fishery, in the period 1950-2021

Discard levels

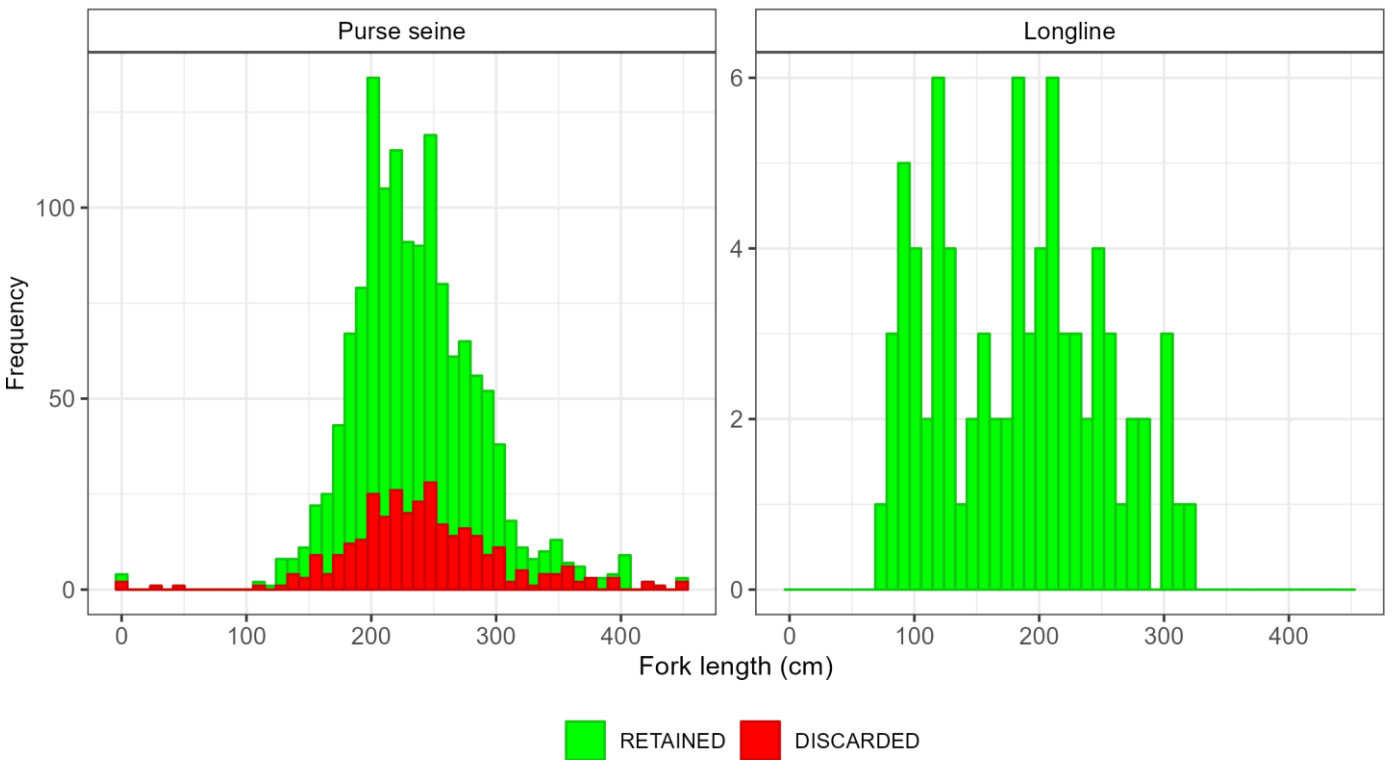


Figure 10: Size (fork length; cm) frequency distribution of black marlin retained and discarded at sea in purse seine and longline fisheries as available in the ROS regional database

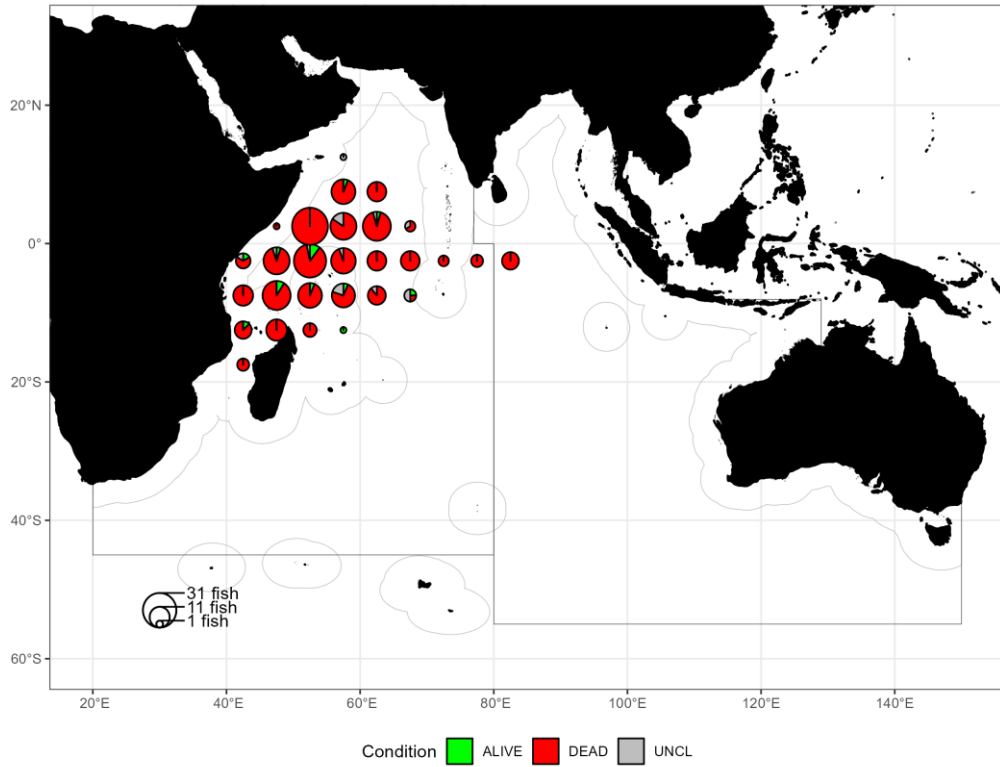


Figure 11: Distribution of black marlins discarded at sea in the western Indian Ocean purse seine fisheries with information on condition at release as available in the ROS regional database

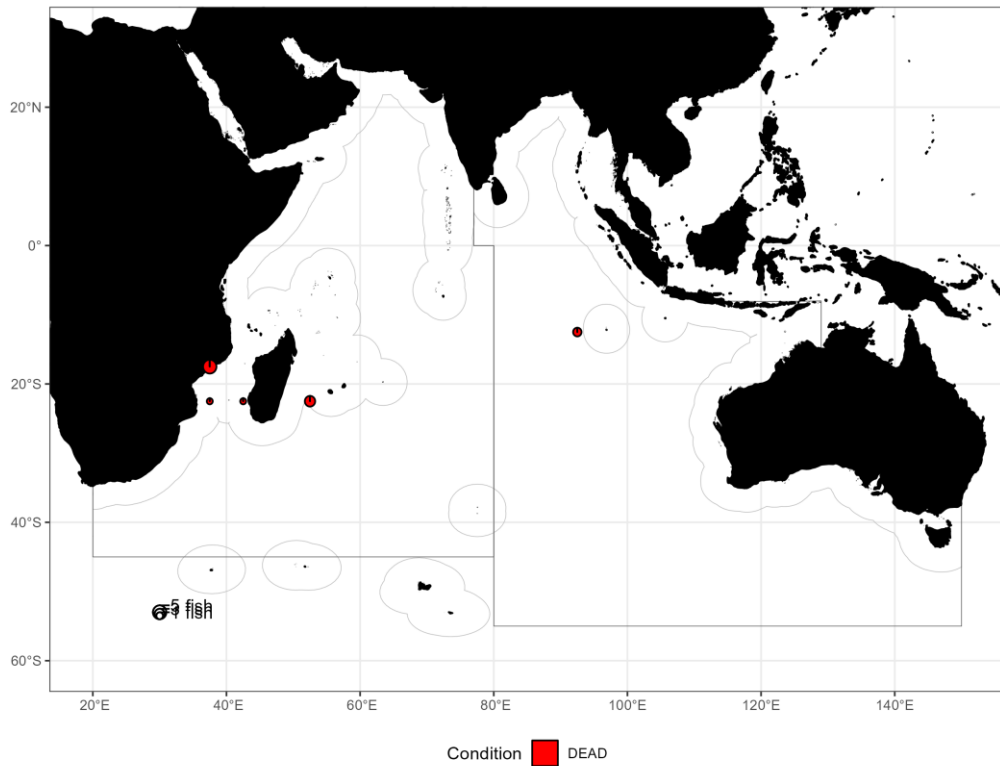


Figure 12: Distribution of black marlins discarded at sea in the Indian Ocean longline fisheries with information on condition at release as available in the ROS regional database

Geo-referenced catch

Spatial distribution of catches

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

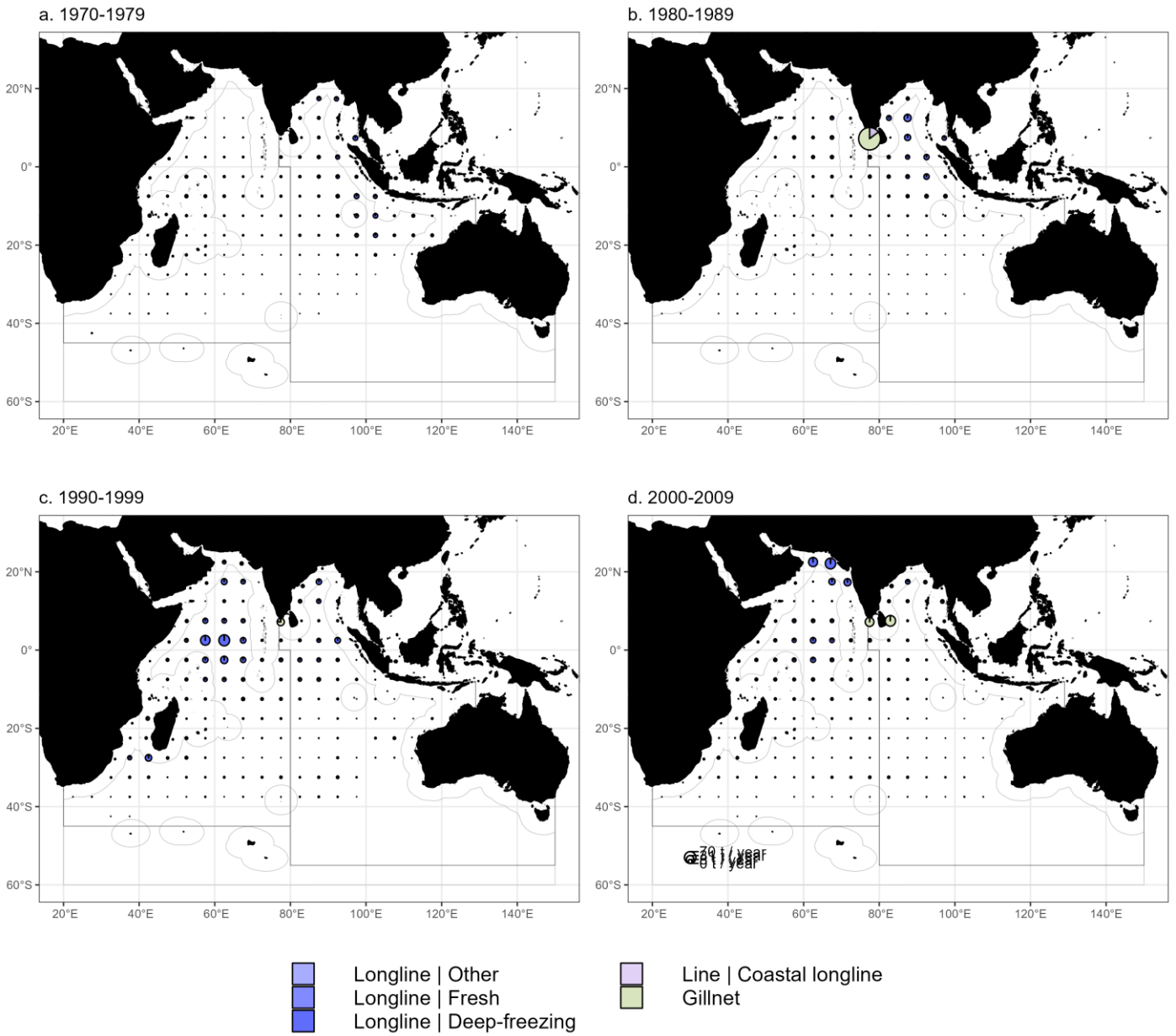


Figure 13: Mean annual time-area catches in weight (metric tonnes; t) of black marlin, by decade, 5x5 grid, and fishery. Data source: [time-area catches](#)

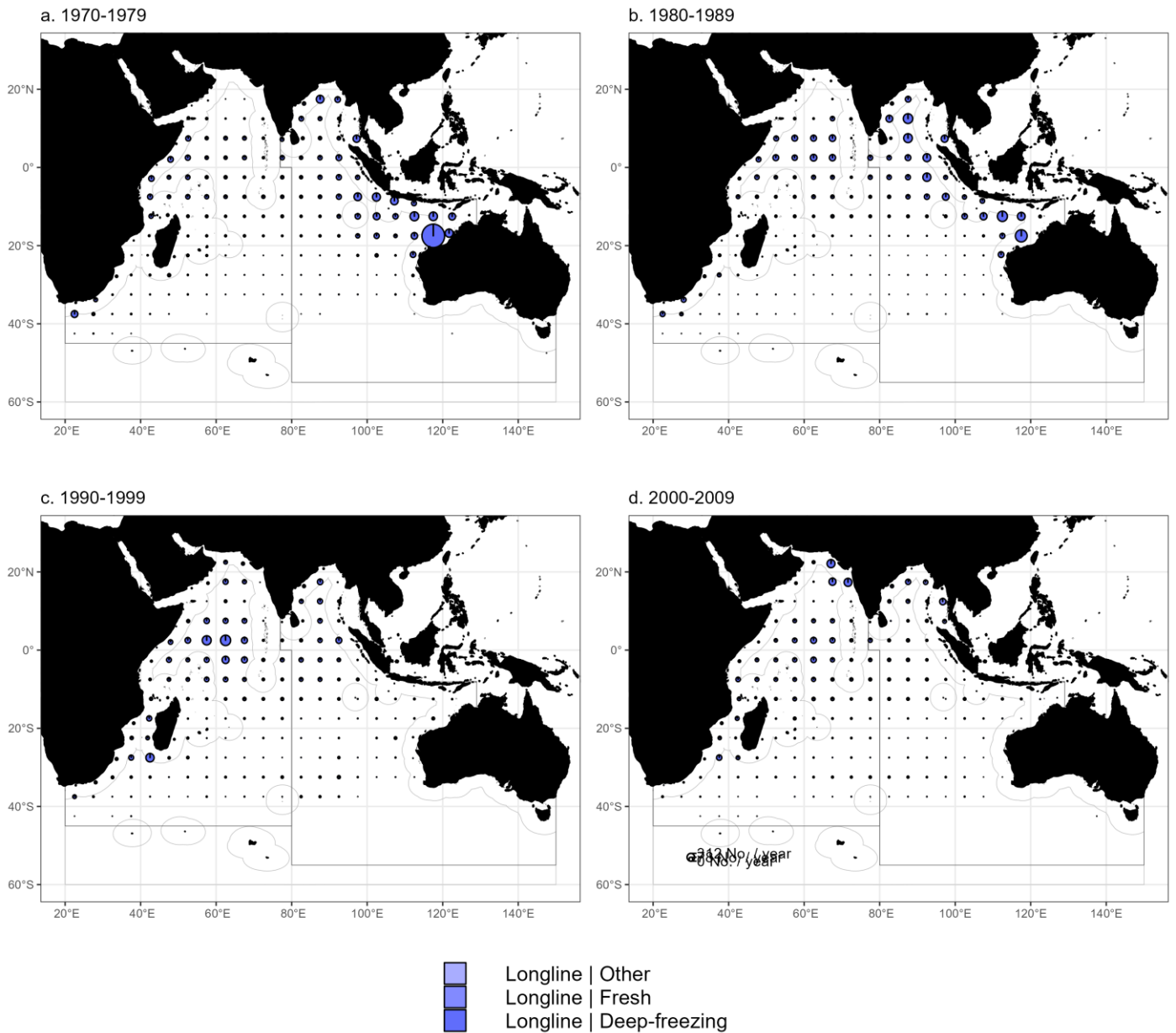


Figure 14: Mean annual time-area catches in numbers of black marlin, by decade, 5x5 grid, and fishery. Data source: [time-area catches](#)

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

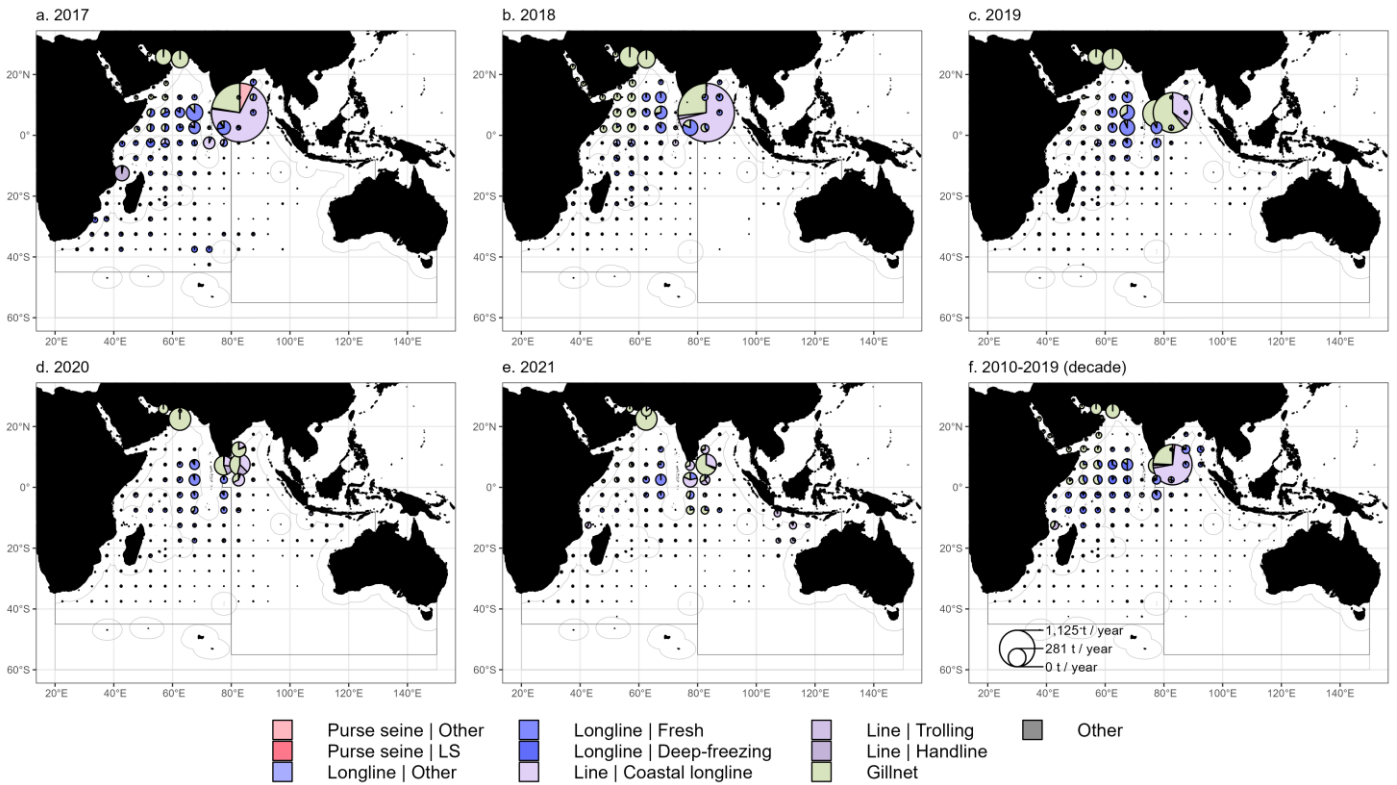


Figure 15: Mean annual time-area catches in weight (metric tonnes; t) of black marlin, by year / decade, 5x5 grid, and fishery. Data source: [time-area catches](#)

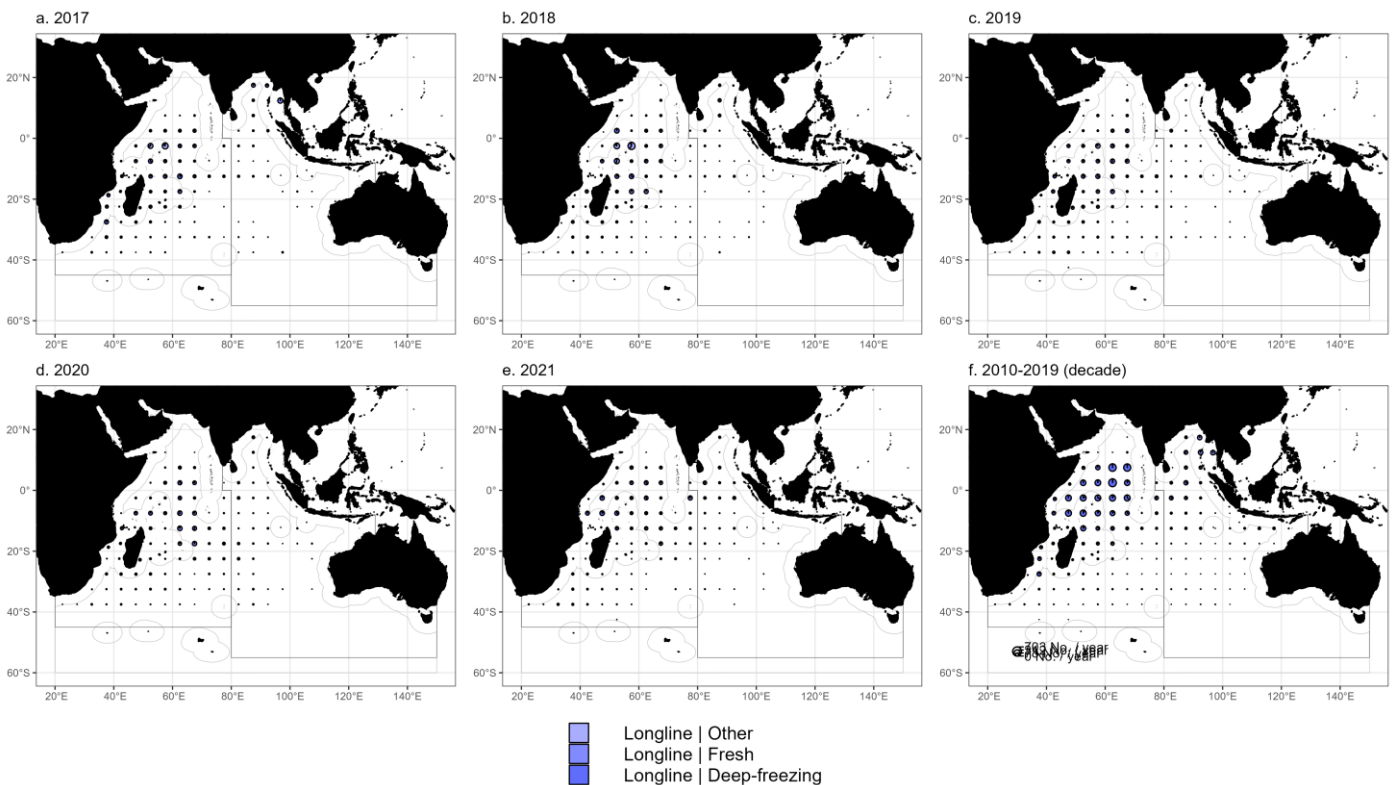


Figure 16: Mean annual time-area catches in numbers of black marlin, by year / decade, 5x5 grid, and fishery. Data source: [time-area catches](#)

Uncertainties in catch and effort data

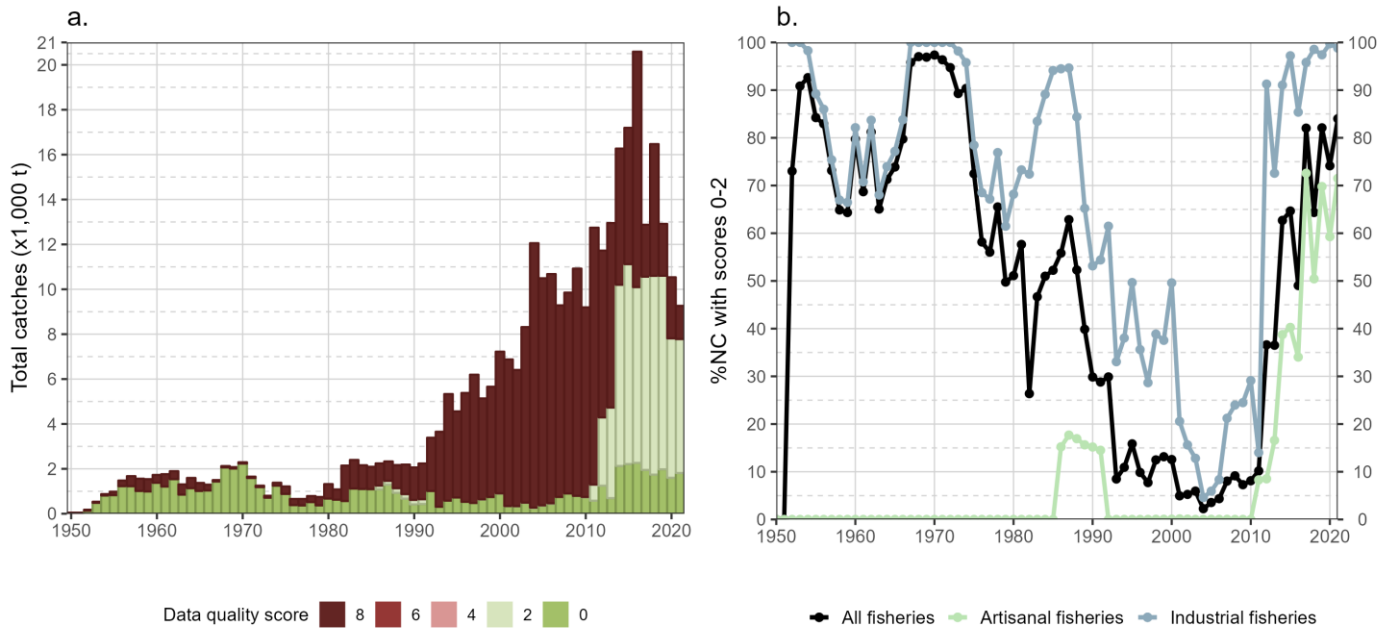


Figure 17: (a) Annual retained catches (metric tonnes; t) of black marlin estimated by quality score and (b) percentage of total retained catch for which geo-referenced catches were reported to the IOTC Secretariat in agreement with the requirements of Res. 15/02 for all fisheries and by type of fishery, in the period 1950-2021

Size composition of the catch

Samples availability

By fishery group

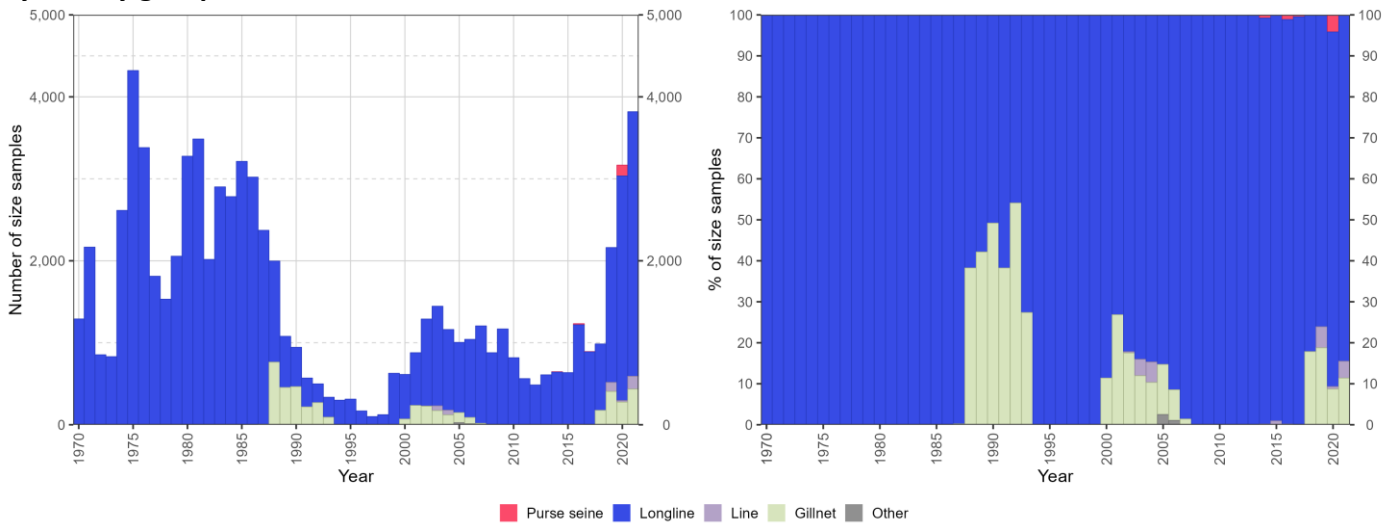


Figure 18: Availability of black marlin size-frequency data as absolute number of samples (left) and relative number of samples (right) per year and fishery group. Data source: [standardized size-frequency dataset](#)

Longline fisheries

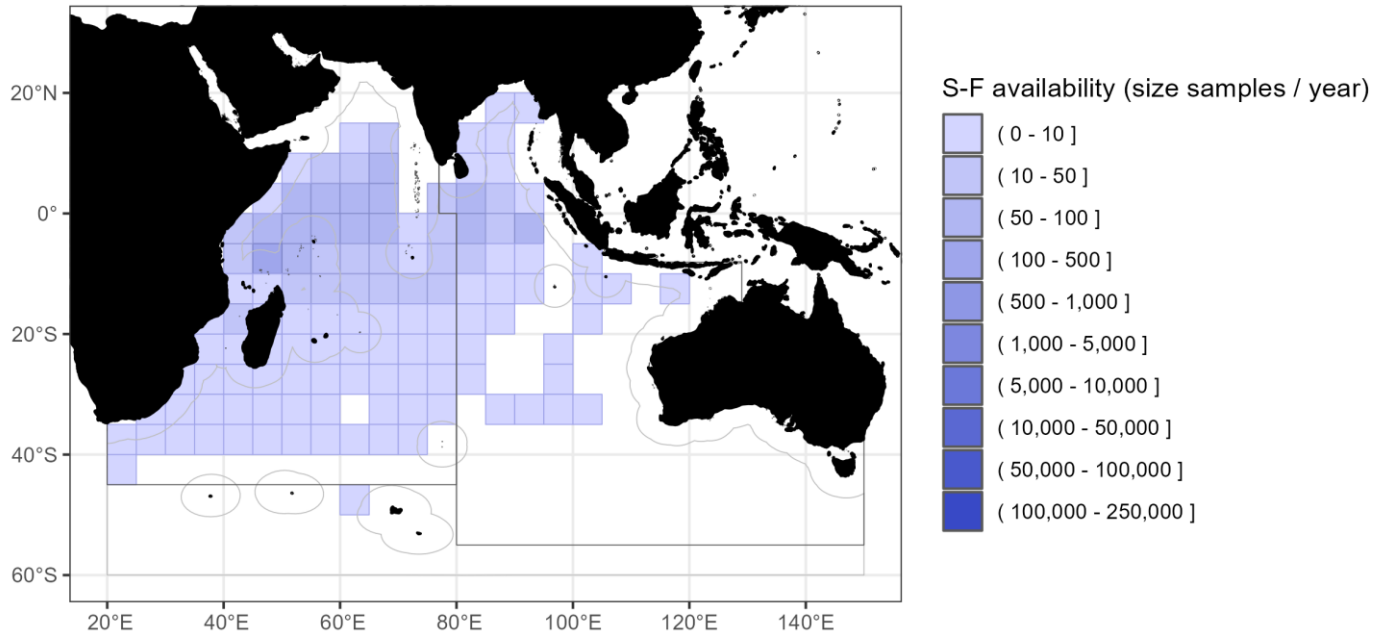


Figure 19: Spatial distribution (average number of samples per grid per year) of available black marlin size-frequency data for longline fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

Gillnet fisheries

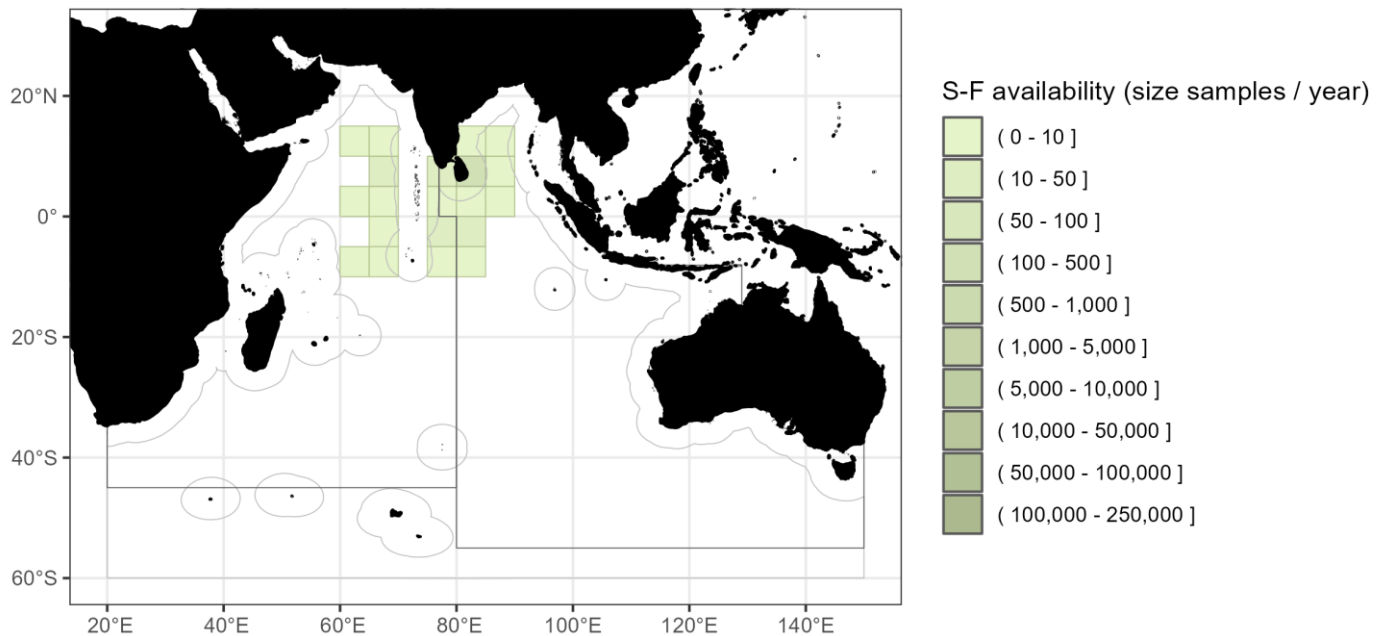


Figure 20: Spatial distribution (average number of samples per grid per year) of available black marlin size-frequency data for gillnet fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

Line fisheries

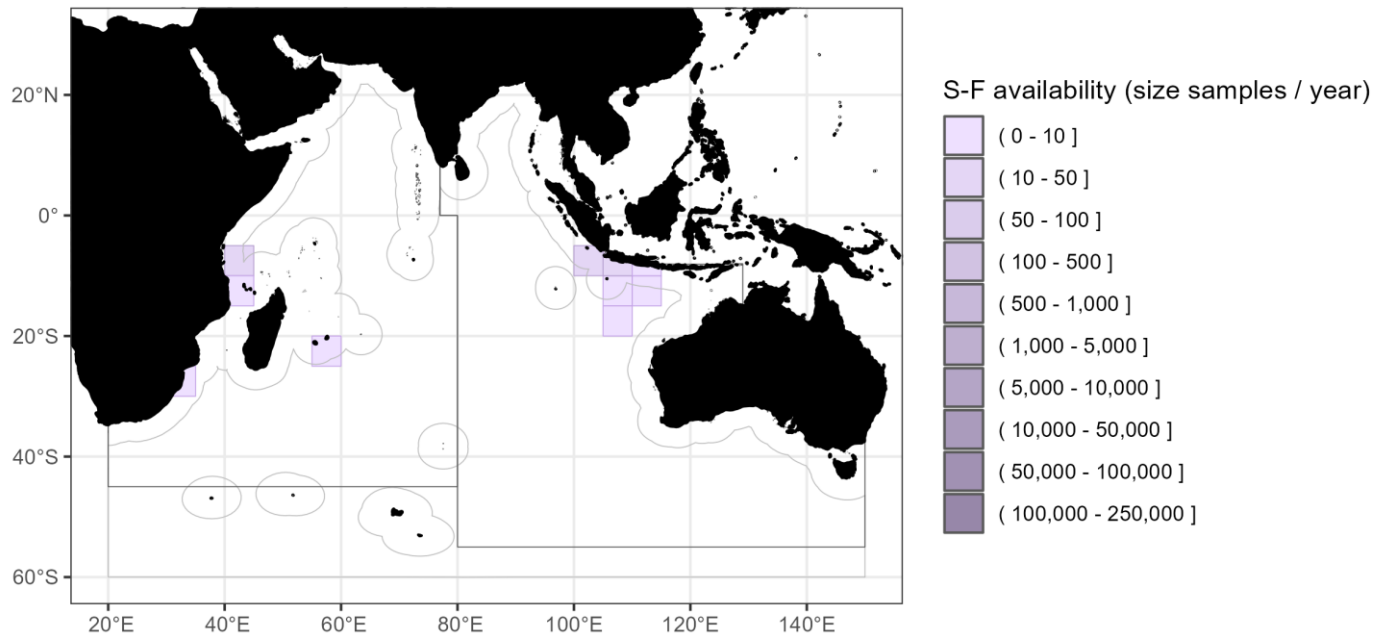


Figure 21: Spatial distribution (average number of samples per grid per year) of available black marlin size-frequency data for line fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

Purse seine fisheries

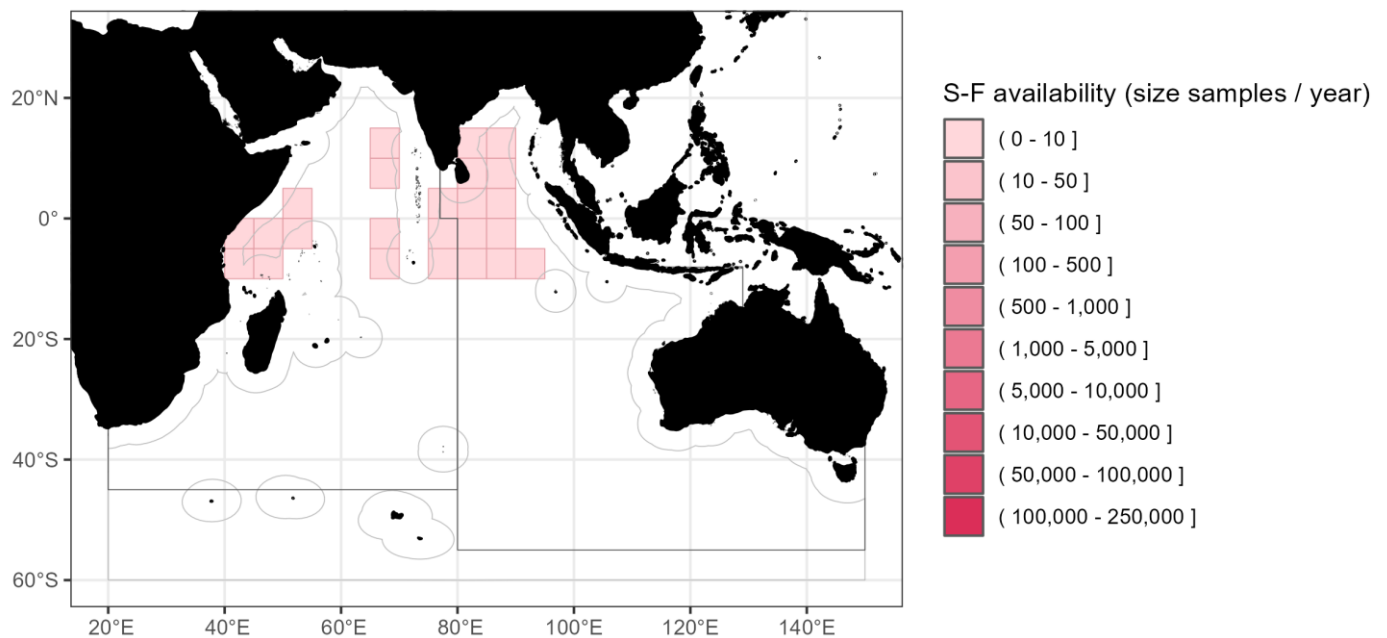


Figure 22: Spatial distribution (average number of samples per grid per year) of available black marlin size-frequency data for purse seine fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

By fishery

Longline fisheries

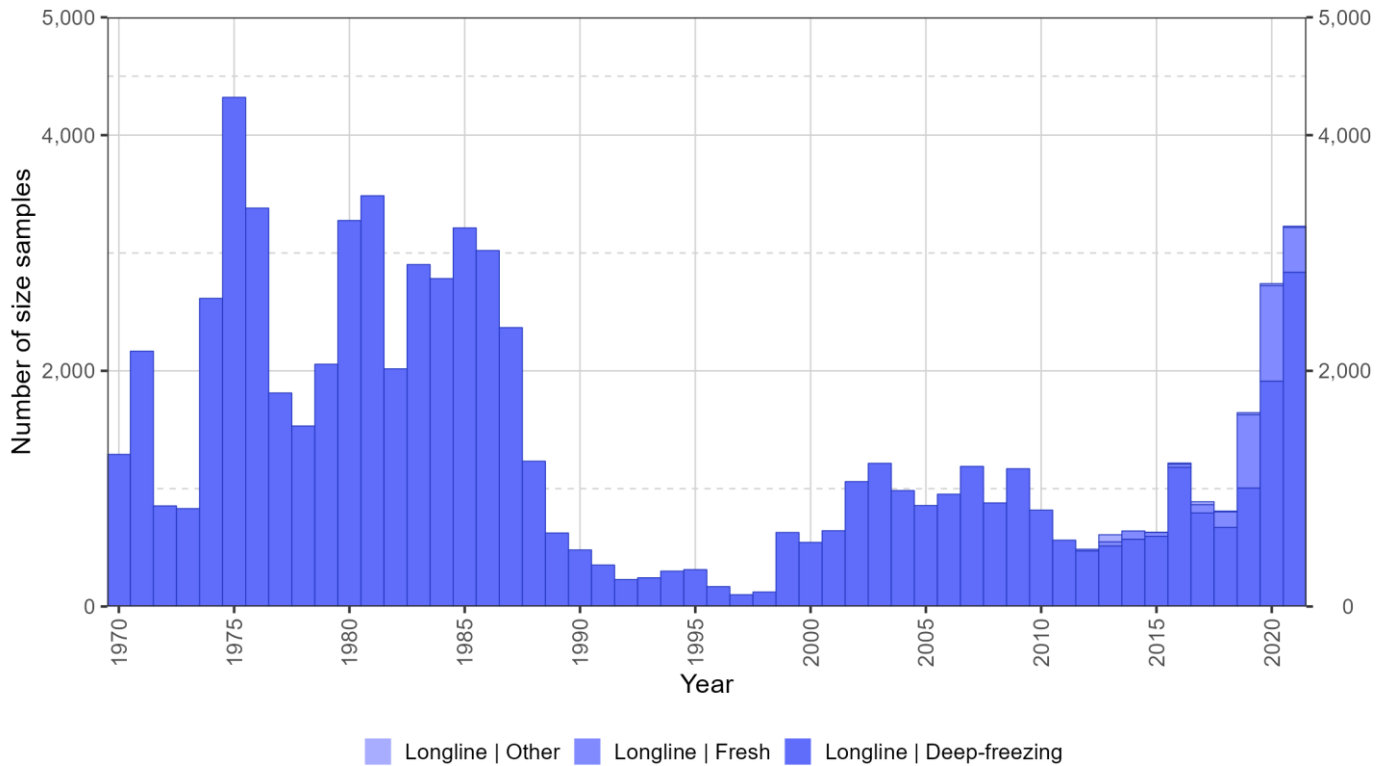


Figure 23: Availability of black marlin size-frequency data as absolute number of samples per year longline fishery. Data source: [standardized size-frequency dataset](#)

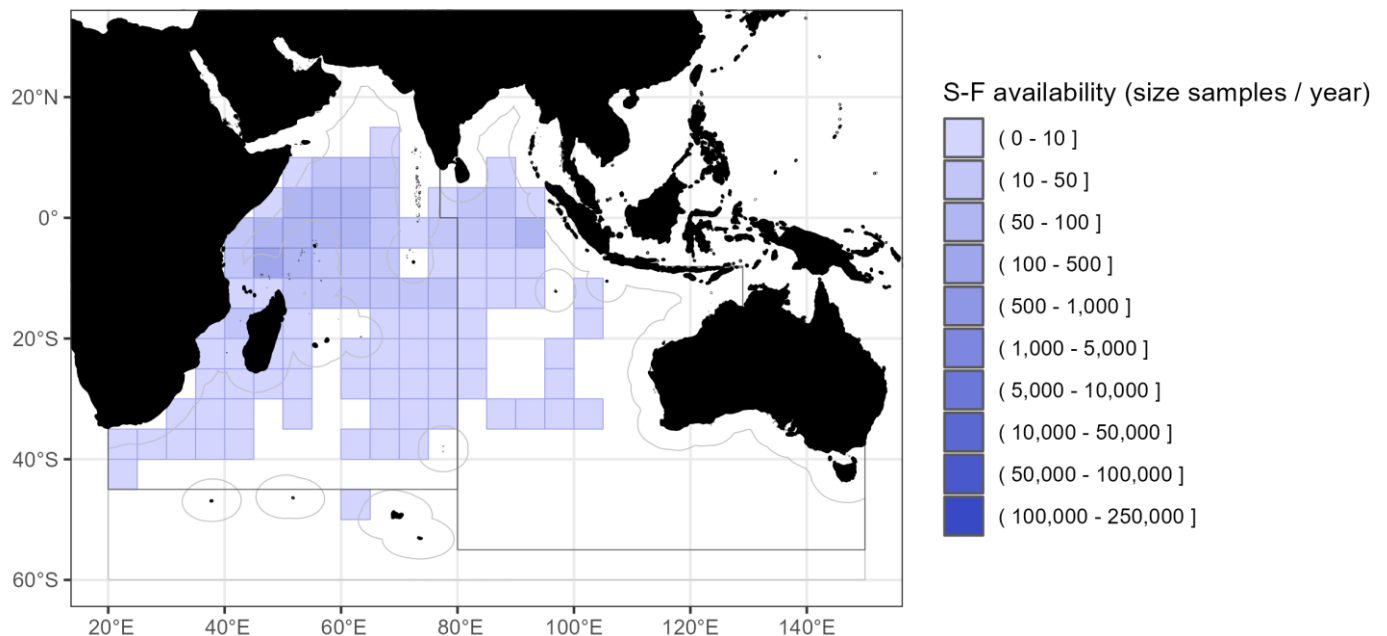


Figure 24: Spatial distribution (average number of samples per grid per year) of available black marlin size-frequency data in deep-freezing longline fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

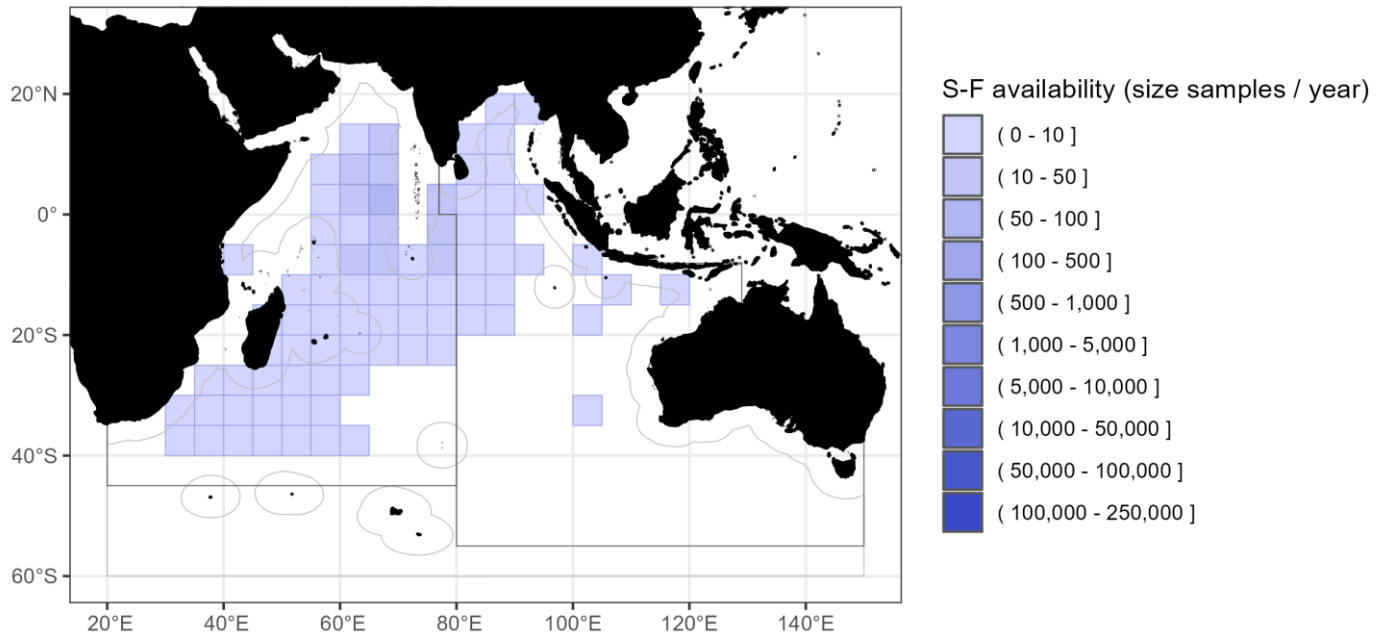


Figure 25: Spatial distribution (average number of samples per grid per year) of available black marlin size-frequency data in fresh longline fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

Gillnet fisheries

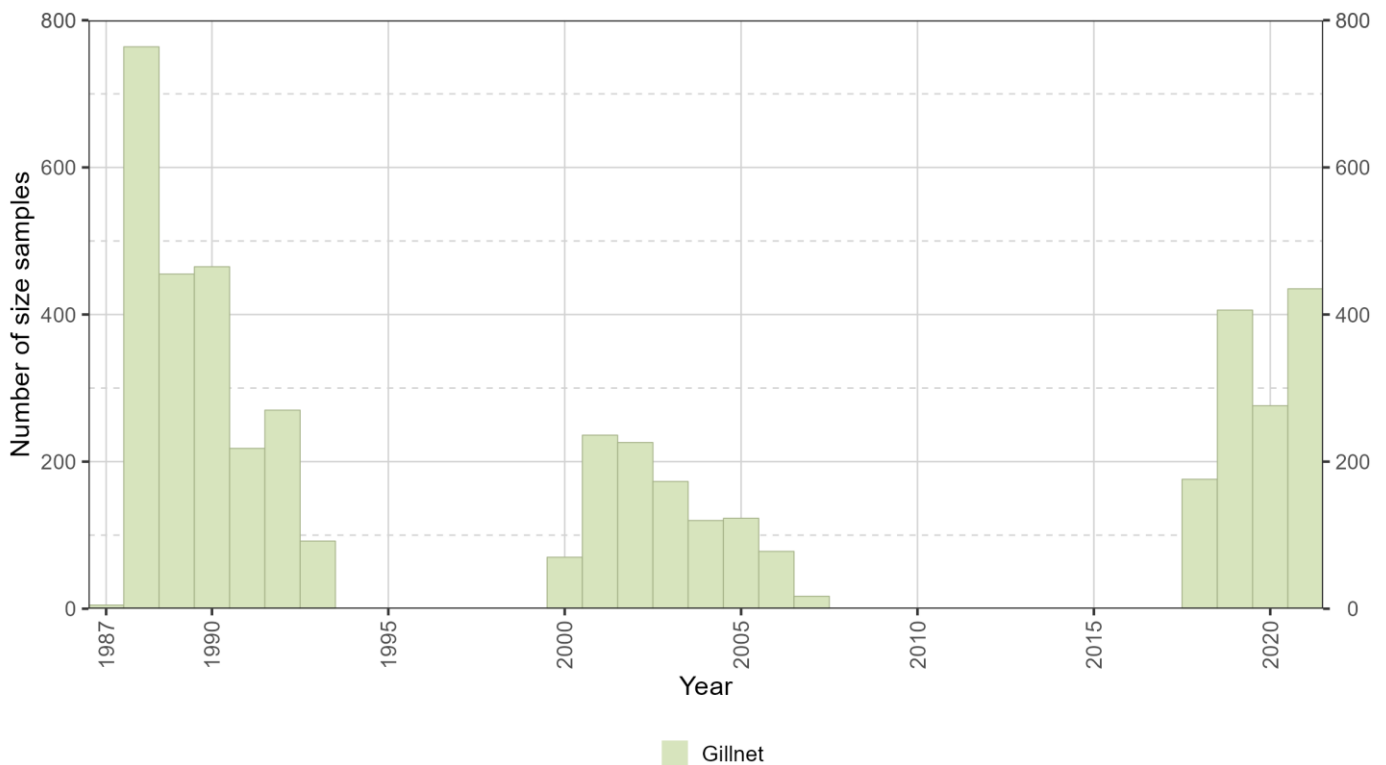


Figure 26: Availability of black marlin size-frequency data as absolute number of samples per year and gillnet fishery. Data source: [standardized size-frequency dataset](#)

Line fisheries

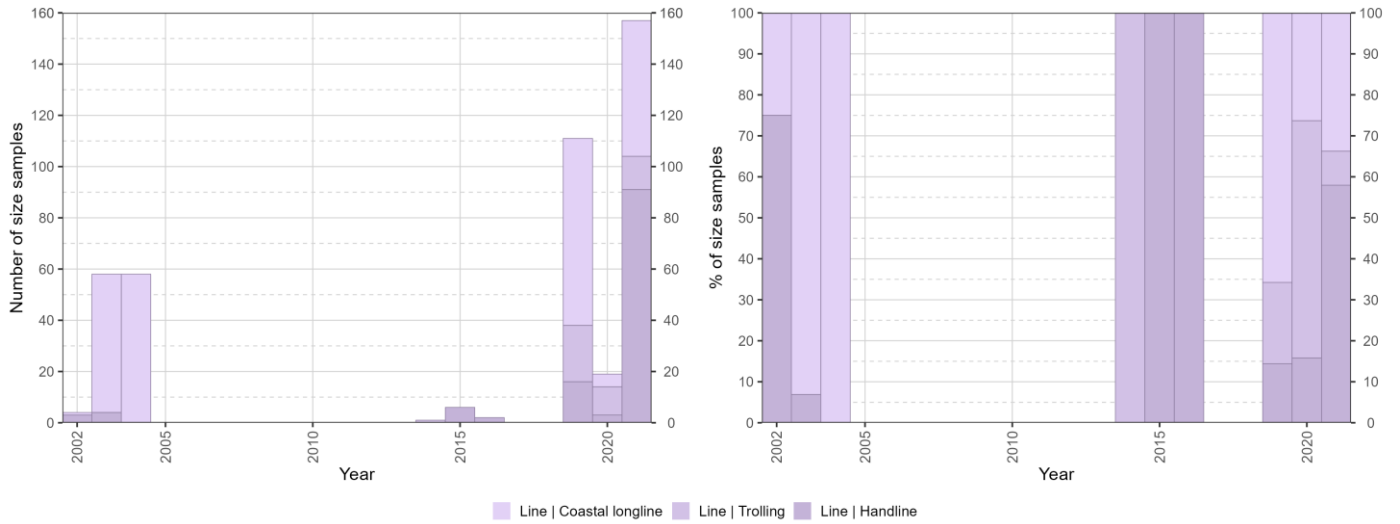


Figure 27: Availability of black marlin size-frequency data as absolute number of samples (left) and relative number of samples (right) per year and line fishery type. Data source: [standardized size-frequency dataset](#)

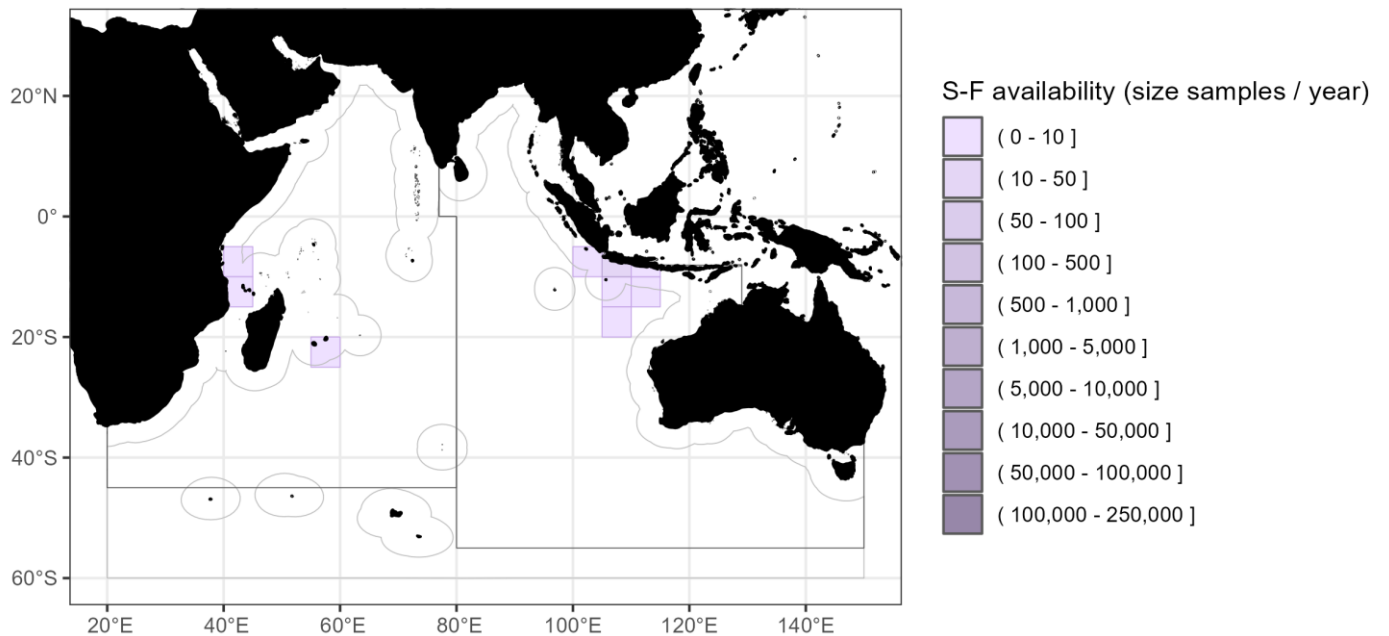


Figure 28: Spatial distribution (average number of samples per grid per year) of available black marlin size-frequency data by line (coastal longline) fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

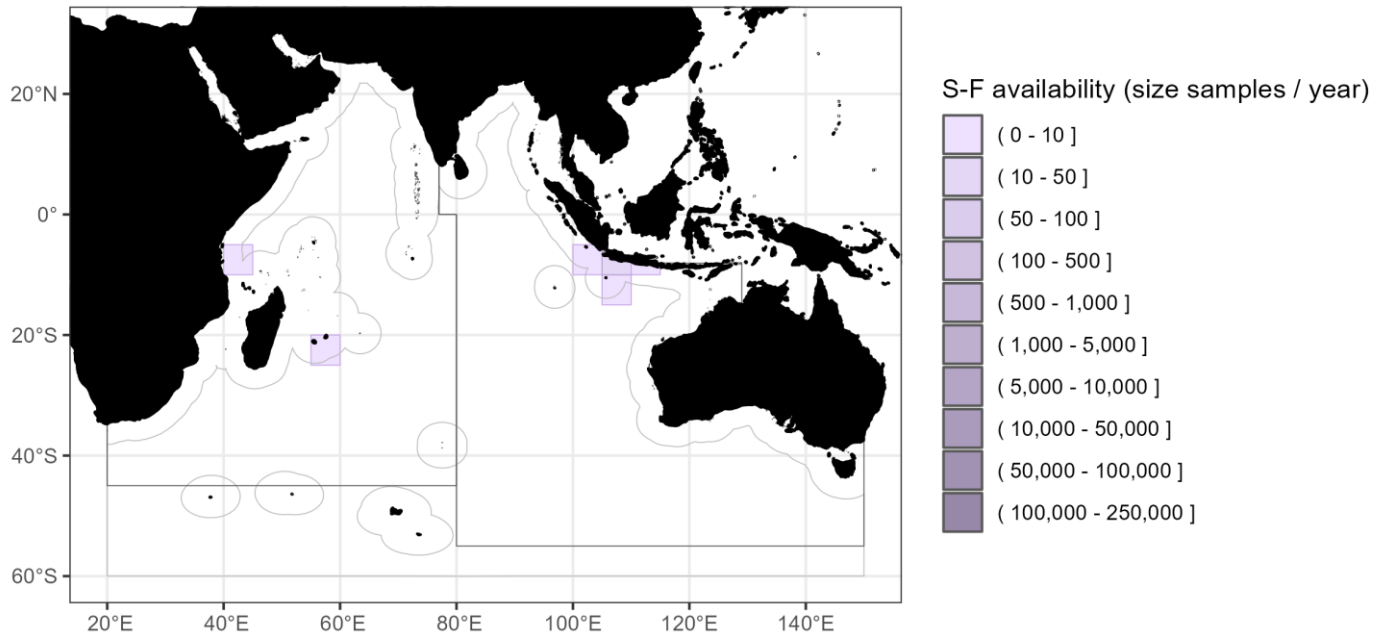


Figure 29: Spatial distribution (average number of samples per grid per year) of available black marlin size-frequency data by line (handline) fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

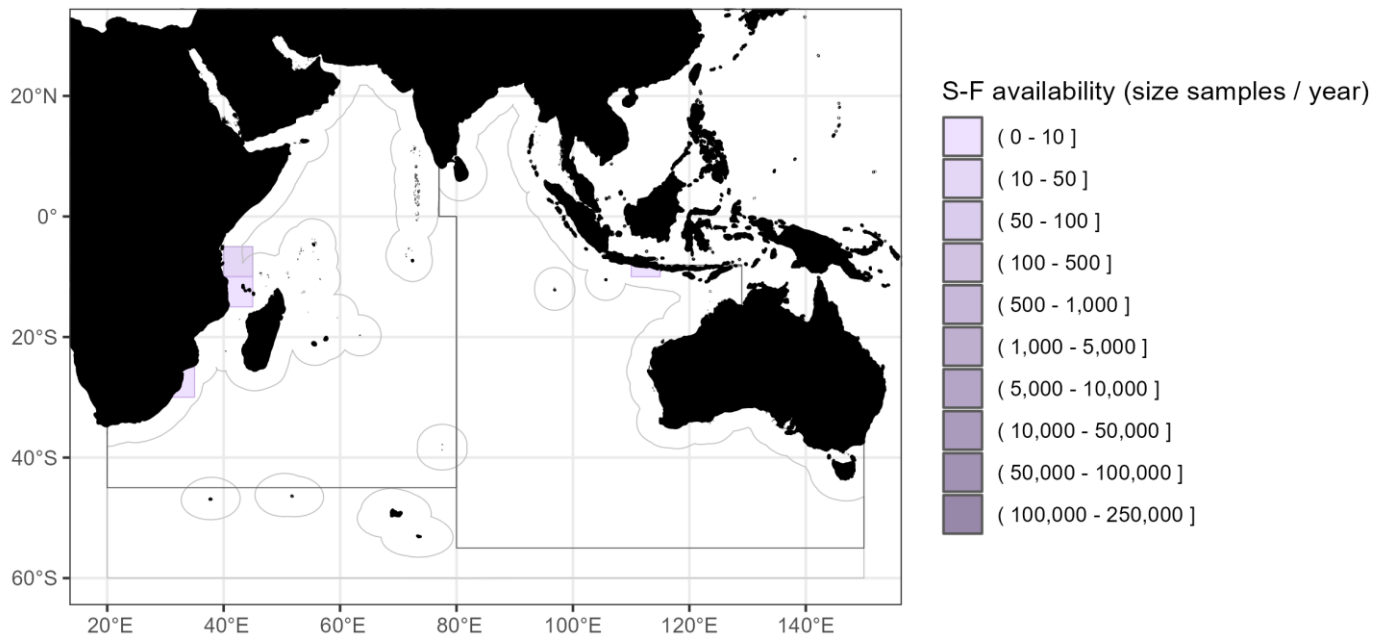


Figure 30: Spatial distribution (average number of samples per grid per year) of available black marlin size-frequency data by line (trolling) fisheries in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

Purse seine fisheries

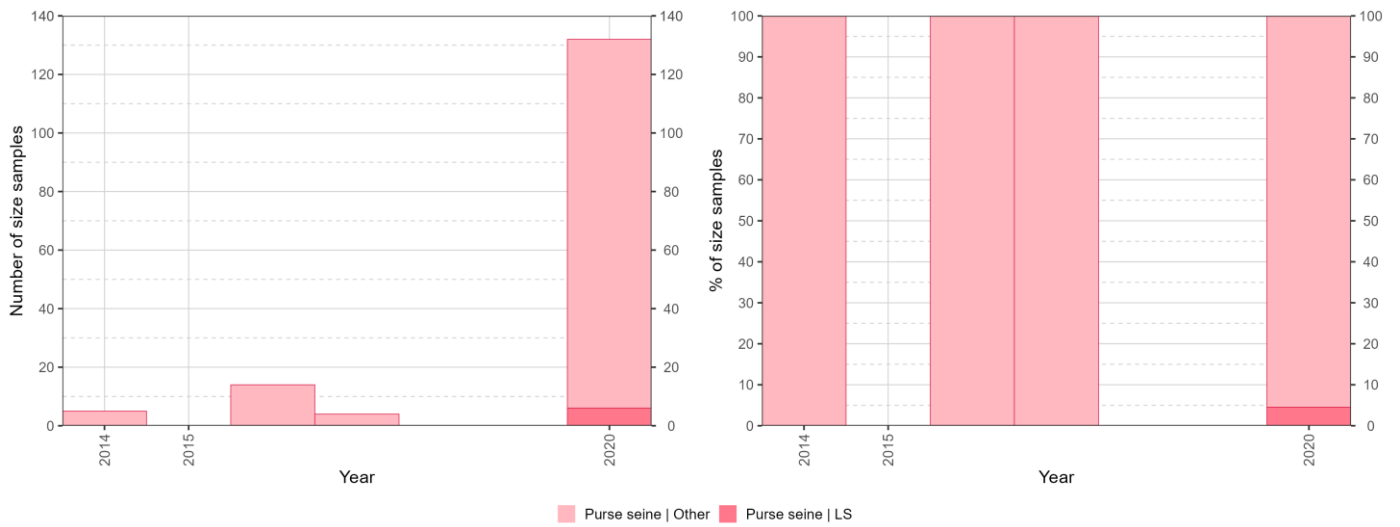


Figure 31: Availability of black marlin size-frequency data as absolute number of samples per year and purse seine fishery. Data source: [standardized size-frequency dataset](#)

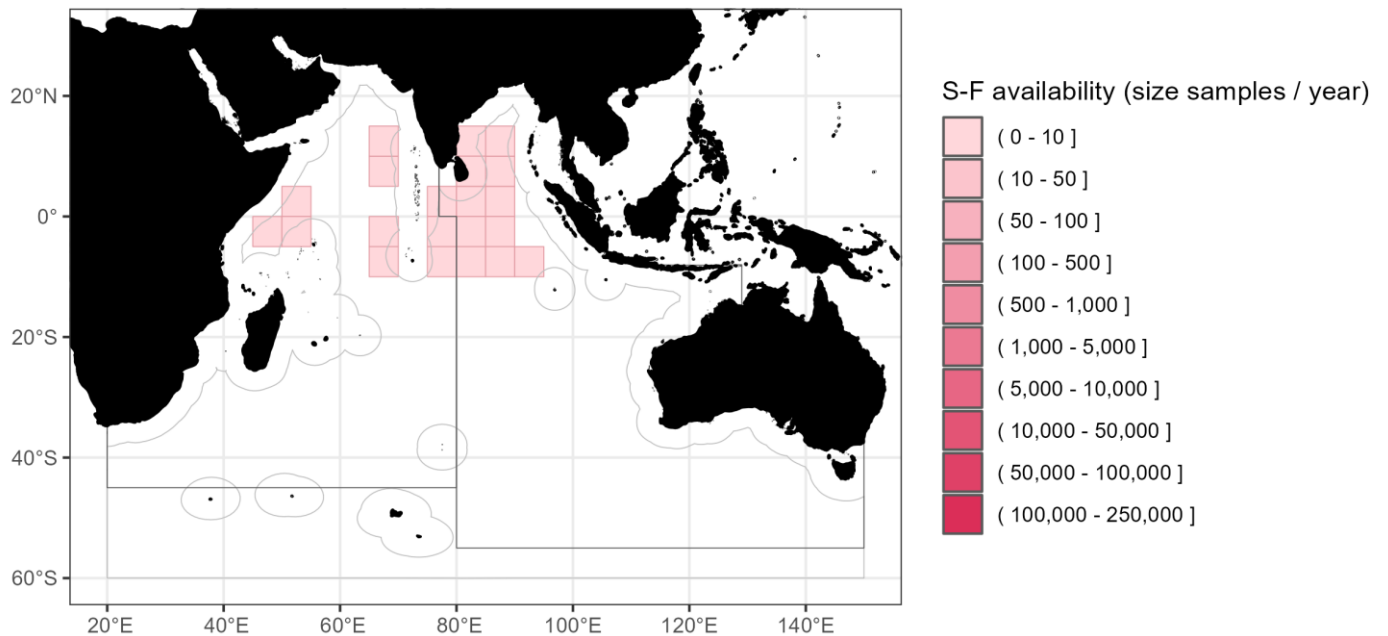


Figure 32: Spatial distribution (average number of samples per grid per year) of available black marlin size-frequency data by purse seine fisheries (other) in the period 2017-2021. Data source: [standardized size-frequency dataset](#)

Temporal patterns and trends in size distributions

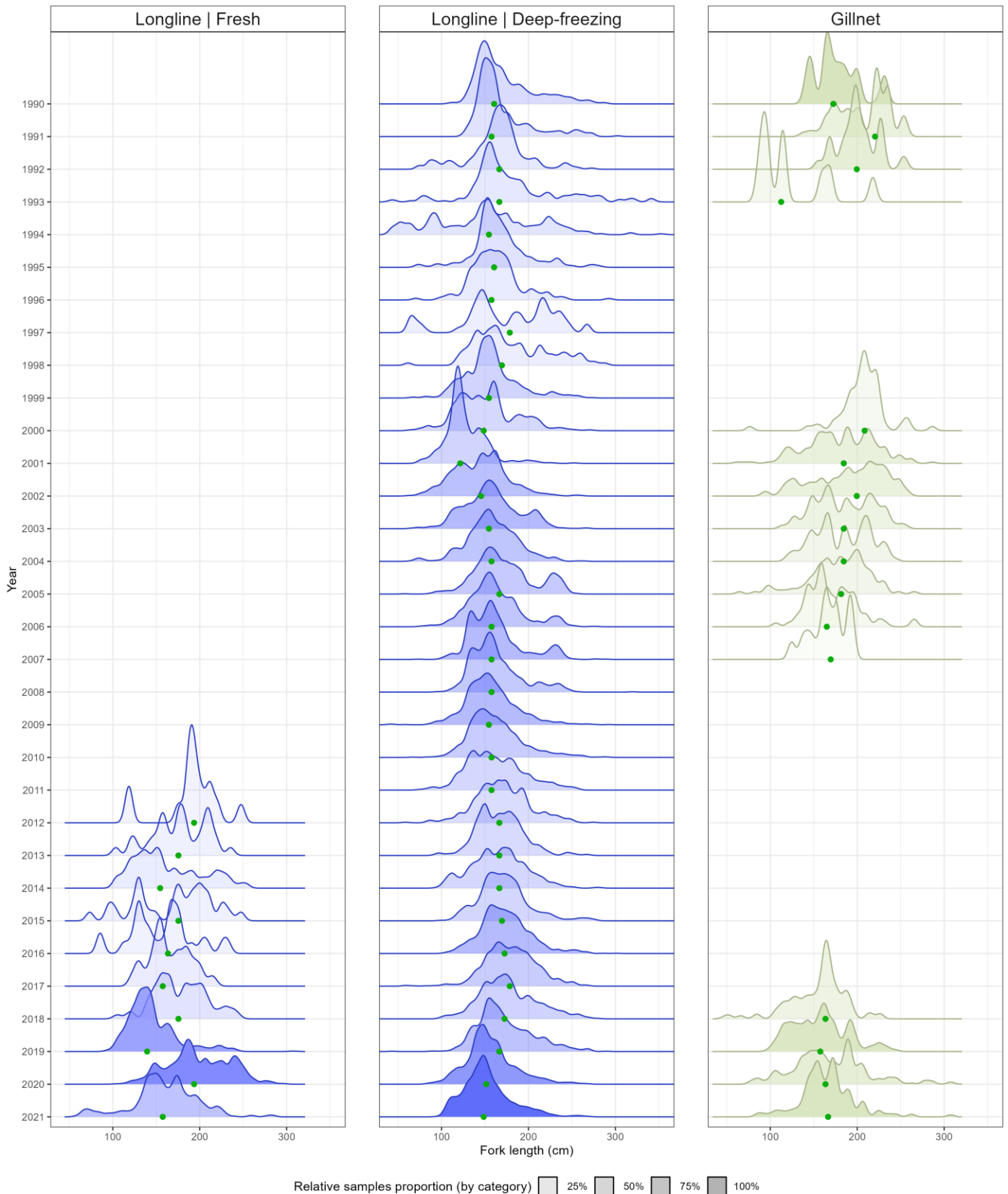


Figure 33: Relative size distribution (fork length; cm) of black marlin caught by purse seine (Other) and gillnet fisheries. Other = no information provided on school association. Fill intensity is proportional to the number of samples recorded for the year, while the green dot corresponds to the median value. Data source: [standardized size-frequency dataset](#)

Size distribution by fishery and fleet

Gillnet fisheries

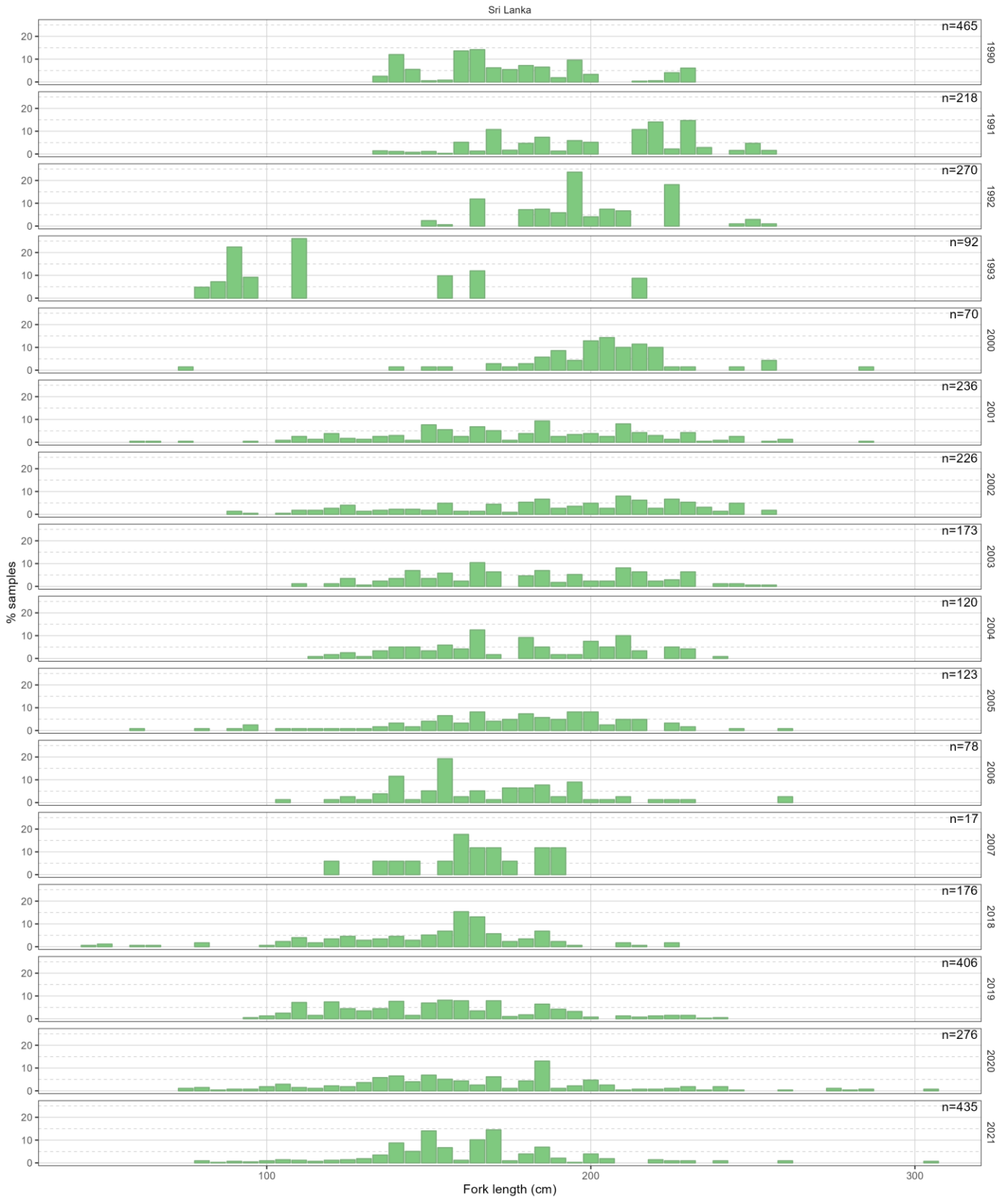


Figure 34: Relative size distribution of black marlin (fork length; cm) recorded for gillnet fisheries by year and main fleet. Data source: [standardized size-frequency dataset](#)

Uncertainties in size-frequency data

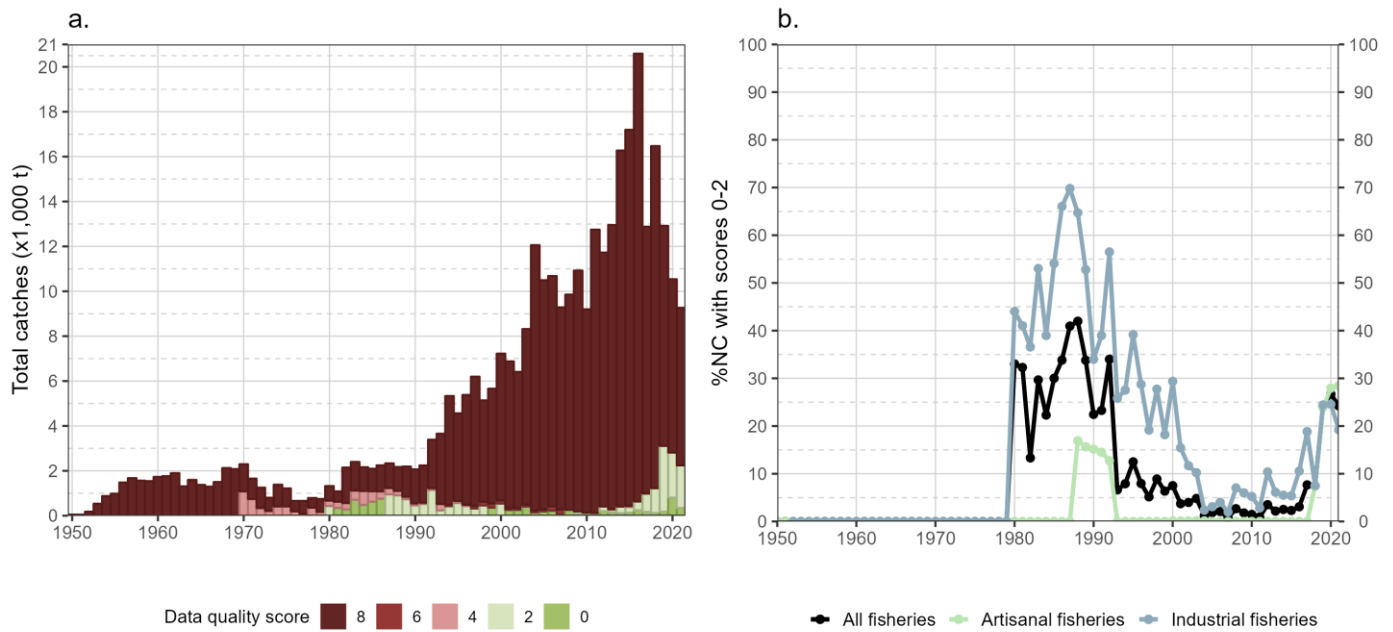


Figure 35: (a) Annual retained catches (metric tonnes; t) of black marlin estimated by quality score and percentage of total retained catches for which geo-referenced size-frequency data were reported to the IOTC Secretariat in agreement with the requirements of Res. 15/02 for all fisheries and by type of fishery, in the period 1950–2021

References

IOTC (2023) [Review of the statistical data for Indian Ocean billfish \(1950-2021\)](#). IOTC, La Saline-les-Bains, Réunion, 06-09 September 2023, p 45

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>Istiompax</i> |
| Species | <i>Istiompax indica</i> |

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

Some improvements were made to the best scientific estimates of retained catches of black marlin since the 19th session of the IOTC Working Party on Billfish ([WPB20](#)), with overall small modifications in the time series of annual catches (**Fig. 8**). The changes covering the period 2017-2020 were due to: (i) revision of catch by I.R. Iran for the period 2011 to 2021 for its gillnet fisheries, (ii) revised of Indonesian catch data by the Secretariat submitted for 2017, with higher overall total catch, and (iii) updating of Mozambique catch based on national report data.

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

| Year | Fleet | Fishery group | Area | Current (t) | Previous (t) | Difference (t) |
|------|-------|---------------|----------------------|-------------|--------------|----------------|
| 2020 | IRN | Gillnet | Western Indian Ocean | 4,857 | 7,538 | -2,682 |
| | MOZ | Line | Western Indian Ocean | 12 | 0 | 12 |
| 2019 | IRN | Gillnet | Western Indian Ocean | 6,847 | 6,759 | 87 |
| | MOZ | Line | Western Indian Ocean | 36 | 0 | 36 |
| 2018 | IRN | Gillnet | Western Indian Ocean | 6,502 | 6,575 | -72 |
| | MOZ | Line | Western Indian Ocean | 20 | 0 | 20 |
| 2017 | IDN | Gillnet | Eastern Indian Ocean | 143 | 115 | 29 |
| | | Line | Eastern Indian Ocean | 1,347 | 1,079 | 268 |
| | | Other | Eastern Indian Ocean | 86 | 69 | 17 |
| | | Purse seine | Eastern Indian Ocean | 498 | 399 | 99 |
| | IND | Gillnet | Western Indian Ocean | 86 | 50 | 36 |
| | IRN | Gillnet | Western Indian Ocean | 5,441 | 5,369 | 72 |
| | MOZ | Line | Western Indian Ocean | 50 | 0 | 50 |