REVIEW OF THE STATISTICAL DATA AVAILABLE FOR INDIAN OCEAN NERITIC TUNA AND SEERFISH SPECIES UNDER IOTC MANAGEMENT

Author: IOTC Secretariat

1 Introduction

Neritic tunas species, mainly found in the continental shelves, have some economic importance for coastal states depending on the commerce brought by the small tuna, or minor tuna as known by International Seafood Sustainability Foundation (ISSF), which indicated the increase of the neritic tunas which are bycatch of major commercial tuna fisheries (Recio et al. 2022). Globally the neritic tunas and seerfish species of the scombrids family, *Euthynnus, Auxis*, and *Scomberomous*, are being more valuable to the socio-economic of coastal fishing nations, particularly in the southeast Asia SEAFDEC, driven by favorable prices from processing companies, which in turn stimulate economic activities within coastal communities. Indonesia, as a large fishing nation, have increasing catches of neritic tunas, and seerfish, from both Indian and Pacific Oceans. In the Indian Ocean, although there are records of several minor tuna being caught, only four neritic species of the scombridae family are managed by Indian Ocean Tuna Commission (IOTC), namely *Thunnus tonggol*, *Euthynnus affinis*, *Auxis rochei*, and *Auxis thazard*, and two seerfish species, S. guttatus and S. commerson.

The FAO fisheries statistics of catch data of the neritic and seerfish species by oceans, indicate steady increase, surpassing 2.3 million t in 2024 (**Fig. 1.1a**). The Western and Central Pacific Ocean region, managed by the Western and Central Pacific Fisheries Commission (WCPFC), and the Indian Ocean region under the management of the Indian Ocean Tuna Commission (IOTC), are the primary contributors to neritic tuna catches, comprising approximately 61% and 30% respectively (**Fig. 1.1b**). These figures underscore the significant role these regions play in global fisheries management and highlight ongoing trends in capture volumes of these important species.

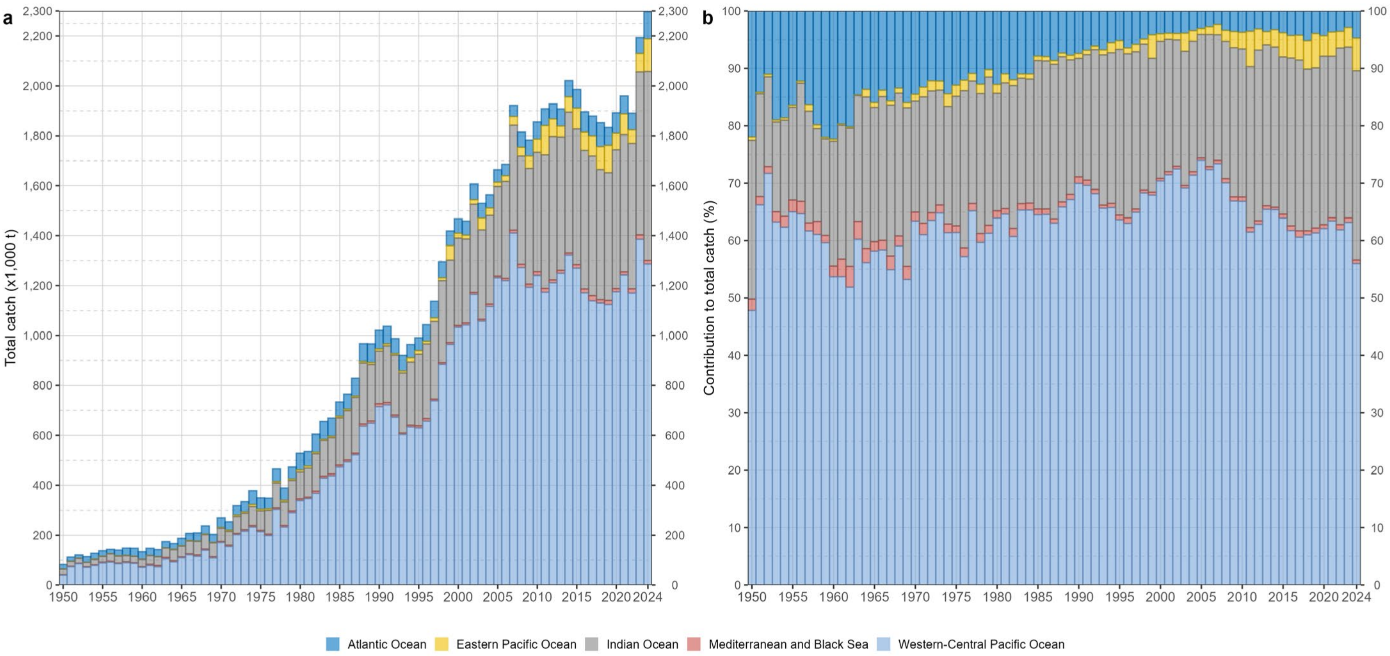

Figure 1.1: Annual time series of (a) cumulative retained catches (metric tonnes; t) and (b) contribution to the total retained catches (percentage; %) of neritic tunas and seerfish by ocean basin for the period 1950-2024. Source: FAO global capture production database

This paper provides a comprehensive review of the status of, and available information on, the six neritic tuna and seerfish species managed by the Indian Ocean Tuna Commission (IOTC), in preparation for the 16th Session of the (WPNT16). Although the IOTC management framework currently covers only these six species, several other neritic pelagic species are also caught in the Indian Ocean, albeit at relatively low reported levels. The paper presents the historical context of these fisheries, noting that coastal and subsistence fisheries targeting neritic tunas and seerfishes have operated throughout the Indian Ocean region for centuries (e.g., Yadav et al. 2020). It compiles and reviews available fisheries statistics from 1950 onwards and describes the methodologies employed by the IOTC Secretariat to process, validate, and assess the quality of these datasets as of June 2026.

In addition, the paper examines major trends and key characteristics of neritic tuna and seerfish fisheries in the Indian Ocean over the past seven decades. By synthesizing available biological, fisheries, and management information, it provides a comprehensive overview of the development, utilization, and management of these economically and socially important marine resources.

2 Materials

The analyses presented in this paper are based on data submitted annually to the IOTC Secretariat by Contracting Parties and Cooperating Non-Contracting Parties (CPCs), in accordance with relevant IOTC Conservation and Management Measures (CMMs). These datasets are routinely updated and revised throughout the year as CPCs improve the accuracy, completeness, and timeliness of their reporting. To enhance transparency and support compliance with reporting requirements, the IOTC Secretariat has developed adaptive online IOTC Reporting guidelines and IOTC standard forms, which are available through the IOTC website. In addition, CPCs can access online reference catalogues, code lists, and validation tools to review and verify the coding systems associated with these reporting forms.

The use of official IOTC reporting forms is mandatory and strongly encouraged to facilitate efficient data submission, curation, and management. These tools contribute to improving data quality and consistency, thereby ensuring that the information used in fisheries analyses is robust, reliable, and suitable for assessing the status and long-term trends of neritic tuna and seerfish fisheries in the Indian Ocean.

2.1 Retained catch data

The reporting of retained catches of species in the Indian Ocean, as mandated by IOTC Res. 15/02, requires that these catches be expressed in live weight equivalent and reported annually, by FAO major fishing area within the Indian Ocean, fleet, fishery, and species, using the IOTC form 1RC(reporting requirements detailed in 1RC form webpage). On occasions, the published retained catch data are reviewed if there have been (i)updates, mainly from longline fisheries; (ii)revisions of data by CPCs; and (iii) changes in estimation process; aiming at keeping the data users up to date with the actual retained catch data at at given point of time.

Reporting of retained catches in the Indian Ocean is mandated under IOTC Res. 15/02. Retained catches must be reported annually in live-weight equivalent and disaggregated by FAO major fishing area within the Indian Ocean, fleet, fishery, and species using IOTC form 1RC (reporting requirements are detailed on the 1RC form webpage).

Published retained-catch datasets are periodically reviewed and updated to ensure that the information available to data users reflects the best available estimates at a given time. Revisions may result from: (i) updated submissions from CPCs, particularly for longline fisheries; (ii) corrections or revisions to previously reported data; and (iii) improvements or modifications to estimation methodologies applied by the IOTC Secretariat. These updates contribute to maintaining a consistent, accurate, and up-to-date data of retained catches for data users.

2.2 Discard data

The IOTC adheres to the FAO definition of discards, as described in previous studies and reports (Alverson et al. 1994, Kelleher 2005). Under this definition, discards include all non-retained catch, regardless of whether the organisms are released alive or discarded dead. In accordance with IOTC reporting requirements, CPCs are required to submit discard data using IOTC Form 1DI (reporting requirements are detailed on the 1DI form webpage). Discard estimates should be reported by FAO major fishing area within the Indian Ocean, fleet, fishery, and species, and expressed either in live-weight equivalent or number of individuals.

While logbooks remain the principal source of information for routine fisheries reporting, the IOTC Regional Observer Scheme (ROS; IOTC Res. 22/04) provides the most reliable and comprehensive source of data on discards. The ROS is designed to collect detailed information on fishing operations, including the spatial and temporal distribution of fishing activities, interactions with target and non-target species, and the fate of observed individuals. These observations provide valuable insights into bycatch and discard practices, particularly within industrial tuna fisheries operating in the Indian Ocean.

Despite improvements in data collection, gaps in discard reporting remain for several fisheries and fleets. In addition, studies have shown that technological advancements in fishing gear and fishing practices have contributed to reducing incidental catches and discards in tuna fisheries (Taiwo 2013). These innovations aim to improve catch selectivity and minimize the capture of non-target species, thereby potentially reducing overall discard rates in fisheries. Continued improvements in both reporting systems and fishing technology are expected to further enhance the quality of discard estimates and support ecosystem-based fisheries management in the Indian Ocean.

2.3 Geo-referenced catch and effort data

Catch-and-effort data within the IOTC framework are reported in accordance with the requirements of IOTC Res. 15/02. These data are collected at a detailed level and stratified across multiple dimensions, including year, month, spatial grid area, fleet, gear type, school association, and target species. IOTC form 3-CE (reporting requirements are detailed on the 3CE form webpage) is the recommended reporting format for the submission of catch-and-effort data, which are generally derived from logbook records and submitted annually by CPCs.

In addition to standard catch-and-effort reporting, information on fishing activities associated with drifting floating objects and anchored fish aggregating devices (FADs) is reported separately. These data are submitted using IOTC forms 3DA and 3AA, respectively, with detailed reporting requirements provided on the corresponding form 3DA and form 3AA webpages.

The collection of these datasets supports the monitoring of fishing activities and fishing patterns across the Indian Ocean. By providing detailed information on vessel operations, gear deployment, and FAD usage.

2.4 Size-frequency data

Size-composition data are derived from datasets containing individual length and weight measurements collected either at sea or during the unloading and landing of fishing vessels. To standardize reporting and facilitate comprehensive data collection, the IOTC has developed form 4SF, which is specifically designed for reporting size-frequency information. In accordance with IOTC Res. 15/02, size-frequency data should be reported by fleet, year, gear type, school association, month, spatial grid area, and species. Detailed reporting requirements are provided on the 4SF form webpage.

Most size-frequency data submitted through Form 4SF relate to retained catches. However, Contracting Parties and Cooperating Non-Contracting Parties (CPCs) may also use the same form to report measurements from discarded individuals.

In addition, onboard observer programmes operating under the ROS provide an important supplementary source of size-composition data, including measurements of individuals discarded at sea. These observer-derived data contribute to improving the quality and representativeness of size-frequency datasets submitted to the IOTC Secretariat.

2.5 Socio-economic data

Fisheries play a vital role in ensuring food security, supporting livelihoods, and promoting economic growth across countries bordering the Indian Ocean. This importance is particularly pronounced in Small Island Developing States (SIDS), where fisheries and other blue-economy sectors constitute a significant component of national economies. In this context, socio-economic information is essential for informing fisheries management decisions, evaluating sector performance, and assessing the contributions of fisheries to national economies and coastal communities (Bennett 2021). Socio-economic analyses have also proven valuable in fisheries management processes, including the development and evaluation of harvest strategies and quota allocation systems, as highlighted in the Tropical Tuna Allocation Criteria (TCAC) discussions within the Indian Ocean (Secretariat 2024).

Recognizing the importance of socio-economic considerations, the second Session of the Working party of Socio-Economic (WPSE02) recommended the development and collection by CPCs of socio-economic indicators for consideration by the Scientific Committee.

Despite this growing recognition, the collection and reporting of socio-economic information under the IOTC framework remain limited and face several challenges. The IOTC form 7PR has been developed to collect price information for all IOTC-managed species, including neritic tunas and seerfishes. However, submission of these data by CPCs is voluntary, resulting in limited data availability within the IOTC Secretariat databases (Appendix I). Notable exceptions include monthly fish price time series reported by Oman since 2015 and by Malaysia since 2018. In addition, information on the value of marine fishery landings has been compiled by the (SEAFDEC) since the late 1970s, providing useful complementary insights into regional fisheries markets and pricing trends.

The limited availability of socio-economic information may partly reflect the fact that neritic tuna and seerfish species often constitute a relatively small component of total catches in many coastal fisheries and are frequently landed as secondary or mixed-species catches. Furthermore, in several countries with substantial catches of tuna and tuna-like species, a significant proportion of production is exported for processing or consumption in regional and international markets, including neighbouring countries, the European Union, Saudi Arabia, and Sri Lanka. Consequently, socio-economic information related to domestic market pricing is often less readily available within national fisheries reporting systems. Strengthening the collection and reporting of socio-economic data remains an important priority for improving understanding of the economic and social contributions of neritic tuna and seerfish fisheries and for supporting evidence-based fisheries management in the Indian Ocean.

2.6 Morphometric data

The length–weight relationships currently used by the IOTC for Indian Ocean neritic tunas and seerfish species are derived from morphometric data collected through various fisheries monitoring programmes across different locations and time periods. These relationships are essential for converting length measurements into weight estimates, thereby supporting catch estimation, stock assessment, and fisheries management activities.

Available length-weight relationships have been developed from several data sources. Historical datasets include measurements collected at landing sites in Sri Lanka during the 1980s, while more recent studies from Iran, Indonesia and India have contributed updated parameter estimates for several species (**Table 2.1**). For **longtail tuna**, the length–weight relationship is based on an extensive dataset collected from five sampling locations along the northern coast of the Persian Gulf and Oman Sea between 2006 and 2007. This study provided good coverage of the species' size range, encompassing individuals between 40 and 120 cm fork length (Kaymaram et al. 2011).

Information on length-weight relationships for **kawakawa**, **frigate tuna**, **bullet tuna** , and **narrow-barred Spanish mackerel** remains relatively limited and is largely based on data compiled under the Indo-Pacific Tuna Development and Management Programme (IPTP) (IPTP 1989). In addition, the currently available length-weight parameters for frigate tuna and bullet tuna are identical, highlighting the need for updated species-specific studies to improve the precision of biological parameter estimates.

For Indo-Pacific king mackerel, length–weight information is primarily derived from studies conducted in the Bay of Bengal Large Marine Ecosystem, with relationships available only for fish measured in total length (Dutta et al. 2012). Furthermore, length-length relationships, which facilitate the conversion between different standard length measurements, are currently unavailable within the IOTC database. However, such relationships have been published for some species, including kawakawa, frigate tuna, and bullet tuna sampled in Sri Lankan waters (Herath et al. 2019).

Expanding and updating the database of morphometric relationships remains a priority for the IOTC. Additional studies covering broader geographic regions, size ranges, and species would improve the accuracy and representativeness of length-weight and length-length relationships used in fisheries analyses. Such information is fundamental for estimating biomass, standardizing fisheries datasets, and strengthening stock assessment and management processes for neritic tuna and seerfish species in the Indian Ocean.

Table 2.1: IOTC reference length-weight power relationships for Indian Ocean neritic tunas and seerfish. FL = fork length (cm); TL = total length (cm); RD = round weight (kg)

Code	Species	Length type	a	b	Min length	Max length	Reference
LOT	Longtail tuna	FL	2.0000e-05	2.83000	40	120	Kaymaram et al. (2011)
KAW	Kawakawa	FL	2.6000e-05	2.90000	20	65	IPTP (1989)
FRI	Frigate tuna	FL	1.7000e-05	3.00000	20	45	IPTP (1989)
BLT	Bullet tuna	FL	1.7000e-05	3.00000	10	40	IPTP (1989)
COM	Narrow-barred Spanish mackerel	FL	1.1760e-05	2.90020	20	200	IPTP (1989)
GUT	Indo-Pacific king mackerel	TL	1.0000e-05	2.89445	15	68	Dutta et al. (2012)

3 Methods

The public release of the latest curated datasets for neritic tuna and seerfish species is undertaken in accordance with the confidentiality requirements of IOTC Res. 12/02. Prior to dissemination, the data undergo a series of processing, validation, and quality-assurance procedures conducted by the IOTC Secretariat to ensure consistency, completeness, and compliance with reporting obligations. A brief summary of the principal processing steps is provided below.

3.1 Data processing

The IOTC Secretariat applies a series of standardized data processing procedures to ensure the quality, consistency, and accuracy of fisheries datasets submitted by CPCs. These procedures support the production of the best available scientific estimates for stock assessment and fisheries management purposes. A summary of the principal processing steps is provided below.

1. **Data Quality Review**: The first stage involves a comprehensive review of the quality, completeness, and consistency of datasets submitted by CPCs. Historically, this process was conducted exclusively by the IOTC Secretariat. However, recent developments have introduced a suite of dataset-specific validation tools that allow CPCs to verify their data prior to submission. These tools facilitate the identification and correction of reporting errors and help ensure compliance with IOTC reporting requirements. Nevertheless, all submitted datasets are subsequently subjected to independent validation by the Secretariat before being incorporated into the IOTC databases and used in further analyses.

2. **Processing Steps for Scientific Estimates**: Following validation, a series of procedures may be applied to generate scientific estimates of retained catches for the species managed under the IOTC framework. These procedures are intended to improve the completeness and reliability of fisheries statistics while maintaining consistency across time series. Key processing rules include:

    a. **Data Imputation**: In cases where catch data are missing or have not been reported by a CPC for a particular year, estimates may be derived using alternative sources of information. These sources can include partial catch-and-effort datasets, historical reporting records, the FAO FishStat database, and purchasing statistics obtained from tuna processing facilities in collaboration with the International Seafood Sustainability Foundation (ISSF). Data imputation is undertaken to maintain continuity in time series and to provide the most complete representation of total catches.

    b. **Re-estimation**: For fisheries where data quality issues have been identified, the Secretariat may re-estimate species and/or gear composition using auxiliary information. This process may involve the use of data from comparable years, neighbouring fishing areas, or proxy fleets with similar operational characteristics and catch profiles (e.g., Moreno et al. (2012) and IOTC Secretariat (2018)). Such re-estimations are applied to improve the accuracy of catch statistics when reported information is incomplete or aggregated.

c. **Disaggregation**: When catches are reported in aggregated categories, the Secretariat applies a disaggregation procedure to allocate catches among individual species and gear types (IOTC Secretariat 2016). This approach uses information from reporting strata where species and gear data are available separately and, where necessary, applies spatial and temporal substitution methods to estimate the most likely species and gear composition of aggregated catches.

These methodologies continue to evolve as data availability and reporting quality improve. In recent years, the need for re-estimation and other reconstruction procedures has gradually declined due to increased reporting of disaggregated catches by CPCs, access to secondary data sources through national fisheries information systems, and ongoing technical assistance provided by the IOTC Secretariat to CPCs experiencing reporting challenges.

A total of 7 aggregates that include IOTC neritic tuna and seerfish species have been reported as retained catches to the Secretariat by some CPCs for years between 1950 and 2024 (**Table 3.1**).

Table 3.1: List of species aggregates with their component species that have been used to report nominal retained catches of neritic tunas and seerfish to the IOTC Secretariat

Aggr. code	Species aggregate	BLT	COM	FRI	GUT	KAW	LOT
AG06	Kawakawa, frigate and bullet tunas	✓		✓		✓	
AG10	Skipjack tuna and kawakawa					✓	
FRZ	Frigate and bullet tunas	✓		✓			
KGX	Seerfishes nei		✓		✓		
TUN	Tunas nei	✓		✓		✓	✓
TUS	True tunas nei						✓
TUX	Tuna-like fishes nei	✓	✓	✓	✓	✓	✓

A total of 7 gear aggregates have been used by some CPCs report retained catch data of IOTC neritic tuna and seerfish species to the Secretariat for years between 1950 and 2024 (**Table 3.2**).

Table 3.2: List of gear aggregates with their component gear codes that have been used to report retained catches of neritic tunas and seerfish to the IOTC Secretariat.

Aggr. code	Gear aggregate	Category	BB	GILL	HAND	LIFT	LL	LLCO	PS	PSS	RR	SPOR	TRAW	TROL
BBPS	Baitboat and purse seine	Baitboat	✓						✓					
GIHT	Gillnet and hand line and troll line	Gillnet		✓	✓									✓
HATR	Hand line and Troll line	Trolling			✓									✓
HOOK	Hook and line	Trolling			✓			✓						✓
LIGB	Gillnet and lines and baitboat and coastal seines	Other	✓	✓	✓									✓
LLTR	Coastal Longline and Troll line combination	Longline						✓						✓
UNCL	Unclassified	Other	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Detailed results of the estimation procedures used to derive the 2024 best scientific estimates, including revisions to the retained-catch time series relative to those presented at the previous Session of the WPNT16, are provided in Appendix II and Appendix III, respectively.

In addition, and for all 16 species managed by the IOTC, as well as the principal shark species listed in the appendices of IOTC Resolution 15/01, a series of filtering, validation, and conversion procedures are applied to size-frequency datasets prior to their dissemination. These procedures are intended to standardize data formats, harmonize measurement units, and exclude records that do not comply with IOTC reporting standards. For example, size-frequency data collected using measurement intervals that exceed the maximum bin width considered biologically meaningful for a given species are excluded from the standardized datasets (IOTC Secretariat 2020).

The IOTC recognizes two standard length measurements for size-frequency reporting. Eye-fork length (EFL), defined as the straight-line distance from the orbit of the eye to the fork of the tail, is used for black marlin (Istiompax indica) and blue marlin (Makaira nigricans). Fork length (FL), defined as the straight-line distance from the tip of the lower jaw to the fork of the tail, is used for all other species subject to mandatory size reporting requirements (IOTC Secretariat 2020).

Where size measurements are collected using alternative length types, the data are converted to the relevant standard measurement (FL or EFL) using IOTC-approved conversion equations. These conversion factors may vary among species and, in some cases, across specific size ranges. When no IOTC-endorsed conversion equation is available for a particular species–measurement combination, the original size-frequency data are retained within the IOTC databases but are not included in publicly disseminated datasets. Such records are preserved for future use should appropriate conversion relationships become available.

3.2 Data quality

The Indian Ocean Tuna Commission (IOTC) evaluation of data quality does not account for several critical factors, including data collection methodologies and dataset characteristics. Despite the presence of ongoing inconsistencies and potential biases, these issues are not explicitly addressed in the quality assessment process. The Intergovernmental Panel on Climate Change (IPCC) has provided guidelines for assessing data uncertainty, which could be relevant and beneficial in evaluating the quality of data collected from the region (Mastrandrea et al. 2010).

A scoring system has been designed to assess the reporting quality of retained catch, catch and effort, and size-frequency data submitted to the Secretariat for all IOTC species. The determination of the score varies according to each type of data set and aims to account for reporting coverage and compliance with IOTC reporting standards (**Table 3.3**). Overall, the lower the score, the better the quality. It is to note that the quality scoring does not account for sources of uncertainty affecting the data such as issues in sampling and processing as well as under- or misreporting.

The IOTC Secretariat has implemented a scoring system to evaluate the reporting quality of retained catch, catch and effort, and size-frequency data submitted by Contracting Parties and Cooperating Non-Contracting Parties (CPCs) to the Secretariat. This scoring system is designed to assess the extent to which data submissions adhere to IOTC reporting standards (**Table 3.3**). Overall, the scoring system plays a crucial role in ensuring that the data used for scientific assessments and management decisions within the IOTC are reliable and consistent across member states.

Table 3.3: Key to IOTC quality scoring system

<table>
<tr><th>Data set</th><th>Criterion</th><th>By species</th><th>By gear</th></tr>
<tr><td rowspan="3">Nominal catch</td><td>Fully available</td><td>0</td><td>0</td></tr>
<tr><td>Partially available</td><td>2</td><td>2</td></tr>
<tr><td>Fully estimated</td><td>4</td><td>4</td></tr>
<tr><td rowspan="4">Catch and effort</td><td>Available according to standards</td><td>0</td><td>0</td></tr>
<tr><td>Not available according to standards</td><td>2</td><td>2</td></tr>
<tr><td>Low coverage (<30% logbooks)</td><td colspan="2">2</td></tr>
<tr><td>Not available</td><td colspan="2">8</td></tr>
<tr><td rowspan="4">Size frequency</td><td>Available according to standards</td><td>0</td><td>0</td></tr>
<tr><td>Not available according to standards</td><td>2</td><td>2</td></tr>
<tr><td>Low coverage (<1 fish per tonne caught)</td><td colspan="2">2</td></tr>
<tr><td>Not available</td><td colspan="2">8</td></tr>
</table>

4 Results

4.1 Retained catches & discards

The best scientific estimates of retained catches for neritic tuna and seerfish species indicate a substantial increase in catches over the past several decades. This trend contrasts with that observed for large pelagic species, for which catches have remained stable or declined in some fisheries. Neritic tunas and seerfishes are primarily harvested in coastal waters, where a wide variety of fishing gears are employed.

4.1.1 Historical trends (1950-2024)

Over the past two decades, the contribution of neritic tuna and seerfish species to the total catch has increased markedly, rising from approximately 25% in the 1990s to 33% by 2010s and continuing to increase thereafter. This shift in catch composition can be attributed to several factors:

1. **Changes in Fisheries Operations**: Beginning in the late 2010s, significant changes occurred in fishing operations across the region. Semi-industrial fisheries, particularly those operating in waters adjacent to Somalia, substantially reduced their activities. As a result, many vessels shifted their operations towards waters within national jurisdictions, potentially increasing fishing effort on neritic tuna and seerfish species in coastal areas.

2. **Changes in Large Pelagic Fisheries**: During the same period, industrial fleets from Distant Water Fishing Nations (DWFNs), which traditionally targeted large pelagic tunas in the western Indian Ocean, also reduced their fishing activities in the late 2010s. This reduction may have contributed to an increase in the relative proportion of neritic tuna and seerfish catches.

3. **Increased Fishing Activity in Coastal Areas**. In recent years, there has been a substantial increase in the number of vessels operating in coastal waters, including both small and medium scale fleets. These vessels often employ multiple fishing gears, allowing them to maximize catches and adapt their fishing strategies to seasonal changes in resource availability (Herrón et al. 2019, Martin 2025).

Fig. 4.1 illustrates changes in catch composition among major species groups between 1950 and 2023. The figure shows a pronounced decline in tropical tuna catches between 2009 and 2011, in contrast to the continued growth in catches of neritic tuna species during the same period. This divergence highlights the increasing contribution of neritic tunas to total catches in the Indian Ocean over recent decades.

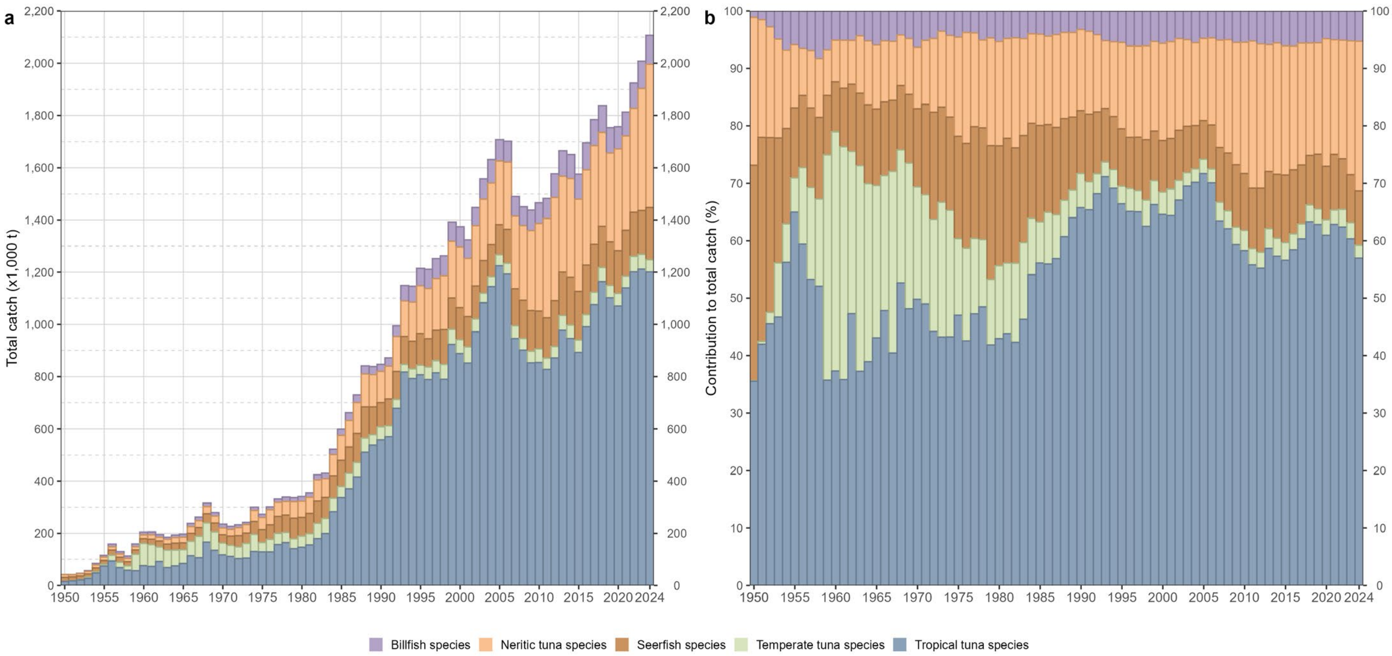

Figure 4.1: Annual time series of (a) cumulative retained catches (metric tonnes; t) and (b) contribution to the total retained catches (percentage; %) of IOTC tuna and tuna-like species by species category for the period 1950-2024

Since 1950, neritic tuna and seerfish species have been predominantly harvested by coastal fisheries, with drifting gillnets accounting for more than 61% of total catches. Drifting gillnets have remained the principal fishing gear targeting these species since the 1950s, particularly for mackerel species across both small and medium scale gillnet fisheries (Nguyen et al. 2023). In addition to drifting gillnets, several other fishing gears contribute substantially to catches in the coastal waters of the Indian Ocean (**Fig. 4.2**):

Surrounding Nets: This category includes purse seines and ring nets, which together accounted for approximately 15% of total catches between 2010 and 2024 (**Fig. 4.2**). These gears are effective in targeting schooling fish near the surface, including neritic tunas. Although primarily associated with coastal fisheries, surrounding nets operating in offshore waters have also been reported to catch neritic tuna species, albeit at lower levels.

Line Fisheries: Line fisheries, including handlines and coastal longlines, contributed approximately 14% of total catches during the same period. These gears are generally more selective and are commonly used to target specific species, including neritic tunas and seerfishes.

Smaller Coastal Fisheries: Fishing gears such as beach seines, Danish seines, and trawls have also contributed increasing catches of neritic tuna and seerfish species in recent years. While these fisheries vary considerably in terms of scale, operation, and target species, they remain important components of coastal fishing activities throughout the Indian Ocean.

In contrast, catches of neritic tunas reported by longline and baitboat fisheries have continued to decline relative to those reported by other fishing gears. This trend likely reflects the primary focus of these fisheries on other target species and their operation in areas where neritic tuna species occur at relatively low abundance.

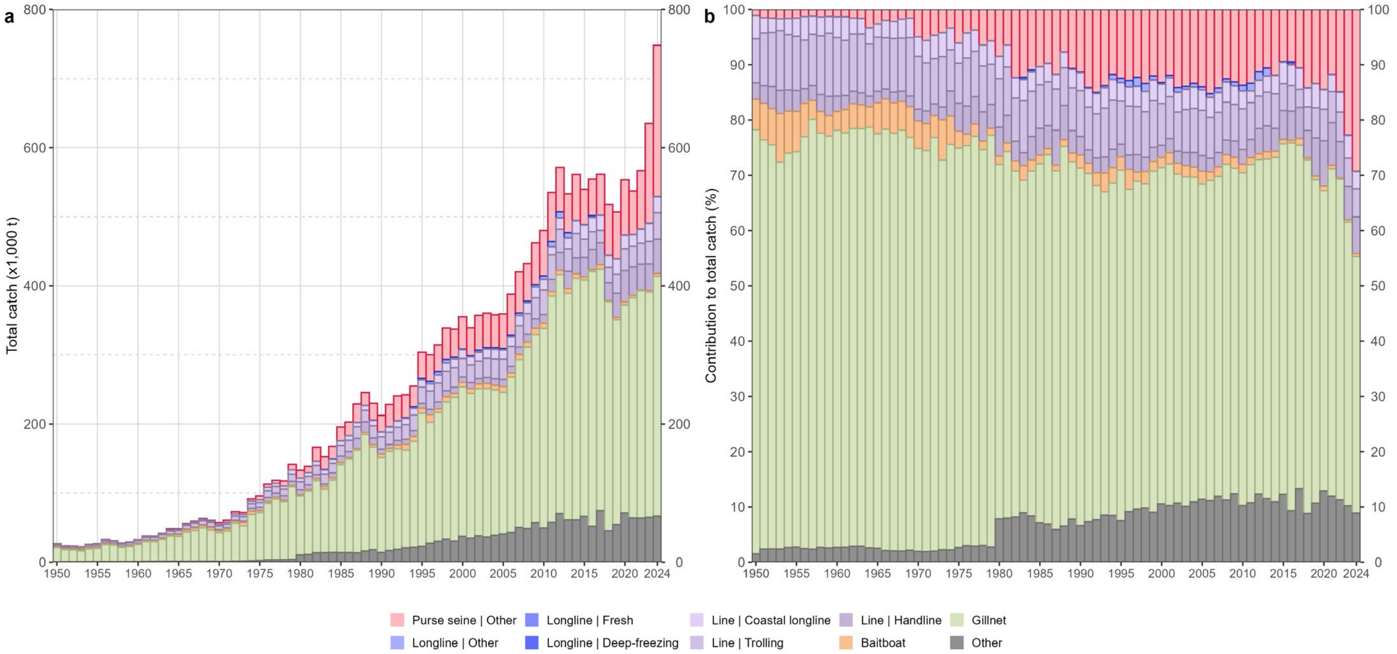

Figure 4.2: Annual time series of (a) cumulative retained catches (metric tonnes; t) and (b) contribution to the total retained catches (percentage; %) of IOTC neritic tunas and seerfish by fishery for the period 1950-2024

Catches of neritic tuna and seerfish species have generally increased since 1950, reaching a record high of approximately 748 thousand t in 2024 following a temporary decline in 2019 (**Fig. 4.3**). Among the species managed by the IOTC, narrow-barred Spanish mackerel contributed the largest cumulative catch, with approximately 5.3 million t between 1950 and 2024, followed by longtail tuna with approximately 4.2 million t over the same period. These species accounted for 28% and 23% of the cumulative catch, respectively. The catch trends also indicate a notable increase in bullet tuna catches in recent years.

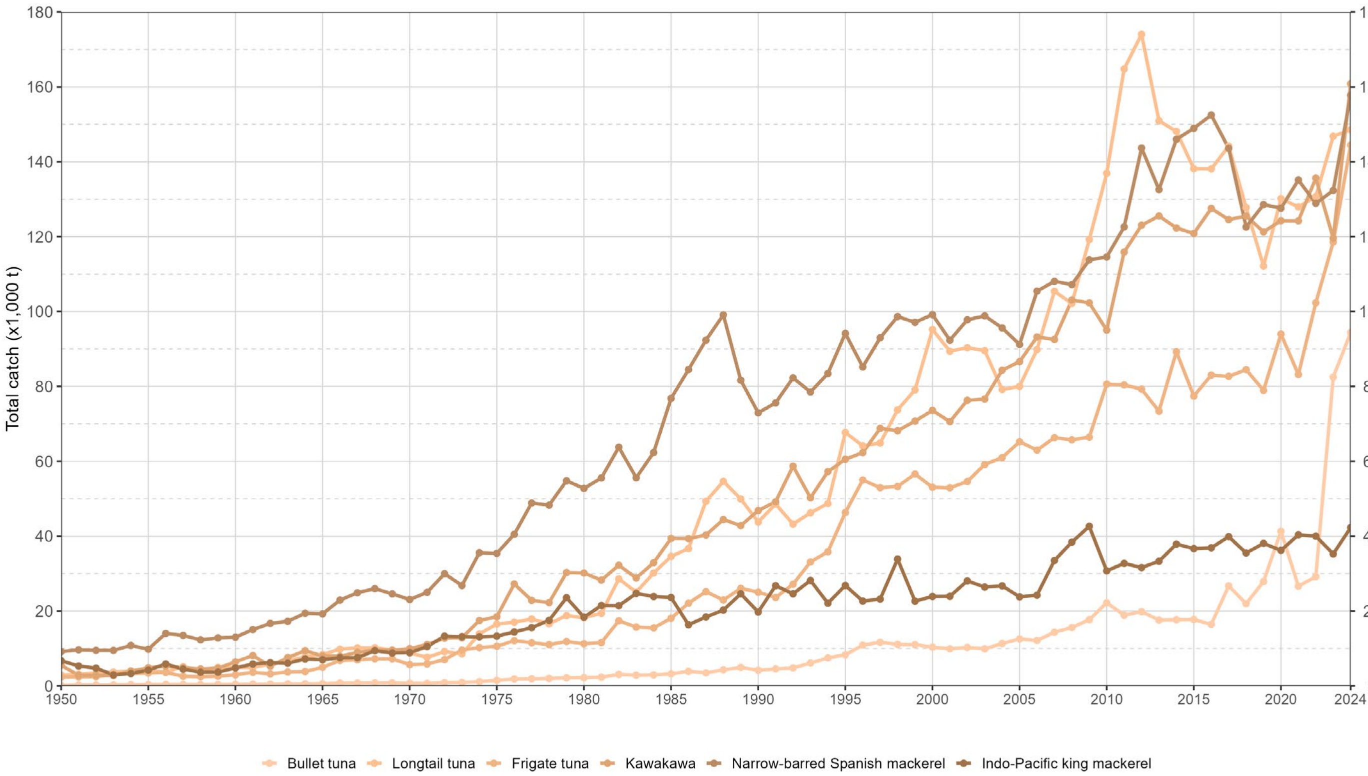

Figure 4.3: Annual time series of retained catches (metric tonnes; t) of IOTC neritic tunas and seerfish by species for the period 1950-2024

Catch trends vary considerably among neritic tuna and seerfish species. Detailed assessments of the three species evaluated this year are provided in the relevant appendices. A brief overview of catch trends for each species is presented below:

- **Bullet Tuna (BLT)**: Recent catch trends indicate a substantial increase in bullet tuna catches, driven primarily by coastal purse-seine fisheries, while catches from other fisheries remain comparatively low. Reported catches increased from 29,000t in 2022 to 94,000t in 2024. Indonesian purse-seine fisheries accounted for approximately 49% of total catches during 2023-2024.

- **Frigate Tuna (FRI)**: Similar to bullet tuna, frigate tuna catches have increased substantially in recent years. Historically, gillnet fisheries were the principal source of catches; however, catches from purse-seine fisheries have increased markedly and now exceed those from gillnet fisheries. Total catches increased from 83,000t in 2021 to 144,000t in 2024. Indonesian fisheries contributed approximately 61% of the total catch in 2024.

- **Kawakawa (KAW)**: Catch trends show a steady increase in catches from gillnet fisheries, accompanied by a sharp rise in purse-seine catches in 2024. Total catches reached a record high of 161,000t in 2024. During the period 2020–2024, gillnet fisheries accounted for 56% of total catches, while purse-seine fisheries contributed 25%. India and the Islamic Republic of Iran were the leading contributors, accounting for 29% and 27% of catches, respectively.

- **Longtail Tuna (LOT)**: In contrast to the previous species, longtail tuna catches have exhibited a more variable pattern. Catches peaked at 174,000t in 2012, reflecting increased fishing activity by coastal fisheries during the piracy period in the western Indian Ocean, before declining in subsequent years. A slight increase was observed in 2024. Gillnets remain the dominant fishing gear, contributing an average of approximately 63% of annual catches during the past five years. Islamic Republic of Iran accounted for more than 39% of total catches over the same period.

- **Indo-Pacific King Mackerel (GUT)**: Catches of Indo-Pacific king mackerel have remained relatively stable over the past five years, averaging approximately 39,000 t annually. Gillnet fisheries continue to dominate catches, contributing around 64% of the total. India remains the leading fishing fleet, accounting for approximately 37% of reported catches.

- **Narrow-barred Spanish Mackerel (COM)**: Historically, narrow-barred Spanish mackerel was the most important neritic species harvested in the Indian Ocean. In recent years, however, catches of several other neritic species have increased and, in some cases, surpassed the narrow-barred Spanish mackerel. As with other neritic species, gillnet fisheries remain the dominant fishing method, accounting for approximately 70% of total catches, which are almost exclusively derived from coastal waters. While India historically reported the highest catches, Iranian fisheries have become the principal contributor in recent years. Approximately two-thirds of total catches originate from the Islamic Republic of Iran (21%), India (19%), and Indonesia (17%). Total catches reached a record high of 158,000t in 2024.

At its most recent session, held in Oman in September 2025, the Regional Commission for Fisheries (RECOFI) reviewed management recommendations for narrow-barred Spanish mackerel in the northern Indian Ocean, including seasonal closures and minimum size measures aimed at improving the sustainability of the fishery (RECOFI 2025).

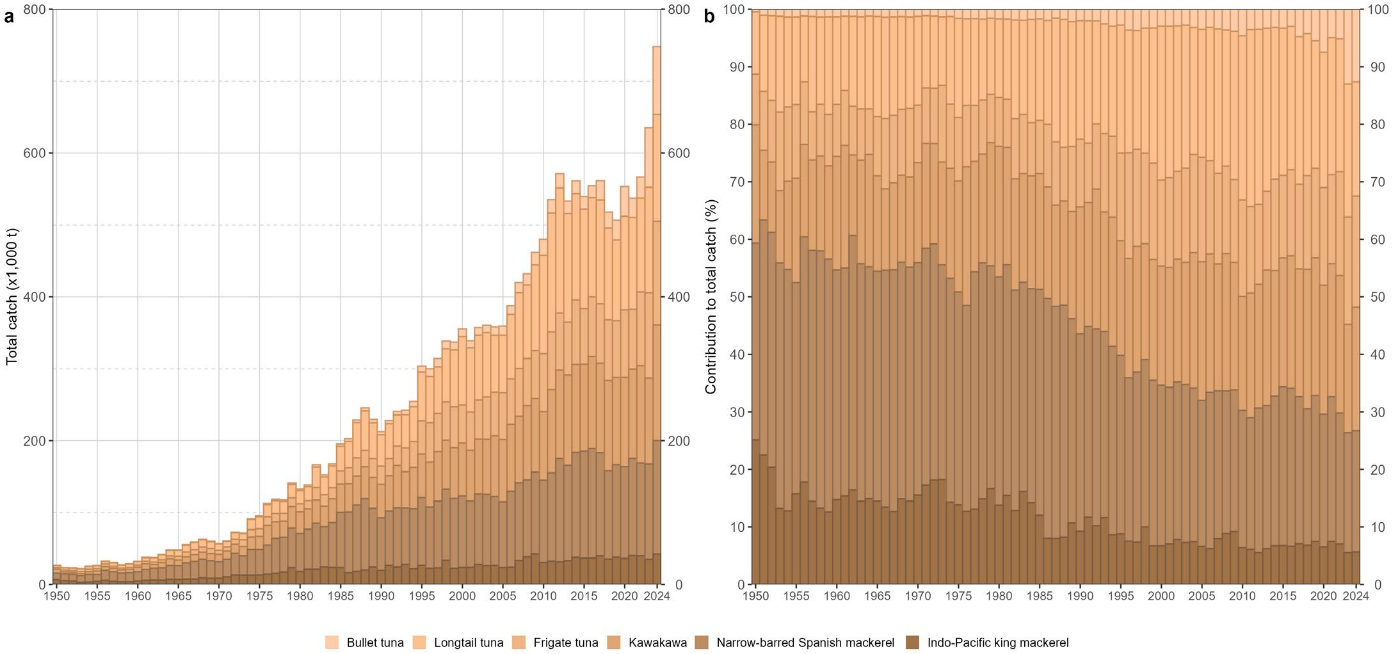

Figure 4.4: Annual time series of (a) cumulative retained catches (metric tonnes; t) and (b) contribution to the total retained catches (percentage; %) of IOTC neritic tunas and seerfish by species for the period 1950-2024

4.1.2 Recent fishery features (2020-2024)

Catches of neritic tuna and seerfish species among the principal fishing fleets have shown notable variation in recent years (2020-2024). Compared with historical estimates, revisions to Indonesia's catch time series have altered the relative contribution of neritic tuna and seerfish species, resulting in lower historical catch estimates. Nevertheless, catches have increased substantially over the past two years, exceeding those of all previous years in the time series. The average annual catch of neritic tuna and seerfish species reported by Indonesia increased from 129,000t between 2020 and 2022 to 232,000t during 2023–2024.

The distribution of catches by fishery in recent years indicates that gillnets remain the dominant fishing gear for neritic tuna and seerfish species, accounting for more than 50% of total catches. Purse-seine fisheries have shown a notable increase in recent years and currently contribute approximately 20% of total catches. In contrast, contributions from other fisheries remain relatively low, with longline fisheries accounting for less than 0.1% of the total catch (**Table 4.1**).

Table 4.1: Mean annual retained catches (metric tonnes; t) of IOTC neritic tunas and seerfish by fishery between 2020 and 2024 with indication of contribution of each fishery to the total

Fishery	Fishery code	Catch	Percentage
Gillnet	GN	324,324	53.3
Purse seine | Other	PSOT	118,281	19.4

Fishery	Fishery code	Catch	Percentage
Other	OT	66,093	10.9
Line | Handline	LIH	42,341	7.0
Line | Trolling	LIT	32,628	5.4
Line | Coastal longline	LIC	21,062	3.5
Baitboat	BB	3,149	0.5
Longline | Fresh	LLF	271	0.0
Longline | Deep-freezing	LLD	47	0.0
Longline | Other	LLO	0	0.0

Recent catch trends indicate that Indonesia, India, and the Islamic Republic of Iran collectively accounted for approximately 68% of total neritic tuna and seerfish catches in the Indian Ocean during 2020 and 2024. These catches were derived from a diverse range of fisheries. Indonesian and Indian fisheries are characterized by multi-purpose, small-scale fleets employing a variety of fishing gears, whereas Iranian fisheries are predominantly gillnet-based, although some vessels switch gears seasonally in response to changing fishing opportunities (**Fig. 4.5**).

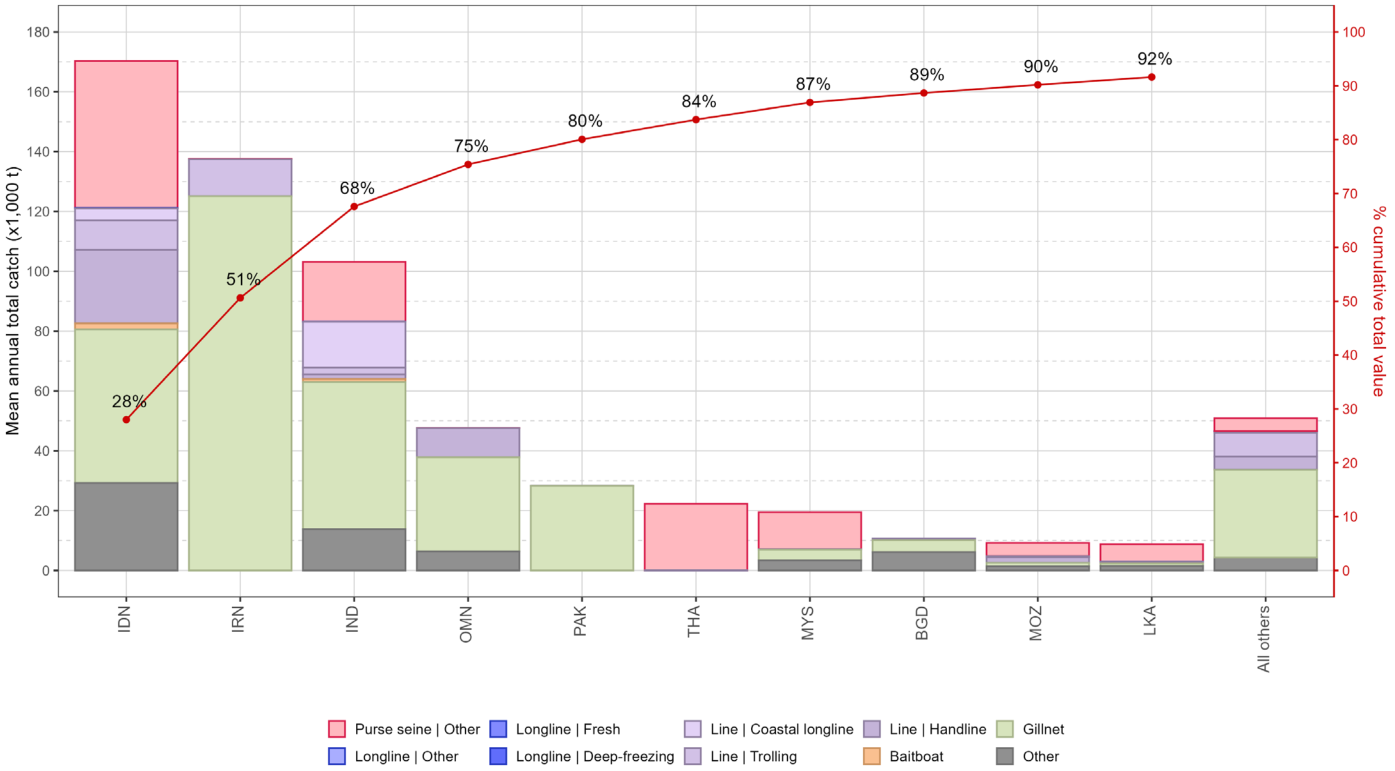

Figure 4.5: Mean annual retained catches (metric tonnes; t) of IOTC neritic tunas and seerfish by fleet and fishery between 2020 and 2024, with indication of cumulative contribution (percentage; %) of catches by fleet

Catch trends by fishery group indicate an overall increase in catches from both gillnet and purse-seine fisheries (**Fig. 4.6**). At the fleet level, Iranian gillnet fisheries have shown increasing catches in recent years, although the magnitude of the increase has been lower than that observed in Indonesian gillnet fisheries. In contrast, catches from Indian gillnet fisheries declined in 2024 after reaching peak levels in 2022 and 2023.

A particularly notable increase was observed in Indonesian purse-seine fisheries, with catches rising from approximately 24,000t to an average of 93,000 t during 2023-2024. Increases in purse-seine catches were also recorded for Thailand and India in 2024. Similar upward trends were observed in Indonesian line, baitboat, and other fisheries.

Conversely, catches from Indian line and baitboat fisheries declined in 2024. Line fishery catches decreased from 24,000 t in 2023 to 12,000 t in 2024, while baitboat fishery catches have shown a continuous decline since 2020. In contrast, catches of neritic tuna and seerfish species from other Indian fisheries increased in 2024(**Fig. 4.7**).

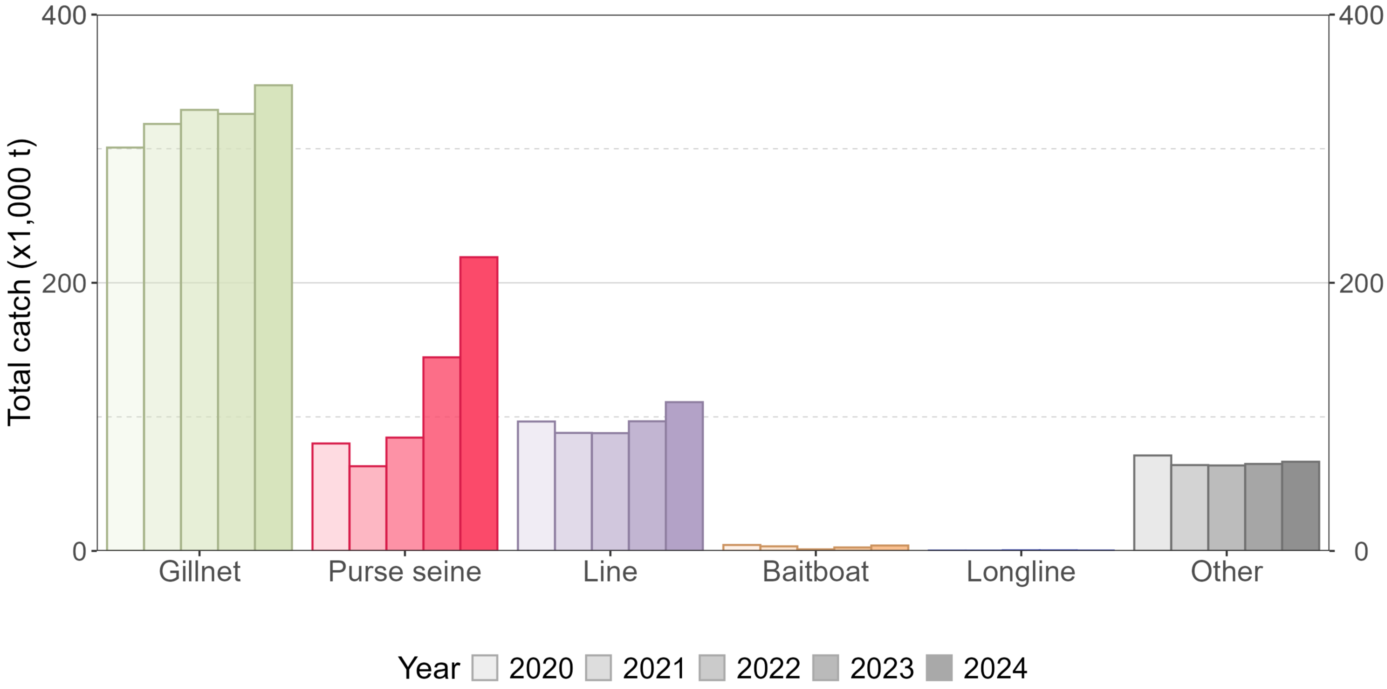

Figure 4.6: Annual trends in retained catch (metric tonnes; t) of IOTC neritic tunas and seerfish by fishery group between 2020 and 2024

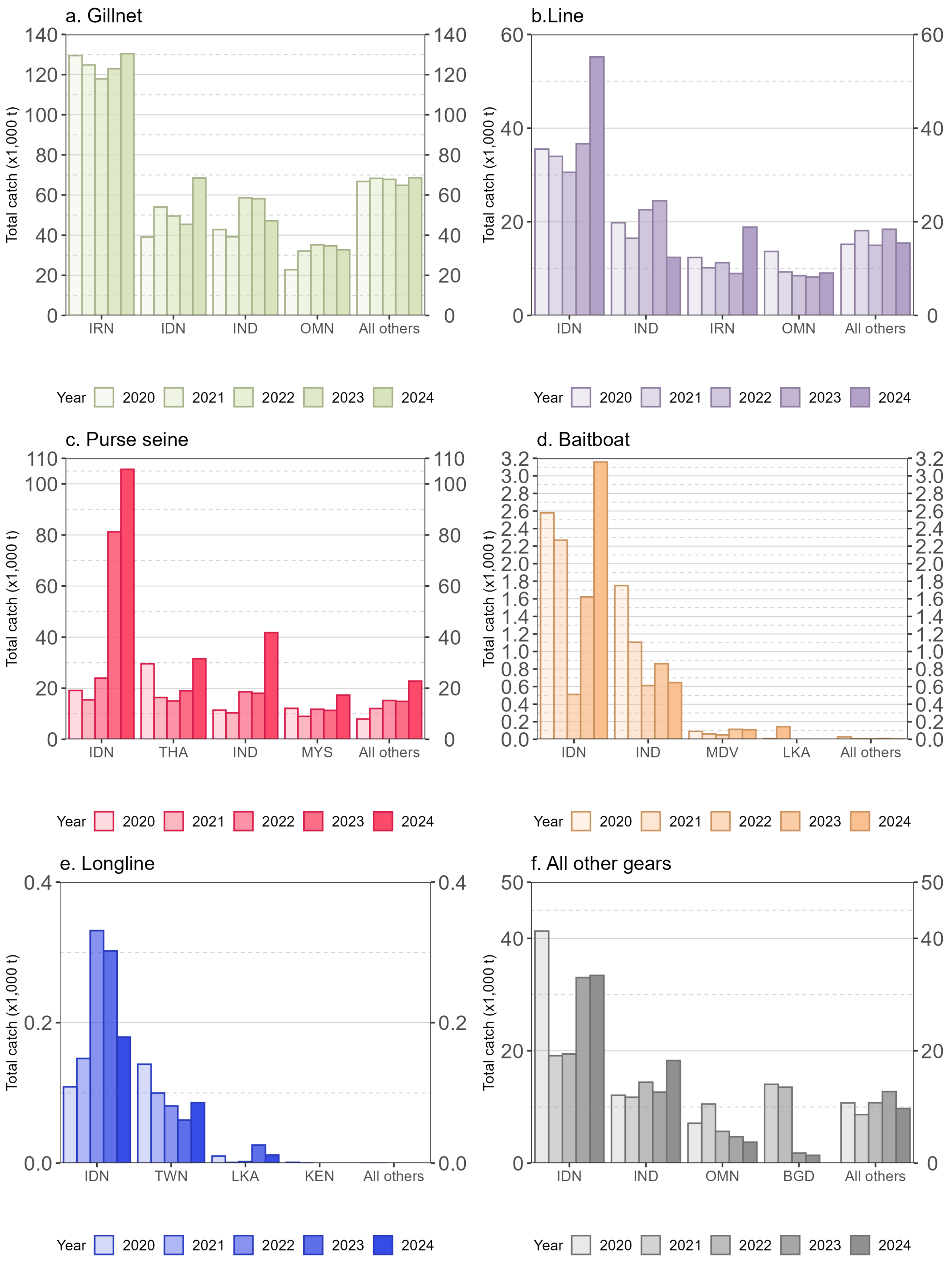

Figure 4.7: Annual trends in retained catch (metric tonnes; t) of IOTC neritic tunas and seerfish by fishery group and fleet between 2020 and 2024

4.1.3 Changes from previous Working Party

The Secretariat did not receive any major historical updates between WPNT15 and WPNT16 that would substantially affect the catch estimates for neritic tuna and seerfish species. Apart from the revision of Indonesia's 2023 catch data, which had previously been estimated by the IOTC Secretariat due to delays in the submission of revised national statistics, only minor changes were reported by a small number of CPCs between the two meetings. Details of catch data revisions by CPC are provided in Appendix III.

The update to Indonesia's 2023 catch data resulted in an overall reduction of approximately -15,000t in the estimated catches of neritic tuna and seerfish species (**Fig. 4.8**).

Comparisons of catch estimates for the species assessed during the current cycle are presented in their respective appendices. These comparisons highlight differences between the catch data used in the previous assessment and the latest datasets available for the current assessment year.

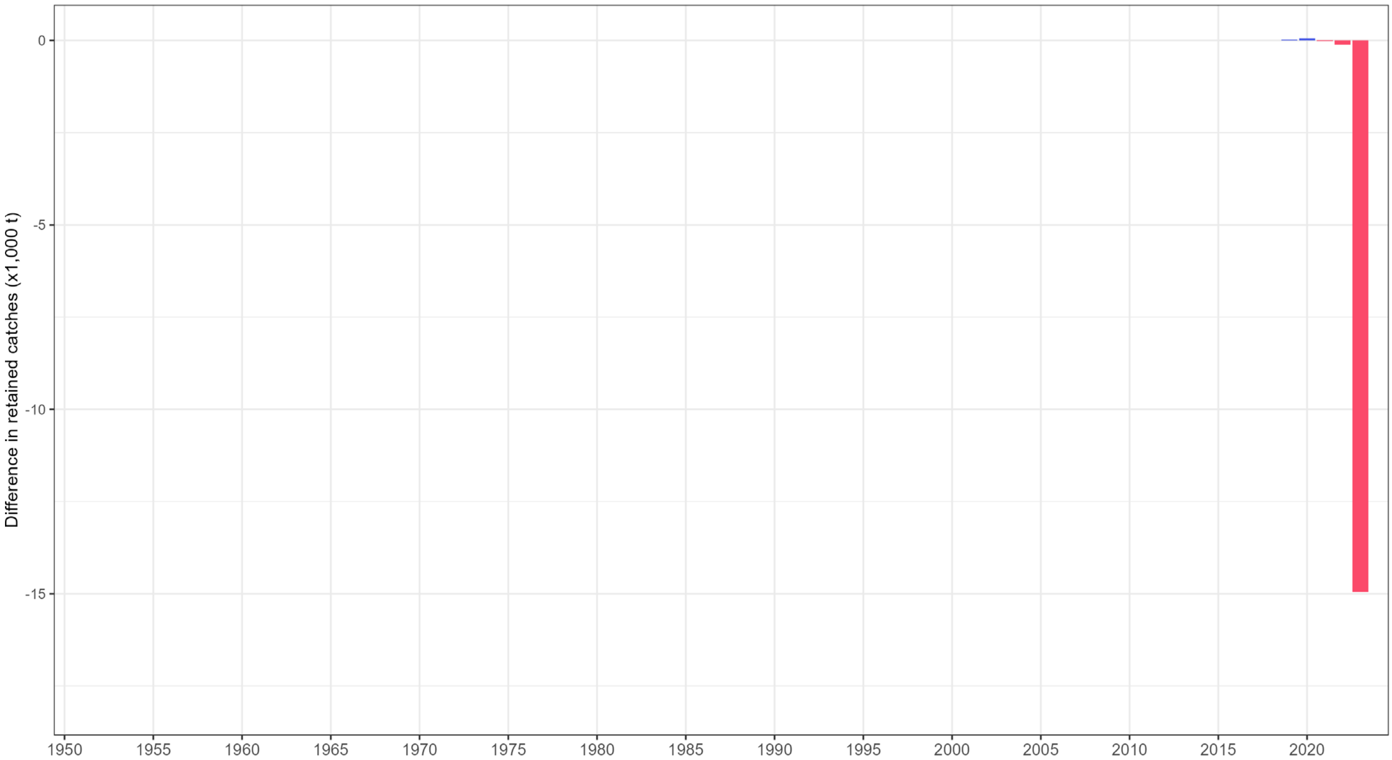

Figure 4.8: Differences in the annual retained catches (metric tonnes; t) of neritic tuna and seerfish available at this WPNT and its previous session

4.1.4 Uncertainties in retained catch data

Uncertainty associated with catch data available in the IOTC databases has become an increasing concern for scientists (Cappa et al. 2024). To address these challenges, the Secretariat, with supplementary funding provided by CPCs, has intensified its support to members with limited reporting capacities (Capacity Development in Support of IOTC Developing Coastal States). These include in-country missions, regional workshops, and other technical assistance modes, as well as the development of a range of reporting and validation tools designed to improve data quality and facilitate compliance with IOTC reporting requirements.

These efforts have resulted in gradual improvements in the reporting of retained-catch data, as reflected by increasing levels of data submission over time. However, similar progress has not been consistently observed across other datasets.

Several CPCs continue to face challenges in meeting reporting obligations due to constraints within their national fisheries data collection systems, including:

- Limited emphasis on recording catches of tuna and tuna-like species, particularly where these species represent a relatively small component of total catches;

- Insufficient numbers of trained personnel and frequent turnover of key technical staff within fisheries administrations;
- Inadequate or non-existent fisheries data collection and management frameworks;
- Limited financial resources available for fisheries monitoring and management activities.

Recent reviews and revisions of catch data have improved the availability of retained catch data for neritic tuna and seerfish species, which are predominantly harvested by coastal fisheries. However, improved availability does not necessarily imply improved data quality. The analyses presented here primarily evaluate the level of catch disaggregation by species and fishery, as well as the overall availability of species-specific catch information. Accurate identification of neritic tuna and seerfish species can be challenging due to similarities among species, particularly at juvenile stages. In addition, the multi-species and multi-gear nature of many coastal fisheries complicates the collection of species and gear specific catch data in the absence of well-designed sampling programmes.

The proportion of nominal catches reported to the Secretariat at either a fully or partially disaggregated level (quality scores 0–2) has varied between 44.7% and 97.8% of total catches over time. Nevertheless, reporting completeness has shown a clear and encouraging upward trend since the mid-1990s, reaching its highest level in 2024 (**Fig. 4.9**)..

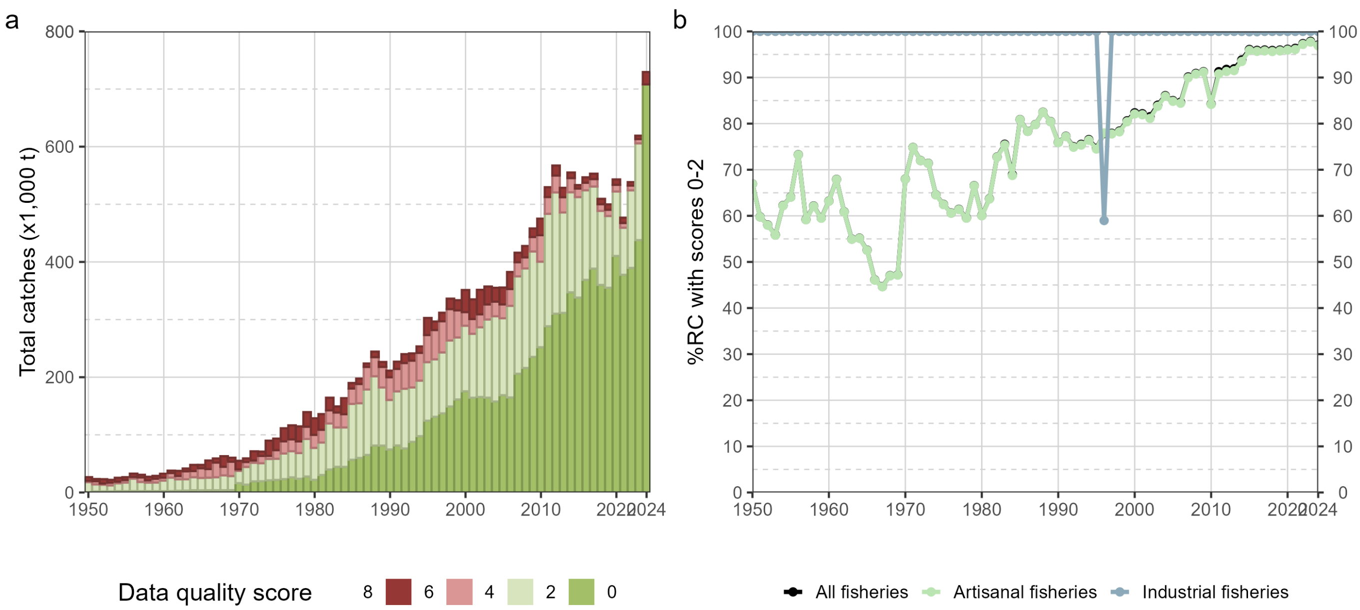

Figure 4.9: Annual time series of (a) cumulative retained catches (metric tonnes; t) estimated by quality score and (b) contribution of retained catches fully or partially reported to the IOTC Secretariat to all retained caches (percentage; %) of IOTC neritic tunas and seerfish for all fisheries and by type of fishery, for the period 1950-2024

The proportion of catches estimated by the Secretariat from alternative information sources has progressively decreased, reflecting improvements in CPC reporting and data availability (Appendix III).

4.2 Spatial distribution of catch and effort

The Secretariat has conducted several workshops to assist CPCs in improving data reporting, including the development and reporting of spatially referenced fisheries information. Particular emphasis has been placed on supporting CPCs in deriving and reporting catches by spatial grid area. Despite these efforts, some CPCs, especially those with large small-scale fisheries sectors, continue to face challenges in providing catch and effort data at the required spatial resolution.

To address these limitations, the Secretariat has developed alternative approaches that allow CPCs to report catches by fishing ground or fishing area. These approaches have been well received by many CPCs and enable the Secretariat to subsequently convert the reported information into the standard IOTC spatial grid format during data processing.

These capacity development activities have contributed to increased availability of geo-referenced catch and effort data from several fleets. Nevertheless, significant challenges remain, particularly in small-scale fisheries, where limitations in data collection infrastructure, financial resources, and technical capacity continue to constrain full compliance with IOTC reporting requirements.

4.2.1 Geo-referenced effort

Geo-referenced effort data are available for several major coastal fisheries targeting neritic tuna and seerfish species. However, these datasets exhibit a number of inconsistencies that limit their direct use in standardized analyses. The principal issues include:

- Changes in the effort units reported over time;
- Misapplication of effort units, whereby the reported values are inconsistent with the specified measurement units;
- Incomplete coverage, resulting in temporal variations in reported effort that may not accurately reflect the le vel of fishing activity associated with total catches.

Although these data are processed and maintained within the IOTC databases, caution should be exercised when interpreting and presenting effort trends derived from them.

Geo-referenced effort data from purse-seine fisheries indicate that fishing effort is distributed across a broad range of areas throughout the Indian Ocean. Although some of these fisheries are classified as small-scale, their operations may extend beyond national Exclusive Economic Zones (EEZs). Malaysia and Thailand have provided relatively consistent effort data in recent years (**Fig. 4.10**). In contrast, Indonesia and Sri Lanka have changed their effort reporting units over time.

Indonesian purse-seine fisheries reported effort in sets between 2019 and 2021 and in fishing days between 2022 and 2024. Despite this change in reporting units, the spatial distribution of fishing effort remained broadly similar between the two periods, with only minor differences observed (**Fig. 4.11**). Likewise, effort data reported by Sri Lanka indicate that fishing activity was concentrated in similar areas across both reporting periods, despite changes in the effort measurement units used (**Fig. 4.12**).

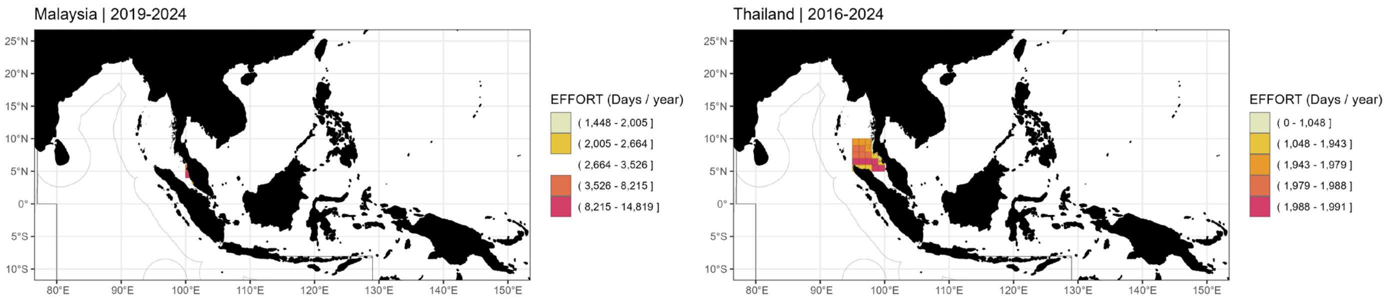

Figure 4.10: Distribution of fishing effort available at the IOTC Secretariat for purse seine fisheries catching IOTC neritic tunas and seerfish from Malaysia and Thailand. Light grey solid lines delineate areas beyond national jurisdiction

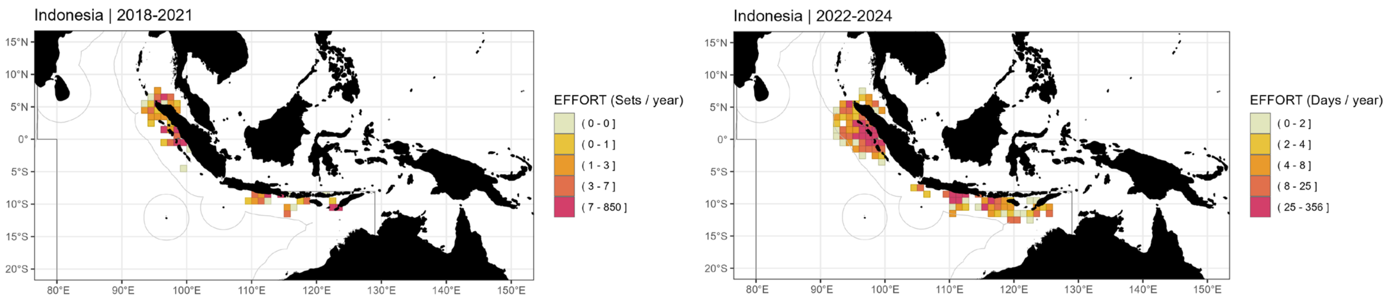

Figure 4.11: Distribution of fishing effort available at the IOTC Secretariat for purse seine fisheries of Indonesia for the catch of IOTC neritic tunas and seerfish between 2018 and 2024, by different effort unit. Light grey solid lines delineate areas beyond national jurisdiction

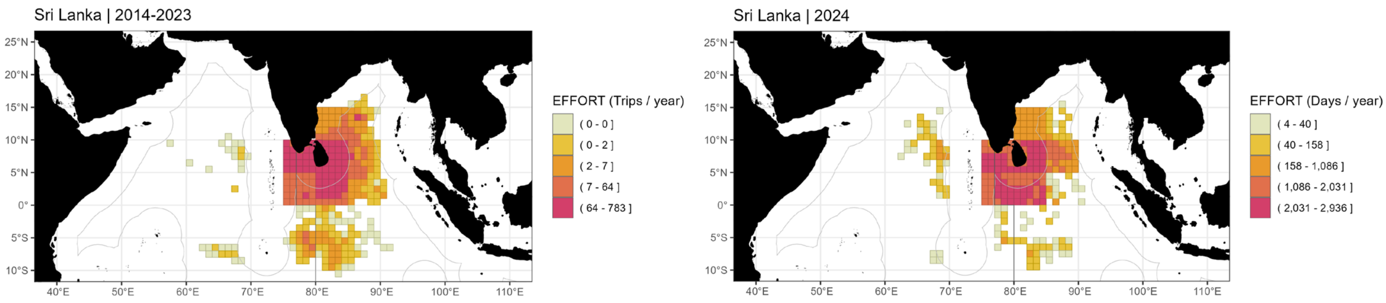

Figure 4.12: Distribution of fishing effort available at the IOTC Secretariat for purse seine fisheries of Sri Lanka for the catch of IOTC neritic tunas and seerfish between 2014 and 2024, by different effort unit. Light grey solid lines delineate areas beyond national jurisdiction

Geo-referenced effort data for line fisheries show varying spatial distributions depending on the effort unit reported. The most commonly used effort measures are fishing days and number of trips, for which effort data are available across much of the Indian Ocean. In recent years, an additional effort metric, number of operational fishing gears, has been reported. However, these data are currently available only for the last two years and have been reported exclusively by coastal states in East Africa (**Fig. 4.13**).

The diversity of effort metrics used in line fisheries reflects differences in national data collection systems and fishery characteristics, complicating comparisons among fleets and across time. As a result, caution is required when interpreting spatial and temporal patterns of fishing effort derived from these datasets.

Recent amendments to IOTC reporting requirements have prompted several CPCs to transition from reporting effort as the number of fishing trips to fishing days, which is now the preferred standard effort unit. This change is expected to improve the consistency and comparability of effort data across fisheries and reporting periods.

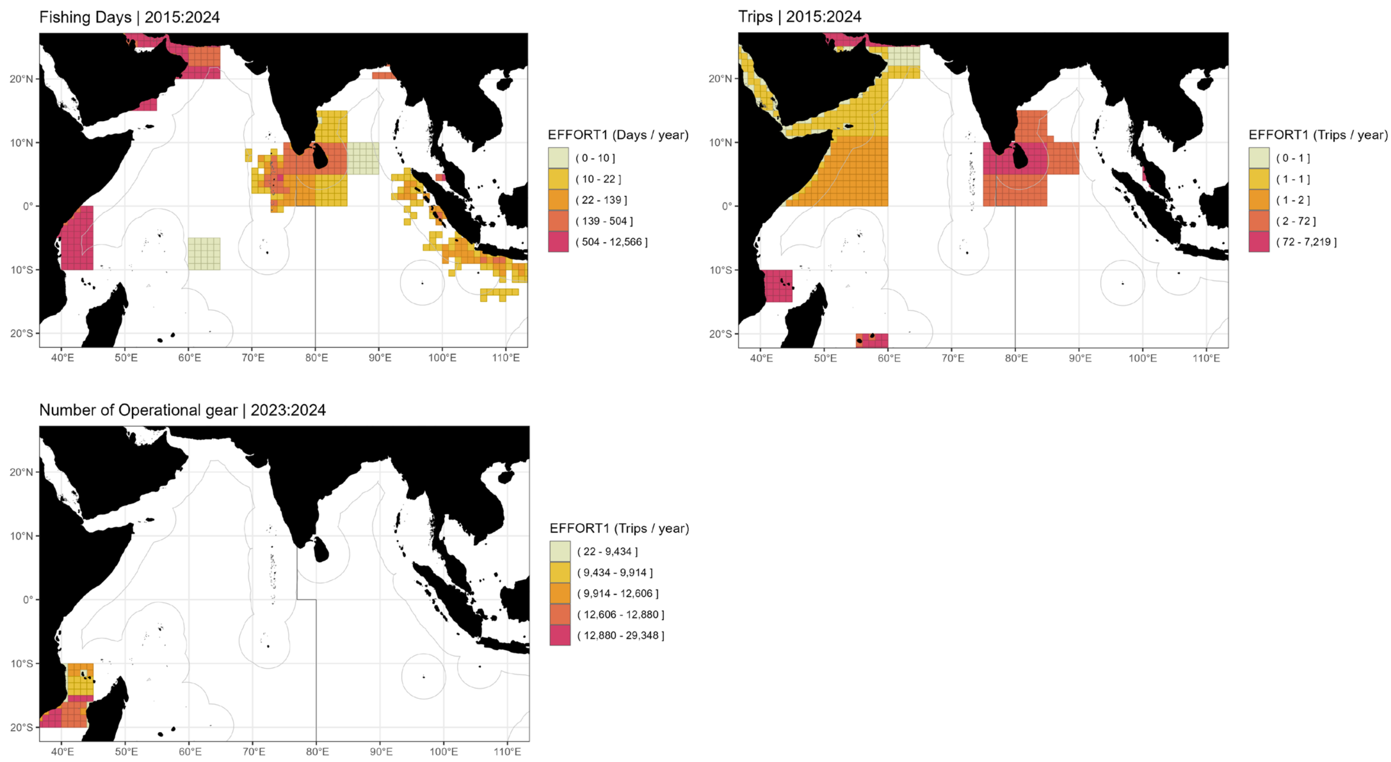

Figure 4.13: Distribution of fishing effort available at the IOTC Secretariat for line fisheries catching IOTC neritic tunas and seerfish by type of effort unit. Light grey solid lines delineate areas beyond national jurisdiction

Assessing the spatial distribution of fishing effort by fleet for line fisheries is challenging with the changes in effort measurement units over time.

Comoros consistently reported line fishery effort in number of trips between 2011 and 2022, while the Maldives used the same effort metric between 2013 and 2022. In earlier years, effort data for most line fisheries were similarly reported in number of trips. Oman, on the other hand, regularly reported effort data prior to 2015 using number of boats as the effort measure, with additional data becoming available again from 2024 onwards. Malaysia has provided relatively consistent effort information, reporting both number of trips and fishing days as effort units throughout the time series (**Fig. 4.14**).

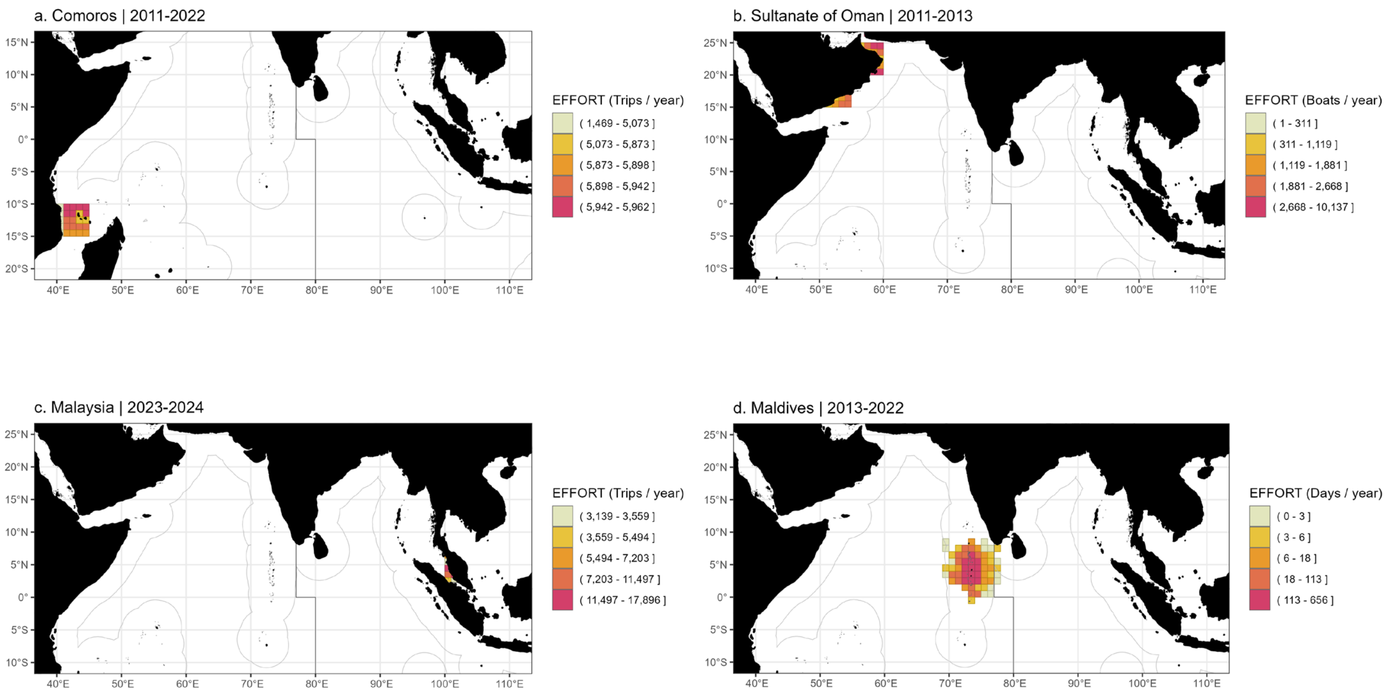

Figure 4.14: Distribution of fishing effort available at the IOTC Secretariat for line fisheries of some line fishing fleets catching IOTC neritic tunas and seerfish by type of effort unit. Light grey solid lines delineate areas beyond national jurisdiction

Indonesia, in contrast, primarily reported effort for its coastal longline fisheries in terms of number of hooks, while fishing days were used as the principal effort metric for other line fisheries (**Fig. 4.15**).

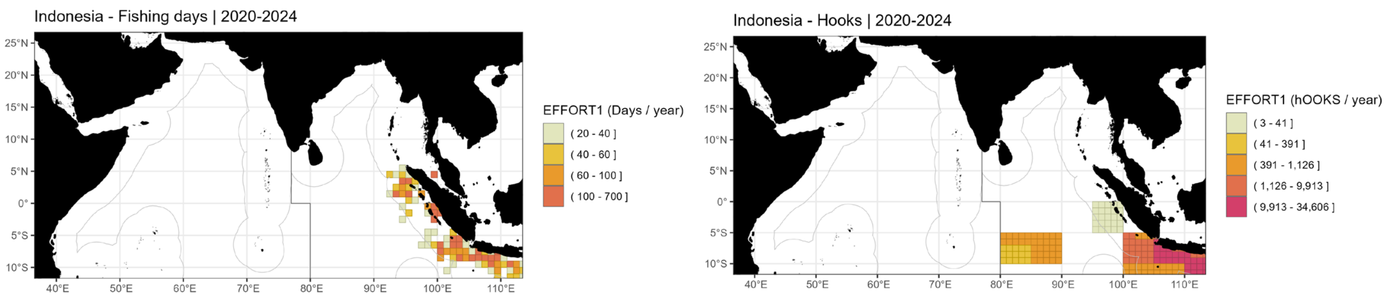

Figure 4.15: Distribution of fishing effort available at the IOTC Secretariat for line fisheries of Indonesia catching IOTC neritic tunas and seerfish by type of effort unit. Light grey solid lines delineate areas beyond national jurisdiction

Geo-referenced effort data from the Islamic Republic of Iran have improved considerably in recent years, with increased availability and coverage of reported data. Historically, effort in line fisheries was reported as the number of trips, calculated from the total number of landings made by individual vessels. However, this reporting approach occasionally resulted in duplicated records and potential overestimation of fishing effort. Since 2023, this fleet has adopted fishing days as the primary effort unit for reporting line fisheries, improving the consistency and reliability of the effort data (**Fig. 4.16**).

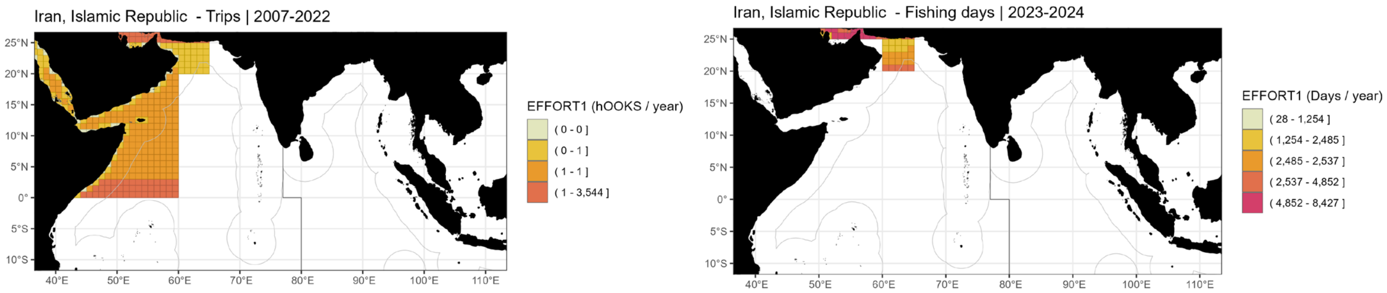

Figure 4.16: Distribution of fishing effort available at the IOTC Secretariat for line fisheries of Islamic Republic of Iran catching IOTC neritic tunas and seerfish by type of effort unit. Light grey solid lines delineate areas beyond national jurisdiction

Despite accounting for a substantial proportion of neritic tuna and seerfish catches, gillnet fisheries have historically been associated with limited effort data availability. The Secretariat has received geo-referenced effort data from the Islamic Republic of Iran since 2007. Sri Lanka submitted effort data for earlier years; however, datasets of sufficient quality for analysis are only available from 2014 onwards. Indonesia, another major contributor to neritic tuna and seerfish catches, has provided geo-referenced effort data since 2018, although coverage remains limited for gillnet. In contrast, India has not been able to provide disaggregated effort data by fishery and fishing ground.

Several fleets have also modified their effort reporting practices in recent years, reflecting broader efforts to harmonize reporting standards across fisheries, including gillnet fisheries.

Historically, geo-referenced effort data from the Islamic Republic of Iran were reported in terms of number of trips, showing effort distributed across several areas of the northwestern Indian Ocean. More recently, effort has been reported in fishing days, with the spatial distribution indicating fishing activity concentrated primarily within the national jurisdictional waters of the Islamic Republic of Iran and adjacent high-seas areas (**Fig. 4.17**). The observed differences in effort distribution between reporting periods may partly reflect changes in reporting methodology rather than actual changes in fishing activity.

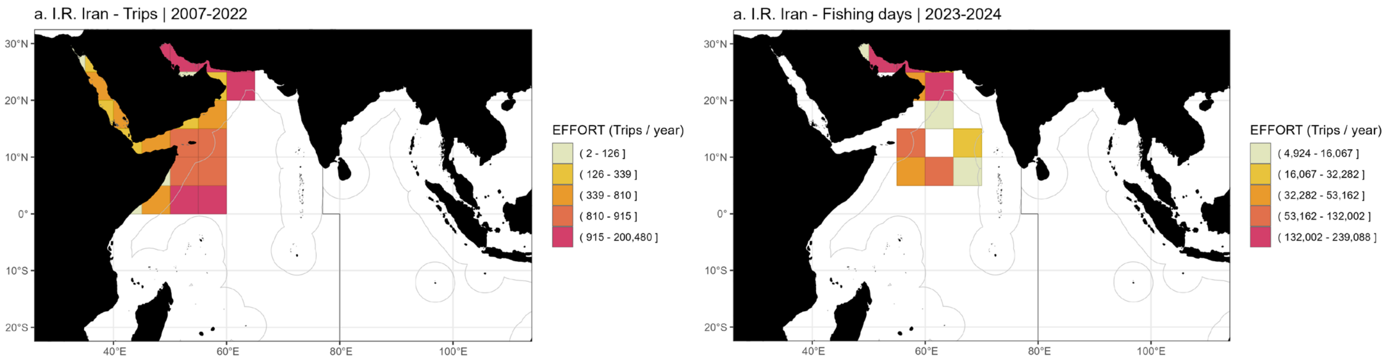

Figure 4.17: Distribution of fishing effort available at the IOTC Secretariat for gillnet fisheries catching IOTC neritic tunas and seerfish from I.R. Iran, by effort unit. Light grey solid lines delineate areas beyond national jurisdiction

Similarly, Sri Lanka has transitioned from reporting effort in number of fishing trips to fishing days as the standard effort measure. Comparison of the spatial distributions between the two reporting periods suggests that fishing effort in 2024 was more concentrated within Sri Lanka’s national jurisdictional waters (NJAs) than in previous years ((**Fig. 4.18**).

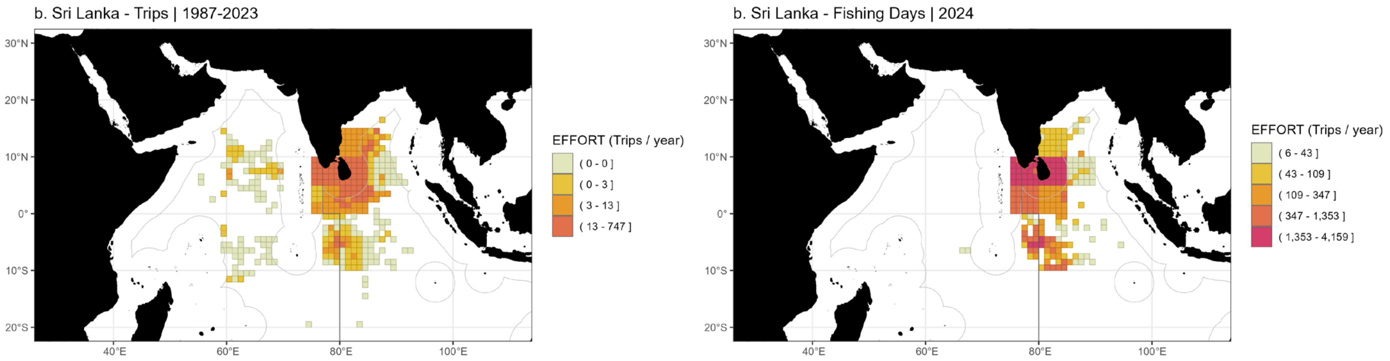

Figure 4.18: Distribution of fishing effort available at the IOTC Secretariat for gillnet fisheries catching IOTC neritic tunas and seerfish from Sri Lanka, by effort unit. Light grey solid lines delineate areas beyond national jurisdiction

4.2.2 Geo-referenced catches

Decadal maps of mean annual catch by gear show the lack of spatial information available on the catches of the six IOTC neritic tuna and seerfish species over the decades 1970-2000 (**Fig. 4.19**).

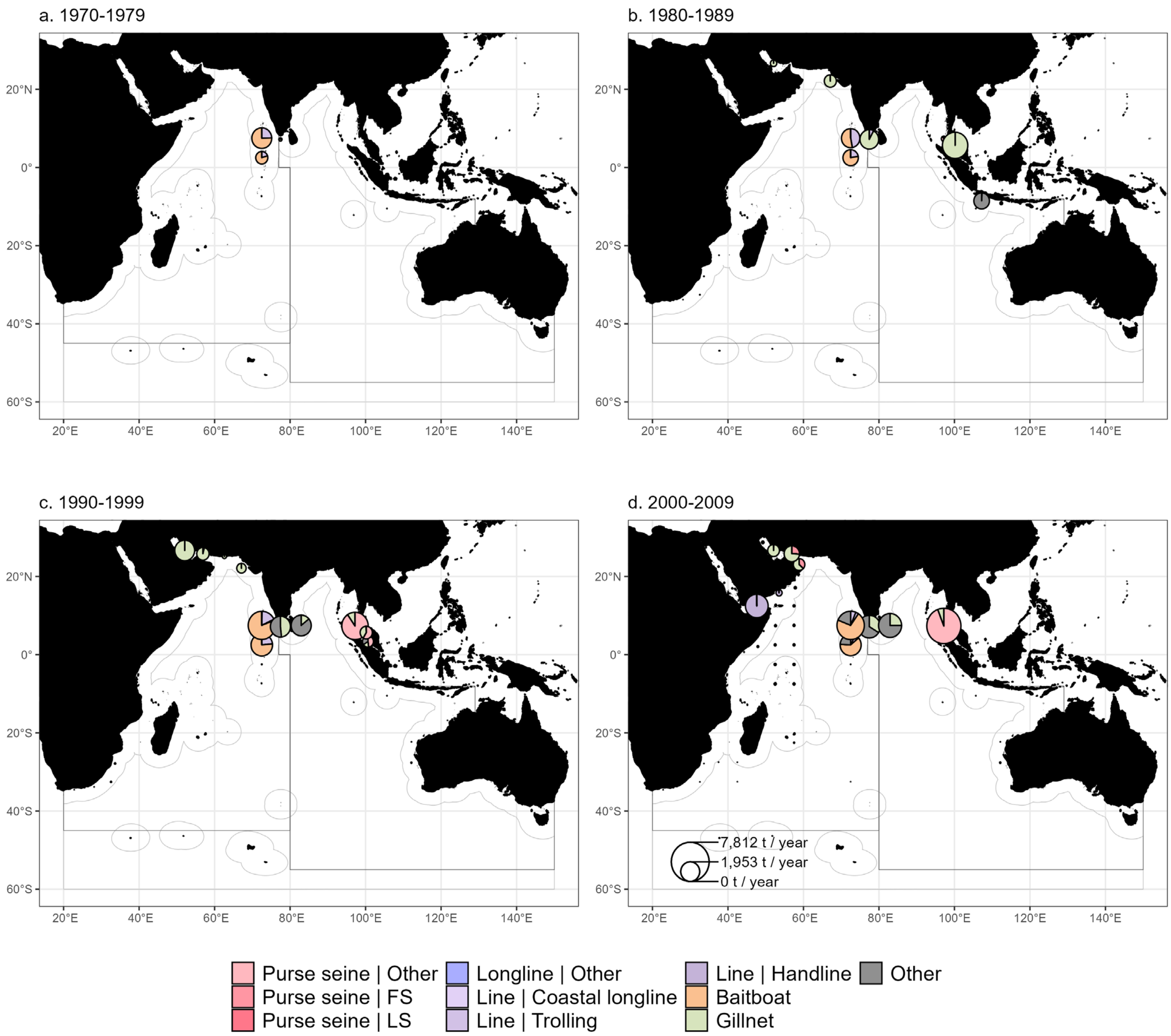

Figure 4.19: Mean annual time-area catches (metric tonnes; t) of IOTC neritic tuna and seerfish species by decade, 5x5 grid, and fishery as reported to the Secretariat. Light grey solid lines delineate areas beyond national jurisdiction

More information on the fishing grounds of IOTC managed neritic tuna and seerfish species has become available over the years (**Fig. 4.20**). However, the perceived spatial distribution and extent of these fisheries remain influenced by gaps in geo-referenced reporting from several major fishing nations targeting neritic tunas, including Indonesia, India, Pakistan, and Oman. Consequently, the spatial patterns presented may not fully reflect the true distribution of fishing activities across the Indian Ocean.

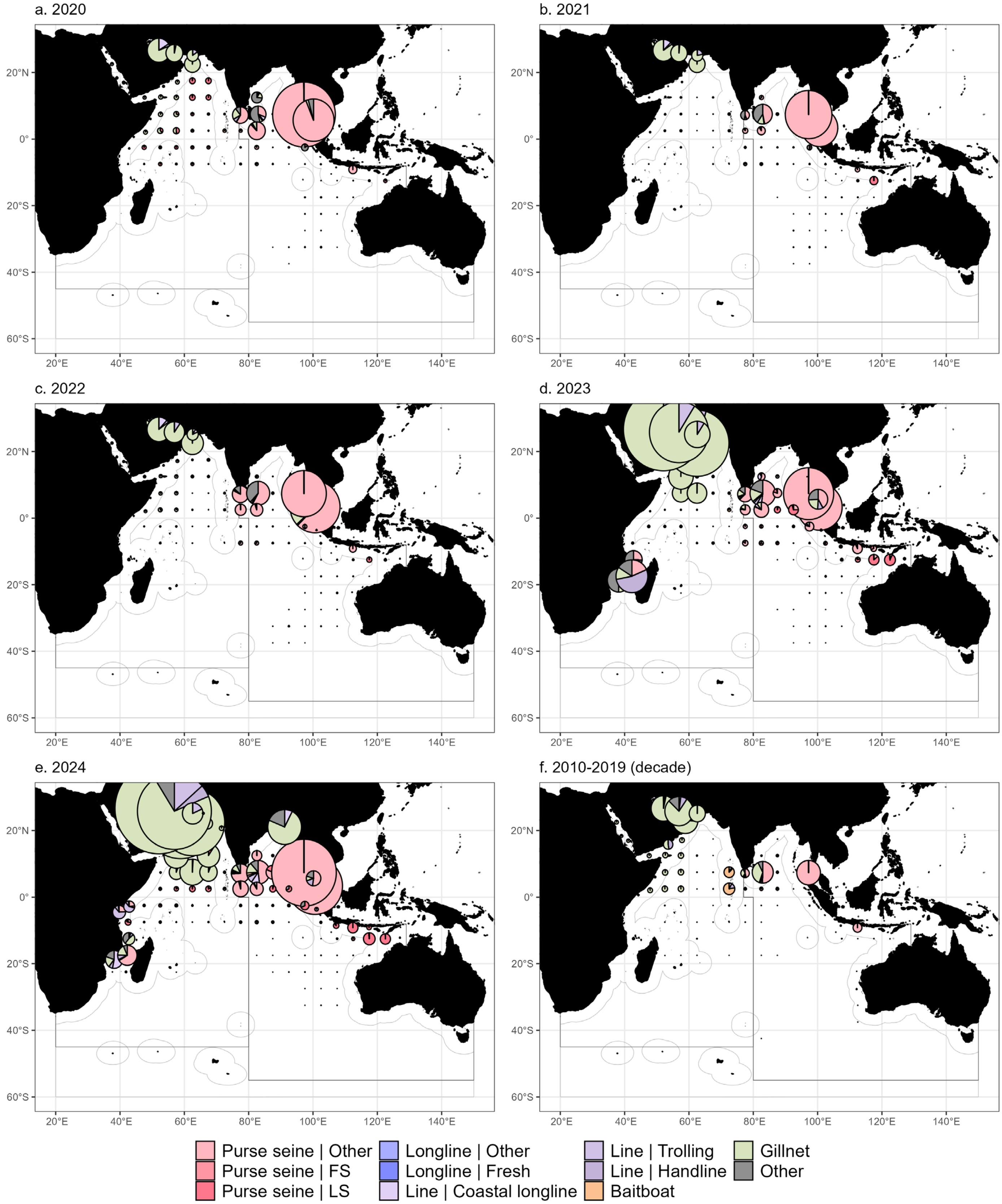

Figure 4.20: Mean annual time-area catches (metric tonnes; t) of IOTC neritic tuna and seerfish species by year for the period 2020-2024 and for the most recent decade, 5x5 grid, and fishery as reported to the Secretariat. Light grey solid lines delineate areas beyond national jurisdiction

4.2.3 Uncertainties in catch and effort data

Workshops and technical missions conducted by the Secretariat over recent years have helped CPCs improve the quality and completeness of their reported data. Nevertheless, the generation of geo-referenced fisheries data remains a challenge for many coastal fleets. Compared with previous years, some progress has been achieved, with several CPCs now submitting geo-referenced data using alternative fishing-ground area classifications, disaggregated by month and accompanied by associated effort information.

Despite these advances, the coverage of geo-referenced catch data for neritic tuna and seerfish species remains limited. This is largely because several of the major fleets targeting these species are still unable to provide complete geo-referenced information for their retained catches.

In recent years, Indonesia and the Islamic Republic of Iran have improved the coverage of their geo-referenced catch reporting; however, coverage remains below 100%. In contrast, India continues to face difficulties in disaggregating fisheries data by month, fishery, and effort. According to national authorities, these challenges arise from the complexity of the data collection process and the extensive spatial distribution of fishing grounds.

In 2024, several CPCs, including Oman, Pakistan, Tanzania, and Kenya, as well as some industrial fleets, submitted geo-referenced data for the first time or at an enhanced level of detail. Although these submissions did not fully meet IOTC reporting requirements, some datasets could be processed successfully, while others required further revision and validation.

Although the availability of geo-referenced data has improved, uncertainties remain. Sampling methodologies have not been systematically evaluated, and inconsistencies are evident in the catch and effort data reported by some CPCs. The principal factors limiting the collection and reporting of geo-referenced fisheries data include:

- Extensive and dispersed landing sites, where fisheries data are collected from only a subset of locations;
- Limited information on the capacity and characteristics of fishing vessels;
- Difficulties in maintaining consistent and reliable effort data over time;
- Insufficient funding to support comprehensive sampling programmes and the training and retention of fisheries enumerators.

The positive impact of Secretariat workshops and awareness-raising activities is reflected in the increasing availability of geo-referenced data from coastal fisheries in recent years (**Fig. 4.21a**). In 2024, the proportion of retained catches associated with sufficient geo-referenced catch-and-effort information (quality scores 0–2) reached 66.1%, representing an increase from 56.4% in 2023.

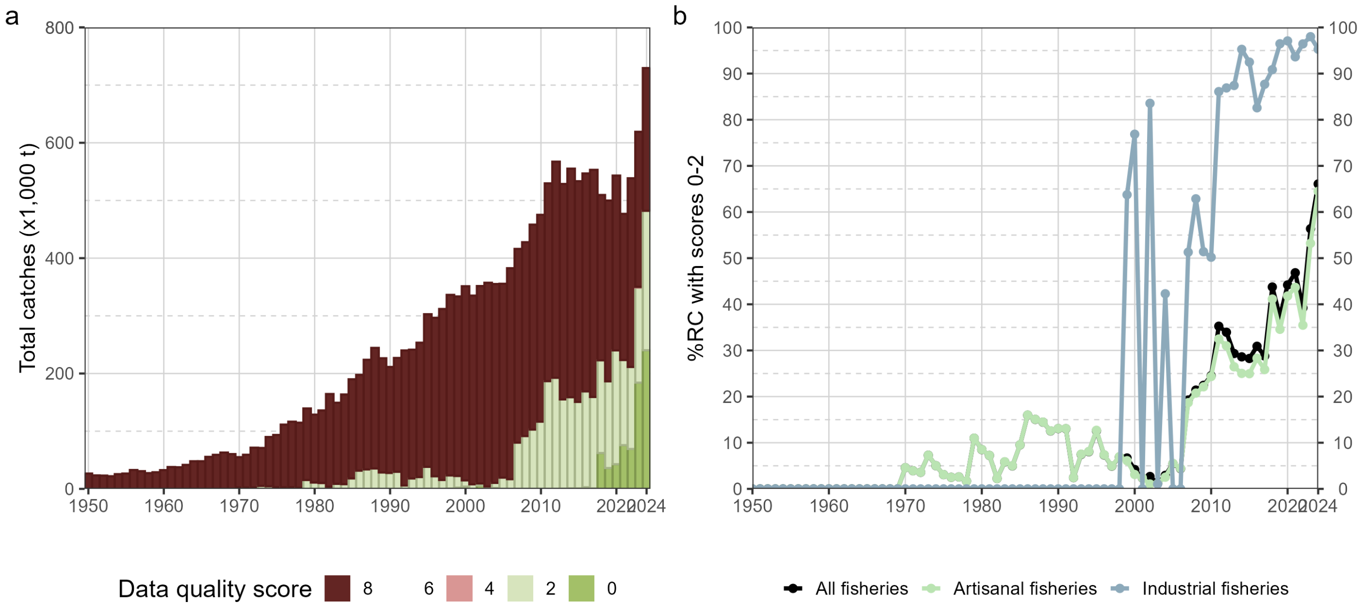

Figure 4.21: Annual time series of (a) cumulative retained catches (metric tonnes; t) estimated by quality score and (b) contribution of retained catches with corresponding geo-referenced catch and effort data reported to the IOTC Secretariat in agreement with the requirements of Res. 15/02 to all retained caches (percentage; %) of IOTC neritic tunas and seerfish for all fisheries and by type of fishery, for the period 1950-2024

4.3 Size composition of the catch

4.3.1 Samples availability

Depending on the catch levels of neritic tuna and seerfish species, CPCs undertaking biological sampling aim to meet the IOTC reporting requirement of at least one fish sampled per metric tonne of catch. Achieving this target has proven challenging for many coastal fisheries due to: (i) limited sampling coverage and resources; and (ii) difficulties in raising sampled data to represent total catches. Nevertheless, several CPCs have increased their sampling coverage in recent years, contributing to improvements in the quantity of size-frequency data available for assessment purposes.

The level of standardized sampling varies considerably among CPCs. The Islamic Republic of Iran consistently provides more than 5,000 samples annually, while Indonesia has substantially increased its sampling of neritic tuna and seerfish species in recent years in response to rising catch levels. Sri Lanka, the Maldives, and Thailand have maintained regular sampling programmes over several years, although at lower levels of coverage (**Fig. 4.22**).

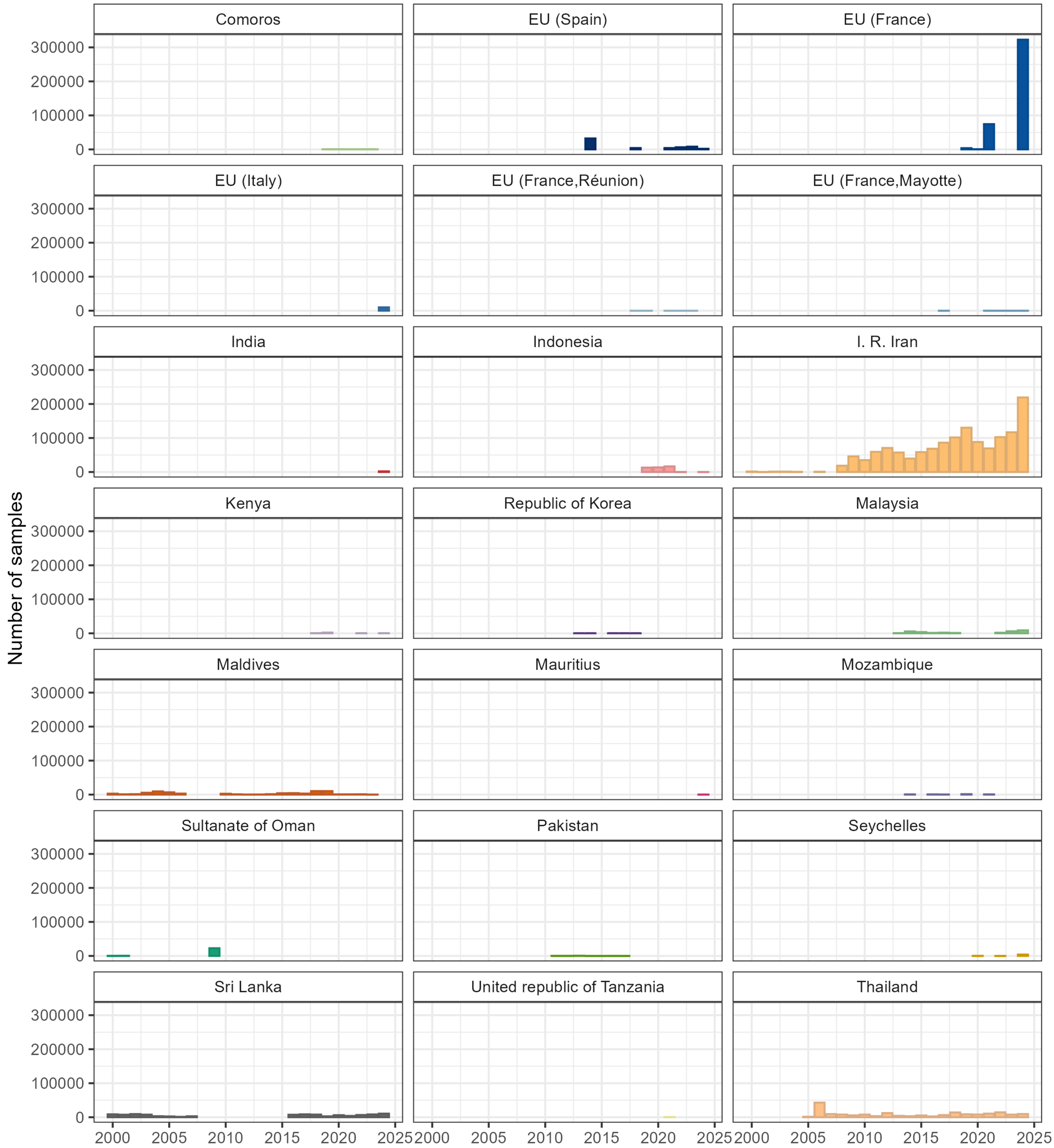

Figure 4.22: Annual number of standard size samples available at the IOTC Secretariat by fleet.

The availability of size-frequency samples varies considerably among fisheries, with the dominant fishing gears contributing the majority of the data. Gillnet fisheries account for the largest share of size samples for neritic tunas and seerfishes, representing 69.9% of all size data available in the IOTC database. Additional size-frequency data have been collected from purse seine (1985-2024), baitboat (1983-2024), and trolling line (1983-2024) fisheries, although in substantially lower quantities than those obtained from gillnet fisheries. Only limited numbers of samples are available from other fishery types (**Fig. 4.23**).

Notably, size frequency data for neritic tuna and seerfish species have been available since the 1980s, largely as a result of sampling programmes conducted under the Indo-Pacific Tuna Programme (IPTP). Early sampling efforts were concentrated in Indonesia, the Maldives, and Malaysia, and were subsequently expanded to include Sri Lanka, the Islamic Republic of Iran, and Pakistan.

In recent years, relatively few projects have specifically targeted the collection of biological samples for neritic tuna and seerfish species, particularly when compared with the level of sampling undertaken during the IPTP period. Biological sampling in coastal fisheries remains constrained by limited funding and logistical challenges, resulting in lower sampling coverage across many fisheries.

To address these gaps, the IOTC Secretariat is exploring initiatives aimed at improving the visibility of small-scale coastal fisheries through dedicated sampling programmes. These efforts are expected to strengthen the collection, management, and accessibility of biological data, thereby enhancing the scientific information available for stock assessment of small species.

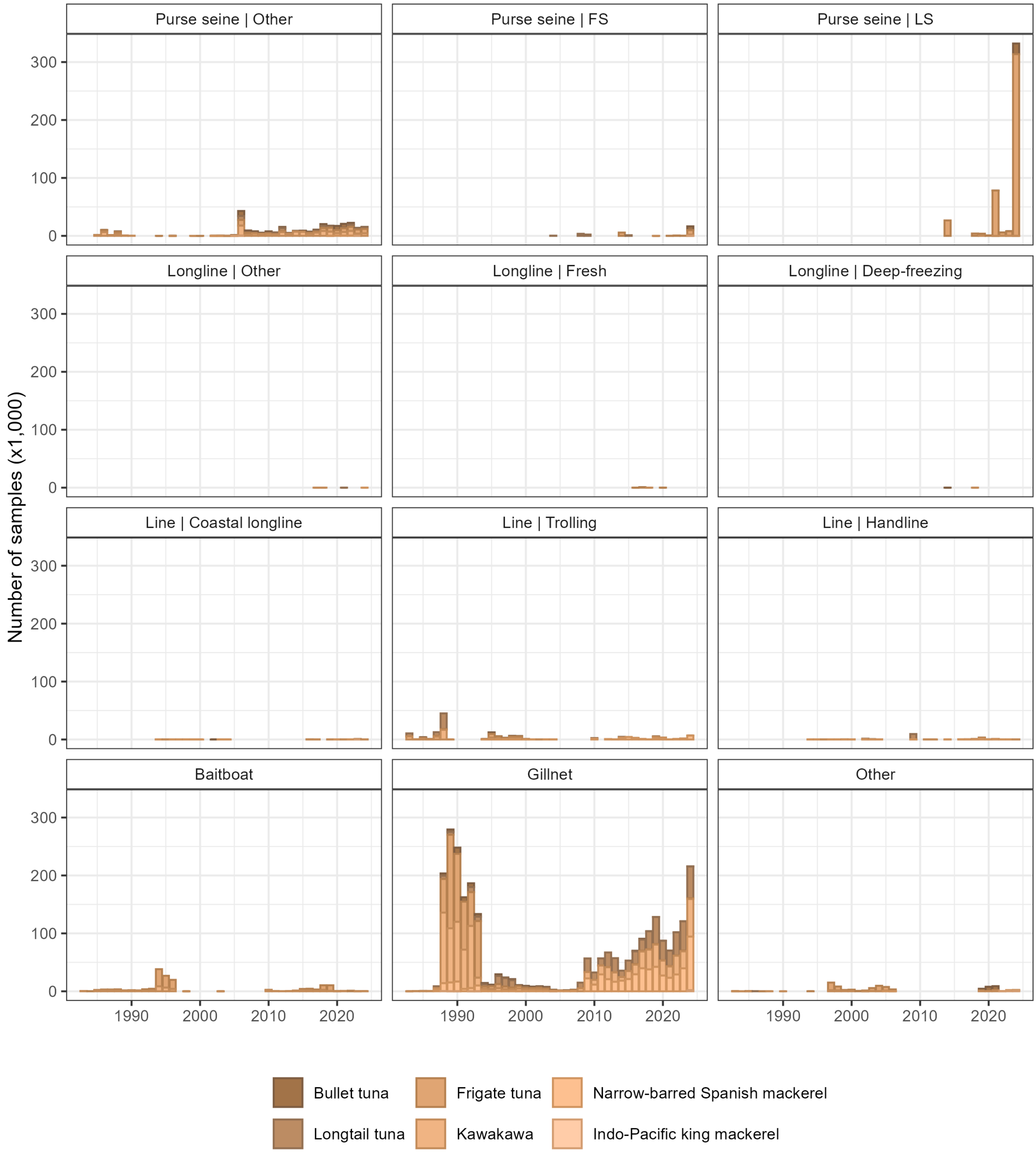

Figure 4.23: Annual number of standard size samples available at the IOTC Secretariat by fishery and neritic species. FS = free-swimming school; LS = school associated with floating object

The distribution of size-frequency samples among species does not reflect the corresponding catch composition of neritic tuna and seerfish fisheries. Although narrow-barred Spanish mackerel has historically contributed the largest proportion of total catches, relatively few biological samples are available for this species compared with neritic tuna species such as frigate tuna and (**Fig. 4.24**).

Frigate tuna and kawakawa together account for more than 60% of all size samples available in the IOTC database, representing 34.41% and 29.37% of the total samples, respectively. In contrast, narrow-barred Spanish mackerel accounts for only 15.59% of the available samples despite its substantial contribution to total catches. Sampling coverage is particularly limited for bullet tuna and Indo-Pacific king mackerel, which together represent less than 5% of the total size-frequency samples available.

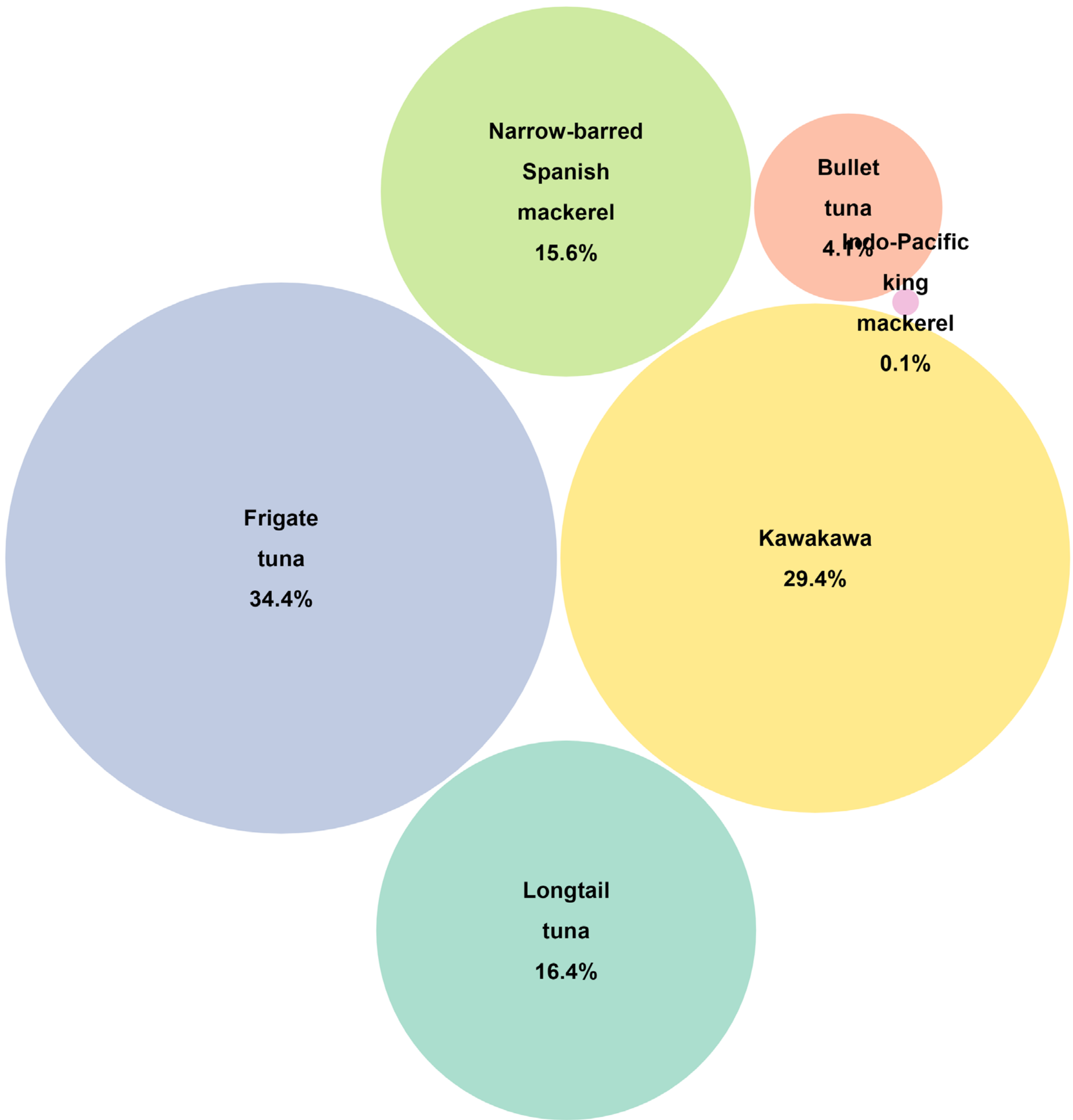

Figure 4.24: Percentage of size samples by species for all standard size data available at the IOTC Secretariat

4.3.2 Size distribution by species and fishery

The aggregated size frequency distributions should be interpreted with caution due to their lack of consideration for spatio-temporal changes in sampling (e.g., fishing grounds). Bias may arise from variability in sampling methodology and intensity over time and across CPCs. Nonetheless, the available data offer general insights into the size composition of the catch, revealing significant size variations across species and fisheries.

Bullet tuna, which has been mostly caught in purse seine fisheries in recent years, appears to be taken at the smallest size, with an overall median fork length of about 26 cm (**Fig. 4.25**). Information on size composition available from other fisheries catching bullet tuna indicates sizes in the interquartile range 22.5-28.5 cm fork length. Frigate tunas are slightly larger than bullet tuna when caught in coastal purse seine fisheries (median fork length of 28.5 cm) and appear to be taken at larger sizes in line fisheries (median fork length of 36.5 cm) and in high seas purse seine fisheries (median fork length of around 37.5 cm). Kawakawa are taken at larger sizes, with a fork length interquartile comprised between 33.5 and 52.5 cm. The largest kawakawa are taken in high seas and coastal longline fisheries with a respective median fork length of 56.5 and 45.5 cm, respectively. The smallest ones are caught in coastal purse seine fisheries (median fork length of 27.5 cm). Finally, narrow-barred Spanish mackerels are described by similar median sizes across fisheries, with the interquartile fork length range being comprised between 73.5 and 98.5 cm (**Fig. 4.25**). The very few samples available for Indo-Pacific king mackerel from coastal purse seine (n = 362) and gillnet (n = 2268) fisheries indicate similar median values of fork length of 38.5 cm.

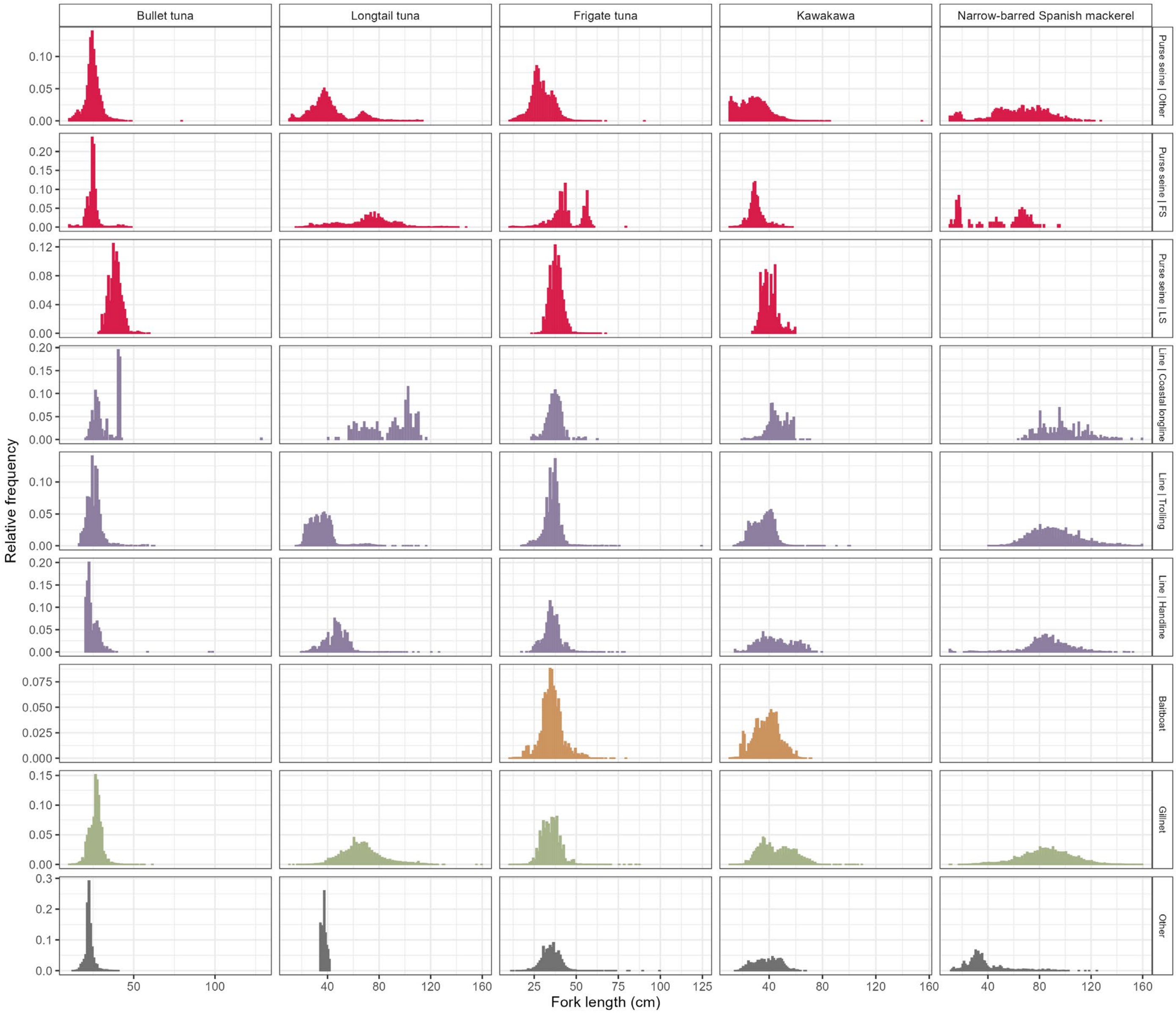

Figure 4.25: Relative fork length (cm) frequency distribution of IOTC neritic tuna and seerfish species (excluding Indo-Pacific king mackerel) aggregated across all samples available at the IOTC Secretariat by fishery, excluding longline fisheries

Size-frequency data from industrial fisheries are collected primarily through the IOTC Regional Observer Programme (ROP), with onboard observers responsible for recording biological measurements and other fisheries-related information during fishing operations.

4.3.3 Uncertainties in size-frequency data

Challenges in collecting size-frequency data remain for many coastal CPCs. As illustrated in the previous section, size-composition data are available from only a limited number of CPCs and, in most cases, sample coverage remains relatively low. The availability of size-frequency data, measured as the proportion of retained catches associated with adequate sampling coverage (quality scores 0–2), averaged only 7.2% over the last decade. Although the number of samples collected has increased in recent years, sampling coverage remains below 50% of retained catches, reaching 26.1% in 2024 (**Fig. 4.26a**)

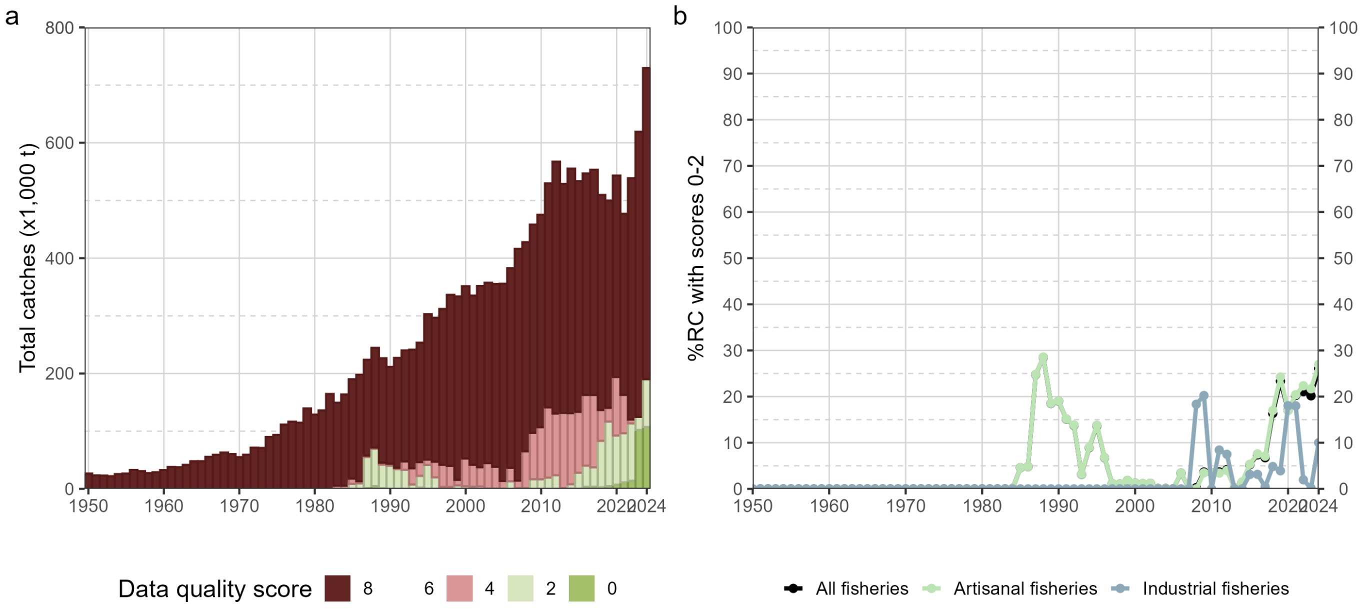

Figure 4.26: Annual time series of (a) cumulative retained catches (metric tonnes; t) estimated by quality score and (b) contribution of retained catches with corresponding geo-referenced size-frequency data reported to the IOTC Secretariat in agreement with the requirements of Res. 15/02 to all retained caches (percentage; %) of IOTC neritic tunas and seerfish for all fisheries and by type of fishery, for the period 1950-2024

The analyses presented above are based on size-frequency data that could be successfully processed and standardized within the IOTC databases. However, there are instances in which CPCs have submitted size-frequency datasets that could not be incorporated into the database due to data quality issues. The most common deficiencies include:

- Size classes that are excessively broad and not biologically meaningful for the species concerned;
- Use of inappropriate or non-standard length measurements;
- Absence of geo-referenced spatial information, with samples often reported only at the level of IOTC major areas;
- Aggregation of data across multiple fisheries, preventing fishery-specific analyses.

The Secretariat provides technical assistance to the affected CPCs to support improvements in data collection, reporting, and submission procedures. However, given the nature of some data collection systems and historical datasets, it is not always possible to fully resolve these issues. Consequently, some submitted size-frequency data remain unsuitable for standardization and inclusion in the IOTC databases.

5 References

Alverson DL, Freeberg MH, Murawski SA, Pope JG (1994) A global assessment of fisheries bycatch and discards. FAO, Rome, Italy.

Auger P, Mchich R, Raïssi N, Kooi BW (2010) Effects of Market Price on the Dynamics of a Spatial Fishery Model: Over-Exploited Fishery/Traditional Fishery. Ecological Complexity 7:13–20.

Bennett NJ (2021) Socio-Economic Monitoring and Evaluation in Fisheries. Fisheries Research.

Cappa P, Andreoli V, Krueger K, Barrie S, La C, Zeller D (2024) Estimating Fisheries Catch from Space: Comparing Catch Estimates Derived from AIS Fishing Effort with Reported Catches for Indian Ocean Industrial Fisheries. Regional Studies in Marine Science 77:103632.

Dutta S, Maity S, Chanda A, Akhand A, Hazra S (2012) Length Weight Relationship of Four Commercially Important Marine Fishes of Northern Bay of Bengal, West Bengal, India. Journal of Applied Environmental and Biological Sciences 2:52–58.

Herath D, Perera C, Hettiarachchi C, Murphy B (2019) Length-Weight and Length-Length Relationships of Three Neritic Tuna Species of Sri Lankan Coastal Waters. International Journal of Fisheries and Aquatic Studies 7:129–133.

Herrón P, Castellanos-Galindo GA, Stäbler M, Díaz JM, Wolff M (2019) Toward Ecosystem-Based Assessment and Management of Small-Scale and Multi-Gear Fisheries: Insights From the Tropical Eastern Pacific. Frontiers in Marine Science 6:127.

IOTC Secretariat (2016) Improving the core IOTC data management processes. IOTC, Victoria, Seychelles, 6 - 10 September 2016, p 38

IOTC Secretariat (2020) Review of detected anomalies in size frequency data submitted to the Secretariat. IOTC, Online meeting, 30 November - 3 December 2020, p 8

IOTC Secretariat (2018) Revision to the IOTC scientific estimates of Indonesia's fresh longline catches. IOTC, Victoria, Seychelles, 29 November - 1 December 2018, p 14

IPTP (1989) Tuna sampling programme in Sri Lanka. Indo-Pacific Tuna Development; Management Programme (IPTP), Colombo, Sri Lanka.

Kaymaram F, Darvishi MF, Parafkandeh SG, Talebzadeh SA (2011) Population dynamic parameters of *Thunnus tonggol* in the north of the Persian Gulf and Oman Sea. IOTC, Chennai, India, 14-16 November 2011, p 8

Kelleher K (2005) Discards in the world's marine fisheries. An update. FAO, Rome, Italy.

Martin D (2025) Impact of Seasonal Variations on Catch Composition in Small-Scale Fisheries. 9.

Mastrandrea MD, Field CB, Stocker TF, Edenhofer O, Ebi KL, Frame DJ, Held H, Kriegler E, Mach KJ, Matschoss PR, Plattner G-K, Yohe GW, Zwiers FW (2010) Guidance Note for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties. IPCC.

Moreno G, Herrera M, Pierre L (2012) DRAFT: Pilot Project to Improve Data Collection for Tuna, Sharks and Billfish from Artisanal Fisheries in the Indian Ocean. Part II: Revision of Catch Statistics for India, Indonesia and Sri Lanka (1950-2011). Assignment of Species and Gears to the Total Catch and Issues on Data Quality.

Nguyen LT, Nguyen KQ, Nguyen TP (2023) Experimental Mixed Gillnets Improve Catches of Narrow-Barred Spanish Mackerel (Scomberomorus Commerson). Fishes 8:210.

Recio L, Murua H, Restrepo V (2022) ISSF 2022-01: Biology and Stock Status of Minor Commercial Tunas: Summary of Current Knowledge and Gaps - International Seafood Sustainability Foundation.

RECOFI (2025) Implementation of the RECOFI Recommendation on Kingfish stock and outcomes of the 2nd regional stock assessment workshop. FAO, Oman

Secretariat I (2024) IOTC-2024-TCAC13-RE_FINAL Report. IOTC, Thailand

Taiwo IO (2013) Discards and Fishing Debris of the Tuna Fisheries in the South West Pacific and Indian Oceans. Science Journal of Environmental Engineering Research.

Yadav S, Abdulla A, Bertz N, Mawyer A (2020) King Tuna: Indian Ocean Trade, Offshore Fishing, and Coral Reef Resilience in the Maldives Archipelago. ICES Journal of Marine Science 77:398–407.

6 Disclaimer

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

7 Appendix

7.1 Appendix I: Time series of price for neritic tunas and seerfish

Fisheries socio-economic indicators are particularly important for Small Island Developing States (SIDS) and other coastal nations that rely heavily on fisheries resources for food security, employment, and livelihoods. Among these indicators, fish prices provide valuable insights into market dynamics and consumer demand, and can therefore serve as an important measure of the economic performance of fisheries (Auger et al. 2010). Consequently, fish price information is increasingly being considered in fisheries management and policy development.

One of the socio-economic datasets collected by CPCs comprises fish price information from various points along the value chain. For neritic tuna and seerfish species, prices are most commonly collected at landing sites directly from fishing vessels, in local markets, and, less frequently, at points of export. Since 2023, an increasing number of coastal CPCs have voluntarily reported fish price data, reflecting growing recognition of the importance of socio-economic indicators in fisheries management, including their potential role in quota allocation discussions and the establishment of the IOTC Working Party on Socio-Economics.

Between 2023 and 2024, approximately ten CPCs submitted fish price information collected from a range of marketing channels. However, only a limited number of CPCs provided price data specifically for neritic tuna and seerfish species, and some submissions contained unrealistic values or insufficient supporting information for validation and analysis. Reliable and usable price data were available from Bangladesh (2023), Sri Lanka (2023–2024), Madagascar (2024), and Thailand (2023–2024) (**Fig. 7.1**). These data provide a preliminary basis for understanding the economic value of neritic tuna and seerfish fisheries across different markets in the Indian Ocean region.

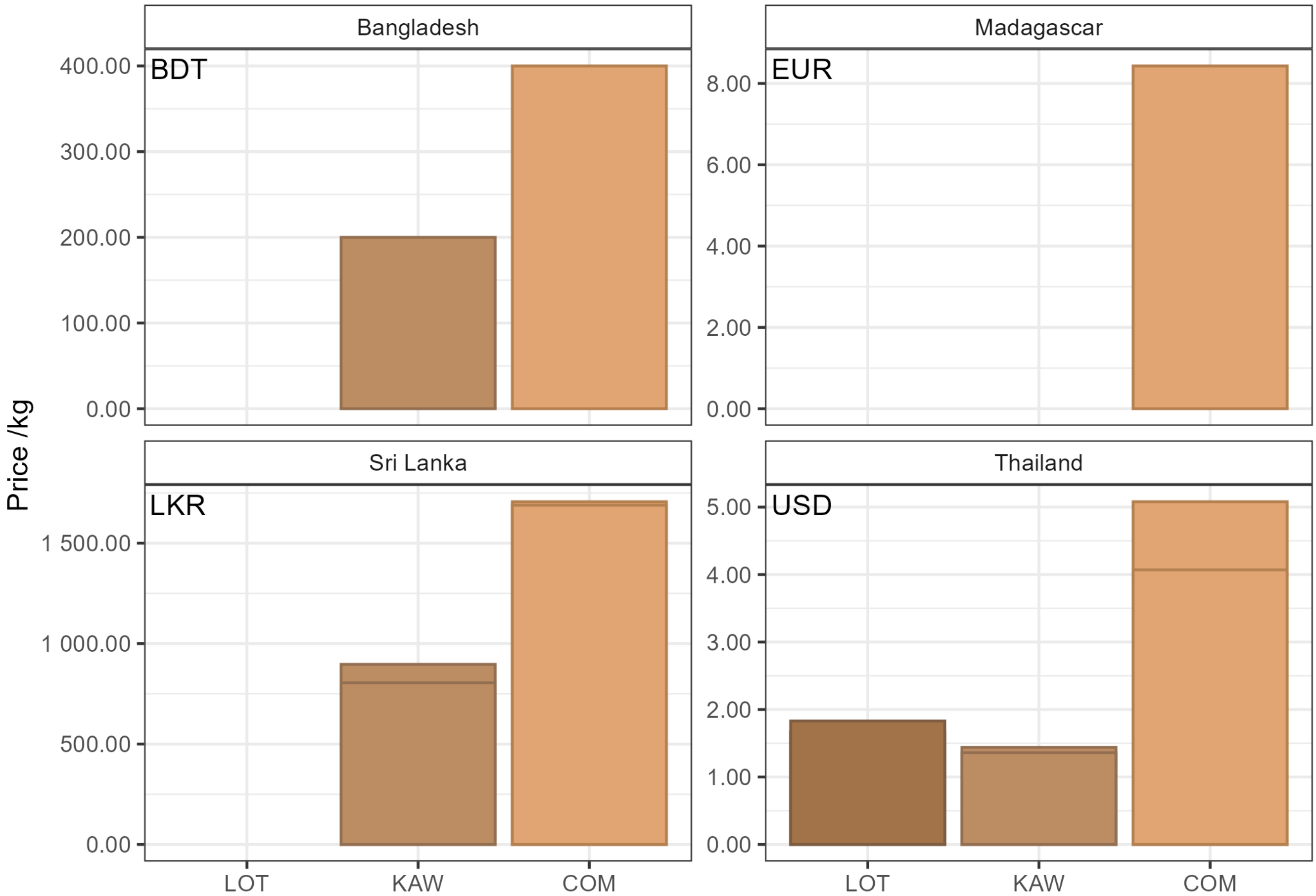

Figure 7.1: Average market price per kg for neritic tunas and seerfish species provided for 2023-2024

The Secretariat also relies on data published by other sources, such as SEAFDEC for neritic species fish prices

7.2 Appendix II: Best scientific estimates of nominal retained catches for 2024

Overall, nominal retained catches of neritic tunas and seerfish fully estimated in 2024 amounted to 28,188 t of fish for 13 distinct fleets, representing 3.8% of all catches of IOTC neritic species (**Table 7.1**).

First, retained catches were estimated for those CPCs that did not report any fishery statistics for 2024. In this case, catches were repeated from previous year (2023) except for Sudan who have not reported any information to IOTC since their accession in 1994 and 1996, respectively (**Table 7.1**). In fact, data for this country have been systematically extracted from the FAO global capture production database and further broken down by gear (**Table 7.1**).

For coastal states which are not members of the IOTC, catches were preferentially extracted from the FAO global capture production database and further broken down into distinct species and gears, when necessary, based on knowledge of the fisheries operating in each of the countries (**Table 7.1**).

Table 7.1: Estimates of nominal retained catches (metric tonnes; t) of IOTC neritic tuna and seerfish species for the year 2024 for non-members (NM) and members (MP) of the IOTC (see text for details)

Fleet code	Fleet	Status	Source	Catch
ARE	United Arab Emirates	NM	IOTC	4,905.0
BHR	Bahrain	NM	IOTC	63.5
DJI	Djibouti	NM	IOTC	884.5
EGY	Egypt	NM	IOTC	1,000.0
ERI	Eritrea	MP	IOTC	259.5
JOR	Jordan	NM	IOTC	42.9
KWT	Kuwait	NM	IOTC	372.0
MMR	Myanmar	NM	IOTC	7,292.4
QAT	Qatar	NM	IOTC	3,417.3
SAU	Saudi Arabia	NM	IOTC	6,716.5
SDN	Sudan	MP	IOTC	170.0
TLS	Timor-Leste	NM	IOTC	480.1
YEM	Yemen	MP	IOTC	2,584.1
ALL	All fleets	-	-	28,187.8

7.3 Appendix III: Changes in best scientific estimates of retained catches from previous WPNT

Table 7.2: Changes in best scientific estimates of annual retained catches (metric tonnes; t) of neritic tuna and seerfish species by year, fleet, fishery group, and main Indian Ocean area, limited to absolute values higher than 10 t. Data source: best scientific estimate of retained catches as estimated annually from 2012 to 2023 for the preceeding statistical year (https://www.iotc.org/meetings/14th-working-party-neritic-tunas-wpnt14-meetingData/03-NC)

Year	Fleet	Fishery group	Area	Current (t)	Previous (t)	Difference (t)
2023	IDN	Baitboat	Eastern Indian Ocean	1,622	145	1,477
		Gillnet	Eastern Indian Ocean	45,402	64,663	-19,261
		Line	Eastern Indian Ocean	36,659	71,194	-34,535
		Longline	Eastern Indian Ocean	302	391	-89
		Other	Eastern Indian Ocean	33,027	37,324	-4,297
		Purse seine	Eastern Indian Ocean	81,224	39,637	41,586
	TMP	Gillnet	Eastern Indian Ocean	435	269	167
2022	BGD	Gillnet	Eastern Indian Ocean	4,170	4,088	83
		Other	Eastern Indian Ocean	13,518	13,714	-196
2021		Gillnet	Eastern Indian Ocean	3,611	3,539	72
		Other	Eastern Indian Ocean	14,033	14,161	-128
	KEN	Line	Western Indian Ocean	180	161	19
		Purse seine	Western Indian Ocean	77	57	20
2020		Line	Western Indian Ocean	218	195	23
		Purse seine	Western Indian Ocean	94	69	25