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

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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 Scombridae family, including Euthynnus, Auxis, and Scomberomorus, are becoming more valuable to the socio-economic well-being of coastal fishing nations, particularly in Southeast Asia, as driven by favourable prices from processing companies, which in turn stimulate economic activities within coastal communities. Indonesia, as a large fishing nation, had 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 a steady increase, surpassing 2,000,000 t in 2023 (**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 65% and 31% respectively (**Fig. 1.1b**). These figures underscore the significant role these regions play in global fisheries management and highlight ongoing trends in the capture volumes of these important species.

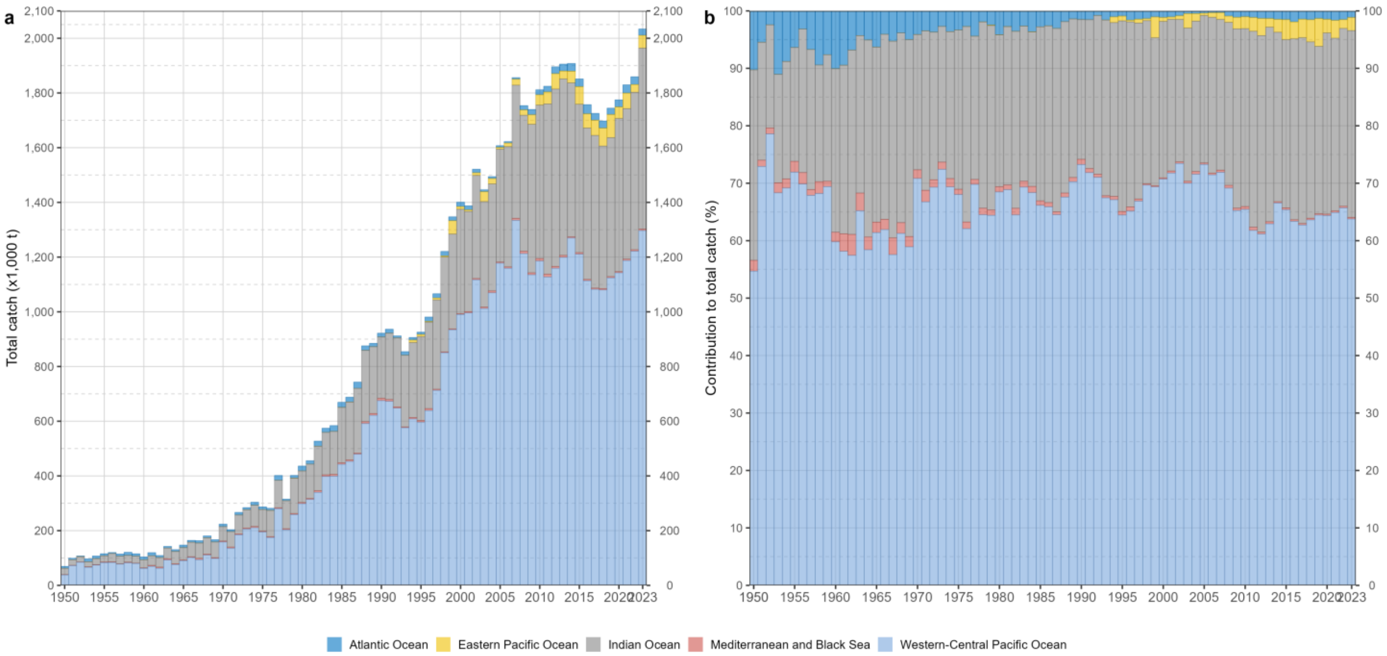

Figure 1.1: Annual time series of (a) cumulative retained catches (metric tonnes; t) and (b) contribution to the total retained catches (percentage; %) of neritic tunas and seerfish by ocean basin for the period 1950-2021. Source: FAO global capture production database

The paper aims to present a comprehensive review of the status and information pertaining to the six neritic tuna and seerfish species managed by the Indian Ocean Tuna Commission (IOTC) in preparation for the 15th Session of the IOTC Working Party on Neritic Tunas (WPNT15). While IOTC management specifically covers six species, there are additional neritic pelagic species caught in the Indian Ocean, albeit at lower reported levels. The document discusses the historical context, noting that subsistence fisheries targeting these species have operated along the Indian Ocean coastlines for centuries (e.g., Yadav et al. 2020). It provides an overview of available fisheries statistics dating back to 1950 and outlines the methodologies used by the IOTC Secretariat to process and evaluate the quality of these datasets as of June 2025. Furthermore, the paper describes key trends and characteristics observed in Indian Ocean neritic tunas and seerfish fisheries over the past seventy years, offering a comprehensive perspective on the management and utilization of these valuable marine resources.

2 Materials

The analysis in the paper relies on data submitted annually to the IOTC Secretariat by Contracting Parties and Cooperating Non-Contracting Parties (CPCs) in accordance with IOTC Conservation and Management Measures (CMMs). These data sets undergo revisions throughout the year, reflecting ongoing improvements in reporting accuracy and completeness. To enhance transparency and compliance with reporting standards, the IOTC Secretariat has increased the visibility of IOTC Reporting guidelines and IOTC forms on the IOTC website. Additionally, CPCs could validate and review all the coding systems related to the reporting forms through the online reference catalogue codelists and validator tools. While adherence to the IOTC Reporting Guidelines is not mandatory, the use of IOTC forms is strongly recommended for submitting data to the Secretariat. These guidelines and forms facilitate effective data curation and management, ensuring that the information used for analysis is robust and reliable for assessing the status and trends of Indian Ocean neritic tunas and seerfish fisheries.

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. This reporting encompasses several key aspects: the major fishing area within the Indian Ocean, the specific fleet involved, and the type of gear used. The preferred method for submission is through the use of IOTC form 1RC, with 1RC form webpage detailing the retained catch data reporting requirements.

Changes in retained catches can occur due to several reasons:

1. **Updates**: Preliminary data for longline fisheries are initially submitted by June 30th each year, with updates received by December 30th of the same year.

2. **Revisions by CPCs**: Contracting Parties and Cooperating Non-Contracting Parties may revise historical data due to corrections of errors, inclusion of missing data, changes in data processing methodologies, etc.

3. **Estimation Process Changes**: The Secretariat may adjust catch estimations based on improved methods or assumptions, such as the selection of proxy fleets or updated morphometric relationships. These adjustments require endorsement by the IOTC Scientific Committee.

These measures ensure that the reported data on retained catches are accurate, comprehensive, and reflective of the ongoing efforts to manage and conserve Indian Ocean fisheries resources effectively.

2.2 Discard data

The IOTC adheres to the FAO's definition of discards, as detailed in previous reports (Alverson et al. 1994, Kelleher 2005). This definition encompasses all non-retained catch, whether individuals are released alive or discarded dead. According to IOTC Resolution 15/02, estimates of total annual discard levels in terms of live weight or number must be reported to the Secretariat. These reports should specify the Indian Ocean major area, species, and type of fishery involved.

To facilitate this reporting, the IOTC has developed IOTC Form 1DI specifically for reporting discards. The data submitted via Form 1DI should be extrapolated at the source to provide comprehensive estimates of total discard levels for the year. This extrapolation should encompass details such as the type of gear used, the fleet involved, the specific Indian Ocean major area, and the species discarded. Notably, these reports should also include data on discards of non-fish species like turtles, cetaceans, and seabirds, ensuring a comprehensive overview of the impacts of fishing activities on marine biodiversity within the Indian Ocean region. The 1DI form webpage detailed the reporting requirements for discarded data.

Discard data reported to the IOTC Secretariat via IOTC Form 1DI are often insufficient, not comprehensive, and do not consistently meet essential reporting standards. As a result, the most reliable and detailed information regarding discards typically originates from the IOTC Regional Observer Scheme (ROS; IOTC Res. 22/04). This scheme focuses on collecting precise details, including the specific spatial and temporal locations of fishing activities and interactions, as well as the fate of observed individuals, encompassing both target and bycatch species in industrial fisheries.

In addition to gaps in reporting, studies in the literature suggest that advancements in gear technology have played a significant role in reducing incidental catch and discards in tuna fishing operations (Taiwo 2013). These technological improvements aim to minimize the unintended capture of non-target species, thereby potentially decreasing overall discard rates observed in fisheries managed by the IOTC.

2.3 Geo-referenced catch and effort data

Catch and effort data within the IOTC framework are detailed and stratified across various parameters, as specified by IOTC Res. 15/02. Typically sourced from logbooks, these data are aggregated and reported annually, delineated by year, month, grid area, fleet, gear type, school type, and species targeted.

Geo-referenced catch information is particularly emphasized, either in live-weight equivalent or fish numbers, and is reported to the IOTC Secretariat. To streamline this reporting process, the recommended IOTC form 3-CE has been designed. This form facilitates the submission of geo-referenced catch and effort data, capturing details such as the activities of support vessels that assist large-scale purse seiners. detailed on the reporting requirements of the geo-reference catch and effort are described in 3CE form webpage

Furthermore, specific information related to the use of drifting floating objects and anchored fish aggregating devices is reported separately. This data is submitted using IOTC forms 3DA and 3AA respectively, with descriptions on the reporting requirements in form 3DA and form 3AA webpages. These forms ensure that comprehensive information on fishing activities, including associated vessels and gear technologies, is available for effective management and conservation efforts within the Indian Ocean region.

2.4 Size-frequency data

The size composition of catches is derived from data sets that include individual body lengths or weights collected both at sea and during the unloading of fishing vessels. To standardize reporting and ensure comprehensive data collection, the IOTC has developed the IOTC Form 4SF. This form includes all necessary fields for complete reporting of size-frequency data, stratified by fleet, year, gear type, school type, month, grid area, and species, as stipulated by IOTC Res. 15/02. Webpage 4SF form, describe the reporting requirements of form 4SF.

While the majority of size data reported via Form 4SF pertain to retained catches, Contracting Parties and Cooperating Non-Contracting Parties (CPCs) also have the option to use the same form to report size data for discarded individuals. This flexibility allows for a more thorough understanding of the size distribution across different species and fishing activities.

Additionally, onboard observer programs under the ROS play a crucial role in collecting supplementary size data, including measurements of individuals discarded at sea. This data is reported to the IOTC Secretariat, contributing to broader insights into fisheries dynamics and supporting management strategies aimed at sustainable resource utilization in the Indian Ocean.

2.5 Socio-economic data

Fisheries are essential to ensure food security and support economic growth of the rim countries of the Indian Ocean. This is particularly true for small island developing states (SIDS) which strongly depend on the blue economy. In this context, socio-economic statistics are key to inform decisions on the management of fisheries and assess their performance and economic contribution to the countries (Bennett 2021). The analysis of the socio-economic data in fisheries management are proven useful particularly in setting-up fishing quota, as indicated in the TCAC document (Secretariat 2024) in the Indian Ocean.

Furthermore, the recent Working party of Socio-Economic (WPSE02) recommended some Socio-economic some fisheries indicators to be considered by the Scientific Committee, to be collected by CPCs.

The collection and reporting of socio-economic information from fisheries in the Indian Ocean under the IOTC framework face significant challenges and limitations. While the IOTC form 7PR focuses on collecting price data for all IOTC species, including neritic tunas and seerfish, reporting by Contracting Parties and Cooperating Non-Contracting Parties (CPCs) is voluntary. This voluntary reporting has resulted in sparse data availability at the Secretariat, with notable exceptions such as time series of monthly prices reported by Oman since 2015 and Malaysia since 2018. Additional information on the value of marine fishery landings has been collected by the Southeast Asian Fisheries Development Center (SEAFDEC) since the late 1970s, providing some insights into pricing dynamics ((Appendix I).

The limited socio-economic data is partly due to tuna species often being a minor target or a small proportion of national catches in many coastal fisheries. Moreover, countries with significant catches of tuna-like species may export them for canning in neighboring countries or to other markets such as the European Union, Saudi Arabia, and Sri Lanka. This export orientation can lead to less emphasis on local pricing and socio-economic impacts within the reporting framework.

In addition to price data, the Fisheries Development Division of the Pacific Islands Forum Fisheries Agency (FFA) has compiled monthly time series data on crude oil prices, a critical factor influencing operating costs in tuna fisheries (Ruaia et al. 2020). This data, covering the period 2000-2021 and based on the arithmetic average of Brent, Dubai, and West Texas crude oil prices, provides insights into cost dynamics within the industry (Appendix II).

Overall, while efforts to enhance socio-economic data collection and analysis are underway, challenges persist in capturing comprehensive information that fully reflects the economic dimensions of neritic tuna and seerfish fisheries in the Indian Ocean region.

2.6 Regional Observer Scheme

(IOTC Res. 24/04) *"On a Regional Observer Scheme"* makes provision for the development and implementation of national observer schemes among the IOTC CPCs starting from July 2010 with the overarching objective of collecting *"verified catch data and other scientific data related to the fisheries for tuna and tuna-like species in the IOTC area of competence"*. The ROS aims to cover *"at least 5% of the number of operations/sets for each gear type by the fleet of each CPC while fishing in the IOTC Area of competence of 24 meters overall length and over, and under 24 meters if they fish outside their EEZs shall be covered by this observer scheme"*. The revised resolution further provide alternative data collection methods to meet the required coverage of 5% (para 4). Human observer may be *complemented or substituted by means of an EMS* and the *the EMS shall be complemented by port sampling and/or other Commission approved data collection methods*. The requirements for ROS data collection and reporting are defined in the ROS data fields and reference codes.

The Secretariat provides an annual update on the status, coverage, and data collected as part of the ROS during the SC, and Update on the implementation of the ROS provide the latest status of the ROS data reported. Although incomplete and characterized by a large variability in coverage between fisheries and over space and time, observer data include information on the fate of the catches (i.e., retained or discarded at sea) as well as on the condition of the discards. Observer data are also the main source of spatial information on interactions between IOTC fisheries and seabirds, marine turtles, cetaceans, as well as any other species encountered.

Despite the fact that ROS programme started over 10 years ago, the Secretariat has not been able to have a comprehensive repository for the data collected and submitted for several reasons:

(i) variation in the data submitted;

(ii) reporting of summarised ROS data;

(iii) data reporting format (word, pdf, excel summary table);

(iv) constant/frequent review of the data reporting requirements.

The ROS database at the Secretariat stored only a fraction of the ROS data reported, due to the issues mentioned above. to date the database only holds data for the period between 2005 and 2021 from 7 fleets: EU,France, Japan, Sri Lanka for longline fisheries and EU,Spain, EU,France, Republic of Korea, Mauritius, Seychelles for purse seine fisheries, with a total of 29,745 sets from 1,700 trips recorded.

2.7 Morphometric data

The length-weight relationships for Indian Ocean neritic tunas and seerfish species utilized by the IOTC are based on morphometric data collected through various fisheries monitoring programs over different periods and locations. Specifically: (i) data from landing sites in Sri Lanka during the 1980s. More recent data from Iran and India have also contributed to updating these relationships (**Table 2.1**) and (ii)**Longtail Tuna**: the length-weight relationship for longtail tuna was established using extensive data collected from five sites along the north coast of the Persian Gulf and Oman Sea between 2006 and 2007, covering well the size range of the species 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 in the Indian Ocean remains limited from the Indo-Pacific Tuna Development and Management Programme (IPTP) (IPTP 1989). Furthermore, the length-weight parameters appear to be identical for frigate and bullet tunas. Data for Indo-Pacific king mackerel are primarily sourced from the Bay of Bengal Large Marine Ecosystem, with length-weight relationships available only for fish measured in total length (Dutta et al. 2012). Currently, the IOTC does not have length-length relationships available, although such relationships have been published for certain species like kawakawa, frigate tuna, and bullet tuna caught in Sri Lankan waters (Herath et al. 2019).

Overall, ongoing efforts are needed to expand the database of length-weight relationships and enhance the accuracy and comprehensiveness of morphometric data across all relevant species within the Indian Ocean region. These relationships are critical for effective fisheries management and stock assessment efforts conducted by the IOTC.

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 release of the latest versions of the curated data sets for neritic tuna and seerfish species in the public-domain, as per the confidentiality rules set in IOTC Res. 12/02, is done following some processing data steps which are briefly summarized below.

3.1 Data processing

The data processing procedures at the IOTC Secretariat involve several systematic steps to ensure the quality and accuracy of reported datasets. Here's an overview of these procedures:

1. **Data Quality Review**: Initially, the Secretariat conducts a standard review of the quality and completeness of datasets submitted by Contracting Parties and Cooperating Non-Contracting Parties (CPCs). Historically, this review was solely performed by the Secretariat, but recent improvements have introduced validator tools for each dataset. These tools encourage CPCs to validate their data before submission, thereby minimizing errors and ensuring compliance with mandatory IOTC standards. Despite CPC validations, the Secretariat continues to validate datasets independently to ensure readiness for further processing.

2. **Processing Steps for Scientific Estimates**: Once validated, a series of processing steps are applied to derive scientific estimates of retained catches for the 16 species under IOTC management. Key processing rules include:

    a. **Data Imputation**: In cases where catches are not reported by a CPC for a specific year, data may be imputed using various sources such as partial catch and effort data, the FAO FishStat database, or data on imports from processing factories collaborating with organizations like the International Seafood Sustainability Foundation.

    b. **Re-estimation**: For fisheries with known data quality issues, re-estimation of species and/or gear composition may occur. This process utilizes data from other years or areas, or employs proxy fleets assumed to have similar catch compositions, e.g., Moreno et al. (2012) and IOTC Secretariat (2018).

    c. **Disaggregation**: If catches are reported in aggregate form, a disaggregation process breaks down these aggregates by species and gear (IOTC Secretariat 2016). This involves using data from strata where species and gears are reported separately, and applying spatial-temporal substitution schemes when necessary.

These methodologies are evolving, with a gradual reduction in re-estimation practices due to improvements such as increased number of CPCs reporting of disaggregated data, availability of secondary data sources from national portals, and technical assistance provided to CPCs facing data 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 2023 (**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. BLT = bullet tuna; COM = narrow-barred Spanish mackerel; FRI = frigate tuna; GUT = Indo-Pacific king mackerel; KAW = kawakawa; LOT = longtail tuna

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 6 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 2023 (**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. BB = baitboat; GILL = gillnet; HAND = handline; LIFT = lift net; LL = deep-freezing longline; LLCO = coastal longline; PS = purse seine; RR = rod and reel; SPOR = gears used for sport fishing; TRAW = trawl; TROL = trolling line

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			✓			✓						✓
LLTR	Coastal Longline and Troll line combination	Longline						✓						✓
UNCL	Unclassified	Other	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Details on the results of the estimation process used to derive the 2023 best scientific estimates for 2023 including the changes in time series of retained catches relative to the previous Working Party on Neritic Tunas are provided in Appendix III and Appendix IV, respectively.

Third, and applying to all 16 IOTC species plus the most common shark species defined in the appendices of IOTC Resolution 15/01, filtering and conversions are applied to the size-frequency data to harmonize their format and structure and remove data which are non-compliant with IOTC standards, e.g., when measurements are provided with size bins exceeding the maximum width considered meaningful for the species (IOTC Secretariat 2020). The standard length measurements considered at IOTC are eye-fork length (EFL; straight distance from the orbit of the eye to the fork of the tail) for black and blue marlins, and fork length (FL; straight distance from the tip of the lower jaw to the fork of the tail) for all other species subject to mandatory size measurements (IOTC Secretariat 2020). All size samples collected using other types of measurements are converted into FL and EFL by using the IOTC equations, considering size range and intervals that may vary with species. If no IOTC-endorsed equations exist to convert from a given length measurement for a species to the standard FL and EFL measurements, the original size data are not disseminated but kept within the IOTC databases for future reference.

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

Data set	Criterion	By species	By gear
Nominal catch	Fully available	0	0
	Partially available	2	2
	Fully estimated	4	4
Catch and effort	Available according to standards	0	0
	Not available according to standards	2	2
	Low coverage (<30% logbooks)	2	
	Not available	8	
Size frequency	Available according to standards	0	0
	Not available according to standards	2	2
	Low coverage (<1 fish per tonne caught)	2	
	Not available	8	

4 Results

4.1 Retained catches & discards

The best scientific estimates of retained catches for neritic tuna and seerfish species indicate a notable increase in catches over the past few decades. This trend stands in contrast to the observations for large pelagic species, where catch trends have shown variability or decline in some cases. In coastal waters, where these small tunas are predominantly caught, a diverse array of fishing gears are reported to be in operation.

4.1.1 Historical trends (1950-2023)

In the past two decades, the contribution of neritic tunas and seerfish species to the total catch has shown a significant increase, rising from 25% in the 1990s to 32% by 2010, with increasing catch in 2023. This shift in the composition of catch can be attributed to two primary factors:

1. **Operational Changes in Fisheries**: Starting in the late 2010s, there was a notable transition in the operational activities of fisheries. Semi-industrial fishing activities, particularly those operating near Somali waters, reduced significantly. Vessels began focusing more on their national jurisdiction areas, potentially leading to a redistribution of fishing effort towards neritic tuna and seerfish species in coastal waters.

2. **Changes in Large Pelagic Fisheries**: Concurrently, industrial vessels from Distant Water Fishing Nations (DWFNs) that traditionally targeted large pelagic tuna species in the Western Indian Ocean also reduced their operations in the late 2010s. This reduction may have further facilitated an increase in relative catch of neritic tunas and seerfish species.

Fig. 4.1 illustrates this shift in catch trends by species groups from 1950 to 2023. It highlights a sharp decline in tropical tunas between 2009 and 2011, contrasting with the sustained increase observed in neritic tuna species over the same period.

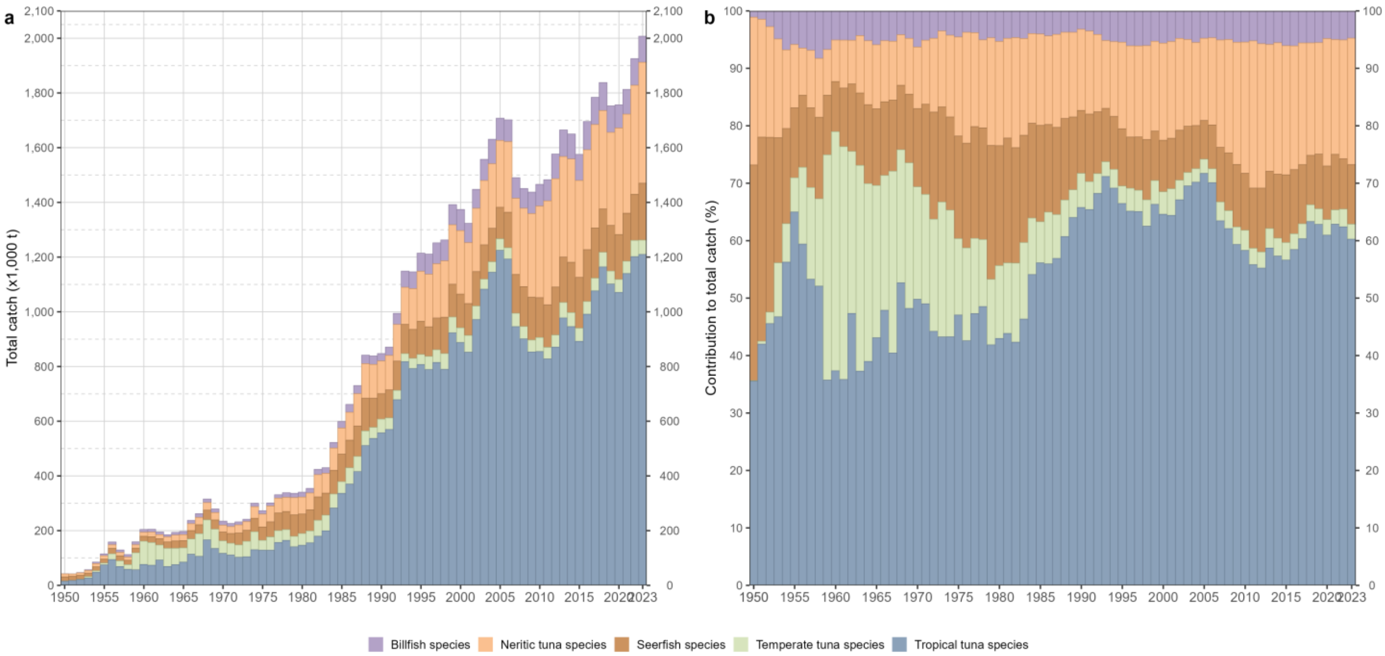

Figure 4.1: Annual time series of (a) cumulative retained catches (metric tonnes; t) and (b) contribution to the total retained catches (percentage; %) of IOTC tuna and tuna-like species by species category for the period 1950-2023

Since 1950, neritic tunas and seerfish species are primarily caught by coastal fisheries, with drifting gillnets playing a predominant role, accounting for over 62% of the catch. This method has remained the major fishery targeting neritic tunas and seerfish species since the 1950s, especially for mackerel species across all sizes of gillnet fisheries (Nguyen et al. 2023). In addition to drifting gillnets, other fishing gears are increasingly operating in coastal waters of the Indian Ocean (**Fig. 4.2**):

1. **Surrounding Nets**: This category includes purse seines and ring nets, which together contributed 13% of the catch between 2010 and 2023 (Fig. 4). These nets are effective in targeting schools of fish near the surface, including neritic tunas. Besides coastal encircle fisheries, records show that such nets fishing offshore, are catching neritics tunas, although at lower rates.

2. **Line Fisheries**: Line fisheries, including handlines and longlines operated in coastal areas, contributed 15% to the catch during the same period. These methods are selective and often target specific species, including neritic tunas and seerfish.

3. **Smaller Coastal Fisheries**: Techniques such as beach seines, Danish seines, and trawlers have also reported increased catches of neritic species in recent years. These methods vary in scale and specificity but contribute significantly to local fisheries.

In contrast, certain fishing methods have recorded lower catches of neritic tuna species, such as pole and line, and industrial longline fisheries

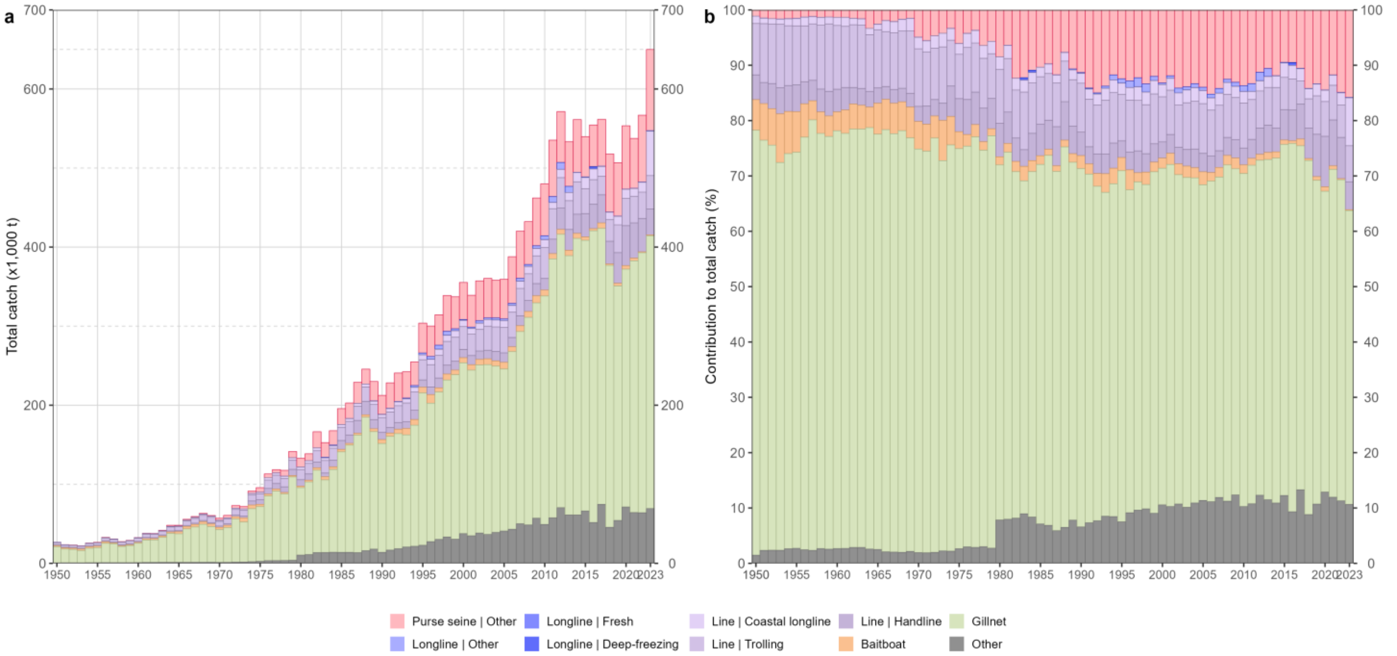

Figure 4.2: Annual time series of (a) cumulative retained catches (metric tonnes; t) and (b) contribution to the total retained catches (percentage; %) of IOTC neritic tunas and seerfish by fishery for the period 1950-2023

Species-wise, the narrow-barred Spanish mackerel is the predominant neritic species caught in the Indian Ocean, totaling approximately 5.2 million t 1950 and 2023 (**Fig. 4.3**). This species alone contributes 29% to the total catch of neritic species. Kawakawa and longtail tunas have also shown increasing trends in recent years, contributing, 22% and 23%, respectively.

This year WPNT, will focus on data preparation of all the neritic and seerfish species under the IOTC mandate. Important to note all factors affecting the data for assessment will be reviewed. Catch trends of each species are detailed in the information papers of each specie. Glancing at the overall trend of the six species, there are various over time:

- **Bullet Tuna (BLT)**: caught predominantly by coastal purse seine and gillnet fisheries, and in recent years, increasing catches recorded by offshore surface fisheries, such as purse seine. Compared to other neritic species, catches remained around 5% in recent years of the total neritic species. The highest catch was recorded in 2020 at 41,000t, primarily from large Indonesian purse seine fisheries. However, catches have declined in recent years, reaching 29,000t in 2023.

- **Frigate Tuna (FRI)**: Often there are confusion of bullet and frigate tunas while identifying these two species, compared to other small tunas. As such, catches from some fleets recorded aggregated catch of bullet and frigate tunas. Similar to bullet tuna, coastal purse seine and gillnet fisheries are main fisheries catching frigate tuna. The highest catch of frigate was recorded at 130,000 in 2023, with increased catch from line fisheries.

- **Kawakawa (KAW)**: Catches of KAW show increasing trend, similar to other neritic species. Predominantly caught by purse seine and gillnet fisheries, recently, catches from the line fisheries are increasing. Maximum catch of KAW were recorded at 149,000t in 2023. The trend show catches dropped around the piracy time, 2009-2011, from several coastal fisheries, which could have been operated offshore, and ceased operation around that time.

- **Longtail Tuna (LOT)**: Gillnet fisheries is the main fishery catching LOT with an average of 66% between 2019 and 2023, and with less catches from purse seine fisheries, as compared to other neritic species. LOT catch peaked at 174,000t in 2012, and dropped considerably from there on, contrast to other species, with increasing catch in recent years. The increase around 2010, were due to more of the gillnet fisheries that were operating offshore, operated inshore due to piracy, and targeting LOT instead of pelagic species.

- **Indo-Pacific King Mackerel (GUT)**: Compared to other neritic species, information on the fisheries catching GUT is limited, and hindered by few biostatistics of this species. Furthermore, some fleet with catches of GUT, unable to properly identify this species from other small size scombemorus species, reported seerfish aggregate. Trend of Indo-Pacific king mackerel remained constant in the recent years, with slight increased in recent years. Peak catches reached 46,000t in 2023, although averaging at 38,000t between 2019 and 2023.

- **Narrow-barred Spanish Mackerel (COM)**: COM was the major neritic species caught in the past, contributed around 39% between 1950 and 1990. Gillnet fisheries catch around 80% during the same period, and recent years catches are increasing from other fisheries. COM are commonly caught in the Arabian sea, whereby the Regional Commission for Fisheries (RECOFI) recommended catch reduction during its 2019 annual meeting RECOFI/X/2019/5, attributed to catch exceeding MSY in 2017, before declining from thereof in the gulf area. Peak catches in the Indian Ocean regions reached 162,000t in 2023, although averaging at 138,000t between 2019 and 2023.

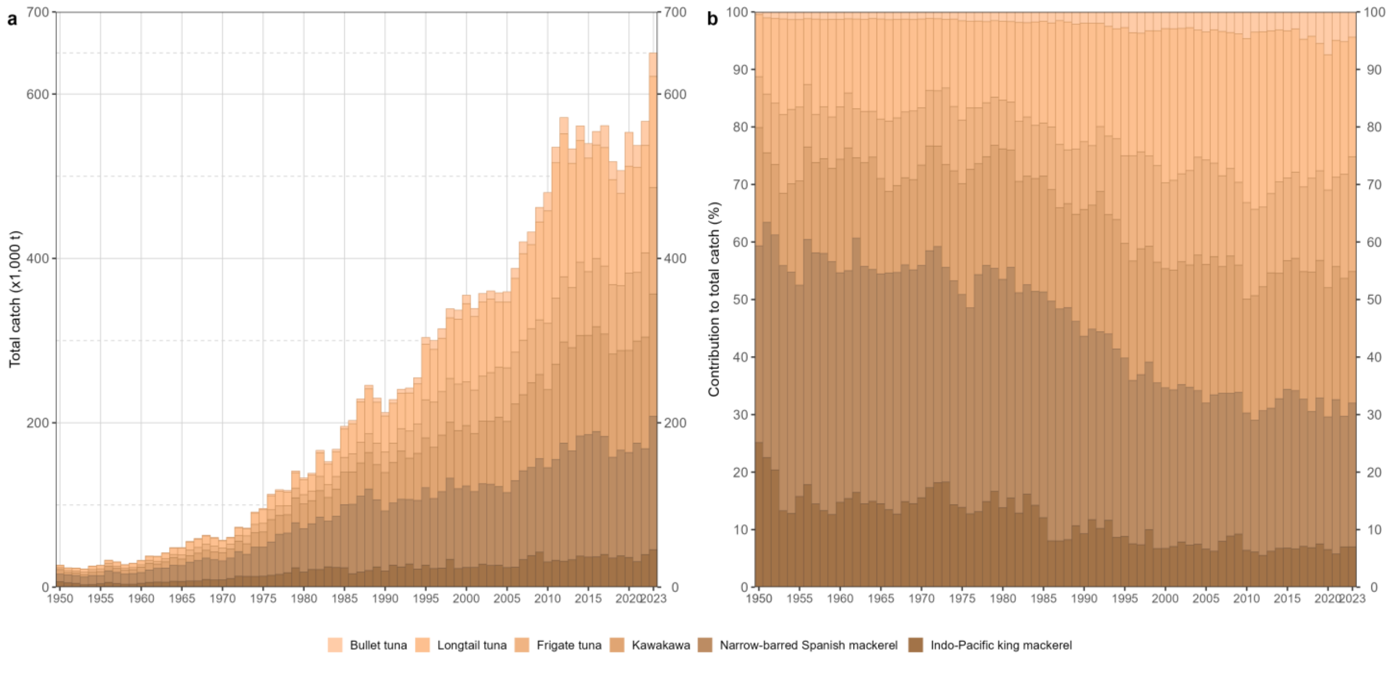

Figure 4.3: Annual time series of (a) cumulative retained catches (metric tonnes; t) and (b) contribution to the total retained catches (percentage; %) of IOTC neritic tunas and seerfish by species for the period 1950-2023

The catch trend of neritic and seerfish species show increasing catch from 1950, with the highest catch at 650,000 t in 2023, following a decline in 2019 (**Fig. 4.4**). Iranian fisheries show significant increase from early 2000s, from around 44,000t in 2004 to reach 132,000t in 2012. Catches from Indonesian and Indian fisheries, however, fluctuated in recent years, although with continuous increasing trends from the 1950s. Indonesia neritic catch in 2023, inflated due to inconsistencies with estimation method prior to 2023, hence increased by 72%. Catches from Indian, on the other hand, following a drop in 2021 to 79,000t from 88,000in 2020, increased again in the last two years, averaging 131,000t between 2022 and 2023.(see Recent fishery features).

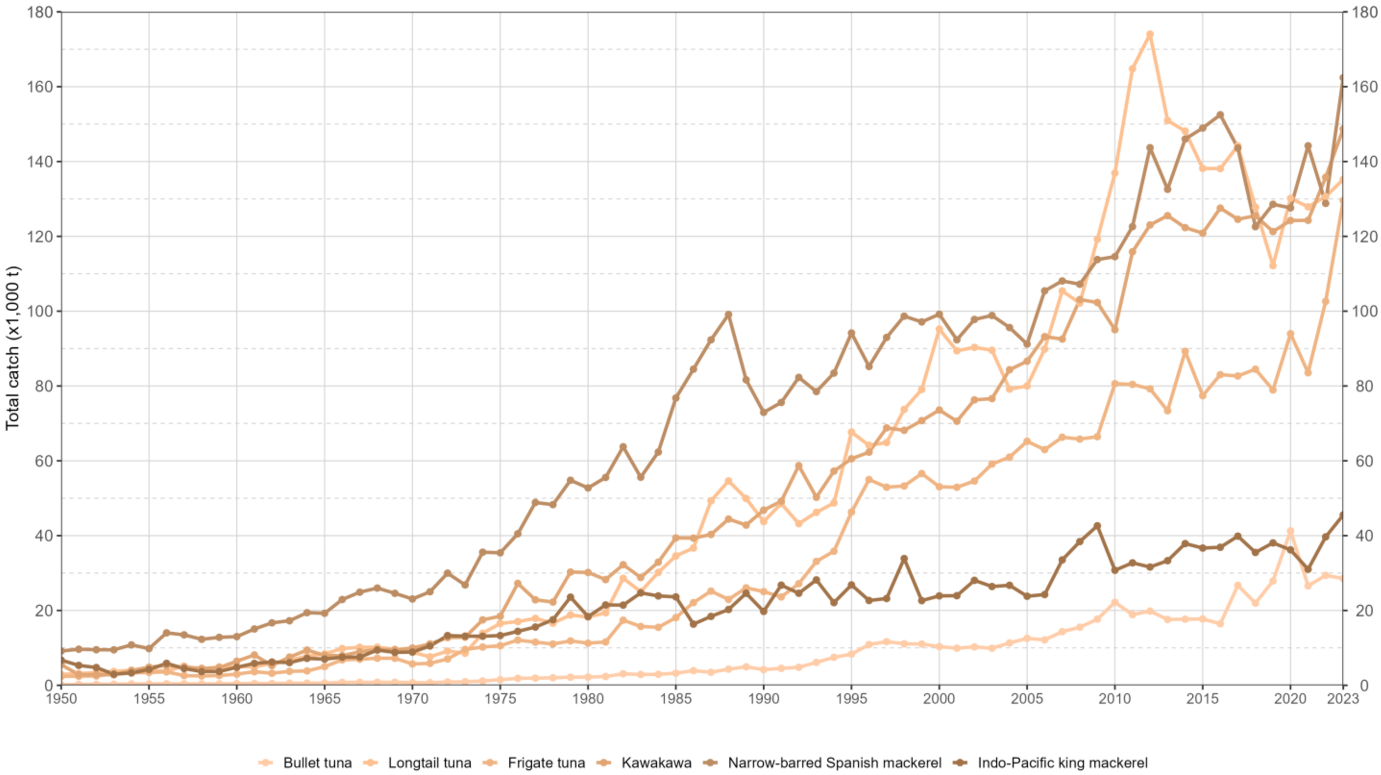

Figure 4.4: Annual time series of retained catches (metric tonnes; t) of IOTC neritic tunas and seerfish by species for the period 1950-2023

4.1.2 Recent fishery features (2019-2023)

Catches of neritic tunas and seerfish species show variation for some main fleet catching these species in recent years (2019-2023). Compared the historical catch data, The historical revision of Indonesia catch data up to 2022, show gradual increasing trend in the historical catch, whereas in recent years, catches fluctuated, from 114,000t in 2019, to averaging 136,000 between 2020 and 2022, with further increased in 2023.

the pattern of catch for the neritic species in the Indian Ocean, shows relatively stable levels compared to historical trends. The mean annual retained catches of all IOTC neritic tuna and seerfish species averaged about 563,000 t per year, with gillnet, line (including handline, coastal longline and trolling), and purse seine fisheries contributing to 56.5%, 17.4%, and 14.2% of total annual catches, respectively (**Table 4.1**). : ::: {custom-style="Table Caption"}

Table 4.1: Mean annual retained catches (metric tonnes; t) of IOTC neritic tunas and seerfish by fishery between 2019 and 2023 with indication of contribution of each fishery to the total

:::

Fishery	Fishery code	Catch	Percentage
Gillnet	GN	317,965	56.5
Purse seine | Other	PSOT	79,690	14.2
Other	OT	64,553	11.5
Line | Handline	LIH	41,730	7.4
Line | Trolling	LIT	35,851	6.4
Line | Coastal longline	LIC	20,085	3.6
Baitboat	BB	2,714	0.5
Longline | Fresh	LLF	283	0.1

Fishery	Fishery code	Catch	Percentage
Longline | Deep-freezing	LLD	42	0.0
Longline | Other	LLO	0	0.0

Indonesia, India and I.R. Iran, accounted for most of the neritic catches in the Indian Ocean, contributing 67% between 2019 and 2023. Fisheries from Indonesia and India are characterised by diverse fishing gear of multipurpose small-scale vessels, whereas Iranian fisheries are generally gillnet, although with seasonal gear changes of some vessels (**Fig. 4.5**).

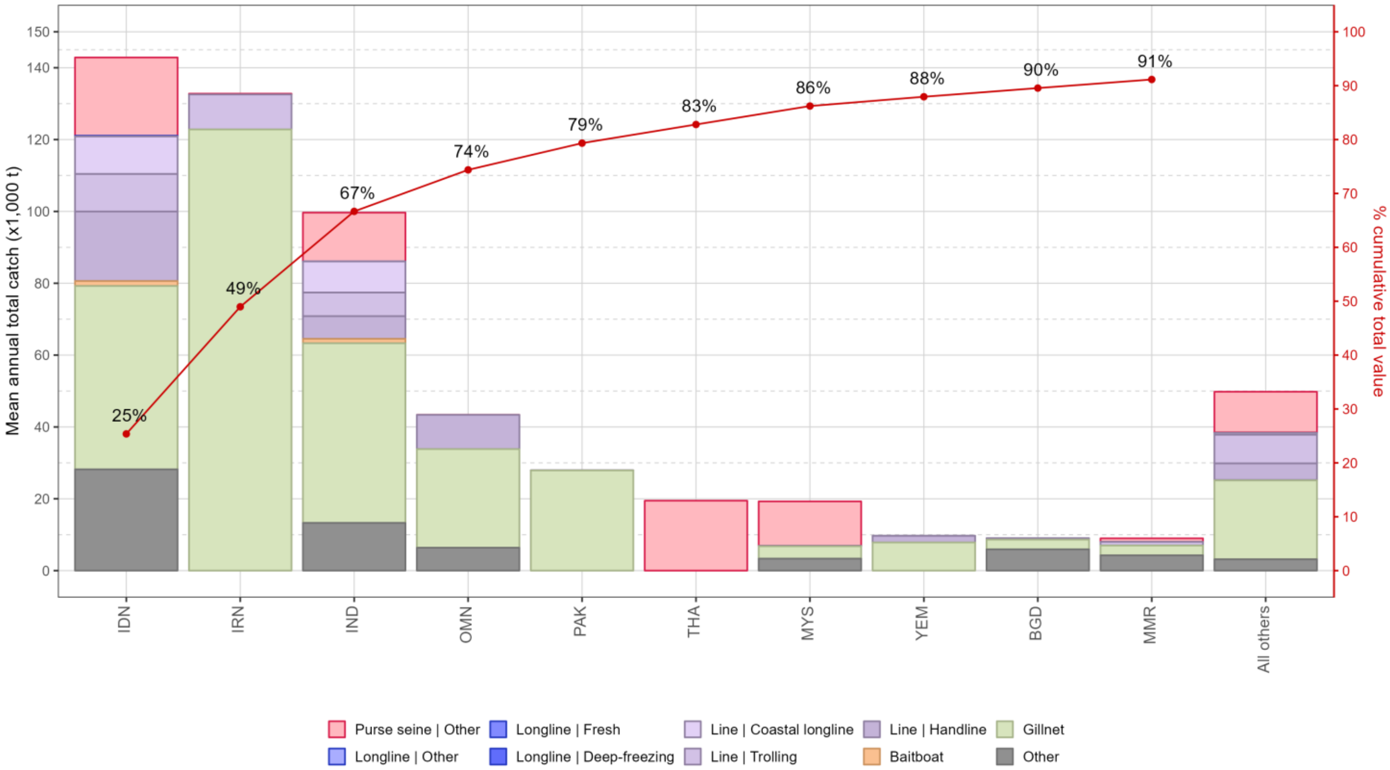

Figure 4.5: Mean annual retained catches (metric tonnes; t) of IOTC neritic tunas and seerfish by fleet and fishery between 2019 and 2023, with indication of cumulative contribution (percentage; %) of catches by fleet

Although neritic tunas and seerfish species are caught by multi coastal fisheries, gillnet remained the dominant fishery, thorugh which in recent years, the overall catch from gillnet fisheries show increasing trend. Catches from other coastal fisheries, line and surrounding nets, fluctuated but with increased in 2023 (**Fig. 4.6**).

In summary, recent year catch trend by fishery:

(i) Gillnet fisheries increased from 297,000t and 345,000t

(ii) Line fisheries show an constant trend between 2019 and 2022, averaging at 89,000t, but increase to its highest catch at 131,000t in 2023.

(iii) The fluctuation in catches from purse seine fisheries, show catches dropping to their lowest point of 63,000t in 2021, but recovery significantly in 2023 at 103,000t.

(iv) Baitboat and industrial longline fisheries recorded limited catches of neritic tuna and seerfish species. Neritic species are occasionally caught as bycatch in industrial longline fisheries, although these catches are typically underreported.

(v) Besides the main fishing gears mentioned, there are other coastal fisheries operating in the region that also catch neritic and seerfish species. These fisheries, although less prominent in overall catch volumes, contribute to the broader exploitation of neritic resources in coastal waters.

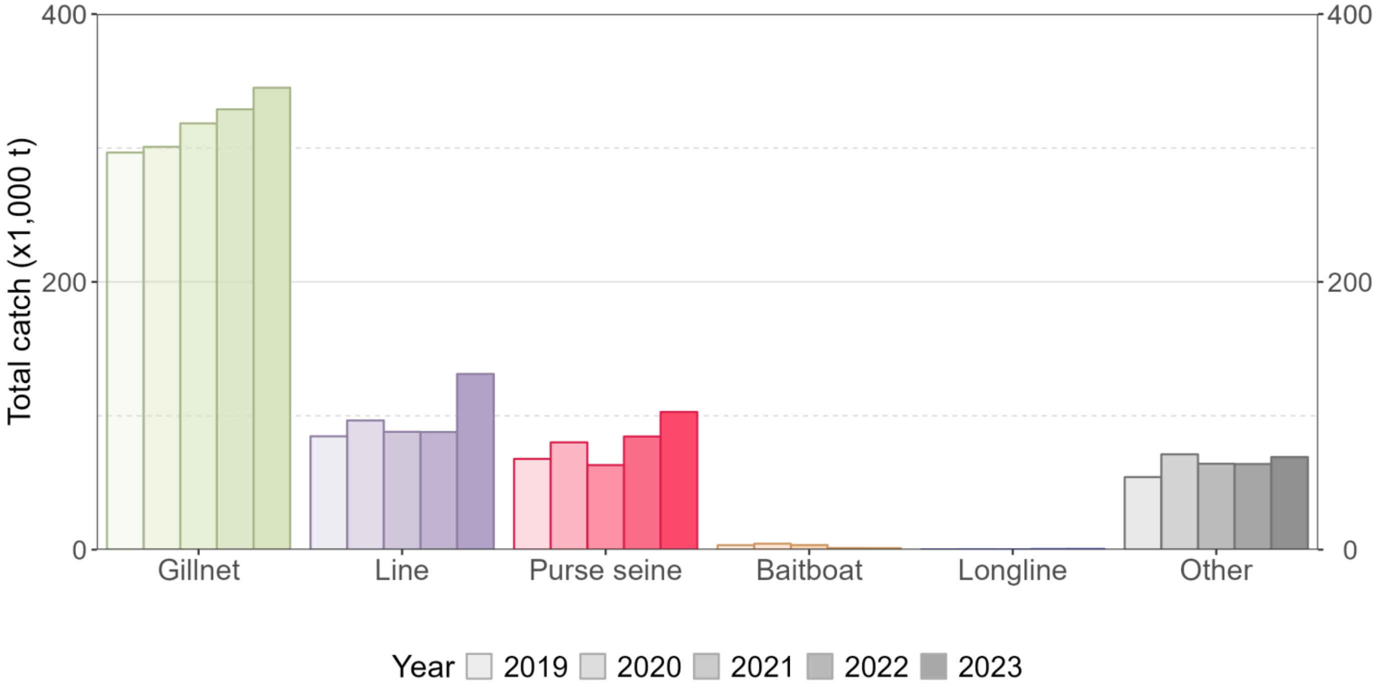

Figure 4.6: Annual trends in retained catch (metric tonnes; t) of IOTC neritic tunas and seerfish by fishery group between 2019 and 2023

Catches from key gillnet fleet, I. R. Iran, show fluctuation in recent years, with overall declining trend. The maximum catch were recorded in 2020 at 10,000t, and maintained below 130,000 tonnes. Catches also fluctuated from other main gillnet fleets, Indonesia, India and Pakistan. In 2023, Indonesia and India catch data increased, to its maximum, 10,000t and 9,000t, respectively, contrary to Pakistan, which maintained below 2020 catch rate. The declining catch rate in the Arabian gulf could be attributed to factors such as fishing closures, reduced demand from the Iranian market (a major export destination for the species), and adverse environmental conditions (Moazzam 2021). Other fleets with gillnet fisheries faced increasing trend in the recent years, with slight decrease in 2023, namely Oman and Yemen (**Fig. 4.7a**).

There are fluctuations in catches from main fleet with line fisheries for the neritic species. The fisheries are primarily dominated by Indonesia, India, and Oman, although their average catch is below 100,000 tonnes.Indonesia saw a marked increase in 2023 with catches rising to71,000t, compared to 31,000t in 2022. catch trend from India fluctuated, dropping to 0t in 2021.The dropped follow rise in the catch thereon, reaching 2019 catch level, 2,000. Catches of I. R Iran and Oman line fisheries, which are at the same level, show similar trend, with decline in recent years. Omani's line catches dropped to 5,000, 0, 1,000, 2,000t in 2023, following the peak in 2020 at 14,000t. Catches of other line fleets varied, with higher catch in 2023 (**Fig. 4.7b**).

Indonesia coastal purse seine fisheies remained the highest contributor of neritic catches from surrounding net fisheries. Although catches fluctuated between 2019 and 2022, substantial catch were recorded in 2023, at 40,000t, from 24,000t in 2022. Thailand purse seine contributed around 0% in recent years. The trend from Thailand purse seine shows catches peaked in 2020 at 30,000t, followed by constant decline between 2021 and 2022, to increase again in 2023. India catch data of neritic species increased by around r(round((NC_RP_PS[YEAR == 2022 & FLEET_CODE == "IND", sum(CATCH)]-NC_RP_PS[YEAR == 2021 & FLEET_CODE == "IND", sum(CATCH)])/(NC_RP_PS[YEAR == 2022 & FLEET_CODE == "IND", sum(CATCH)])))*100% between 2021 and 2022, and remaining high in 2023. Contrary to India, catches from Malaysia declined in the recent years, with catches in 2022 and 2023 around 0tonnes, compared to maximum catch in 2019 at 110.0800018tonnes. Other purse seine fleets show an overall increase in recent years, averaging around 12,000 tonnes (**Fig. 4.7c**).

Neritic species are also caught by other fisheries, baitboat(**Fig. 4.7d**), industrial longline(**Fig. 4.7e**) and other minor fisheries(**Fig. 4.7f**), and their average catch are around, 86tonnes, 36tonnes, and 8801tonnes, respectively. Indonesia is the main contributor of catch from these fisheries, with high catches in 2022 and 2023 for longline and other fisheries, but minimum catch in 2023 from the baitboat fishery. India catches from other fisheries, show constant trend in recent years, although catches declined in 2023 by r(round((NC_RP_OT[YEAR == 2022 & FLEET_CODE == "IND", sum(CATCH)]-NC_RP_OT[YEAR == 2023 & FLEET_CODE == "IND", sum(CATCH)])/(NC_RP_OT[YEAR == 2022 & FLEET_CODE == "IND", sum(CATCH)])))*100%. Recently Bangladesh reported catch data by fisheries, where all catches were previously assigned to coastal gillnet fishery. Between 2021 and 2023, catches are reported for trawling and set bagnet. The trend show average catch around 8,000 tonnes between 2021 and 2022, however dropped to around 2,000 tonnes in 2023 (**Fig. 4.7f**).

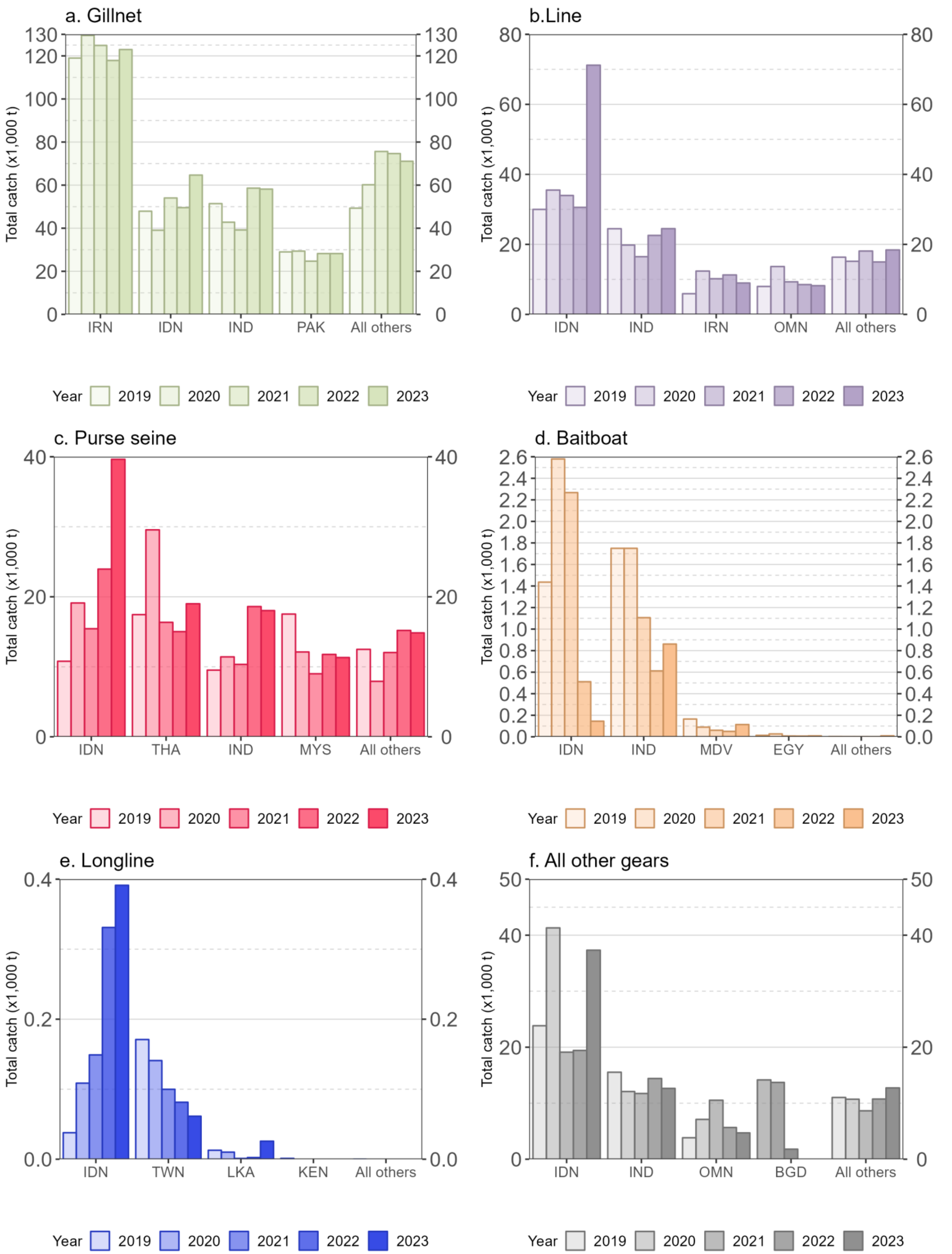

Figure 4.7: Annual trends in retained catch (metric tonnes; t) of IOTC neritic tunas and seerfish by fishery group and fleet between 2019 and 2023

4.1.3 Changes from previous Working Party

Submission of catch data from some coastal fisheries are submitted late, or revised after initial submission, which affect the preliminary data. Following the release of data for the 14th session of the Working Party on Neritic Tunas held in July 2024, covering the period 1950-2022, several fleet provided updated catch data. The major updates were:

(i) Indonesia: revision of historical catch data between 1950 and 2022 of all fisheries and the 16 IOTC species. Depending on the fisheries and species, catch either increased or declined during the revised period.

(ii) Iran: catches were revised for the period 2011 and 2014

(iii) Non-reporting (data sources from FAO FishStat): revision of catch data between 2018 and 2022

Besides the major revisions, changes primarily affected the years 1950 to 2022, resulting from adjustment of dissaggregation within the database of fisheries with aggregated catch data following adjustments made from any historical revision (**Fig. 4.8**). Overall, the updated trend show catches declining from the 1950. Appendix II display the changes in catch data by fleet between 2012 and 2022.

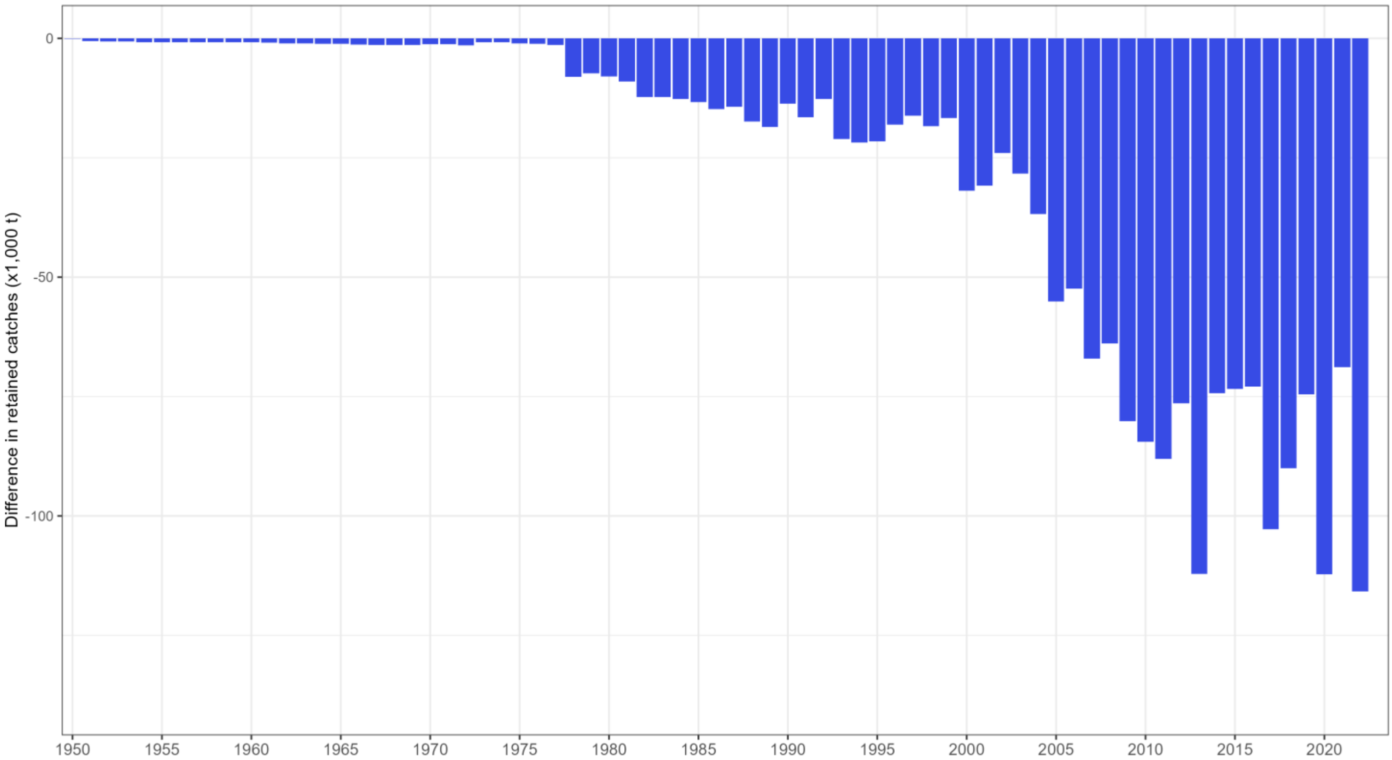

Figure 4.8: Differences in the annual retained catches (metric tonnes; t) of neritic tuna and seerfish available at this WPNT and its previous session

5 Historical revision of Indonesia catch data

Indonesia for sometime, have been trying to re-estimate the historical catch data, which were mainly estimated catch based on findings of a data review done in 2012 by IOTC consultant. The new estimation methodology for Indonesia is based on information collected from landing sites, logbooks and other sources between 2010 and 2019. The (Marine Affairs and Fisheries 2024) described the methodology used by Indonesia for the estimation. The revising led to changes in the catch of neritic species, where the overall catch of these species reduced considerably (**Fig. 5.1**).

Species wise, the differences vary, where some species show fluctuated catch series (bullet tuna) and some species the differences are minimal (**Fig. 5.2**)

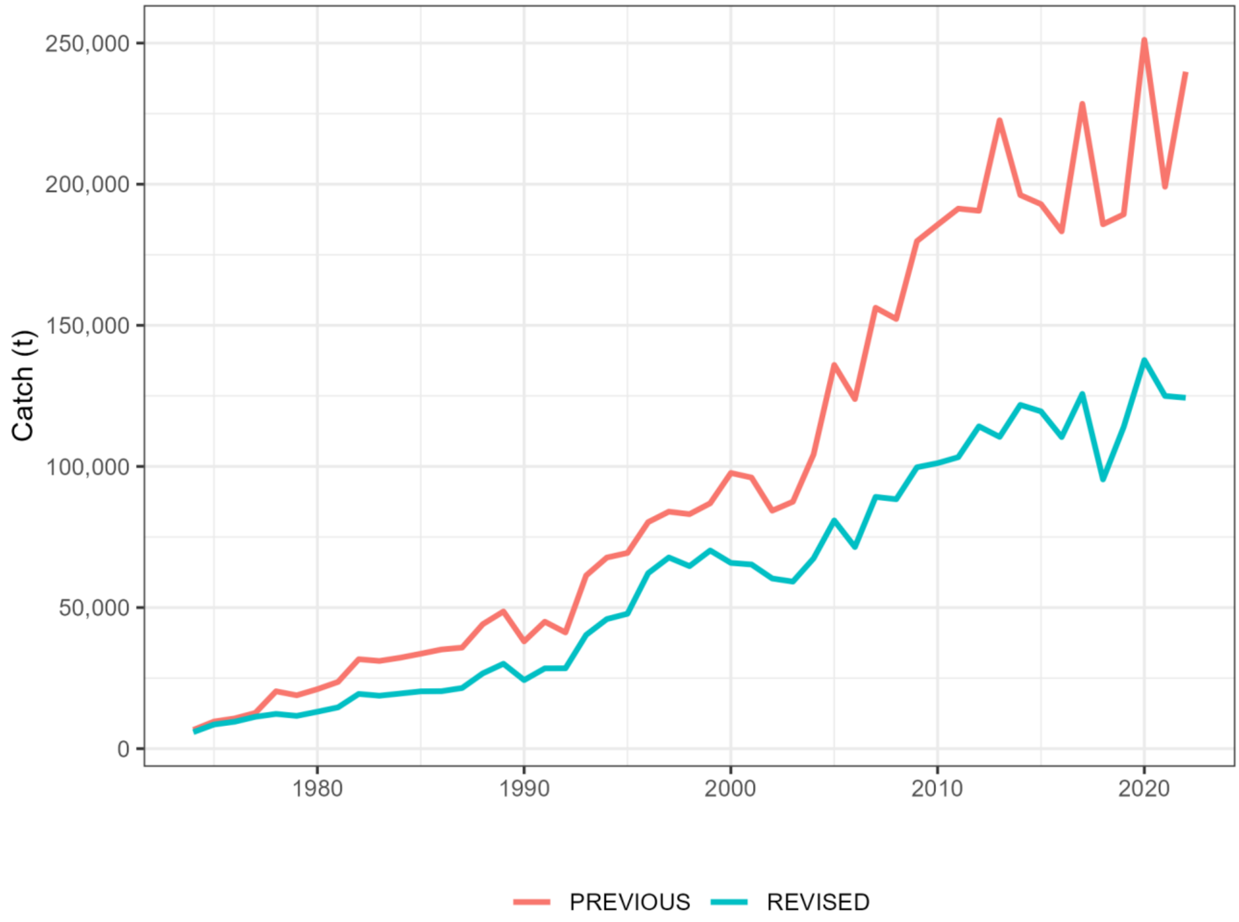

Figure 5.1: Differences in the annual retained catches (metric tonnes; t) of neritic tuna and seerfish of Indonesia between the previous catch and revised catch

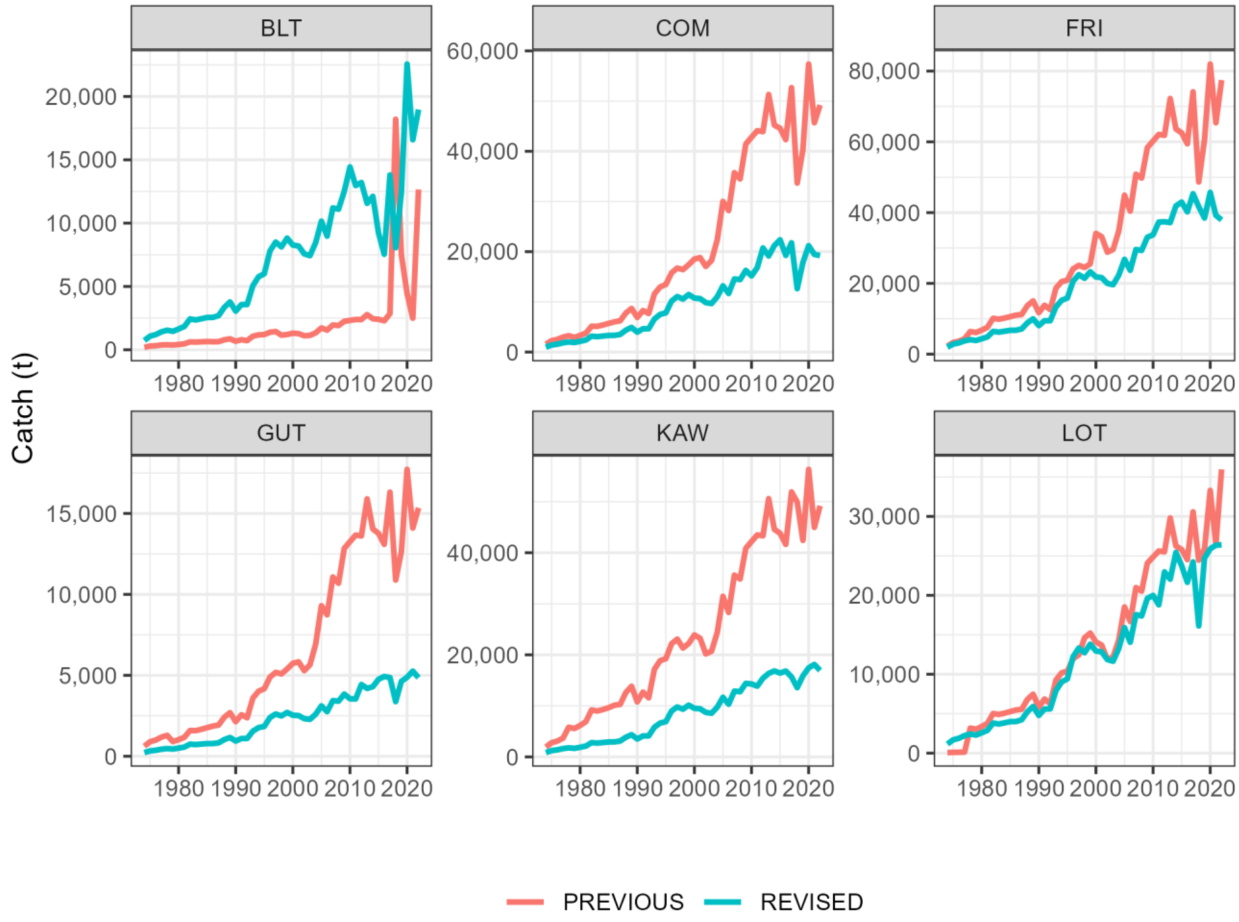

Figure 5.2: Differences in the annual retained catches (metric tonnes; t) of neritic tuna and seerfish of Indonesia between the previous catch and revised catch

5.0.1 Uncertainties in retained catch data

5.0.1.1 Overall reporting quality scores

Uncertainty in the catch data available in the IOTC databases are becoming more concern to scientists using the data (Cappa et al. 2024). The Secretariat, with the supplementary funds from members is working closely with CPCs less able to meet the reporting requirements through several in-country missions and workshops held by data section (Capacity Development in Support of IOTC Developing Coastal States) , aiming at enhancing the data reporting quality, and with the production of several tools to assist CPCs.

Uncertainty in the catch data available in the IOTC databases is becoming an increasing concern for scientists relying on this information (Cappa et al. 2024). To address this issue, the Secretariat—supported by supplementary funding from member states—has been working closely with CPCs (Contracting Parties and Cooperating Non-Contracting Parties) that face challenges in meeting reporting requirements. This support includes multiple in-country missions and workshops conducted by the Data Section as part of the Capacity Development in Support of IOTC Developing Coastal States initiative. The recent supports provided to CPCs can be viewed in (Capacity Development in Support of IOTC Developing Coastal States). These efforts aim to improve data reporting quality and provide CPCs with various tools to support their reporting processes.

During the country missions, many CPCs highlighted significant challenges related to inadequate or outdated data collection systems. These limitations have hindered their ability to gather accurate and timely catch data. In response, several CPCs have initiated efforts to improve their data collection capabilities, including the adoption and pilot testing of electronic data collection tools. However, the training workshops provided by the Secretariat have primarily focused on data reporting rather than field-level data collection practices.

Although annual catch data indicate increasing catches from coastal fisheries operating within national jurisdictions, and highlight the importance of these catches in decision-making processes, such as quota setting, the level of uncertainty for these data remains high. This persistent uncertainty is largely attributed to challenges in data collection, including

- Inadequate data processing systems for estimating catch volumes
- Inefficient or absent data collection frameworks
- Limited focus on recording catches of tuna and tuna-like species, primarily due to their low catch rates
- Frequent aggregation and misidentification of tuna species
- Concurrent use of multiple fishing techniques, complicating effective monitoring
- Shortage of trained personnel for data collection tasks

Recently, CPCs such as Indonesia and the Islamic Republic of Iran have undertaken revisions of their historical catch data, aiming to reduce discrepancies and improve overall data quality. Despite these efforts, uncertainties in coastal fisheries data persist, largely due to limitations in the original data sources. The recent revisions primarily involved replacing earlier estimated catch figures with data collected by liaison officers, an important step in enhancing the reliability of the dataset. As a result, these revised datasets are expected to be assessed as having lower uncertainty in the final uncertainty analysis.

Data collection in national jurisdictions primarily relies on landing surveys, which have inherent limitations. Annual changes in the composition of retained catches, as indicated by quality scores, provide insights into data uncertainty at the IOTC Secretariat. Quality scores for the nominal catches of six IOTC neritic tunas and seerfish reflect: Non-reporting of data; estimation of species and gear composition when reporting aggregate figures; and persistent data quality issues in major countries such as India.

The percentage of nominal catches fully or partially reported to the Secretariat (quality score between 0 and 2) has varied between 44.7% and 97.4% of total catches over time, showing an encouraging increasing trend since the mid-1990s. However, the reporting quality has decreased since then and 66% of all retained catch was fully or partially reported to the Secretariat in 2023 (**Fig. 5.3**).

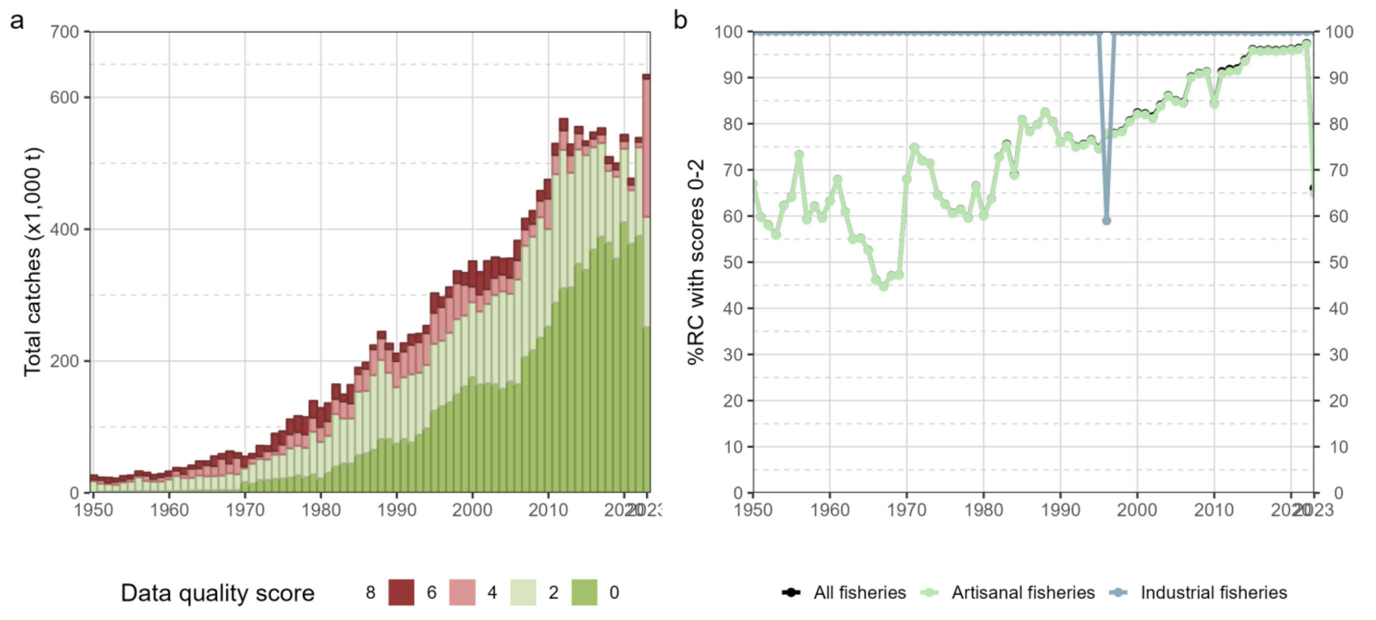

Figure 5.3: Annual time series of (a) cumulative retained catches (metric tonnes; t) estimated by quality score and (b) contribution of retained catches fully or partially reported to the IOTC Secretariat to all retained caches (percentage; %) of IOTC neritic tunas and seerfish for all fisheries and by type of fishery, for the period 1950-2023

In 2023, approximately 39.6% of the retained catch was estimated to have been fully reported to the Secretariat, with the remainder requiring partial or full estimation. Some of these catches were derived from alternative sources of catch data for CPCs and non-CPC coastal states that did not report directly to the Secretariat (Appendix III). Furthermore, a re-estimation process was undertaken for artisanal fisheries in Bangladesh, India, and Indonesia, along with adjustments for reporting catch data through species aggregates (Appendix III).

5.0.2 Discards

Due to incomplete reporting and varying data quality across coastal fisheries in the Indian Ocean, discarded catch data remains largely unknown to the IOTC Secretariat. Research (Heidrich et al. 2022) has indicated that discards of neritic and seerfish species do occur in several fisheries within the region, although specifics are not well documented. Discrepancies between reported data and estimates derived from sources like the Sea Around Us highlight the need for further analysis on the quality of reported data, species identification, and collaboration with institutions such as UBC for data validation. The Secretariat briefly reviewed and compared the data of Sea Around Us with information from IOTC database, which indicated various between the two data sets.

Despite the underreporting of discarded catch, research show that discard from some main tuna fisheries are reducing, attributed to resolutions prohibiting discard onboard tuna fishing vessels and fishing methods employ, suchas gear selectivity to reduce discard(Gilman et al. 2017).

Regional observer program on board fishing vessels resume for some fleets, following the disruption during the COVID-19 pandemic. Furthermore, the SEcretariat is reviewing the current procedures of ROS reporting process, and the repository to improve the estimation of discard from the ROS data.

Data within the ROS regional database from 2005 to 2021 suggest that discarding of neritic species is minimal in longline fisheries but more common in purse seine fisheries, particularly for frigate tuna and kawakawa, and to a lesser extent for bullet tuna (**Fig. 5.4**). Notably, observations from industrial purse seine fisheries reveal widespread distributions of frigate tuna, kawakawa, and bullet tuna throughout the Western Indian Ocean, challenging previous assumptions that these species were strictly coastal.

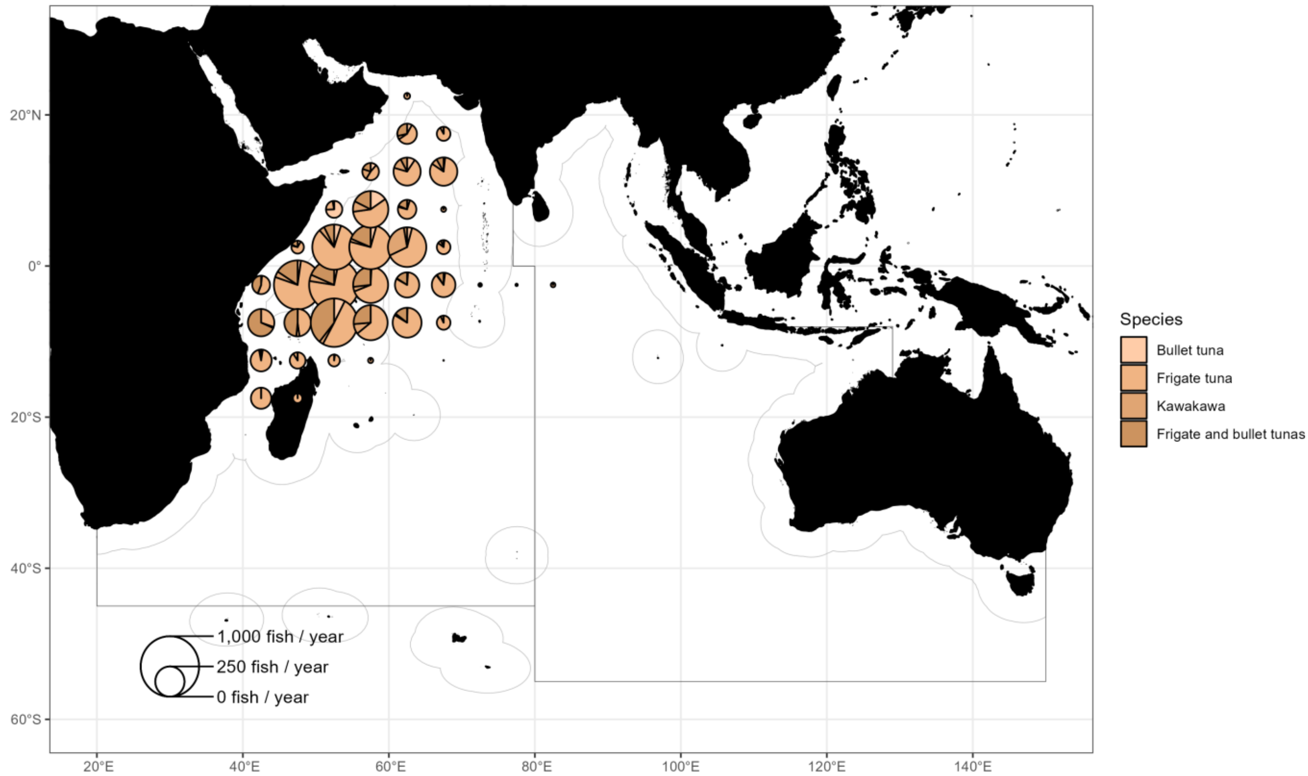

Figure 5.4: Distribution of interactions of neritic tunas with Western Indian Ocean purse seine fisheries as available in the ROS regional database. Light grey solid lines delineate areas beyond national jurisdiction

Currently, the ROS regional database does not include information on the release status (i.e., *alive* or *dead*) of neritic tunas discarded at sea by purse seine fisheries. This absence is primarily due to the data exchange format used by national institutes managing observer programs. However, it is widely believed that most tunas discarded at sea do not survive. This assumption stems from the conditions under which purse seine operations typically occur, where the handling and retrieval methods often result in high mortality rates for discarded fish.

It’s important to note that existing observer protocols within the ROS focus specifically on discards, omitting information on the fate of discarded tunas post-release. Furthermore, while discards are the primary focus, a portion of the bycatch of neritic tunas may be retained, particularly for international markets.

Size data collected at sea by scientific observers provide insights into the size ranges of different neritic tuna species caught with purse seines. Frigate and bullet tunas typically exhibit similar fork length ranges, spanning from 25 cm to 60 cm, with a median size around 38-40 cm. In contrast, kawakawas tend to be larger, with a median fork length of approximately 45.5 cm and occasionally reaching up to 70 cm (**Fig. 5.5**).

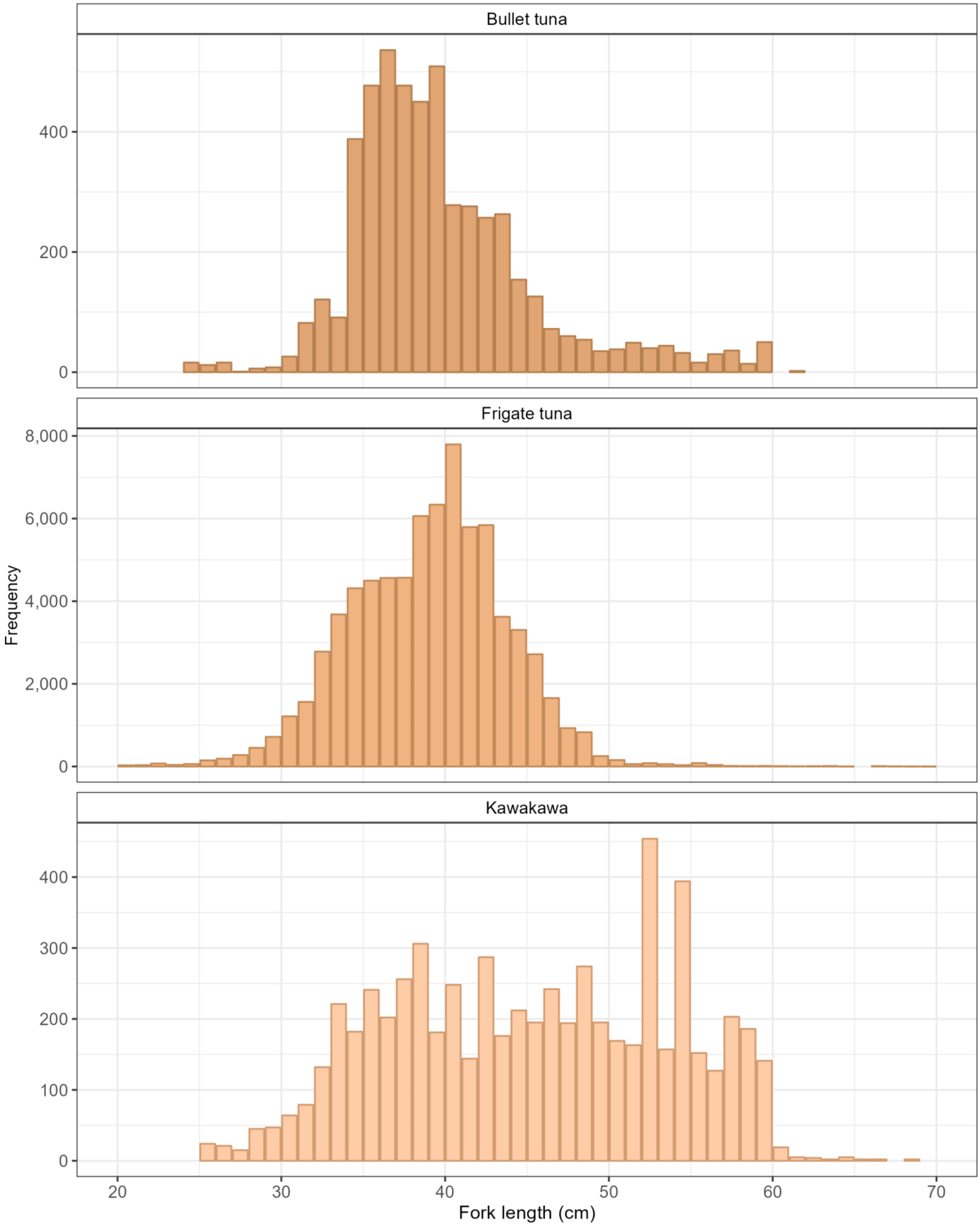

Figure 5.5: Size frequency distribution of neritic tunas caught in Western Indian Ocean purse seine fisheries as available in the ROS regional database

5.1 Spatial distribution of catch and effort

The workshops held to help CPCs to improve the reporting of data, also assist CPCs to define their spatial areas using grid squares, as providing grid squares for the coastal fisheries are challenging for many coastal countries. Although limited, there are some progress in the reporting of geo-referenced catch data for 2023.

Not all CPCs were able to provide geo-referenced catch and effort data for major fisheries targeting neritic species in the Indian Ocean, whereby the data are either completely unavailable or very limited in scope. This limitation extends to the time frames for which such data are accessible, further complicating efforts to analyze fishing activities comprehensively. One of the primary challenges is the inconsistency in recorded effort, as different units of effort (e.g., trips, days, etc.) have been used over time within the same fishery.

Indonesia and India, which together account for approximately (43.1%) of the total catches of neritic species in the Indian Ocean in recent years, face significant gaps in their geo-referenced catch and effort data. Indonesia began reporting time-area catches for some artisanal and industrial fleets from 2018 onward, but the coverage remains notably low, typically less than 5% of fishing grounds. This limited coverage suggests that the reported data may not fully represent the extent of fishing activities across Indonesian waters.

In contrast, India has not reported any geo-referenced catch and effort data for its coastal fisheries since 1981, despite consistently reporting substantial annual catches, reaching about 100,000 t of fish in recent years. The absence of geo-referenced data poses challenges for accurately assessing the spatial distribution and intensity of fishing efforts in Indian coastal waters.

Furthermore, Pakistan has not submitted any geo-referenced data to the IOTC Secretariat since 1991, while Oman's last submission was in 2013. These omissions are noteworthy considering the significant contributions of these countries' fisheries to the total catches of neritic species in recent years.

These fisheries with crucial gaps in the geo-reference catch and effort data, contributed significant to the total catches of neritic species (**Fig. 4.5**).

I.R. Iran has established a robust time series of catch and fishing effort data since 2007 through a dedicated port sampling program for their coastal and offshore gillnet fisheries. This initiative has significantly enhanced the availability of data, particularly following an IOTC Data Compliance mission conducted in late 2017. As a result, I.R. Iran has started reporting catch and effort data in compliance with Resolution 15/02. Despite the report of the temporal data, the spatial component of the catch and effort were not by the requirements.

Improvement in the Spatial data reported from I. R Iran (23.6%) and Bangladesh (1.6%) coastal fisheries for 2023, which either did not provide geo-referenced data or provide inconsistencies data, following the training-workshops provided by the Secretariat.

In addition to reporting catch and effort data, efforts have been made to derive time series of Catch Per Unit Effort (CPUE) for key species such as longtail tuna, kawakawa, frigate tuna, and narrow-barred Spanish mackerel for the period 2008-2017 (Fu et al. 2019). This initiative provides valuable insights into the trends and dynamics of these fisheries, albeit with some challenges. Notably, the reported fishing effort for Iranian gillnetters is expressed in terms of fishing trips, reflecting the operational characteristics of a fleet comprising more than 1,200 vessels ranging from less than 15 m to over 30 m in length overall. The variability in trip durations introduces complexities in interpreting effort data, and efforts to derive days at sea from trip-level data collected by the Iranian Fisheries Organization may contain inherent biases (Fu et al. 2019).

Further collaboration with I.R. Iran is essential to leverage and refine the catch and effort data available from their gillnet fishery. Such collaboration will support the development of robust stock assessment models for neritic tunas and seerfish in the Indian Ocean, contributing to effective fisheries management and conservation efforts in the region.

5.1.1 Geo-referenced effort

Very little information is available on the fishing effort exerted by Malaysian purse seiners that caught a yearly average of 12,000 t of IOTC neritic species in recent years. The effort is only available since 2019 and limited to one 5°x5° square grid (**Fig. 5.6a**). Similarly, the spatial distribution of effort for Indonesian purse seiners is restricted to a few recent years and scattered in a limited number 1°x1° grids along the coasts of Indonesia, notwithstanding the fact that the national purse seine fleet is composed of more than 150 vessels larger than 24 m length overall (**Fig. 5.6b**). More effort data are available from the purse seine fisheries of Thailand and Sri Lanka but the time series remain short (**Fig. 5.6c-d**).

Very little information is available regarding the fishing effort exerted by Malaysian purse seiners, despite their annual average catch of 12,000 t of IOTC neritic species in recent years. Effort data are only accessible from 2019 onward and are confined to a single 5°x5° square grid (**Fig. 5.6a**). Similarly, the spatial distribution of effort for Indonesian purse seiners is limited to a few recent years and scattered across a few 1°x1° grids along the Indonesian coastlines, despite Indonesia's national purse seine fleet comprising over 150 vessels larger than 24 meters in length overall (**Fig. 5.6b**).

More extensive effort data are available from the purse seine fisheries of Thailand and Sri Lanka, although the time series remain relatively short (**Fig. 5.6c-d**).

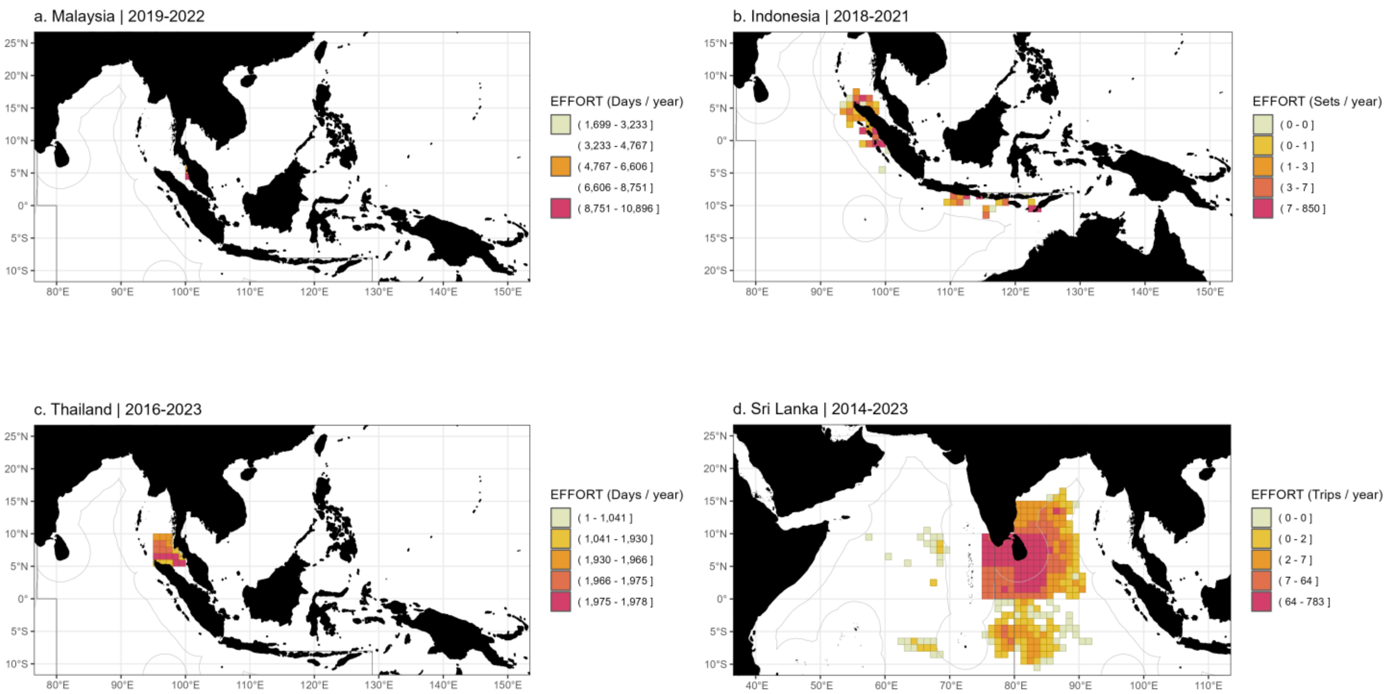

Figure 5.6: Distribution of fishing effort available at the IOTC Secretariat for purse seine fisheries catching IOTC neritic tunas and seerfish from (a) Malaysia (2019-2021), (b) Indonesia (2018-2021), (c) Thailand (2016-2021), and (d) Sri Lanka (2014-2021). Light grey solid lines delineate areas beyond national jurisdiction

Effort available from line fisheries is also restricted in time and space for Comoros and Oman, while effort from Indonesia is only available from 2019 onwards (**Fig. 5.6a-c**). Effort data from Maldives seem to be consistently reported since 2013, but the catches of neritic tunas and seerfish in Maldivian fisheries are almost negligible (**Fig. 5.6d**).

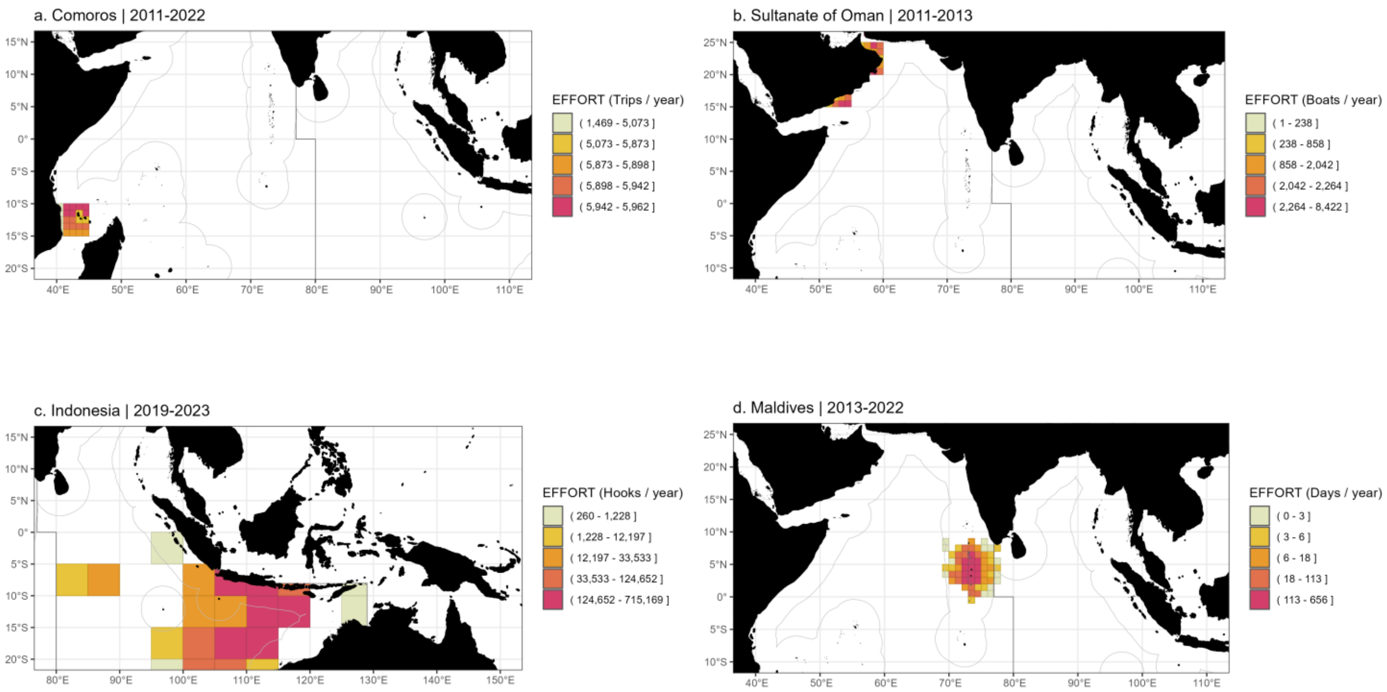

Figure 5.7: Distribution of fishing effort available at the IOTC Secretariat for line fisheries catching IOTC neritic tunas and seerfish from (a) Comoros (2011-2021), (b) Sultanate of Oman (2011-2013), (c) Indonesia (2019-2021), and (d) Maldives (2013-2021). Light grey solid lines delineate areas beyond national jurisdiction

Effort data for the gillnet fisheries of I.R. Iran and Sri Lanka are described by a better coverage than for purse seine and line fisheries. The effort from Iranian gillnetters is based on a large sample of vessels and appears to cover a large area of the northwestern Indian Ocean between 2007 and 2021 (**Fig. 5.8a**). The spatial distribution of the effort of the Sri Lankan gillnetters is also good in time and space (**Fig. 5.8b**). However, many Sri Lankan gillnetters used in the past a combination of gillnet and longline over a same fishing trip, with no accurate information collected of the composition of the catch by by the actual gear used, this preventing the use of nominal CPUE time series for deriving abundance indices for the species caught in this fishery.

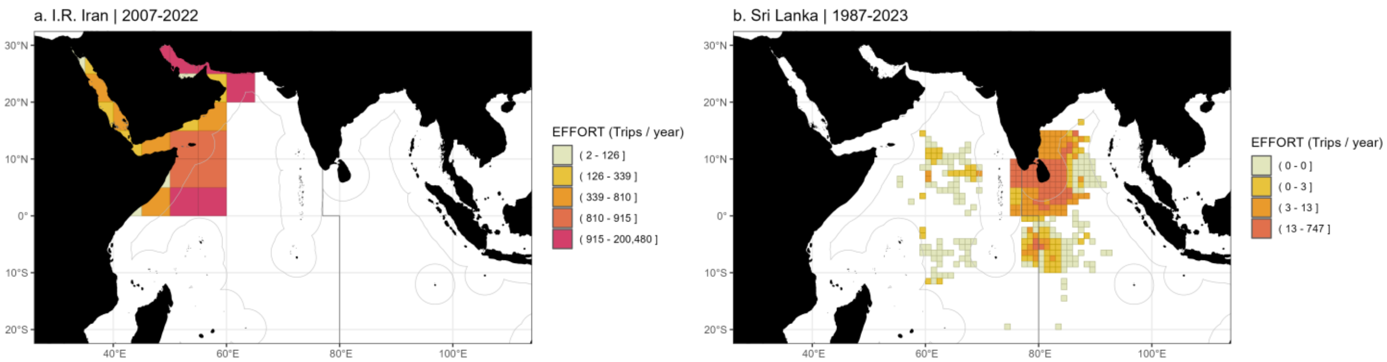

Figure 5.8: Distribution of fishing effort available at the IOTC Secretariat for gillnet fisheries catching IOTC neritic tunas and seerfish from (a) I.R. Iran (2007-2021) and (b) Sri Lanka (1987-2021). Light grey solid lines delineate areas beyond national jurisdiction

CPCs were asked recently to consider using other fishing units instead of "TRIPS" as effort unit for the coastal fisheries. Hence, several CPCs changed their effort unit in 2023, from "TRIPS" to effort units such as "Fishing Days" and "number of fishing gear".

5.1.2 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. 5.9**).

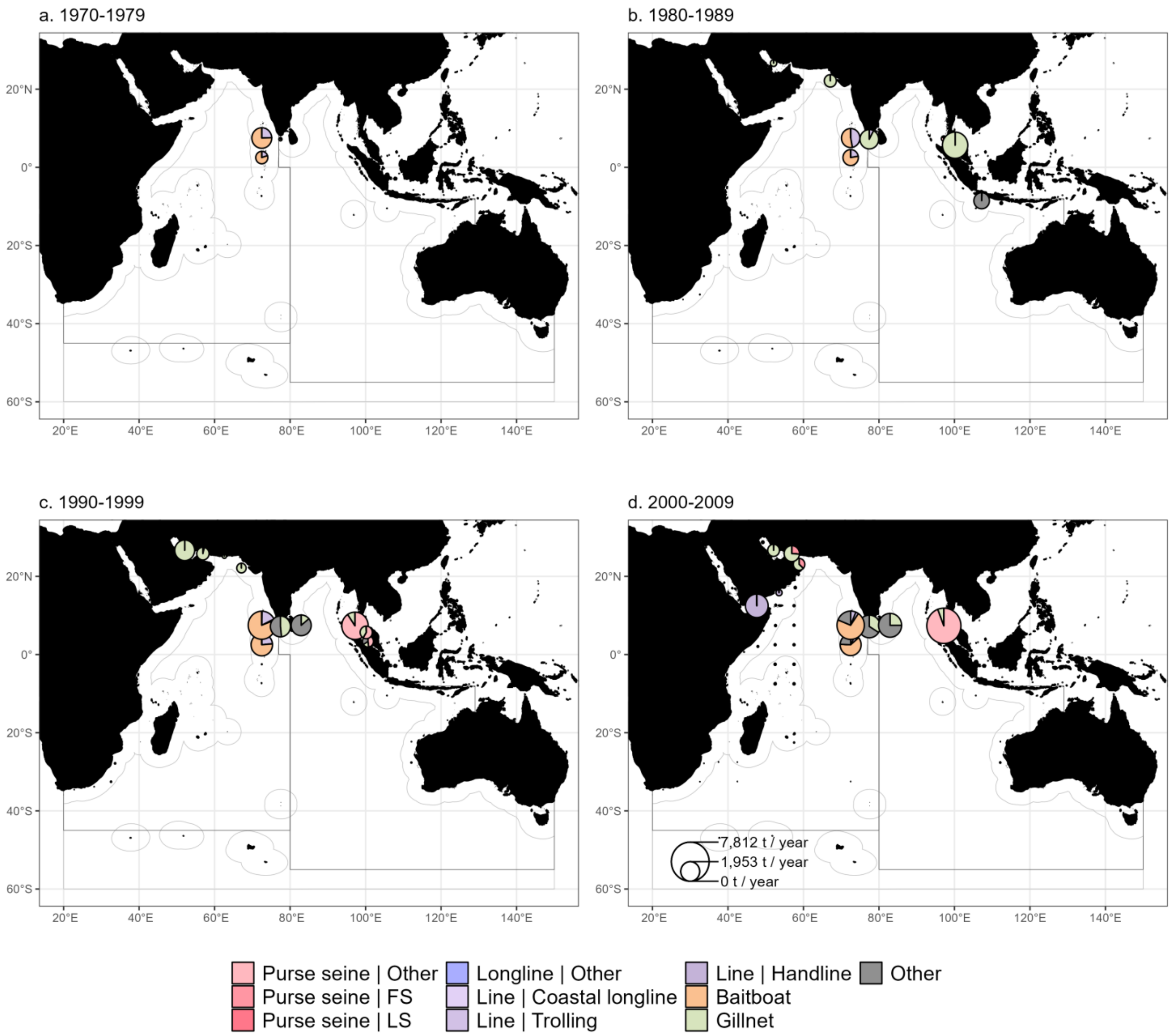

Figure 5.9: Mean annual time-area catches (metric tonnes; t) of IOTC neritic tuna and seerfish species by decade, 5x5 grid, and fishery as reported to the Secretariat. Light grey solid lines delineate areas beyond national jurisdiction

More information on the fishing grounds of IOTC neritic species has become available over the last decade (**Fig. 5.10**). However, the perception of the spatial extent of the fisheries in this period is biased by the limited geo-referenced data reported by some of the major neritic tunas fishing nations such as Indonesia, India, Pakistan, and Oman.

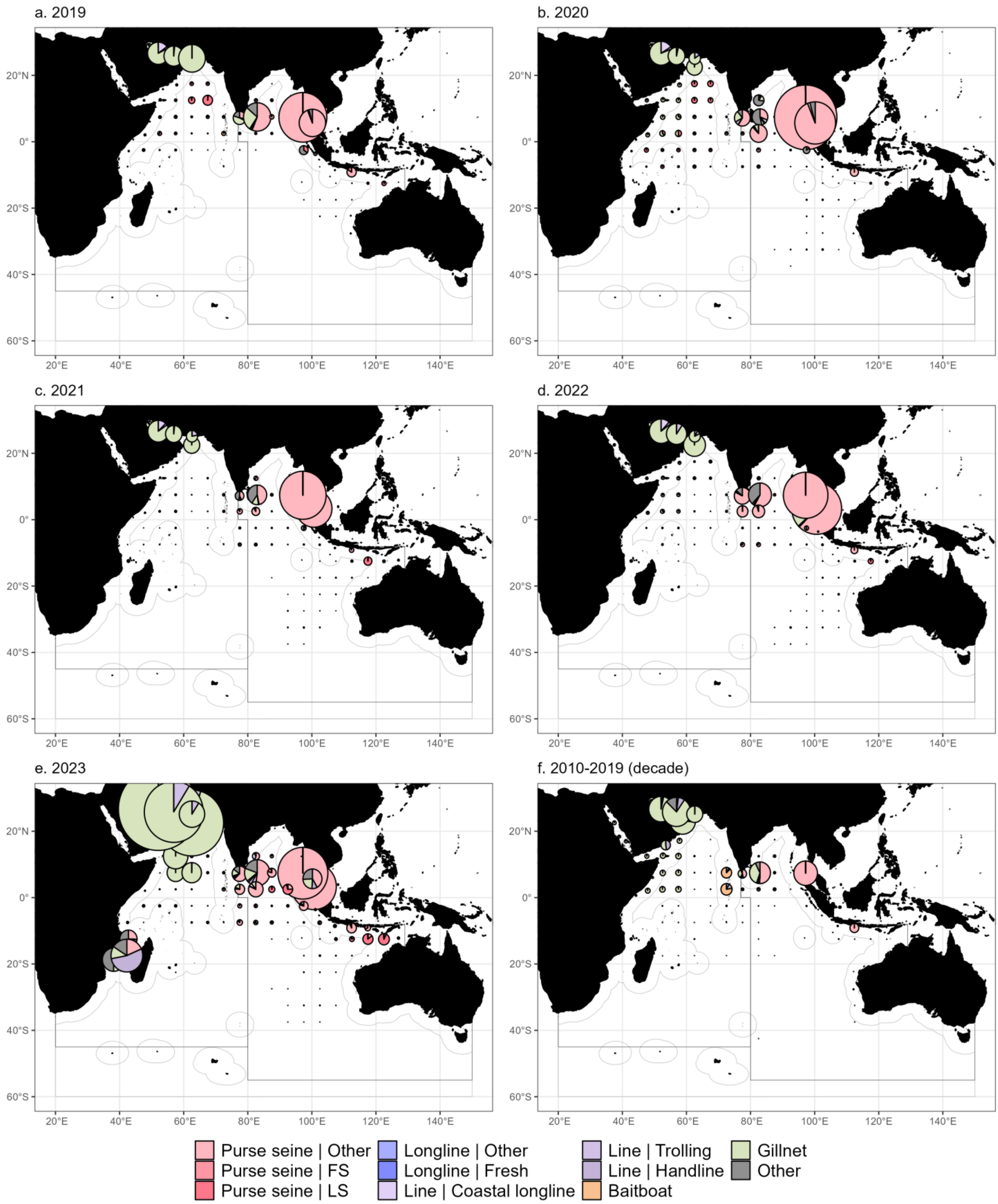

Figure 5.10: Mean annual time-area catches (metric tonnes; t) of IOTC neritic tuna and seerfish species by year for the period 2019-2023 and for the most recent decade, 5x5 grid, and fishery as reported to the Secretariat. Light grey solid lines delineate areas beyond national jurisdiction

5.1.3 Geo-referenced catch of Iran 2023

Geo-referenced catch and effort data from the Islamic Republic of Iran have been submitted using irregular grid formats since 2007, and several discrepancies have been observed within these datasets. Catch and effort data were provided separately, often with mismatched stratification, making direct comparisons difficult. However, the geo-referenced catch data submitted for 2023 showed notable improvements, with fewer inconsistencies. The data were reported using standardized 1-degree grid squares and were consistent with retained catch figures. It should be noted, however, that the 2023 submission covered only offshore gillnet fisheries (**Fig. 5.11**).

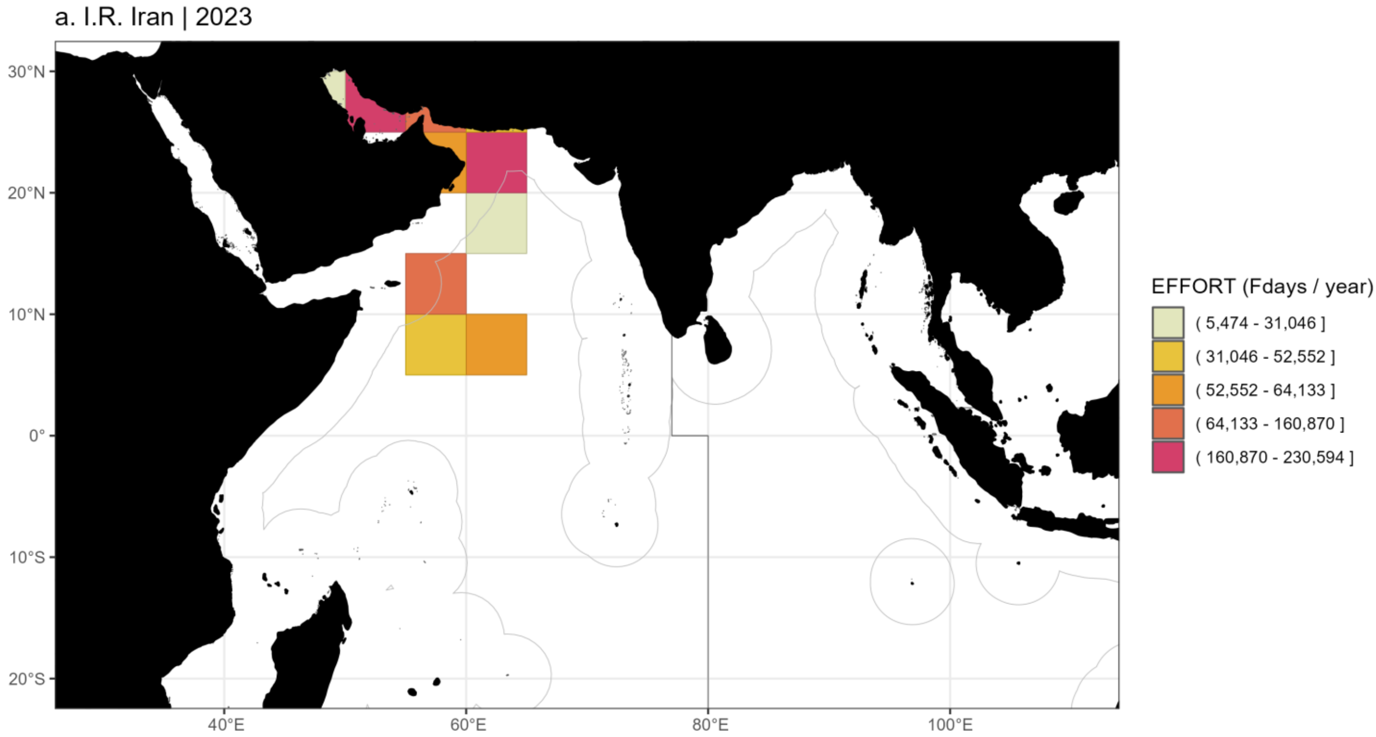

Figure 5.11: Distribution of fishing effort available at the IOTC Secretariat for gillnet fisheries of I.R. Iran (2023). Light grey solid lines delineate areas beyond national jurisdiction

5.1.4 Uncertainties in catch and effort data

In 2024, catch revision efforts focused primarily on retained catch, rather than geo-referenced catch from major neritic fishing fleets. The Islamic Republic of Iran was the only CPC to make improvements to both catch and effort data. Although Iran revised its geo-referenced catch data for 2023, these revisions were limited to offshore gillnet fisheries. Coastal gillnet fisheries—which account for over 80% of neritic species catches, were not included, and their data remain non-compliant with reporting requirements. Consequently, uncertainty in the geo-referenced catch data for Iran remains significant.

Despite the improvement in the uncertainty of retained catch, uncertainty in geo-referenced catch and effort data from fisheries catching neritic tunas, remain low in the data submitted to the Secretariat (**Fig. 5.12a**) Data from I. R Iran, although not fully by standard, slightly improved the quality of the geo-referenced data from 2007. Thailand and Sri Lanka provide quality geo-referenced data from mid-2010s. Whereas Indonesia and India, the two main neritic tuna fleets, do not provide geo-referenced catch for all their fisheries. In 2023, the percentage of retained catches with sufficient geo-referenced catch and effort data (scores 0-2; **Table 3.3**) stood at 52.9% in 2023, increased from 39.2% in 2022 (**Fig. 5.12b**).

Increased awareness of geo-referenced catch reporting requirements has led to some improvements in the quality of geo-referenced data submitted. However, CPCs lacking proper data collection systems continue to face challenges in providing consistent and reliable geo-referenced data. Uncertainties in catch and effort data, particularly from coastal fisheries, remain due to several factors:

- Absence of reported data for handline and/or trolling line fisheries (e.g., Oman, Madagascar)
- Low sampling coverage, limiting representativeness of data (e.g., Indonesia)
- Aggregated gear categories that obscure specific effort data for coastal fisheries (e.g., Australia, EU, France)
- Poor data quality, where even basic reporting requirements are not met (e.g., India)
- changes in effort unit over time (in 2023, eliminating TRIPS as effort unit)
- Use of "trip" as the unit of effort in fisheries with widely varying vessel sizes and trip durations, reducing comparability and reliability of effort data

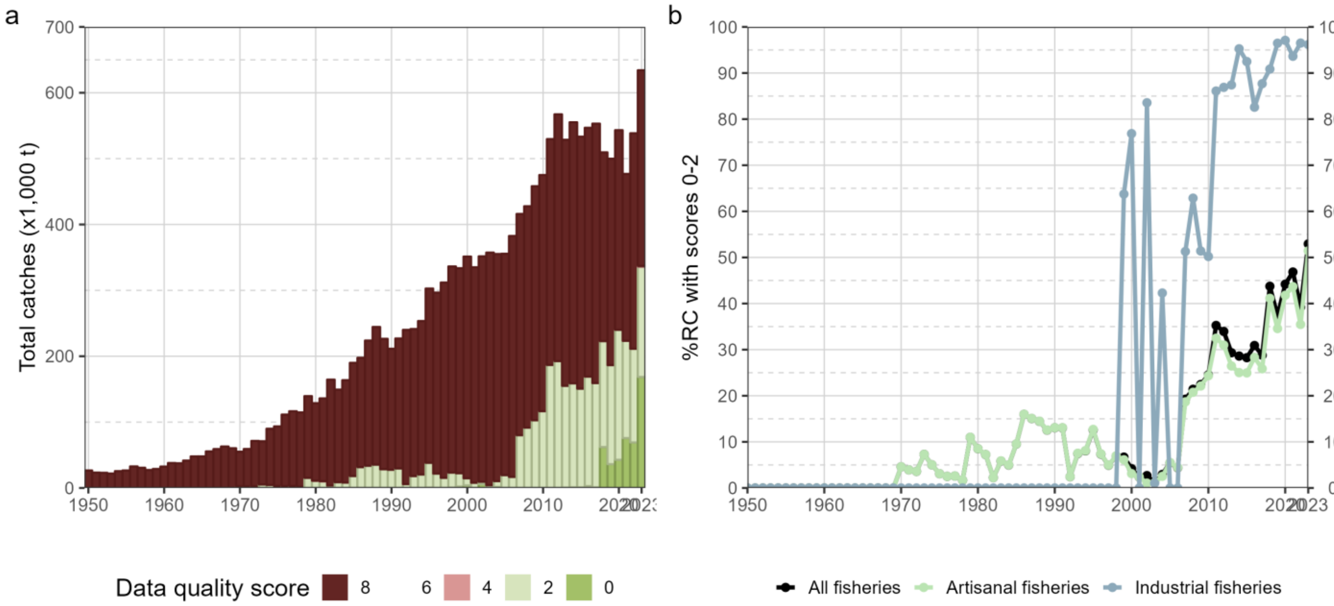

Figure 5.12: Annual time series of (a) cumulative retained catches (metric tonnes; t) estimated by quality score and (b) contribution of retained catches with corresponding geo-referenced catch and effort data reported to the IOTC Secretariat in agreement with the requirements of Res. 15/02 to all retained caches (percentage; %) of IOTC neritic tunas and seerfish for all fisheries and by type of fishery, for the period 1950-2023

5.2 Size composition of the catch

5.2.1 Samples availability

Over the years, size samples of neritic species have been collected primarily by main neritic fleets such as I.R. Iran and Sri Lanka, with recent contributions from Indonesia and Thailand. Despite consistent data reporting from some fleets, meeting quality standards has proven challenging, even though samples are gathered from multiple fisheries.

The size samples available for neritic tunas and seerfish are predominantly from gillnet fisheries, comprising 75.7% of all size data in the IOTC database. Additionally, size samples are available from purse seine (1985-2023), baitboat (1983-2023), and trolling line (1983-2023) fisheries, albeit in smaller numbers compared to gillnet fisheries, while very few samples are available from all other fisheries (**Fig. 5.13**). Interestingly, size data have been available since the 1980s, primarily from projects conducted under the Indo-Pacific Tuna Programme (IPTP). Early samples were collected in Indonesia, Maldives, and Malaysia, and later in Sri Lanka, I.R. Iran, and Pakistan.

Recently, although there are several projects collecting size data, these projects focus on endangered species such as sharks or species with high commercial value, like large palagic species. Sampling of neritic species are rare for research, or if collected data not publicly available. The number of samples collected recently for neritic species, as part of routine data collection, are low compared to the year 1990s where IPTP project collected high number samples of neritic species. In recent years, coastal fisheries have collected very few samples. For example, Sri Lanka averaged sampling about 194,000 fish annually between 1985 and 1993, but less than 6,000 samples annually between 2019 and 2023. In contrast, I.R. Iran has increased the number of neritic fish sampled over the last decade, reaching around 130,000 in 2019, but decreasing recently to reach 117,000 fish in 2023 while the total catch levels have remained quite stable.

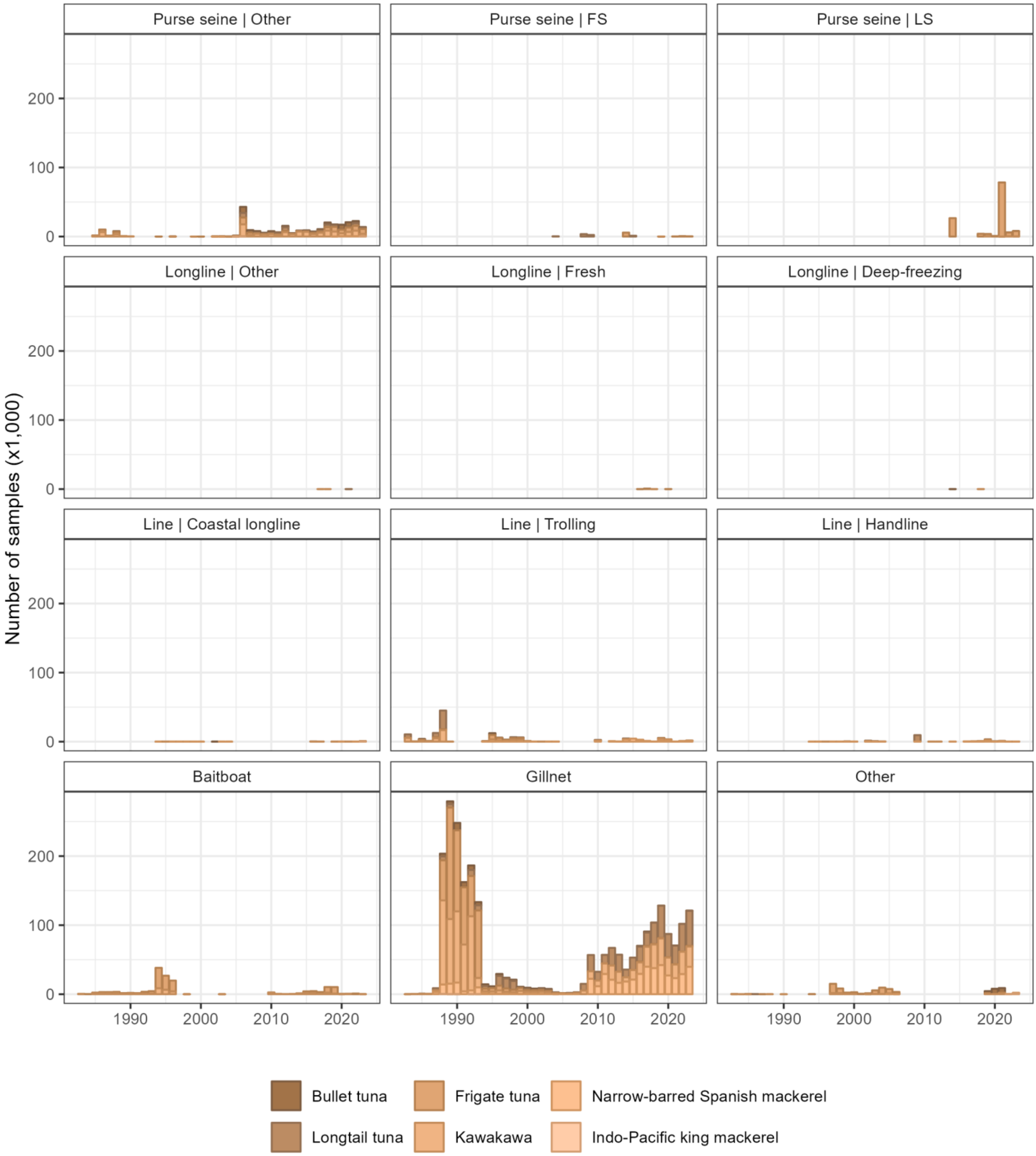

Figure 5.13: Annual number of standard size samples available at the IOTC Secretariat by fishery and neritic species. FS = free-swimming school; LS = school associated with floating object

The number of size samples by species is very unbalanced and not representative of the importance of each species in the retained catches (**Fig. 5.14**). About two thirds of all samples available are for kawakawa (32.4%) and frigate tuna (30.6%). Samples for narrow-barred Spanish mackerel only represent 15.3% of the samples even though this species has been the most abundant in the catch over the last four decades, i.e., representing almost 30% of all catches of neritic species between 1980 and 2020. Only 1794 fish samples are available for Indo-Pacific kingfish when more than 1.3 million t of catch have been reported for this species since 1980.

Figure 5.14: Percentage of size samples by species for all standard size data available at the IOTC Secretariat

5.2.2 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. 5.15**). 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 39.5 cm). Kawakawa are taken at larger sizes, with a fork length interquartile comprised between 32.5 and 51.5 cm. The largest kawakawa are taken in high seas and coastal longline fisheries with a respective median fork length of 56.5 and 46.5 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 74.5 and 98.5 cm (**Fig. 5.15**). The very few samples available for Indo-Pacific king mackerel from coastal purse seine (n = 362) and gillnet (n = 393) fisheries indicate similar median values of fork length of 37.5 cm.

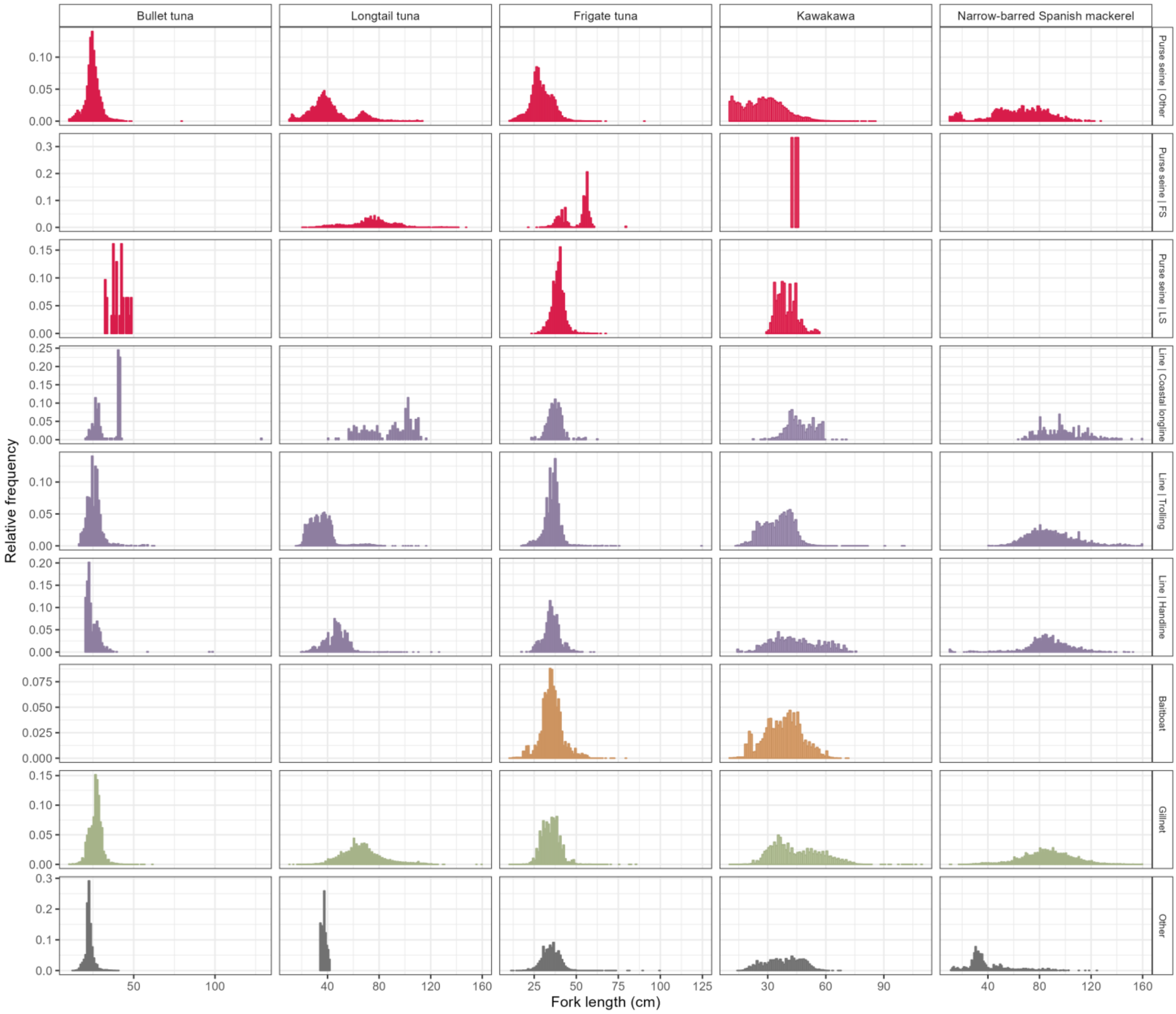

Figure 5.15: Relative fork length (cm) frequency distribution of IOTC neritic tuna and seerfish species (except for Indo-Pacific king mackerel) aggregated across all samples available at the IOTC Secretariat by fishery, excluding longline fisheries

By fleet, as indicated, majority of the samples are collected from Iranian fisheries, and increased in the sample coverage by Thailand (**Fig. 5.16**).

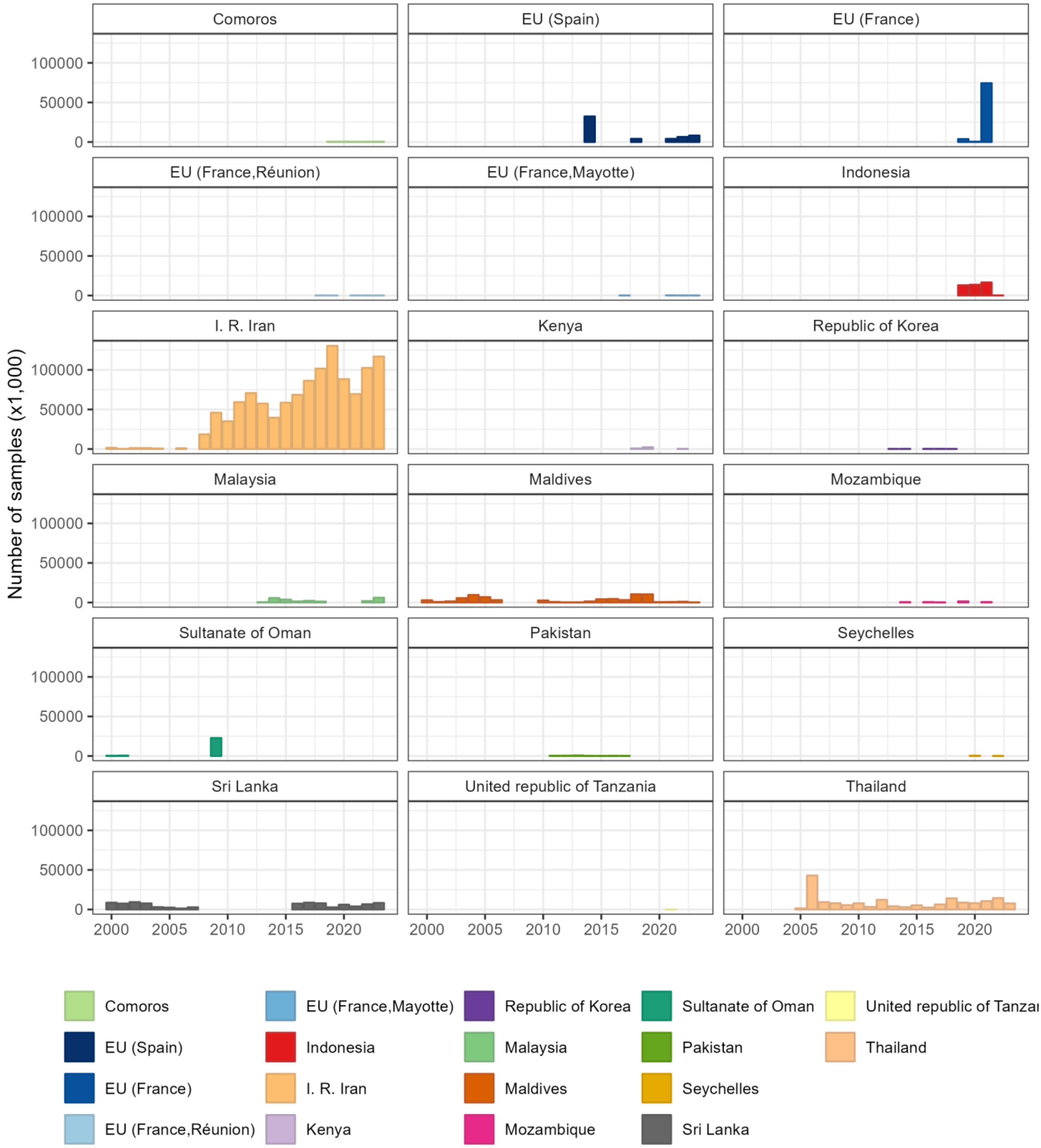

Figure 5.16: Relative fork length (cm) frequency distribution of IOTC neritic tuna and seerfish species (except for Indo-Pacific king mackerel) by fleet

Besides the regular data submission by the CPCs, the Secretariat also holds size frequency data collected at sea by scientific observers, which provide size information on neritic tunas taken in industrial purse seine fisheries (See section Discards).

5.2.3 Uncertainties in size-frequency data

The reporting quality of size-frequency data remians the lowest among all IOTC species groups. The overall quality – as measured by the percentage of nominal catches with data of quality scores between 0-2 – of size data available for neritic tunas and seerfish is poor. Almost no size data are available prior to the 1980s and the fraction of data of acceptable quality has averaged around 7.2% over the last decade, with only 19.7% in 2023 (**Fig. 5.17a**).

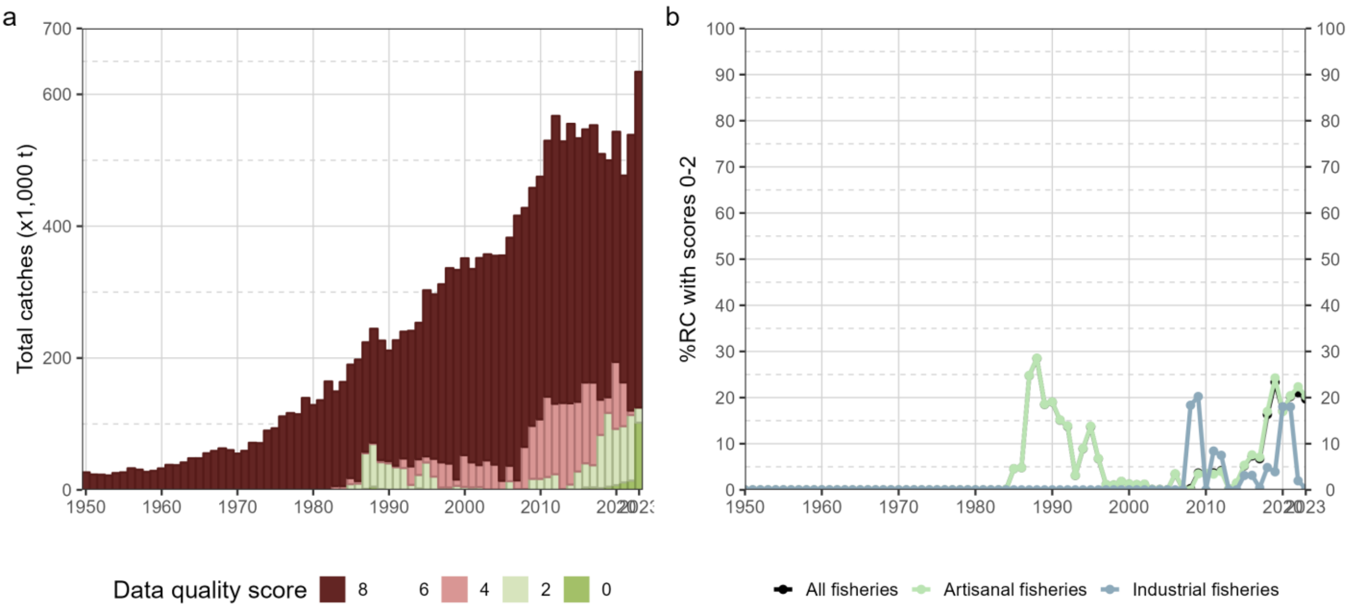

Figure 5.17: Annual time series of (a) cumulative retained catches (metric tonnes; t) estimated by quality score and (b) contribution of retained catches with corresponding geo-referenced size-frequency data reported to the IOTC Secretariat in agreement with the requirements of Res. 15/02 to all retained caches (percentage; %) of IOTC neritic tunas and seerfish for all fisheries and by type of fishery, for the period 1950-2023

Size frequency data are often not reported by the IOTC standards and as such cannot not be processed and included in the database. Recently the Secretariat has put more emphasis on complying with IOTC reporting requirements, such as including appropriate spatial information and using the recommended size bins for tuna and tuna-like species. In some instance however, data are included in the database but cannot be used due to poor quality. In particular, several size data sampled from neritic and seerfish species have been reported with large size bins and/or sizes exceeding the known maximum length of the species, e.g., size frequency data from Madagascar artisanal fisheries. Such data are filtered out in the IOTC processing generating the species-specific standard size data sets (see section Methods).

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7 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.

8 Appendix

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

The analysis of fisheries socio-economic indicators is important for coastal nations with high economic dependency on fisheries. The IOTC started to review the fisheries socio-economic indicators following resolution 23/10. Fish prices is an important indicator in understanding the driving forces behind exploitation (Auger et al. 2010). Currently providing market price and other market information is voluntary at IOTC. With the increasing discussion of the impact of CMM on socio-economic of coastal nations, several CPCsfind it necessary to provide the addional information on prices. Before the resolution 23/10 came into force, only two, maximum three CPCs will provide fish prices and market information annually, although such information is part of their routine data collection on landing sites, plus countries' statistical bureau regular data collection exercise. In 2024, eight CPCs provide fish market price for year 2023, for several species, including neritic species through the legacy form 7PR.

Prices for neritic species were provided by four coastal countries, monthly and by market destination. Only Indonesia indicated that the LOT caught were being sold on foreign market (Europe & Asia), whereas the others, all neritic prices are from local market, collected from fish market or from boat owners. The prices of the neritic species from the countries providing information in form 7PR varied by species and countries (**Fig. 8.1**).

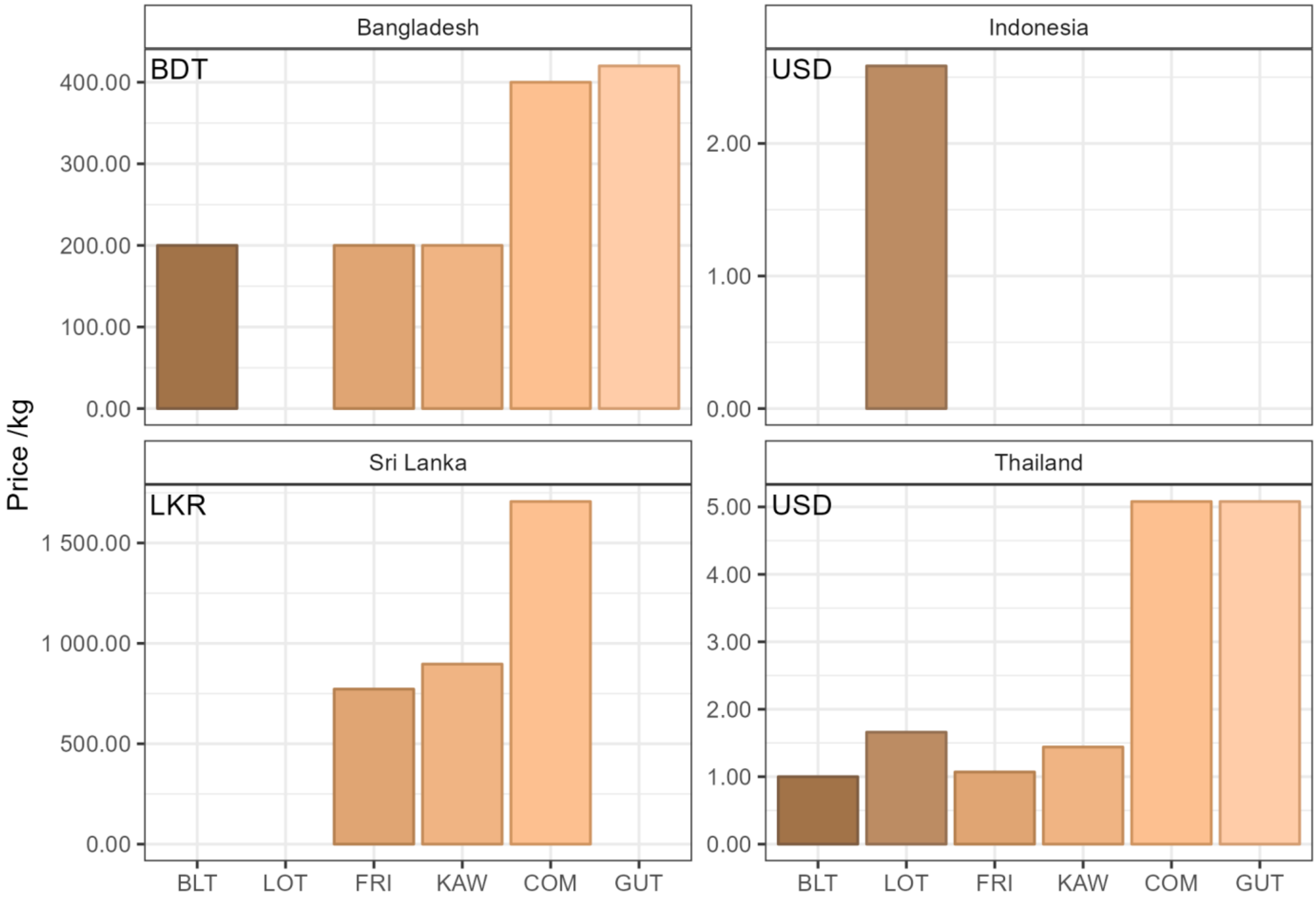

Figure 8.1: Average market price per kg for neritic tunas and seerfish species provided for 2023

Besides the data of fish prices submitted to the Secretariat, other data sources are reviewed, such as SEAFDEC, which holds fish prices for neritic species for South East Asian countries.

Monthly market prices expressed in Omani Rials (OR) of longtail tuna, frigate tuna, kawakawa, and narrow-barred Spanish mackerel have been reported to the Secretariat by the Sultanate of Oman since late 2015 for each of its 11 governorates. No information is available on the source of price data which may have been collected from the sale value at landings in local markets and/or from prices of export to Omani neighboring countries.

Price information gives the value rank for each of the four species. Narrow-barred Spanish mackerel is the most expensive species with an average value of 3.20 OR (~8.25 USD) between 2016 and 2020. Longtail tuna comes second with a mean value of 1.55 OR (~4 USD) between 2016 and 2020 when kawakawa and frigate tuna are described by lower sale prices, i.e., 0.81 OR (~2.1 USD) and 0.62 OR (1.6 USD), respectively. Fish prices show some quite large variability between months without any particular trend for narrow-barred Spanish mackerel while the price for the three neritic tunas has shown a susbtantial decline in 2020 as compared to previous years (**Fig. 8.2**).

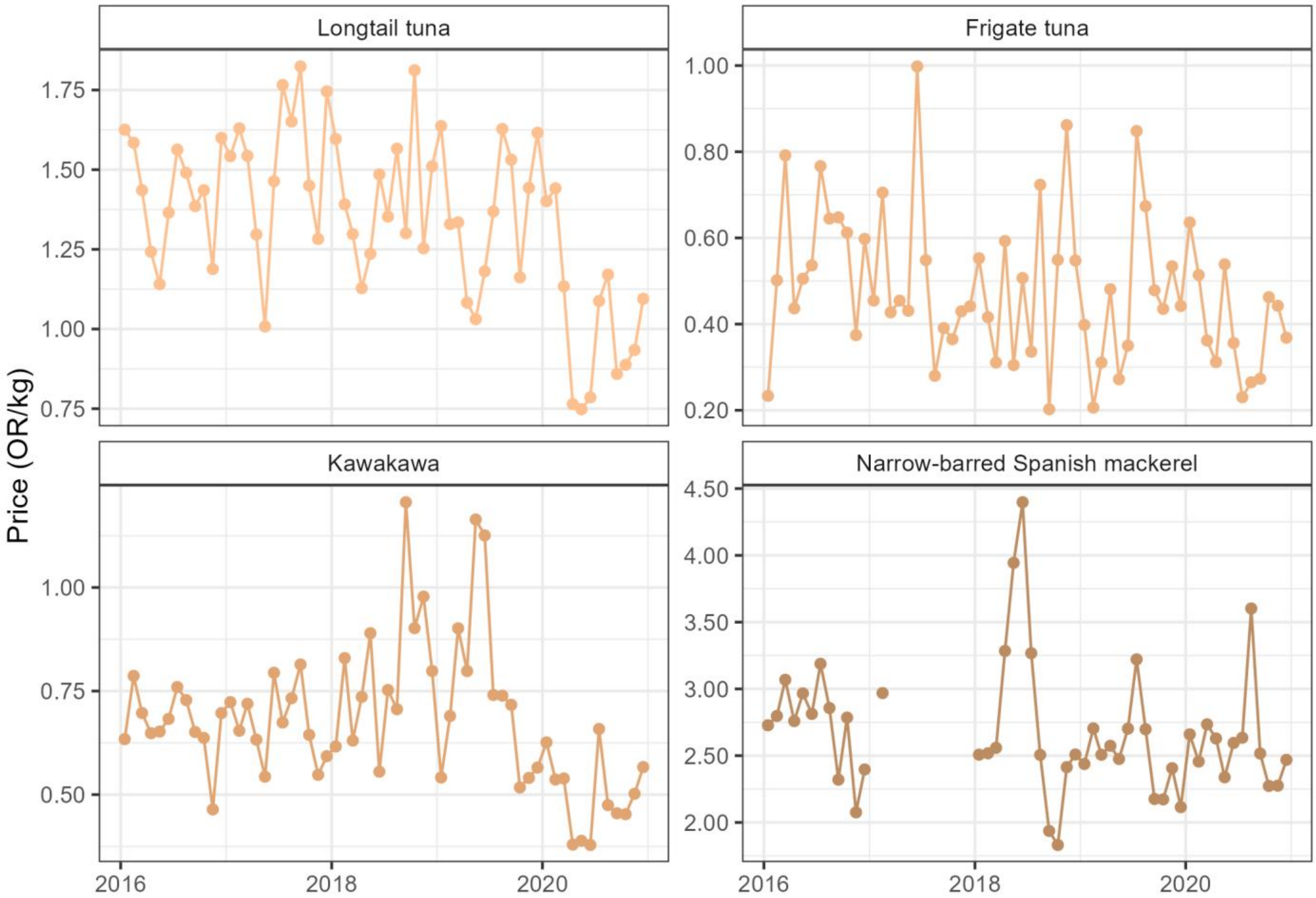

Figure 8.2: Monthly time series of price (Omani Rials; OR) for longtail tuna, frigate tuna, kawakawa, and narrow-barred Spanish mackerel in Oman between 2016 and 2020

SEAFDEC provides market prices for neritic and seerfish species in Thailand ((**Fig. 8.3**)) for multiple years, and in Indonesia (**Fig. 8.4**) for the year 2021 only. The trends observed in neritic market prices in Thailand indicate variations across years and seasonal fluctuations, suggesting that prices are influenced by market demand and supply dynamics.Conversely, market price data from Indonesia highlight the high value of king mackerel in the local market.

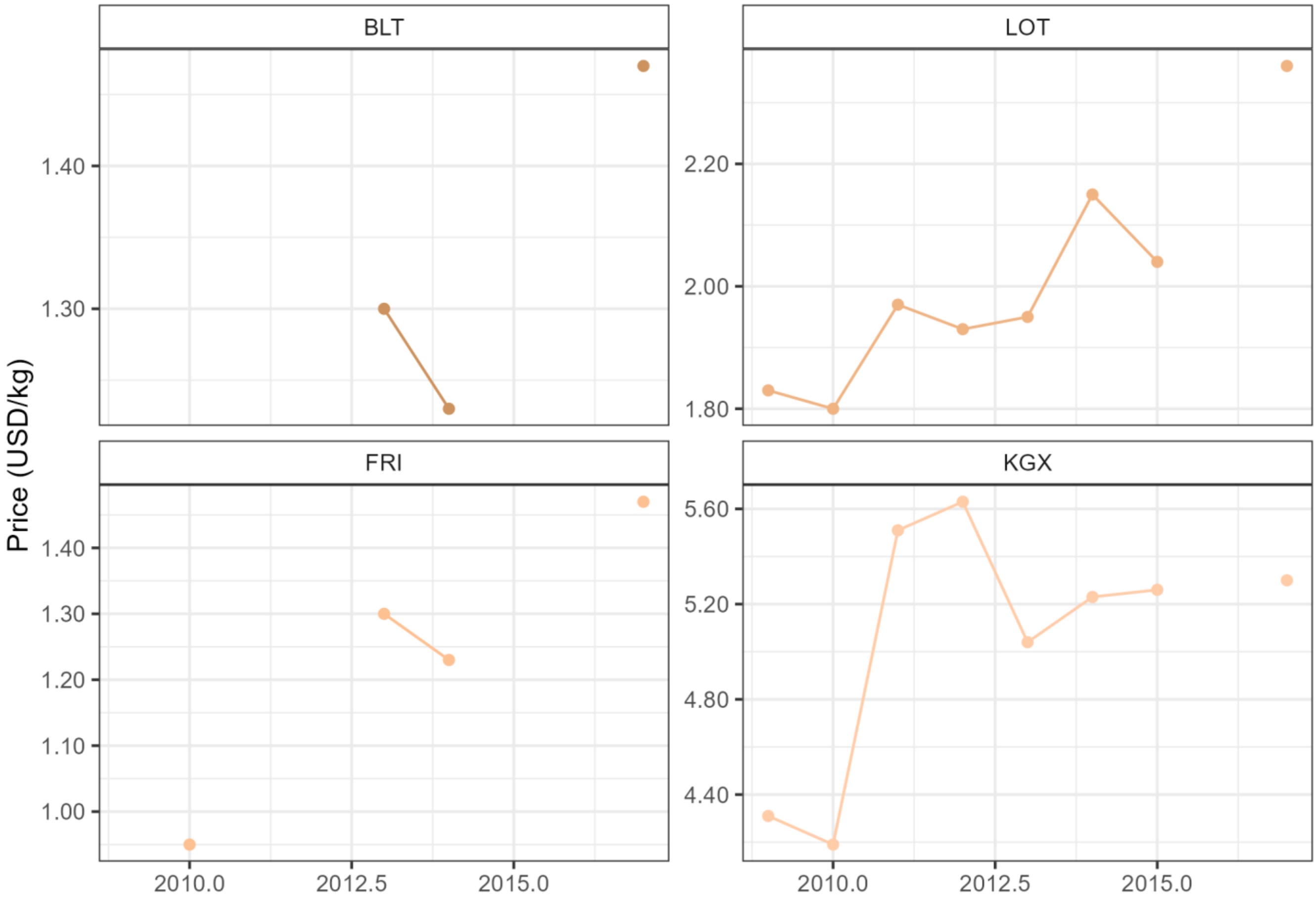

Figure 8.3: Monthly time series of price (Omani Rials; OR) for longtail tuna, frigate tuna, kawakawa, and narrow-barred Spanish mackerel in Oman between 2016 and 2020

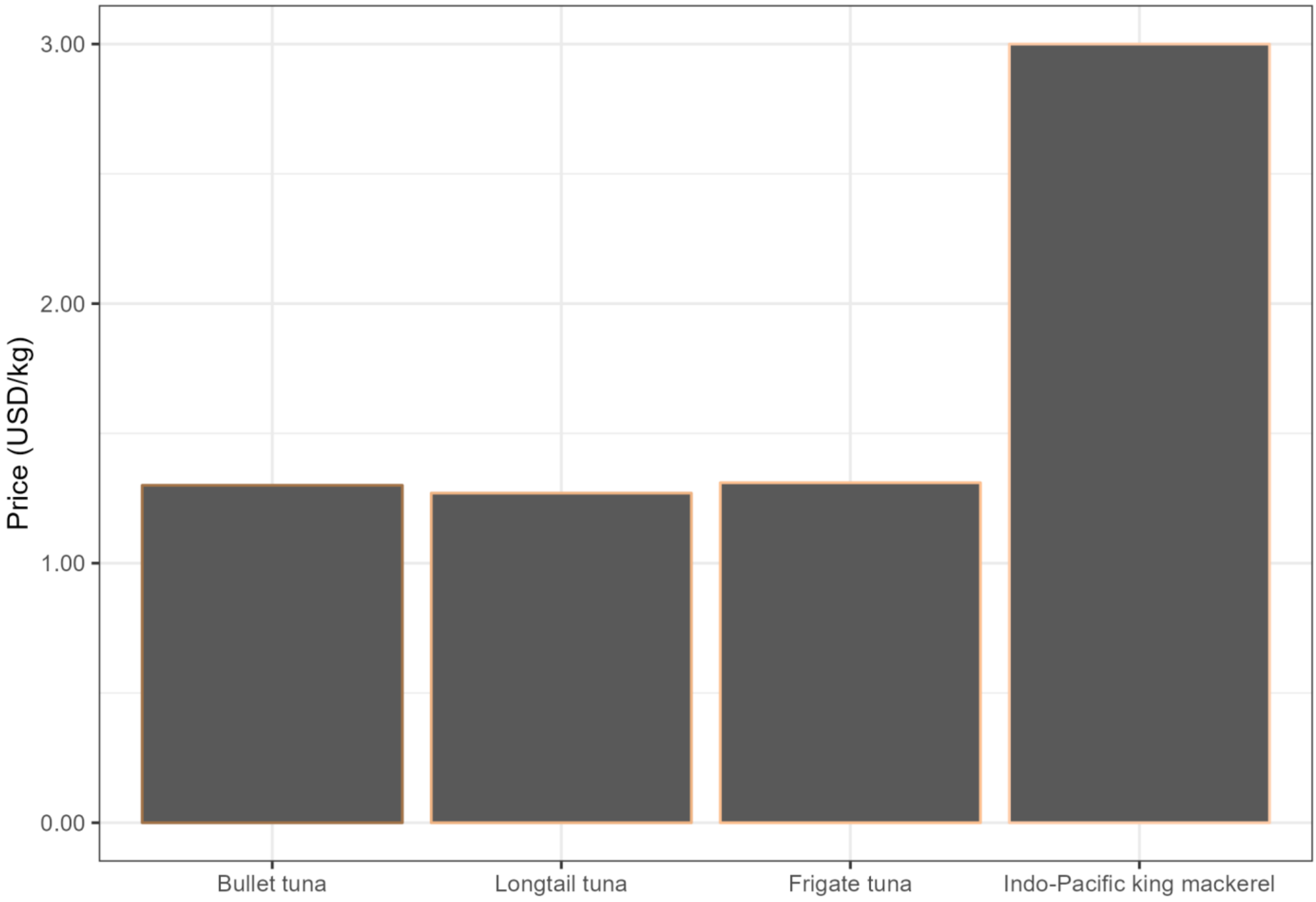

Figure 8.4: Monthly time series of price (Omani Rials; OR) for longtail tuna, frigate tuna, kawakawa, and narrow-barred Spanish mackerel in Oman between 2016 and 2020

8.2 Appendix II: Time series of fuel price

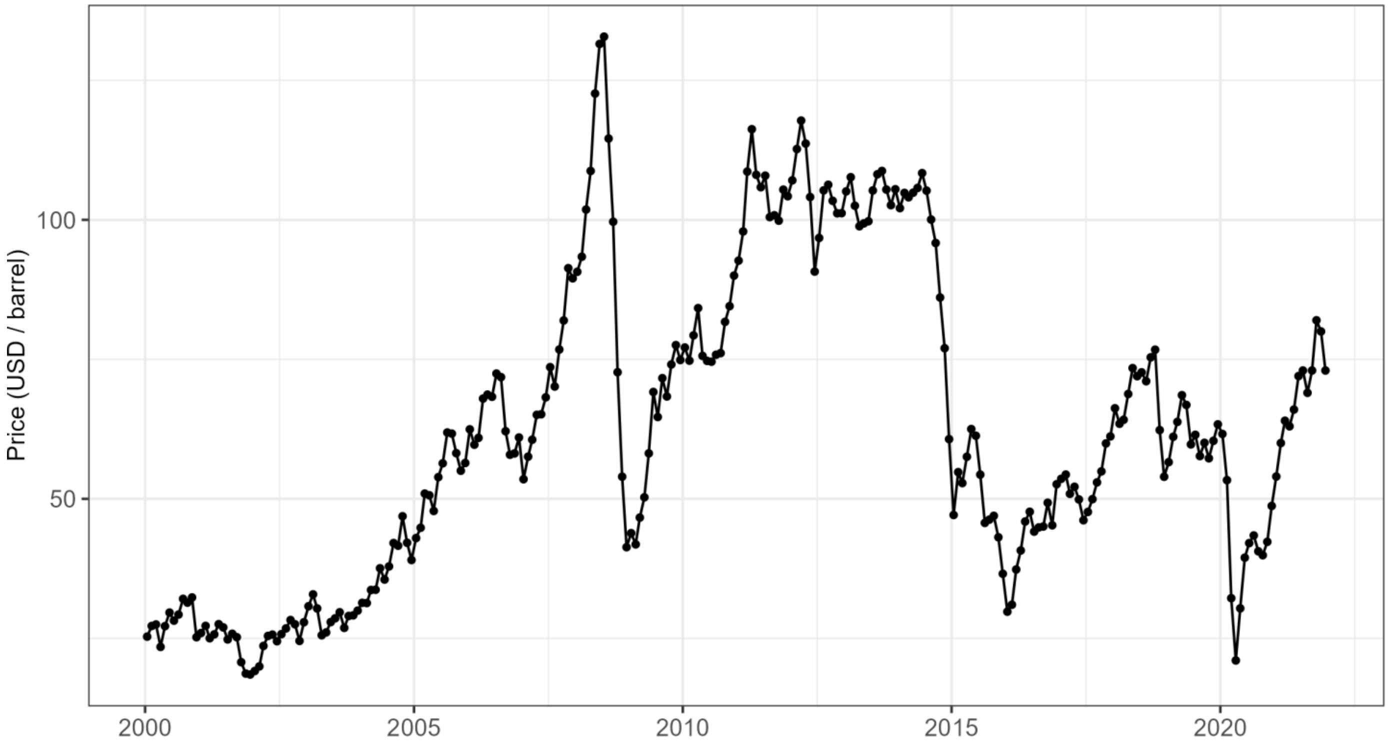

Figure 8.5: Monthly time series of crude oil spot price (USD/barrel) during the period 2000-2021. Data sourced from the spot prices of Brent, Dubai, and West Texas, compiled, and curated by the FFA Fisheries Development Division (Ruaia et al. 2020)

8.3 Appendix III: Best scientific estimates of nominal retained catches for 2023

Overall, nominal retained catches of neritic tunas and seerfish fully estimated in 2023 amounted to 35,449 t of fish for 14 distinct fleets, representing 5.5% of all catches of IOTC neritic species (**Table 8.1**).

First, retained catches were estimated for those CPCs that did not report any fishery statistics for 2023. In this case, catches were repeated from previous year (2022) except for Sudan who have not reported any information to IOTC since their accession in 1994 and 1996, respectively (**Table 8.1**). In fact, data for this country have been systematically extracted from the FAO global capture production database and further broken down by gear (**Table 8.1**).

Madagascar and Tanzania on annual basis reported data to the Secretariat. However, for the last three years Madagascar was not able to provide any data, following the termination of the World Bank project, which was aiming at assisting Madagascar to conduct sampling activities in various regions. Even though Madagascar was providing the sampling data to the Secretariat, the data fluctuated and diverse species and fisheries reported, attributed to the sampling strategy applied. Therefore, the Secretariat continue to repeat the catch data of Madagascar coastal fisheries.

Tanzania is progressing slowly following the several technical assistance. There are progress in the data from 2022, however, the gaps remained for historical data. REcent years data indicate a large number of species are caught from diverse fisheries in Tanzania.

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 8.1**).

Table 8.1: Estimates of nominal retained catches (metric tonnes; t) of IOTC neritic tuna and seerfish species for the year 2023 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	FAO	4,905.0
BHR	Bahrain	NM	FAO	63.7
DJI	Djibouti	NM	FAO	885.2
EGY	Egypt	NM	FAO	1,000.0
ERI	Eritrea	MP	FAO	259.5
JOR	Jordan	NM	FAO	43.2
KWT	Kuwait	NM	FAO	372.0
MDG	Madagascar	MP	IOTC	6,021.4
MMR	Myanmar	NM	FAO	7,292.4
QAT	Qatar	NM	FAO	3,417.3
SAU	Saudi Arabia	NM	FAO	6,716.5
SDN	Sudan	MP	FAO	170.0
TLS	Timor-Leste	NM	FAO	268.6
YEM	Yemen	MP	FAO	4,034.0
ALL	All fleets	-	-	35,448.8

Second, a re-estimation process was performed for the artisanal fisheries of India and Indonesia which are considered to be of low quality.

For India the current re-estimation process builds on a review requested by the IOTC Scientific Committee in the early 2010s, aiming at producing a temporary revision of the artisanal catches time series to be maintained until measurable improvements in data collection and reporting to the IOTC were detected (Moreno et al. 2012). The re-estimation process does conserve the total catches reported for each of the six IOTC neritic tuna and seerfish species, but modifies the gear composition of the catch by Indian Ocean major area for the following gears: beach seine (BS), gillnet (GILL), hook and line (HOOK), small purse seine (PSS), ring nets (RIN), trawl (TRAW), and troll line (TROL). In 2023, the total catches reported by India for the IOTC neritic tuna and seerfish species were about 114,000 t, with more than half of them taken in the gillnet fishery.

In the case of Indonesian coastal fisheries, re-estimation was done for historical catch data between 1950 and 2022, however not same methodology was applied to 2023 data, leading to inconsistencies between data prior to 2022 and data for 2023. The methodology based on estimated from previous review, that is fixed proportion of total catch for each species and fishing gear is used to derive the catches of each of the IOTC neritic tuna and seerfish species based on samples of catch composition available for the period 2003-2011 (Moreno et al. 2012). In 2023, about 213,000 t of fish were estimated to be caught in Indonesian fisheries for these six species.

8.4 Appendix IV: Changes in best scientific estimates of retained catches from previous WPNT

Table 8.2: 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 2022 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)
2,022	ARE	Gillnet	Western Indian Ocean	5,236	6,439	-1,203
		Line	Western Indian Ocean	837	1,029	-192
	BGD	Gillnet	Eastern Indian Ocean	4,088	765	3,322
		Line	Eastern Indian Ocean	770	643	127
		Other	Eastern Indian Ocean	13,714	14,048	-334
	BHR	Line	Western Indian Ocean	42	55	-14
	DJI	Gillnet	Western Indian Ocean	1,146	867	278
	EGY	Gillnet	Western Indian Ocean	885	708	177
		Line	Western Indian Ocean	79	67	12
	ERI	Gillnet	Western Indian Ocean	329	467	-138
	EUITA	Purse seine	Western Indian Ocean	83	0	83
	IDN	Baitboat	Eastern Indian Ocean	511	146	366
		Gillnet	Eastern Indian Ocean	49,545	65,040	-15,495
		Line	Eastern Indian Ocean	30,569	73,144	-42,575
		Longline	Eastern Indian Ocean	331	4,335	-4,004
		Other	Eastern Indian Ocean	19,421	37,579	-18,158
		Purse seine	Eastern Indian Ocean	23,953	62,522	-38,569
	MMR	Gillnet	Eastern Indian Ocean	2,504	2,703	-199
		Line	Eastern Indian Ocean	947	1,022	-75
		Other	Eastern Indian Ocean	3,917	4,228	-311
		Purse seine	Eastern Indian Ocean	876	946	-70
	NEIPS	Purse seine	Western Indian Ocean	0	83	-83
	QAT	Gillnet	Western Indian Ocean	3,156	3,184	-28
	SAU	Gillnet	Western Indian Ocean	4,761	7,020	-2,259
		Line	Western Indian Ocean	1,213	2,629	-1,415
		Other	Western Indian Ocean	235	472	-237

Year	Fleet	Fishery group	Area	Current (t)	Previous (t)	Difference (t)
		Purse seine	Western Indian Ocean	22	69	-47
	SDN	Gillnet	Western Indian Ocean	152	123	29
	TMP	Gillnet	Eastern Indian Ocean	208	0	208
	YEM	Gillnet	Western Indian Ocean	11,909	7,699	4,209
		Line	Western Indian Ocean	2,141	1,368	773
2,021	BGD	Gillnet	Eastern Indian Ocean	3,539	234	3,306
		Line	Eastern Indian Ocean	757	1	756
		Other	Eastern Indian Ocean	14,161	14,379	-218
	BHR	Gillnet	Western Indian Ocean	8	19	-11
		Line	Western Indian Ocean	29	55	-27
	EUITA	Purse seine	Western Indian Ocean	11	0	11
	IDN	Baitboat	Eastern Indian Ocean	2,267	141	2,126
		Gillnet	Eastern Indian Ocean	54,040	60,271	-6,231
		Line	Eastern Indian Ocean	33,963	69,512	-35,549
		Longline	Eastern Indian Ocean	149	230	-81
		Other	Eastern Indian Ocean	19,115	36,456	-17,342
		Purse seine	Eastern Indian Ocean	15,437	32,501	-17,063
	KEN	Gillnet	Western Indian Ocean	297	310	-13
		Line	Western Indian Ocean	161	135	27
	MMR	Gillnet	Eastern Indian Ocean	2,323	2,703	-380
		Line	Eastern Indian Ocean	879	1,022	-144
		Other	Eastern Indian Ocean	3,634	4,228	-594
		Purse seine	Eastern Indian Ocean	813	946	-133
	NEIPS	Purse seine	Western Indian Ocean	0	11	-11
	SDN	Gillnet	Western Indian Ocean	138	122	16
	TMP	Gillnet	Eastern Indian Ocean	257	0	257
	YEM	Gillnet	Western Indian Ocean	9,335	7,366	1,969
		Line	Western Indian Ocean	2,201	1,701	500
2,020	BGD	Gillnet	Eastern Indian Ocean	151	128	23
	IDN	Baitboat	Eastern Indian Ocean	2,580	177	2,402

Year	Fleet	Fishery group	Area	Current (t)	Previous (t)	Difference (t)
		Gillnet	Eastern Indian Ocean	39,064	75,529	-36,465
		Line	Eastern Indian Ocean	35,512	87,110	-51,598
		Longline	Eastern Indian Ocean	109	305	-196
		Other	Eastern Indian Ocean	41,304	45,685	-4,381
		Purse seine	Eastern Indian Ocean	19,114	42,367	-23,253
	KEN	Gillnet	Western Indian Ocean	359	375	-16
		Line	Western Indian Ocean	195	163	32
	TMP	Gillnet	Eastern Indian Ocean	898	0	898
	YEM	Gillnet	Western Indian Ocean	6,928	6,701	228
		Line	Western Indian Ocean	2,473	2,366	106
2,019	IDN	Baitboat	Eastern Indian Ocean	1,436	121	1,315
		Gillnet	Eastern Indian Ocean	47,887	51,649	-3,762
		Line	Eastern Indian Ocean	29,987	59,568	-29,581
		Longline	Eastern Indian Ocean	38	370	-332
		Other	Eastern Indian Ocean	23,832	31,241	-7,409
		Purse seine	Eastern Indian Ocean	10,789	46,356	-35,567
	TMP	Gillnet	Eastern Indian Ocean	420	0	420
	YEM	Gillnet	Western Indian Ocean	7,027	6,728	299
		Line	Western Indian Ocean	2,465	2,360	104
2,018	EUITA	Purse seine	Western Indian Ocean	138	0	138
	IDN	Baitboat	Eastern Indian Ocean	683	104	579
		Gillnet	Eastern Indian Ocean	36,855	44,306	-7,450
		Line	Eastern Indian Ocean	21,527	51,099	-29,571
		Longline	Eastern Indian Ocean	136	344	-208
		Other	Eastern Indian Ocean	16,825	26,799	-9,974
		Purse seine	Eastern Indian Ocean	19,371	63,140	-43,769
	NEIPS	Purse seine	Western Indian Ocean	0	138	-138
	TMP	Gillnet	Eastern Indian Ocean	162	0	161
	YEM	Gillnet	Western Indian Ocean	8,289	8,068	221
		Line	Western Indian Ocean	1,088	1,053	35

Year	Fleet	Fishery group	Area	Current (t)	Previous (t)	Difference (t)
2,017	IDN	Baitboat	Eastern Indian Ocean	6,319	164	6,155
		Gillnet	Eastern Indian Ocean	42,900	69,758	-26,859
		Line	Eastern Indian Ocean	22,645	80,454	-57,809
		Other	Eastern Indian Ocean	38,455	42,195	-3,739
		Purse seine	Eastern Indian Ocean	15,321	35,878	-20,558
2,016		Baitboat	Eastern Indian Ocean	1,446	131	1,315
		Gillnet	Eastern Indian Ocean	56,340	55,933	407
		Line	Eastern Indian Ocean	24,618	64,509	-39,891
		Longline	Eastern Indian Ocean	147	110	38
		Other	Eastern Indian Ocean	20,127	33,832	-13,705
		Purse seine	Eastern Indian Ocean	7,721	28,768	-21,047
2,015		Baitboat	Eastern Indian Ocean	3,562	138	3,423
		Gillnet	Eastern Indian Ocean	47,903	58,860	-10,957
		Line	Eastern Indian Ocean	23,419	67,884	-44,465
		Longline	Eastern Indian Ocean	155	173	-18
		Other	Eastern Indian Ocean	37,820	35,603	2,217
		Purse seine	Eastern Indian Ocean	6,646	30,273	-23,628
2,014	DJI	Gillnet	Western Indian Ocean	397	375	23
	IDN	Baitboat	Eastern Indian Ocean	4,428	141	4,287
		Gillnet	Eastern Indian Ocean	37,753	59,888	-22,135
		Line	Eastern Indian Ocean	26,438	69,070	-42,632
		Longline	Eastern Indian Ocean	303	35	268
		Other	Eastern Indian Ocean	33,975	36,225	-2,249
		Purse seine	Eastern Indian Ocean	18,902	30,802	-11,900
2,013	DJI	Gillnet	Western Indian Ocean	342	326	15
	IDN	Baitboat	Eastern Indian Ocean	5,107	160	4,948
		Gillnet	Eastern Indian Ocean	34,813	67,987	-33,174
		Line	Eastern Indian Ocean	28,531	78,411	-49,880
		Longline	Eastern Indian Ocean	27	0	27
		Other	Eastern Indian Ocean	32,873	41,123	-8,251

Year	Fleet	Fishery group	Area	Current (t)	Previous (t)	Difference (t)
		Purse seine	Eastern Indian Ocean	9,117	34,968	-25,850
2,012		Baitboat	Eastern Indian Ocean	4,077	137	3,940
		Gillnet	Eastern Indian Ocean	43,266	58,194	-14,929
		Line	Eastern Indian Ocean	25,843	67,117	-41,274
		Longline	Eastern Indian Ocean	63	11	52
		Other	Eastern Indian Ocean	35,700	35,200	500
		Purse seine	Eastern Indian Ocean	5,251	29,931	-24,680