Report of the 14th Session of the IOTC Working Party on Neritic Tunas

Story Hotel, Seychelles, 8 – 12 July 2024

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ACRONYMS

aFAD	Anchored Fish Aggregating Device
B	Biomass (total)
BLT	Bullet tuna
B_{MSY}	Biomass which produces MSY
CMM	Conservation and Management Measure (of the IOTC; Resolutions and Recommendations)
C-MSY	Catch and Maximum Sustainable Yield data limited stock assessment method
COM	Narrow-barred Spanish mackerel
CPCs	Contracting parties and cooperating non-contracting parties
CPUE	Catch per unit of effort
current	Current period/time, i.e., $F_{current}$ means fishing mortality for the current assessment year.
EEZ	Exclusive Economic Zone
F	Fishing mortality: F_{2023} is the fishing mortality estimated in the year 2023
FAD	Fish aggregating device
F_{MSY}	Fishing mortality at MSY
FRI	Frigate tuna
GLM	Generalised Linear Model
GUT	Indo-Pacific king mackerel
IO	Indian Ocean
IOTC	Indian Ocean Tuna Commission
KAW	Kawakawa
LL	Longline
LOT	Longtail tuna
M	Natural mortality
MPF	Meeting Participation Fund
MSY	Maximum sustainable yield
n.a.	Not applicable
OCOM	Optimised Catch Only Method
PS	Purse seine
ROS	Regional Observer Scheme
SB	Spawning Biomass (sometimes expressed as SSB)
SB_{MSY}	Spawning stock Biomass which produces MSY
SC	Scientific Committee of the IOTC
SEAFDEC	Southeast Asian Fisheries Development Center
SRA	Stock Reduction Analysis
SWIOFP	South West Indian Ocean Fisheries Project
VB	Von Bertalanffy (growth)
WPDCS	Working Party on Data Collection and Statistics
WPNT	Working Party on Neritic Tunas of the IOTC
WWF	World Wide Fund for Nature (a.k.a World Wildlife Fund)

STANDARDISATION OF IOTC WORKING PARTY AND SCIENTIFIC COMMITTEE REPORT TERMINOLOGY

SC16.07 (para. 23) The SC **ADOPTED** the reporting terminology contained in Appendix IV and **RECOMMENDED** that the Commission considers adopting the standardised IOTC Report terminology, to further improve the clarity of information sharing from, and among its subsidiary bodies.

HOW TO INTERPRET TERMINOLOGY CONTAINED IN THIS REPORT

Level 1: ***From a subsidiary body of the Commission to the next level in the structure of the Commission:***
RECOMMENDED, RECOMMENDATION: Any conclusion or request for an action to be undertaken, from a subsidiary body of the Commission (Committee or Working Party), which is to be formally provided to the next level in the structure of the Commission for its consideration/endorsement (e.g. from a Working Party to the Scientific Committee; from a Committee to the Commission). The intention is that the higher body will consider the recommended action for endorsement under its own mandate, if the subsidiary body does not already have the required mandate. Ideally this should be task specific and contain a timeframe for completion.

Level 2: ***From a subsidiary body of the Commission to a CPC, the IOTC Secretariat, or other body (not the Commission) to carry out a specified task:***
REQUESTED: This term should only be used by a subsidiary body of the Commission if it does not wish to have the request formally adopted/endorsed by the next level in the structure of the Commission. For example, if a Committee wishes to seek additional input from a CPC on a particular topic, but does not wish to formalise the request beyond the mandate of the Committee, it may request that a set action be undertaken. Ideally this should be task specific and contain a timeframe for the completion.

Level 3: ***General terms to be used for consistency:***
AGREED: Any point of discussion from a meeting which the IOTC body considers to be an agreed course of action covered by its mandate, which has not already been dealt with under Level 1 or level 2 above; a general point of agreement among delegations/participants of a meeting which does not need to be considered/adopted by the next level in the Commission's structure.
NOTED/NOTING: Any point of discussion from a meeting which the IOTC body considers to be important enough to record in a meeting report for future reference.

Any other term: Any other term may be used in addition to the Level 3 terms to highlight to the reader of and IOTC report, the importance of the relevant paragraph. However, other terms used are considered for explanatory/informational purposes only and shall have no higher rating within the reporting terminology hierarchy than Level 3, described above (e.g. **CONSIDERED**; **URGED**; **ACKNOWLEDGED**).

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Executive summary

The 14th Session of the Indian Ocean Tuna Commission's (IOTC) Working Party on Neritic Tunas (WPNT14) was held in a hybrid format in Seychelles and online using the Zoom online platform from 8-12 July 2024. A total of 47 participants (35 in 2023, 36 in 2022, 33 in 2021 and 43 in 2020) attended the Session. The list of participants is provided at Appendix I. The meeting was opened by the Chairperson, Dr. Farhad Kaymaram from I. R. Iran, who welcomed participants to the meeting.

Section 3.4 Progress on the Recommendations of WPNT13 and SC26

WPNT14.01 (para 20) The WPNT **RECOMMENDED** that the SC urge all coastal CPCs to join future WPNT meetings, **NOTING** the high level of catches of neritic species from CPCs such as India and Pakistan who regularly do not attended these meetings.

Section 4.1 Review of the statistical data available for neritic tunas

WPNT14.02 (para 28) **ACKNOWLEDGING** the difficulties associated with deriving geo-referenced size-frequency data at the spatial resolution of 5° grids in most coastal fisheries, and the fact that most analyses, including stock assessments, do not require such fine resolution, the WPNT **RECOMMENDED** the SC to urge the Commission to align the spatial resolution of size-frequency data with that of geo-referenced catch and effort data. Consequently, the data may be provided using an alternative geographical area if it better represents the fishery concerned.

Section 4.2 Review new information on fisheries and associated environmental data

WPNT14.03 (para 40) The WPNT **RECOMMENDED** that the SC **ENCOURAGE** CPCs to evaluate the socio-economic status of their fisheries involved in catching neritic tunas.

WPNT14.04 (para 66) Therefore, the WPNT **RECOMMENDED** that the SC **ENCOURAGE** collaboration between CPCs to carry out stock identification by the application of genetics in order to better understand the structure of all neritic stocks for improved management plans.

Section 6.2 Stock status indicators for other neritic tuna species

WPNT14.05 (para 116 & 117) In this context, the WPNT **DISCUSSED** potential future assessment options for neritic tuna species. The WPNT **NOTED** that each method requires certain assumptions. For catch-only methods, the assumption is relatively simple and widely used in fisheries applications (functional form for surplus production). Therefore, if the catch estimates are accurate, the application of catch-only methods can prove effective and easy to implement. Furthermore, these methods can yield management metrics required by the IOTC, and the results are more easily understood by managers.

Conversely, the inputs for the length-based approach are more likely to be of better quality, especially considering the widespread implementation of sampling programs among coastal countries. There has also been considerable recent advancement and emphasis on the length-based approach, which can estimate stock status and serve as a valuable monitoring tool for various fisheries. The WPNT thus **ENCOURAGED** the continued exploration and utilization of both methods and **RECOMMENDED** that the SC urge the Commission to put greater focus on urging CPCs to collect more representative length composition data for the effective assessment of these species. The WPNT also **REQUESTED** that CPCs summarize the size data from their sampling programs for the next WPNT meeting.

Section 7.1 Revision of the WPNT Program of Work (2025–2029)

WPNT14.06 (para 124) The WPNT **RECOMMENDED** that the SC consider and endorse the WPNT Program of Work (2025–2029), as provided in Appendix VI.

Section 8.2 Review of the draft, and adoption of the Report of the 14th Working Party on Neritic Tunas

WPNT13.07 (para 128) The WPNT **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPNT14, provided in Appendix XIII, as well as the management advice provided in the draft resource stock status summary for each of the six neritic tuna (and seerfish) species under the IOTC mandate, and the combined Kobe plot for the species assigned a stock status in 2024:

- Bullet tuna (*Auxis rochei*) – Appendix VII
- Frigate tuna (*Auxis thazard*) – Appendix VIII
- Kawakawa (*Euthynnus affinis*) – Appendix IX
- Longtail tuna (*Thunnus tonggol*) – Appendix X
- Indo-Pacific king mackerel (*Scomberomorus guttatus*) – Appendix XI
- Narrow-barred Spanish mackerel (*Scomberomorus commerson*) – Appendix XII

Table 1. Status summary for species of neritic tuna and tuna-like species under the IOTC mandate: 2024

Neritic tunas and seerfish: these six species have become as important or more important as the three tropical tuna species (bigeye tuna, skipjack tuna and yellowfin tuna) to most IOTC coastal states with a total estimated catch of 683,000 t landed in 2022. They are caught primarily by coastal fisheries, including small-scale industrial and artisanal fisheries. They are almost always caught within the EEZs of coastal states. Historically, catches were often reported as aggregates of various species, making it difficult to obtain appropriate data for stock assessment analyses.

Stock	Indicators	2018	2019	2020	2021	2022	2023	2024	Advice to the Commission
Bullet tuna *Auxis rochei*	Catch 2022: 20,794 t Average catch 201-2022: 21,949 t MSY (1,000 t) unknown F_{MSY}: unknown B_{MSY} (1,000 t): unknown $F_{current}/F_{MSY}$: unknown $B_{current}/B_{MSY}$: unknown $B_{current}/B_0$: unknown								A new assessment was carried out in 2024 using data-limited techniques (CMSY,LB-SPR, and fishblicc). However, the catch data for bullet tuna are very uncertain given the high percentage of the catches that had to be estimated due to a range of reporting issues. The size-based assessment methods LB-SPR and fishblicc using size data from gillnet and purse seine fisheries both estimated the current spawning potential ratio to be below the reference level of SPR40% (a proxy for 40% depletion often considered as the risk averse target in many data-poor fisheries). Due to a lack of fishery data for several fisheries, only preliminary stock status indicators (CPUE and average weight) can be used. Aspects of the fisheries for bullet tuna combined with the lack of data on which to base an assessment of the stock are a cause for concern. Stock status in relation to the Commission's B_{MSY} and F_{MSY} reference points remains unknown. For assessed species of neritic tunas and seerfish in the Indian Ocean (longtail tuna, kawakawa and narrow-barred Spanish mackerel), the MSY was estimated to have been reached between 2009 and 2011 and both F_{MSY} and B_{MSY} were breached thereafter. Therefore, in the absence of a stock assessment of bullet tuna a limit to the catches should be considered by the Commission, by ensuring that future catches do not exceed the average catches estimated between 2009 and 2011 (8,590 t). This catch advice should be maintained until an assessment of bullet tuna is available. Considering that MSY-based reference points for assessed species can change over time, the stock should be closely monitored. Mechanisms need to be developed by the Commission to improve current statistics by encouraging CPCs to comply with their recording and reporting requirements, so as to better inform scientific advice. Click here for a full stock status summary: Appendix VII
Frigate tuna *Auxis thazard*	Catch 202: 141,279 t Average catch 2018-2022: 114,431 t								A new assessment was carried out in 2024 using data-limited techniques (CMSY,OCOM, LB-SPR and fishblicc). However, the catch data for frigate tuna are very uncertain given

Stock	Indicators	2018	2019	2020	2021	2022	2023	2024	Advice to the Commission
	MSY (1,000 t) unknown F_{MSY}: unknown B_{MSY} (1,000 t): unknown $F_{current}/F_{MSY}$: unknown $B_{current}/B_{MSY}$: unknown $B_{current}/B_0$: unknown								the high percentage of the catches that had to be estimated due to a range of reporting issues. Due to a lack of fishery data for several gears, only preliminary stock status indicators can be used. However, the size-based assessment showed results with considerable uncertainty - LB-SPR estimated a SPR greater than the reference level of SPR40%, (a proxy for 40% depletion often considered as risk averse target in many data-poor fisheries) whereas the fishblicc estimated a SPR below the reference level. Aspects of the fisheries for frigate tuna combined with the lack of data on which to base an assessment of the stock are a cause for considerable concern. Stock status in relation to the Commission's B_{MSY} and F_{MSY} reference points remains **unknown.** For assessed species of neritic tunas in Indian Ocean (longtail tuna, kawakawa and narrow-barred Spanish mackerel), the MSY was estimated to have been reached between 2009 and 2011 and both F_{MSY} and B_{MSY} were breached thereafter. Therefore, in the absence of an accepted stock assessment for frigate tuna, a limit to the catches should be considered by the Commission, by ensuring that future catches do not exceed the average catches estimated between 2009 and 2011 (101,260 t). The reference period (2009-2011) was chosen based on the most recent assessments of those neritic species in the Indian Ocean for which an assessment is available under the assumption that MSY for frigate tuna was also reached between 2009 and 2011. This catch advice should be maintained until an assessment of frigate tuna is available. Considering that MSY-based reference points for assessed species can change over time, the stock should be closely monitored. Mechanisms need to be developed by the Commission to improve current statistics by encouraging CPCs to comply with their recording and reporting requirements, so as to better inform scientific advice. Click here for a full stock status summary: Appendix VIII
Kawakawa *Euthynnus affinis*	Catch 202[2]: 166,777 t Average catch 201-2022: 157,852 t MSY(80% CI) 154 (122 –193) F_{MSY} (80% CI) 0.60 (0.48–0.74) B_{MSY} (80% CI) 258 (185–359) $F_{current}/F_{MSY}$ (80% CI) 0.98 (0.82–2.20) $B_{current}/B_{MSY}$ (80% CI) 0.99 (0.45–1.20)						**27%**		No new stock assessment was conducted in 2024 for kawakawa and so the results are based on the results of the assessment carried out in 2023 which examined a number of data-limited methods include C-MSY, OCOM, and JABBA models (based on data up to 2021). These models produced stock estimates that are not drastically divergent because they shared similar dynamics and assumptions. The C-MSY model has been explored more fully and therefore is used to obtain estimates of stock status. The C-MSY model indicated that the fishing mortality F was very close to F_{MSY} (F/F_{MSY}=0.98), and the current biomass B was also very close to B_{MSY} (B/B_{MSY}=0.99). The estimated probability of the stock currently being in yellow quadrant of the Kobe plot is about 27%. The analysis using OCOM model is more pessimistic and using JABBA incorporating gillnet CPUE indices is more optimistic. Due to the quality of the data being used, the simple modelling approach employed in 2020 and 2023, and the large increase in kawakawa catches over the last decade, measures need to be taken in order to reduce the level of catches which have surpassed the estimated MSY levels for most years since 2011. Based on the weight-of-evidence available, the kawakawa stock for the Indian Ocean is classified as **overfished** but **not subject to overfishing**. However, the assessment using catch-only method is subjected to high uncertainty and is highly influenced by several prior assumptions.

Stock	Indicators	2018	2019	2020	2021	2022	2023	2024	Advice to the Commission
									The assessment models rely on catch data, which are considered to be highly uncertain. The catch in 2022 was just above the estimated MSY. The available gillnet CPUE of kawakawa showed a somewhat increasing trend although the reliability of the index as abundance indices remains unknown. Despite the substantial uncertainties, the stock is probably very close to being fished at MSY levels and that higher catches may not be sustained in the longer term. A precautionary approach to management is recommended. Click here for a full stock status summary Appendix IX
Longtail tuna *Thunnus tonggol*	Catch 202: 139,879 t Average catch 2018-202: 132,042 t MSY (80% CI) 133 (108–165) F_{MSY} (80% CI) 0.31 (0.22–0.44) B_{MSY} (80% CI) 433 (272–690) $F_{current}/F_{MSY}$ (80% CI) 1.05 (0.84–2.31) $B_{current}/B_{MSY}$ (80% CI) 0.96 (0.44–1.19)						35%		No new stock assessment was conducted for longtail in 2024 and so the results are based on the results of the assessment carried out in 2023which examined a number of data-limited methods including C-MSY, OCOM, and JABBA models (based on data up to 2021). These models produced stock estimates that are not drastically divergent because they shared similar dynamics and assumptions. The C-MSY model has been explored more fully and therefore is used to obtain estimates of stock status. The C-MSY analysis indicates that the stock is being exploited at a rate that exceeded F_{MSY} in recent years and that the stock appears to be below B_{MSY} and above F_{MSY} (35% of plausible models runs). Catches between 2017 and 2021 were slightly above MSY but steadily declined from 2012 to less than 113,000 t in 2019, (**Fig. 1**). The F_{2021}/F_{MSY} ratio is lower than previous estimates and the B_{2021}/B_{MSY} ratio was higher than in previous years. The analysis using the OCOM model is more pessimistic and using JABBA incorporating gillnet CPUE indices is more optimistic. The JABBA model, however, is unable to estimate carrying capacity with a fair degree of certainty without additional prior constraints, indicating the fact that the CPUE is either not informative or is conflicting with catch data. While the precise stock structure of longtail tuna remains unclear, recent research (IOTC-2020-SC23-11_Rev1) provides strong evidence of population structure of longtail tuna within the IOTC area of competence, with at least 3 genetic populations identified. This increases the uncertainty in the assessment, which currently assumes a single stock of longtail tuna. Based on the C-MSY assessment, the stock is considered to be both **overfished** and **subject to overfishing**. However, the assessment using catch-only method is subjected to high uncertainty and is highly influenced by several prior assumptions. The catch in 2022 was above the estimated MSY and the exploitation rate has been increasing over the last few years, as a result of the declining abundance. Despite the substantial uncertainties, this suggests that the stock is being fished above MSY levels and that higher catches may not be sustained. A precautionary approach to management is recommended Click here for a full stock status summary: Appendix X
Indo-Pacific king mackerel	Catch 202: 45,769 t Average catch 2018-2022: 43,416 t				35%			27%	

Stock	Indicators		2018	2019	2020	2021	2022	2023	2024	Advice to the Commission
Scomberomorus guttatus	MSY (1,000 t) F_{MSY} B_{MSY} (1,000 t) $F_{current}/F_{MSY}$ $B_{current}/B_{MSY}$ $B_{current}/B_0$	47 (39–56) 0.74 (0.56–0.99) 63.1 (43.1–92.4) 0.95 (0.82–2.13) 1.02 (0.46–1.19) 0.51 (0.23–0.60)								A new assessment was conducted in 2024 using the data-limited techniques (CMSY and CMSY++) (using data up to 2022). Analysis using the catch only method CMSY indicates the stock is being exploited at a rate that is below F_{MSY} in recent years and that the stock appears to be above B_{MSY}, although the estimates would be more pessimistic if the stock productivity is assumed to be less resilient. An assessment using CMSY++was also explored in 2024. The stock estimates with CMSY++ are estimated to be very close to the biomass target even though the stock status is more pessimistic than with CMSY. Despite some of the caveats of the underlying assumptions, the catch-only model has provided a more defensible approach in addressing the uncertainty of key parameters and the currently available catch data for the Indo-Pacific king mackerel appear to be of sufficient quality. Based on the weight-of-evidence currently available, the stock is considered to be **not overfished and not subject to overfishing** Reported catches of Indo-Pacific king mackerel in the Indian Ocean has increased considerably since the late 2000s with recent catches fluctuating around estimated MSY, although the catch in 2021 and 2022 was below the estimated MSY. This suggests that the stock is close to being fished at MSY levels and that higher catches may not be sustained despite the substantial uncertainty associated with the assessment, a precautionary approach to management is recommended. Click here for a full stock status summary: Appendix XI
Narrow-barred Spanish mackerel *Scomberomorus commerson*	Catch 202: Average catch 2018-2022: MSY (80% CI) F_{MSY} (80% CI) B_{MSY} (80% CI) $F_{current}/F_{MSY}$ (80% CI) $B_{current}/B_{MSY}$ (80% CI)	168,167 t 159,064 t 161 (132–197) 0.60 (0.48–0.74) 271 (197–373) 1.07 (0.88–2.38) 0.98 (0.44–1.19)						**31%**		No new stock assessment was conducted in 2024 for narrow-barred Spanish mackerel and so the results are based on the results of the assessment carried out in 2023which examined a number of data-limited methods including C-MSY, OCOM, and JABBA models (based on data up to 2021). These models produced stock estimates that are not drastically divergent because they shared similar dynamics and assumptions. The C-MSY model has been explored more fully and therefore is used to obtain estimates of stock status. The C-MSY analysis indicates that the stock is being exploited at a rate that exceeded F_{MSY} in recent years and that the stock appears to be below B_{MSY} and above F_{MSY} (31% of plausible models runs). The analysis using OCOM model is more pessimistic and using JABBA incorporating gillnet CPUE indices is more optimistic. The JABBA model, however, is unable to estimate carrying capacity with a fair degree of certainty without additional prior constraints, indicating that the CPUE is either not informative or is conflicting with catch data. An analysis undertaken in 2013 in the Northwest Indian Ocean (Gulf of Oman) indicated that overfishing is occurring in this area and that localised depletion may also be occurring. While the precise stock structure of Spanish mackerel remains unclear, recent research (IOTC-2020-SC23-11_Rev1) provides strong evidence of population structure of Spanish mackerel within the IOTC area of competence, with at least 4 genetic populations identified. This increases the uncertainty in the assessment, which currently assumes a single stock of Spanish mackerel. Based on the C-MSY assessment, the stock appears to be **overfished** and **subject to overfishing**. However, the assessment using catch-only method is subjected to high uncertainty and is highly influenced by several prior assumptions. The catch in 2022 was above the estimated MSY and the available gillnet CPUE shows a somewhat increasing trend in recent years although the reliability of the index as an

Stock	Indicators	2018	2019	2020	2021	2022	2023	2024	Advice to the Commission
									abundance index remains unknown. Despite the substantial uncertainties, the stock is being fished above MSY levels and higher catches may not be sustained. Click here for a full stock status summary: Appendix XII

*Indicates range of plausible values

Colour key	Stock overfished (SB_{year}/SB_{MSY}< 1)	Stock not overfished (SB_{year}/SB_{MSY}≥ 1)
Stock subject to overfishing (F_{year}/F_{MSY}> 1)		
Stock not subject to overfishing (F_{year}/F_{MSY}≤ 1)		
Not assessed/Uncertain		

1. Opening of the Meeting

1. The 14th Session of the Indian Ocean Tuna Commission's (IOTC) Working Party on Neritic Tunas (WPNT14) was held in a hybrid format in Seychelles and online from 8-12 July 2024. A total of 47 participants (35 in 2023, 36 in 2022, 33 in 2021 and 43 in 2020) attended the Session. The list of participants is provided at Appendix I. The meeting was opened by the Chairperson, Dr Farhad Kaymaram from I. R. Iran, who welcomed participants to the meeting.

2. Adoption of the Agenda and Arrangements for the Session

2. The WPNT **ADOPTED** the Agenda provided at Appendix II. The documents presented to the WPNT14 are listed in Appendix III.

3. The IOTC process: Outcomes, updates and progress

3.1 Outcomes of the 26th Session of the Scientific Committee

3. The WPNT **NOTED** paper IOTC–2024–WPNT14–03 which outlined the main outcomes of the 26th Session of the Scientific Committee (SC26), specifically related to the work of the WPNT and **AGREED** to consider how best to progress these issues at the present meeting.

3.2 Outcomes of the 27th Session of the Commission

4. The WPNT **NOTED** paper IOTC–2024–WPNT14–04 which outlined the main outcomes of the 27th Session of the Commission, specifically related to the work of the WPNT. The WPNT further **NOTED** that the 28th Session of the Commission report is currently still unavailable and therefore no new outcomes or Resolutions were available for discussions since the 27th Session.

5. WPNT14 participants were **ENCOURAGED** to familiarise themselves with the previously adopted Resolutions, especially those most relevant to the WPNT.

3.3 Review of Conservation and Management Measures relevant for neritic tunas

6. The WPNT **NOTED** paper IOTC–2024–WPNT14–05 which aimed to encourage participants at the WPNT14 to review some of the existing Conservation and Management Measures (CMM) relating to neritic tunas.

7. The WPNT **NOTED** that while there are no Conservation and Management Measures specific to neritic species, they are likely to be impacted by other fisheries where they may be caught as bycatch. The WPNT **NOTED** that following rules relating to gears such as the 2.5km limit on the length of gillnets is particularly important for neritic tuna as gillnets take a high percentage of these species.

3.4 Progress on the Recommendations of WPNT13 and SC26

8. The WPNT **NOTED** paper IOTC–2024–WPNT14–06 which provided an update on the progress made in implementing the recommendations from the 13th Session of the WPNT for the consideration and potential endorsement by participants.

9. The WPNT **NOTED** that good progress had been made on these Recommendations, and that several of these would be directly addressed by the participating scientists when presenting their updated results for 2024.

10. The WPNT participants were **ENCOURAGED** to review paper IOTC–2024–WPNT14–06 during the meeting and report back on any progress in relation to requests or actions by CPCs that have not been captured by the report, and to note any pending actions for attention before the next meeting (WPNT15).

11. The WPNT **REITERATED** its **REQUEST** for CPCs to report size and weight data for neritic (and all) species, to the Secretariat. The WPNT **NOTED** that the Secretariat has been working to harmonise the code lists for different length types which necessitates each fish to be identified with its corresponding length and weight measurements. This effort aims to streamline the reporting process for these data.

12. The WPNT **NOTED** that it would be valuable to compare the different conversion factors and morphometric relationships used by CPCs. The WPNT further **NOTED** concerns regarding the length-weight relationships for bullet and frigate tuna currently being used by the Secretariat, which are based on outdated data and are identical for both species which is highly unlikely to be accurate.

13. The WPNT **NOTED** the abundance of information and data on life history characteristics of neritic species from studies conducted in CPCs. However, the WPNT **NOTED** that to date, these have not been systematically collected and organised for all species. The WPNT **RECALLED** that in 2016, papers summarising population parameters were developed for Indo-Pacific king mackerel, frigate and bullet tunas, **NOTING** that these could be updated and expanded to include the other three species of interest. The WPNT further **NOTED** that eventually these data can be stored in a database full of biological parameters to be made available on the IOTC website so they are available for use by scientists.

14. The WPNT **NOTED** that there are some discrepancies between the length-weight relationships found from studies in different regions which needs further examination. The WPNT **NOTED** that the Secretariat has started to review these relationships with the aim of developing a model for the Indian Ocean.

15. **ACKNOWLEDGING** the requirement under Resolution 15/02 for CPCs to fully explain the processes used to raise their data, including the relationships used, but further **NOTING** that many CPCs are not currently providing this information, the WPNT **ENCOURAGED** CPCs to provide the relationships that they use in their own processes, as well as any raw data they have, to contribute to this work.

16. The WPNT **NOTED** that a significant unknown issue for neritic tuna is the stock structure of these species. Currently these species are treated as a single stock during stock assessments, but previous stock structure projects appeared to suggest the presence of multiple stocks. The WPNT **NOTED** that a previously run population structure study was initially designed to focus on neritic tuna species but ended up focusing on tropical and temperate species and that the WPNT should push for a project focusing on neritic species.

17. The WPNT **NOTED** that the Secretariat plans to develop a project to develop an Indian Ocean wide sampling programme. The WPNT **NOTED** that this could include the collection of biological and life history data, as well as samples such as otoliths and tissues which could be used to study stock structure of these species. The WPNT **EMPHASISED** the importance of collecting life history information, including growth, age and productivity, for catch-based stock assessment methods, and the necessity of length data for length-based assessment methods.

18. The WPNT **NOTED** the Secretariat's plan to develop a simple standardised model to store information on life history parameters but **NOTED** that including data on samples would add another level of complexity to the database.

19. The WPNT **NOTED** the difficulty of aging tropical species such as those studied by the WPNT using otoliths and **NOTED** that it may be easier to age these species by reading spines instead.

20. The WPNT **RECOMMENDED** that the SC urge all coastal CPCs to join future WPNT meetings, **NOTING** the high level of catches of neritic species from CPCs such as India and Pakistan who regularly do not attended these meetings.

21. The WPNT **NOTED** the issues of species identification in many CPCs, particularly for similar-looking species like frigate and bullet tuna, yellowfin and bigeye tuna, and the two mackerel species. The WPNT **NOTED** the Secretariat's intent to organise regional workshops on species identification to train individuals from each CPC who can then go on to train enumerators in their respective CPCs.

22. The WPNT **NOTED** that OFCF, in collaboration with the Secretariat, is developing additional species identification materials. This includes translating the IOTC identification guides into various languages and creating online tools, such as videos, which explain key differences between species that can be difficult to distinguish. The WPNT **ENCOURAGED** the continuation of this valuable work.

4. New Information on Fisheries and Associated Environmental Data for Neritic Tunas

4.1 Review of the statistical data available for neritic tunas (IOTC Secretariat)

23. The WPNT **NOTED** paper IOTC–2024–WPNT14–07 which provided an overview of the standing of a range of information received by the IOTC Secretariat for the six species of neritic tuna and tuna-like species, in accordance with IOTC Resolution 15/02 *On mandatory statistical reporting requirements for IOTC Members and Cooperating non-Contracting Parties (CPCs)*, for the period 1950–2022. A summary is provided at Appendix IV.

24. The WPNT **NOTED** the main data issues that are considered to negatively affect the quality of the statistics for neritic tunas and seerfish available at the IOTC Secretariat, which are provided in Appendix V by type of dataset and fishery, and **ENCOURAGED** the listed CPCs to make efforts to remedy the data issues identified and to report back to the WPNT at its next meeting.

25. The WPNT **NOTED** that poor data quality is mainly due to non-reporting and species identification issues, which impedes stable data series over time.

26. The WPNT **NOTED** that industrial purse seine fisheries catch some neritic species, mainly when moved into Arabian Sea, and although previously they were discarded, nowadays they are retained and exported. The WPNT also **NOTED** that there is no separation at the species level in logbooks for these species, and they are usually recorded as other tunas which adds to the issue of poor reporting.

27. The WPNT **NOTED** that monitoring of exports could provide better estimates but considered that this would represent a small amount of the catches.

28. **ACKNOWLEDGING** the difficulties associated with deriving geo-referenced size-frequency data at the spatial resolution of 5° grids in most coastal fisheries, and the fact that most analyses, including stock assessments, do not require such fine resolution, the WPNT **RECOMMENDED** the SC to urge the Commission to align the spatial resolution of size-frequency data with that of geo-referenced catch and effort data. Consequently, the data may be provided using an alternative geographical area if it better represents the fishery concerned.

29. The WPNT **NOTED** the lack of size frequency data, particularly for the Indo-Pacific king mackerel (GUT), which makes it difficult to carry out length-based assessments and **SUGGESTED** that improvements could be made if a large-scale sampling programme, similar to the one conducted by IPTP in the early 1990s, were to be implemented, for example, the ongoing sampling programme in Bangladesh funded by Work Bank.

30. The WPNT **NOTED** that most of the issues faced by CPCs are attributed to the interpretation of the Resolutions relating to data submissions and the operating manner of coastal fisheries, as it is not convenient to collect data on board vessels in these fisheries. Therefore, the WPNT **NOTED** that there is a need to review Resolution 15/02.

31. The WPNT **NOTED** that coastal CPCs could collect several data types during landing but **NOTED** that it would be difficult to trace back the origin of catching areas for the provision of geo-referenced positions.

32. The WPNT **NOTED** the setbacks of CPCs catching neritic tuna species as indicated in paper IOTC-2024-WPNT14-INF09, a complementary presentation provided by the Secretariat that was requested by the Chair. The WPNT **ACKNOWLEDGED** the effort of several CPCs to improve the quality of data, while at the same time **ENCOURAGING** others to be more active in IOTC Scientific meetings to gain knowledge and learn more about how to improve the quality of data reporting.

33. The WPNT **NOTED** that the Secretariat has been working with Indonesia on their catch re-estimation methods and **NOTED** that good progress has been made. The WPNT **NOTED** that an update on this work has been provided in paper IOTC-2024-WPNT14-INF01. The WPNT **NOTED** that the new estimations are likely to drastically change the catch time series for most neritic species and further **NOTED** that as catch data is the primary source of data in neritic stock assessments, this change to the time series is likely to have an impact on these assessments.

4.2 Review new information on fisheries and associated environmental data (all)

34. The WPNT **NOTED** paper IOTC–2024–WPNT14–09 on The role and importance of neritic tuna fishing in I. R. Iran’s fisheries, including the following abstract provided by the authors:

“Neritic tuna fishing plays a crucial role in the livelihoods of coastal communities and is considered one of the valuable opportunities for developing employment, income, and the long-term and sustainable exploitation of marine resources in line with responsible fishery practices pursued by the country's fisheries management. Approximately around 6,500 fishing crafts are involved in neritic tuna fishing, contributing significantly to the country's aquatic production.

In 2022, Iran's total aquatic product output was estimated at 1,352 thousand tonnes, with 751 thousand tonnes from marine capture fisheries. Of this, 282 thousand tonnes were tuna, tuna like species and billfishes, *including 129 thousand tonnes of neritic tuna, predominantly caught by small-scale coastal fishers using methods like gillnetting, trolling, and longlining.*

Neritic tuna species, such as longtail tuna, Narrow-barred Spanish Mackerel, and Indo-Pacific King Mackerel, are vital for the socioeconomic stability of coastal communities. To ensure the sustainable and responsible exploitation of these resources, Iran has implemented several management and operational programs. These include data collection enhancements, training on how to complete and submit the Indian Ocean Tuna Commission (IOTC) new forms via the e-MARIS system, species identification guidelines, analyzing catch composition and the status of tuna bycatch and discards, and compliance with IOTC resolutions.

Key management strategies focus on adjusting and reducing fishing efforts to balance harvest levels and sustain tuna stocks. Every year, efforts are made to adapt and implement the recommendations of the IOTC in Iran, with a focus on identifying suitable areas for implementation that will involve the cooperation and participation of the fishing community. Continuous education and training programs are also integral to improving fishing conditions and ensuring the long-term sustainability of neritic tuna stocks.

This paper assesses the effectiveness of these management measures, evaluates the trends in neritic tuna fishing, and discusses the implications for future policy and practice to enhance the sustainability and productivity of Iran's tuna fisheries."

35. The WPNT **NOTED** that some small-scale vessels in Iran are transitioning from using gillnets to longlines.

36. The WPNT **NOTED** that administrative constraints have significantly limited the activity of purse seine vessels in Iran, so they are not deploying FADs.

37. The WPNT **NOTED** that there is some bycatch of dolphinfish from Iranian longline fisheries, but **NOTED** that as the vessels operate more than 20 miles from the coast, there is minimal bycatch of neritic species.

38. The WPNT **NOTED** that bullet tuna is primarily found in the region close to Pakistan and are rarely encountered elsewhere in Iranian waters.

39. **ACKNOWLEDGING** that the first Working Party on Economics is due to meet later in 2024, the WPNT **NOTED** that socio-economic data from Iran and other CPCs would be valuable to this working party, particularly data relating to fish prices and so **ENCOURAGED** CPCs to provide relevant data.

40. The WPNT **RECOMMENDED** that the SC **ENCOURAGE** CPCs to evaluate the socio-economic status of their fisheries involved in catching neritic tunas.

41. The WPNT **NOTED** that currently, all tuna species caught in Iran, regardless of the gear used, end up being processed in canneries so there are not yet any financial benefits to fishing with longlines which generally yield higher quality fish. The WPNT further **NOTED** the challenges associated with exporting fish products from Iran, but recognised the potential for producing other products, such as sashimi grade tuna, in the future.

42. The WPNT **RECALLED** the mission conducted by the Secretariat to Iran a few years ago which developed a long-term CPUE series for neritic species and **NOTED** the intention to conduct another mission to extend this CPUE series. The WPNT **NOTED** that one of the issues with developing a CPUE series in Iran is the use of number of trips as the unit for reporting effort, which is not a standardised unit of measurement as trips can vary significantly in length. The WPNT **NOTED** the intention to align the effort data held by the Secretariat with those held in Iran to attempt to standardise these. The WPNT further **NOTED** the intention of the Secretariat to also carry out a mission to Sri Lanka to develop CPUE series for their fisheries, but this is likely to focus mostly on skipjack tuna.

43. The WPNT **NOTED** paper IOTC–2024–WPNT14–10 on Artisanal fishing gears efficiency on kawakawa (*Euthynnus affinis*), including the following abstract provided by the authors:

"A survey was conducted along the Kenyan marine Coastline waters to ascertain the most effective fishing gear applied by artisanal fishers to catch Kawakawa (Euthynnus affinis). The survey involved administration of structured questionnaires that were administered to fishers by enumerators. Four gears that are predominantly used to catch Kawakawa were selected from among other gears viz. Gillnet, hand lines, trolling lines and long lines. The survey compared the frequency counts of Kawakawa caught per each fishing gear recorded in the questionnaire. The main objective of this study was to identify the most effective gear used

to catch Kawakawa, identify which landing sites have the highest frequency of the gear with the aim of recommending appropriate management measures for the fishing gear and the fishery.

For data collection, publicity posters were circulated informing fishers about the survey through structured questionnaires, and with the use of species identification guides. The data collected was digitized using tablets or android phones and laptops. Enumerators were trained on interviewing techniques to be applied during the survey and species identification to ensure they recorded responses in relation to Kawakawa versus other species caught. The survey covered all 214 landing sites for 3 days. This involved administering Questions to respondents (Fishermen) on the gears used to target Kawakawa.

The results were analyzed using MS excel software. The survey showed trolling lines at 28% and long lines at 27% were the main gears targeting Kawakawa. Hand lines at 14%, Gillnets at 12.5% and other gears at 18.5% were the other respective gears targeting Kawakawa. Trolling lines are predominantly used by sport fishers while long lines are used mostly by artisanal fishers. The highest concentration of trolling lines was in Kilifi County while the highest concentration of long lines was recorded in Lamu County and the most common used hook sizes were 4-7 inches.

Kenya Fisheries Service in collaboration with other government agencies and stakeholders should develop management measures for the Kawakawa fishery aimed at addressing both artisanal fishers using long lines and sport fishers using trolling lines targeting the same species. This will ensure sustainable exploitation of the fishery as per the mandate of Kenya Fisheries Service."

44. The WPNT **NOTED** the fluctuation seen in the number of hooks used on longlines throughout the survey period since 2004 and observed a correlation between the number of hooks and kawakawa catches, with the highest catches occurring in regions where the most hooks were deployed.

45. The WPNT **SUGGESTED** that it may be more beneficial to reduce the number of landing sites covered but to sample each site for longer periods compared to the current approach where a high number of sites are only being sampled for 3 days each over a short time period. The WPNT **NOTED** that conducting sampling multiple times across a year in each site would provide information on seasonal trends, catch composition etc. The WPNT **NOTED** that the current approach was driven by the requirements of the project funders who wanted the entire coastline of Kenya covered.

46. The WPNT **RECOGNISED** that the most standardised way to compare the efficiency of different gears is by using CPUE indices and **NOTED** the author's hope to develop some CPUE series when the data have been fully analysed. The WPNT also **NOTED** the intent of the authors to manage the recent increase in effort in Kenya and **EMPHASISED** that robust landings data should support the development of conservation and management measures in the region.

47. The WPNT **NOTED** the lack of size frequency data originating from these surveys but **NOTED** the author's intention to include the collection of size information in the next round of sampling.

48. The WPNT **NOTED** some issues related to the stability of data enumerators which could be leading to issues with species identification and reporting.

49. The WPNT **NOTED** paper IOTC–2024–WPNT14–11 on Overview of neritic tuna fishery in Madagascar, including the following abstract provided by the authors:

"Neritic tunas are the main tuna species caught in Madagascar's coastal fishery. The big island has a total of 48,538 traditional canoes (ECN, 2013), less than 7 meters, used by small scale fishermen, all of which are non-motorized boats and which use very rudimentary and traditional fishing gear. Data collections on neritic tuna in Madagascar are very recent. The collection of data for coastal fishery was initiated in 2017 but only in landing sites sampled in the northern part of Madagascar, given the extent of the Malagasy coast. As a result of this data collection, the main species of neritic tunas, under IOTC mandate, caught in Madagascar are Narrow barred Spanish mackerel (Scomberomorus commerson) (46.29%), Kawakawa (Euthynnus affinis) (29.61%), Kingfish (Scomberomorus guttatus) (17.78%), Auxide (Auxis thazard) (5.81%) and Bonitou (Auxis rochei) (0.51%). Other types of neritic tuna such as Wahoo (Acanthocybium solandri), striped and bigeye bonito are also caught by our coastal fisheries. The main fishing gears are the gillnet (63.55%), the line (31.1%), the longline (4.35%) and the harpoon (1%). Our research aims initially to provide an overview of data

on neritic tunas in Madagascar and subsequently to identify other potential fishing areas for neritic tuna fishery through literature reviews as well as traceability of the internal trade."

50. The WPNT **NOTED** that in Madagascar, what is referred to as the small-scale fleet consists of non-motorised small boats only and further **NOTED** that only the vessels classified as artisanal and industrial are required to carry logbooks. The WPNT **NOTED** that small vessels will use longlines and gillnets so are not specifically longline vessels.

51. The WPNT **NOTED** that neritic species are mostly caught in the small-scale and artisanal fisheries, but these vessels are not only targeting tuna.

52. The WPNT **NOTED** that there are few data available from the small-scale fisheries and that those that are available mostly come from surveys carried out in 2018 from 18 landing sites in the north of the country which found that few longtail tuna were being caught. The WPNT **NOTED** the intent to carry out a similar survey in other parts of the country in the future.

53. The WPNT **NOTED** paper IOTC–2024–WPNT14–12 on Small scale purse seine with FADs fishery in the Andaman Sea of Thailand, including the following abstract provided by the authors:

"A study of small-scale purse seine with fish aggregating devices (FADs) fishery in the Andaman Sea of Thailand were carried out by collecting data from small-scale purse seiners using FADs which were landed at fishing ports along the Andaman Sea Coast of Thailand from January to December 2023. The objectives of the study were to analyze catch per unit effort (CPUE), species composition and size of neritic tunas and seerfishes. The results showed that the CPUE of small-scale purse seine with FADs was 2,688.13 kg/day. The highest species composition was scads (Decapterus spp.), 24.72% of the total catch, followed by mackerels (Rastrelliger spp.), bigeye scads (Selar spp.), and sardinellas (Sardinella spp.), accounted for 20.85%, 10.25%, and 7.11% of the total catch respectively. The composition of four neritic tunas and two seerfishes sum up 12.04% and 0.46% of the total catch. The size measurement of neritic tunas found that the fork length of Kawakawa ranged from 10.50 – 49.50 cm and the average length was 26.95 ± 8.14 cm, the fork length of bullet tuna ranged from 12.00 – 35.00 cm and the average length was 23.61 ± 4.12 cm, the fork length of frigate tuna ranged from 13.00 – 37.00 cm and the average length was 23.06 ± 6.75 cm, and the fork length of longtail tuna ranged from 11.50 – 42.00 cm and the average length was 27.59 ± 7.01 cm. For seerfishes, the fork length of narrow-barred Spanish mackerel ranged from 40.00 – 60.50 cm and the average length was 72.29 ± 8.94 cm and the fork length of Indo-Pacific king mackerel ranged from 11.50 – 42.00 cm and the average length was 40.37 ± 1.36 cm."

54. The WPNT **NOTED** Thailand's recent efforts to re-estimate the catch composition data going back several years. The WPNT **NOTED** the challenge of distinguishing between very small bullet and frigate tuna commonly caught in Thailand but **NOTED** Thailand's confidence in the ability of their enumerators to distinguish between these.

55. The WPNT **NOTED** that it is generally impossible for enumerators in Thailand to separate catches between those caught on anchored FADs and those caught in free-schools due to the mixing of all fish onboard vessels, regardless of the fishing method.

56. The WPNT **NOTED** that in many Thai fisheries, IOTC species comprise a very small percentage of the total catches of all species, further **NOTING** that while vessels operating in these fisheries should be registered in the RAV database, in practice tuna species are not being targeted but are instead caught as bycatch.

57. The WPNT **NOTED** the difficulty in registering all anchored FADs in Thailand due to their short lifespan, as the materials often used for their construction like bamboo and palm leaves quickly break apart, making them difficult to monitor and report.

58. The WPNT **NOTED** that catch and species composition are estimated monthly and the sampling programme for this has been running for 10 years. The WPNT **NOTED** the value of compiling a time series of the indicators calculated in this paper to monitor fisheries effectively.

59. The WPNT **NOTED** that the data collected as part of the port sampling programme can vary depending on the projects underway at the time. The WPNT **NOTED** that in some years biological studies such as those used to estimate maturity have been conducted, but this is not part of the routine data and sample collection.

60. The WPNT **NOTED** that logbooks are required in these fisheries, but they provide only an overall catch by species without including effort, so preventing the estimation of catch rates.

61. The WPNT **NOTED** that in these purse seine fisheries, the same small mesh size of 25mm is used year-round.

62. The WPNT **NOTED** paper IOTC-2024-WPNT14-20 on Stock identification of frigate tuna (*Auxis thazard*) and bullet tuna (*Auxis rochei*) populations of Sri Lankan waters, including the following abstract provided by the authors:

"Understanding the origin of different populations is useful when managing the stocks of a species. Frigate tuna (Auxis thazard) and bullet tuna (Auxis rochei) are very important neritic tuna species found in Sri Lankan waters. Stock identification studies for these two species were carried out by using morphometrics as well as by using molecular techniques from 2016 to 2018. The use of two or more methods for the identification of stocks makes a stock identification study more accurate and reliable. The samples were collected from the commercial fishers that operated in the Southern, Southwestern, Western, Northwestern and the Eastern coastal areas of Sri Lanka from August 2015 to August 2018. The morphometric analysis involved recording 22 morphometric measurements for each fish and subsequently carrying out a Principal Component Analysis to determine the origin of the stocks. This analysis of the morphometric data of both species, A. thazard and A. rochei, showed that different clusters contained sequences from all provinces indicating that the populations of different coastal areas have originated from one common ancestor and that they have evolved as one stock. The stock structure analysis using molecular markers involved the sequencing of the mitochondrial COI gene and the mitochondrial D-loop region. The phylogenetic analysis for both species showed that between populations, the haplotype diversity was high while the nucleotide diversity was low. The phylogenetic trees revealed that the populations of A. thazard and A. rochei of the different fisheries for all the coastal areas of Sri Lanka consist of one single stock confirming the results obtained with the morphometric analysis. Therefore, when management plans need to be implemented for these species, a unified strategy could be implemented throughout the studied coastal areas for each species. Moreover, it is recommended to conduct similar studies that combine samples from different nations. This approach would provide a comprehensive understanding of the status of fish populations across the region."

63. **ACKNOWLEDGING** the use of sophisticated methods and extensive sampling for this study, the WPNT **CONGRATULATED** the authors on this work.

64. The WPNT **NOTED** the length-weight relationships presented in this paper, **NOTING** that currently few morphometric relationships are available for neritic species, and so **ENCOURAGED** Sri Lanka to share these data with the Secretariat.

65. The WPNT **NOTED** that the lack of distinct populations found in samples from around Sri Lanka was unsurprising given the relatively small area being studied. The WPNT **NOTED** that similar work has been carried out in India and Indonesia and that it would be valuable to compare the results to get a better idea of potential population structure in the region. The WPNT **EMPHASISED** the value of conducting similar studies around the Indian Ocean and comparing results to determine whether separate populations exist within the region.

66. Therefore, the WPNT **RECOMMENDED** that the SC **ENCOURAGE** collaboration between CPCs to carry out stock identification by the application of genetics in order to better understand the structure of all neritic stocks for improved management plans.

67. The WPNT **NOTED** that DNA barcoding is a less expensive technique that was used by India but **ACKNOWLEDGED** that not all CPCs have the capacity to carry out this type of analysis and **SUGGESTED** that it might be helpful to build capacity in this area in order to conduct these studies across the Indian Ocean region. The WPNT **NOTED** a suggestion that CPCs could conduct the initial part of the PCR approach then send the outputs to India for sequencing and the final analysis to save on costs.

68. The WPNT **SUGGESTED** that would be valuable to hold a mini workshop on stock structure techniques at next year's WPNT meeting which would require the invited expert to have extensive knowledge in this area. The WPNT further **REQUESTED** that CPCs submit relevant papers on genetic studies to help the invited expert to understand the current level of knowledge within the WPNT on this topic.

5. Neritic Tuna Species – Review of New Information on Stock Status

5.1 Review new information on the biology, stock structure, fisheries and associated environmental data

69. The WPNT **NOTED** paper IOTC–2024–WPNT14–13 on Biological parameters of Auxis sp. in some parts of Indonesian waters, including the following abstract provided by the authors:

"Neritic tuna species play a significant role in Indonesia, contributing to its economy, food security, ecosystem health, cultural heritage, and tourism industry. This study was conducted in 2019. The biological samples, including gonads and muscle tissue were collected and funded by the Ministry of Marine Affairs and Fisheries, Indonesia. Gonad maturity level was assessed morphologically. Whereas genetic analysis using the polymerase chain reaction (PCR) to amplify the samples, and electrophoresis using the QIAxcel fragment analysis tool. The results of this study showed that length at first maturity (Lm50) of female bullet tuna was estimated to be 23.5 cm FL (R =0.70). The result from AMOVA analysis, there are signs of clustering of 2 subpopulations of bullet tuna, distinguished by the greatest inter-group variation values between stock groups, specifically Padang (PD) and Bengkulu (BB)-Lampung (KA) with P-value 0.0039. While frigate tuna genetic analysis discovered the presence of 2 major clusters showing the highest inter-group variation values, specifically representing the frigate tuna subpopulation, surrounding Aceh (AC), Padang (PD), and Sibolga (SB), along with Bengkulu (BB). Understanding the reproductive biology and population genetic of Auxis sp. is essential for fisheries management and conservation efforts. The output of the study can be used by scientists and resource managers to develop strategies to sustainably manage bullet tuna and frigate tuna populations and ensure their long-term viability."

70. **ACKNOWLEDGING** that knowledge of biological aspects of neritic tuna species, particularly information relating to maturity, are very important particularly for stock assessments, the WPNT **THANKED** the authors for this work.

71. The WPNT **NOTED** paper IOTC–2024–WPNT14–14 Preliminary analysis on the abundance indices of neritic tuna species from Indonesian fleets in the north-eastern Indian Ocean 2012-2023, including the following abstract provided by the authors:

"Indonesia is one of the world's largest tuna producers, with approximately 300,000 tons/year (equal to £35 billion in value in 2018) harvested from its archipelagic waters, Economic Exclusive Zone (EEZ), and high seas. About a quarter of the catch belongs to the neritic tuna group, e.g., eastern little tuna. Neritic tuna is caught mainly by artisanal fisheries, associated with fish aggregating devices (FADs), and consumed and traded among coastal communities. However, given its importance, the available data, such as reported catches and effort alone, are insufficient for assessing the stock. Therefore, this study aims to give some preliminary historical trends of abundance indices of neritic tuna species from Indonesian fleets, with emphasize on estimating the number of FAD based on set-by-set information from logbook data from 2012-2023. The result then used for generating the catch-per-unit-of-effort (CPUE) in units of kg/FAD. The first classification using density-based spatial clustering of applications with noise (DB SCAN) on trip level looked satisfactory, with most of the cluster generated are within their respective diameter. The next step is finding the best solution for determining the number of FAD if there are more than one suspected FADs from different fishing trips and gears."

72. The WPNT **RECOGNISED** that this study is a good start to identifying anchored FADs (aFADs) in Indonesia but **NOTED** that determining the total number of aFADs remains unlikely due to incomplete logbook coverage in Indonesian fisheries.

73. The WPNT **NOTED** that literature estimates the average turnover rates of aFADs to be around 2 years due to the materials used in their construction and chains being broken over time but further **NOTED** that broken aFADs are likely to be redeployed in similar areas if fishers consider the area to be productive.

74. The WPNT **ACKNOWLEDGED** the challenge faced by Indonesia in maintaining a register of all aFADs as required under Resolution 23/01, given their large number and high turnover rates, especially compared to CPCs like Maldives and Mauritius which have relatively few aFADs. The WPNT **NOTED** that to assist with this, a solution that is being trialed this year is the addition of a requirement for logbooks to detail fishing activities around aFADs along with their locations.

75. The WPNT **NOTED** the author's intention to eventually estimate total annual catch as a kind of abundance index, similar to what the EU has done in the past, which could be incorporated into stock assessments for all species, including neritic species. The WPNT **EMPHASISED** that developing such abundance indices is crucial for improving stock assessments of these data-poor species, enabling the group to move away from relying solely on catch-only methods.

76. **ACKNOWLEDGING** that FAD design has not been shown to affect the abundance of tuna underneath them, and the range of variability associated with tuna aggregations, the WPNT **NOTED** that the author does not intend to include FAD materials as co-variates in this analysis.

77. The WPNT **NOTED** that a significant amount of data were excluded from the analyses due to errors resulting from misinputs of information into logbooks by fishers.

6. STOCK ASSESSMENT UPDATES

6.1 Stock assessment updates

78. The WPNT **NOTED** paper IOTC–2024–WPNT14–15 on Assessment of Bullet tuna (*Auxis rochei*) using data-limited methods, including the following abstract provided by the authors:

"Assessing the status of the stocks of neritic tuna species in the Indian Ocean is challenging due to the paucity of data. There is lack of reliable information on stock structure, abundance, and biological parameters. There has been no formal stock assessment conducted for bullet tuna (Auxis rochei). Fu (2021) provides a preliminary assessment of A. rochei using data-limited methods. This paper provides an update of that assessment using the C-MSY method (Froese et al. 2016), based on the most recent catch information, and a length-based method for estimation of spawning potential ratio (Hordyk et al. 2014), based on the available length composition data from the gillnet fishery."

79. The WPNT **NOTED** that the assessment explored the application of the C-MSY model and a length-based method for estimating the spawning potential ratio (LB-SPR), as well as the Bayesian length interval catch curve analysis (fishblicc). The WPNT **NOTED** that the catch estimates from the "Sea Around us Project" (SAUP) were used as a sensitivity run for the C-MSY model.

80. The WPNT **NOTED** significant increases in bullet tuna catches since the 2010s, which are unsubstantiated. The reliability of these catch estimates suffers greatly due to inadequate reporting from Indonesia. The WPNT **NOTED** that Indonesia has undertaken an exhaustive review and re-estimation of its catches in collaboration with the Secretariat. Preliminary results indicate that the trend in the re-estimated catch appears more credible and could be incorporated into the assessment following review and endorsement by the WPDCS and SC.

81. The WPNT **RECALLED** that the SC did not adopt the C-MSY assessment for bullet tuna in 2021 because of significant uncertainty in the reported catch data. The WPNT **NOTED** that this uncertainty remains in the current scientific estimates compiled by the Secretariat for bullet tuna. The C-MSY assessment was updated to maintain continuity.

82. The WPNT **NOTED** that the trend of SAUP catch estimates seems more credible, yet these estimates lack independent verification. The WPNT **NOTED** that SAUP estimates include a category combining bullet and frigate tuna. As such the assessment assumed that half of this category is attributed to bullet tuna, despite it representing only a minor portion of the total bullet tuna catches. The WPNT considered this assumption to be unjustifiable.

83. The WPNT **NOTED** that, although the estimated overfishing status differs when using the best scientific (Secretariat) estimates (F>FMSY) compared to the SAUP estimates (F<FMSY), the stock status is relatively close to the target reference points in both instances, as indicated by the proximity to the center of the Kobe plot. This similarity arises because both sets of catch data exhibit a consistent pattern of increasing catches that level off in recent years. Consequently, the stock reduction analysis tends to assign the highest productivity to the period with the highest catches, resulting in a current stock status close to the target. The WPNT also **NOTED** that catches with more rapid changes typically lead to greater uncertainty in estimates of MSY.

84. The WPNT **NOTED** that the life history parameters used to define the prior for the growth parameter (*r*) were derived from the literature review conducted in 2016 (IOTC-2016-WPNT06-DATA14).

85. The WPNT **NOTED** that in the LB-SPR method, the Spawning Potential Ratio (SPR) of a stock is the remaining unfished reproductive potential under a certain level of fishing pressure. This ratio commonly serves to establish target and limit reference points for fisheries management. An SPR at 40% is a well recognised biological reference point that is deemed to be a cautious benchmark for many species and fisheries. Should the estimated SPR fall below 40%, the stock is considered to be overfished.

86. The WPNT **NOTED** that the LB-SPR was applied to recent length samples from both the gillnet and purse seine fisheries. It is important to note that the LB-SPR presumes logistic selectivity only, hence it should in theory, apply to fisheries where one can assume selectivity reaches an asymptote.

87. The WPNT **NOTED** that the LB-SPR estimated the recent SPR for samples from the gillnet fishery to be below 40% and approximately 40% from the purse seine fishery.

88. The WPNT **NOTED** that the estimates of fishing mortality to natural mortality ratio (F/M) seem exceedingly high (greater than 5). Similar observations of unusually high F/M ratios were made in the LB-SPR assessment of Kawakawa in the previous year. The reason remains unclear and requires additional examination. Nevertheless, this finding should not influence the interpretation of SPR, which remains the key indicator.

89. The WPNT **NOTED** that the fishblicc model functions in a similar way to LB-SPR, aiming to estimate SPR as an indicator of stock depletion using length composition data through a length-based catch curve analysis. The WPNT further **NOTED** that the primary advantage of this method is its ability to account for selectivities from multiple gears, particularly in estimating dome-shaped selectivity. The model accommodates size frequencies from various gears, assigning weights according to their respective catch proportions. The WPNT **NOTED** that it utilizes a similar set of biological parameters to those used in LB-SPR.

90. The WPNT **NOTED** that the fishblicc estimation placed the SPR at below 40%, using most recent length data from gillnet, line, and purse seine fisheries.

91. The WPNT **NOTED** paper IOTC–2024–WPNT14–16 on Catch-based data-limited stock assessment of Indian Ocean Frigate tuna (*Auxis thazard*, Lacepède, 1800), including the following abstract provided by the authors:

"The aim of this study was to develop a framework for investigating the catch trend and estimating the optimized catch limit of Frigate tuna (FRI) stock by collecting catch data in the Persian Gulf, Oman Sea and Indian Ocean. Two methods were employed to determine the biological reference points (BRPs) of Frigate tuna in two regions. The Frigate tuna average catch (Ct) of the Iranian Waters was 22,439 tons (95% confidence interval 18,299 - 26,638 tonnes), showing a significant increase in the Iranian southern waters over the past two decades (R = 0.9, P < 0.05). The catching trend of this species in the IOTC area competence is increasing and according to the ARIMA model the growth increase is expected (AIC=1452, BIC=1455). The current biomass to the biomass of MSY (B/BMSY) ratio and the ratio of saturation (S = B/K) were obtained using Optimized Catch Only Method (OCOM) and Zhou-Boosted regression tree models (Zhou-BRT). The results from different models showed that the current B/BMSY ratio and S ratio were not significantly different based on a one-sample t-test (P>0.05). The findings from the last year of the study indicated that Frigate tuna stock exploitation ratio in Iranian waters (the Persian Gulf and Oman Sea) and IOTC area competence is below sustainable levels (under exploitation/green color), This suggests that the stock is close to being fished at MSY levels and that higher catches may not be sustained despite the substantial uncertainty associated with the assessment, a precautionary approach to management is recommended."

92. The WPNT **NOTED** the assessment was based on the Optimal Catch Only Method (OCOM) and was applied to both the southern waters of Iran (Persian Gulf and Oman sea), and the whole Indian Ocean. Furthermore, the assessment employed the ARIMA model for forecasting in order to determine optimal catch limits.

93. The WPNT **NOTED** that the OCOM method had previously been applied to various neritic tuna species. It yielded comparable results to those of the C-MSY method when identical input parameters and assumptions were employed.

94. The WPNT **NOTED** paper IOTC–2024–WPNT14–17 on Assessment of Indian Ocean frigate tuna (*Auxis thazard*) using data-limited methods, including the following abstract provided by the authors:

"Assessing the status of the stocks of neritic tuna species in the Indian Ocean is challenging due to the paucity of data. There is lack of reliable information on stock structure, abundance, and biological parameters. There has been no formal stock assessment conducted for frigate tuna (Auxis thazard). Fu (2021) provides a preliminary assessment of A. thazard using data-limited methods. This paper provides an update of that assessment using the C-MSY method (Froese et al. 2016), based on the most recent catch information, and a length-based method for estimation of spawning potential ratio (Hordyk et al. 2014), based on the available length composition data from the line fishery."

95. The WPNT **NOTED** that the assessment has explored the application of the catch-only model (C-MSY) and a length-based method for estimating the spawning potential ratio (LB-SPR), and as well as the Bayesian length interval catch curve analysis (fishblicc).

96. The WPNT **NOTED** with concern that the overall quality of the total catches of frigate tuna is very low as a large part of the historical catches have been fully re-estimated and less than 30% of the total catches have been fully or partially reported to the Secretariat in recent years, with all catches from Indonesian coastal fisheries being estimated based on methodology that mostly relies on data collected in the 2000s.

97. The WPNT **RECALLED** that the SC did not adopt the C-MSY assessment for bullet tuna in 2021 because of significant uncertainty in the reported catch data. The WPNT **NOTED** that this uncertainty remains in the current, scientific estimates compiled by the Secretariat for bullet tuna. The C-MSY assessment was updated to maintain continuity.

98. The WPNT **NOTED** that the life history parameters used to define the prior for the growth parameter (r) were derived from the literature review conducted in 2016 (IOTC-2016-WPNT06-DAT13).

99. The WPNT **NOTED** observed that the LPBSP's estimates indicated the SPR from both gillnet and purse seine fisheries exceed 40%. In contrast, the fishblicc's estimation suggested an SPR below 40%.

100. The WPNT **NOTED** paper IOTC–2024–WPNT14–18 on Stock assessment of Indian Ocean Indo-Pacific king mackerel (*Scomberomorus guttatus*) using CMSY data poor methods, including the following abstract provided by the authors:

"The purpose of this study was to develop a framework for investigating the catch trend. However, it is currently difficult to provide scientific advice for management purposes using only catch data. This article presents a data poor method for stock assessment of Scomberomorus guttatus by collecting catch data in the Persian Gulf & Oman Sea and Indian Ocean. In this study, CMSY method was used to determine the biological reference points (BRPs) of Indo-Pacific king mackerel in the two mentioned study area. Catch data was collected from 1997-2022 and 1950 -2022 in the Persian Gulf & Oman Sea and Indian Ocean, respectively. The average catch of the Persian Gulf & Oman Sea was 5750 tons in the studied period. The average (minimum -maximum) of carrying capacity (K), maximum sustainable yield (MSY), the biomass of maximum sustainable yield (Bmsy), current biomass (B) and Fishing mortality of maximum sustainable yield (Fmsy) were obtained by the Catch- maximum sustainable yield (CMSY) method. F/FMSY was estimated 1.11 and 0.69 in the Indian Ocean and Persian Gulf & Oman Sea, respectively. B/BMSY was identified less than 1 in the Indian Ocean. The KOBE plot indicates that based on the CMSY model results, Indo-Pacific king mackerel is currently overfished (B2022/BMSY=0.97) and is subject to overfishing (F2022/FMSY = 1.11) in the Indian Ocean, but the current stock situation is not overfished (B2022/BMSY=1.35) and not subject to overfishing (F 2022/F MSY = 0.69) in the Iranian southern waters."

101. The WPNT **NOTED** the C-MSY assessment was applied to both the southern waters of Iran (Persian Gulf and Oman sea), and the whole Indian Ocean.

102. The WPNT **NOTED** that the assessment employed the identical model as the C-MSY assessment described in IOTC-2024-WPNT14-19, with the same input catch data and model configurations (for the IO region model). However, this assessment used intrinsic growth rate (r) values ranging from 0.2 to 0.8, based on the Fishbase resilience classification for *Scomberomorus guttatus*. In contrast, the assessment model in IOTC-2024-WPNT14-19 applied higher r values of 0.6 to 2.0, derived from available biological parameters. Consequently, this assessment model estimated a more pessimistic stock status compared to the assessment model in IOTC-2024-WPNT14-19.

103. The WPNT **THANKED** the authors for their excellent work and urged CPCs to endeavour to develop assessment models for neritic tuna species. Meanwhile, the WPNT **SUGGESTED** that coordinated efforts be made to facilitate collaboration among scientists, ensuring consistency in input parameters and preventing confusion.

104. The WPNT **NOTED** paper IOTC–2024–WPNT14–19 on Assessment of Indian Ocean Indo-Pacific King Mackerel (*Scomberomorus guttatus*) using data-limited methods, including the following abstract provided by the authors:

"Assessing the status of the stocks of neritic tuna species in the Indian Ocean is challenging due to the paucity of data. There is lack of reliable information on stock structure, abundance, and biological parameters. There

has been no formal stock assessment conducted for Indo-Pacific king mackerel (Scomberomorus guttatus). Fu (2021) provides a preliminary assessment of S. guttatus using data-limited methods. This paper provides an update of that assessment using the C-MSY method (Froese et al. 2016), based on the most recent catch information. Additionally, a further development of this method, C-MSY++ (Froese et al. 2021), was also explored in the assessment".

105. The WPNT **THANKED** the authors for the progress made in the development of assessment models for Indo-Pacific king mackerel, including the application of the catch-only models C-MSY and C-MSY++. The assessment also examined the catch estimates of Indo-Pacific king mackerel from the SAUP ("Sea-Around-Us Project") as sensitivities.

106. The WPNT **NOTED** that the life history parameters used to define the prior range (0.6 – 2.0) for the growth parameter (*r)* were derived from a comprehensive review of the literature made in 2016 and available in the document IOTC-2016-WPNT06-DATA12, **ACKNOWLEDGING** that this approach is an improvement over the use of a fixed range of *r* values available from FishBase (i.e., *r* in the range 0.2-0.8).

107. The WPNT **NOTED** that the prior distribution for *r* was derived from a Life History Module based on the Euler-Lotka equation (https://github.com/cttedwards/bdm) and that such an approach might be more adapted to shark species and large marine mammals than teleosts, and **ENCOURAGED** the authors to explore alternative methods in the future to elicit the prior for *r*.

108. The WPNT **NOTED** that the *FishLife* package (https://github.com/James-Thorson-NOAA/FishLife) offers an a more robust framework for compiling life-history traits (demographic parameters as well as reproductive, morphological, and trophic traits) and suggested that it should be considered in future demographic analyses of the species. However, it was not clear whether this package can directly estimate *r* values.

109. The WPNT **SUGGESTED** making the scripts for deriving demographic parameters accessible, for example, via a GitHub repository. This would facilitate updates to the analysis when new biological information becomes available. Furthermore, it would enhance the transparency and reproducibility of the analysis.

110. The WPNT **NOTED** that due to poor reporting, only recent data are likely to be more reliable. The WPNT **QUESTIONED** whether it would be preferable to apply the model only to recent catches. To do so, one must assume an initial depletion level at the beginning of the time series, which is highly uncertain given the uncertain history of early exploration. Consequently, there is a trade-off between using the complete catch series with earlier data of questionable quality but a more justifiable assumption of initial depletion, compared with using recent data with better quality but uncertain initial depletion levels.

111. The WPNT **NOTED** that the estimates of management quantities align closely with those of the 2021 assessment. The estimate of MSY was 47 000 t in the 2024 assessment and 46 900 t in the 2021 assessment, respectively. This is likely because catches have stabilized since approximately 2010, with the exception of notably low catches in 2021 (except for the noticeably low catch in 2021). The assessment estimated that the current biomass is marginally above BMSY (the median of $B_{current}$ /B_{MSY} is 1.02) and that the fishing mortality is below the FMSY (the median of 0.95 $F_{current}$/F_{MSY}).

112. The WPNT **NOTED** that the outcomes of the C-MSY++ model are slightly more pessimistic than those of the C-MSY method. Nevertheless, for both models, the current stock status is estimated to be very close to the target reference point.

113. The WPNT **NOTED** that C-MSY++ represents a further development of the C-MSY model. It utilizes Markov Chain Monte Carlo (MCMC) to estimate parameters through prior distributions, compared with the deterministic stock reduction analysis employed by C-MSY. Nevertheless, the performance of this model remains uncertain due to the absence of fitted observations as it relies solely on prior information and catch data.

114. The WPNT **NOTED** that the sensitivity analysis employing SAUP catch estimates yielded varying outcomes across models. Additionally, the WPNT **ACKNOWLEDGED** the challenges in independently verifying the reliability of SAUP catch estimates.

6.2 Stock status indicators for other neritic tuna species

115. The WPNT **DISCUSSED** the advantages and disadvantages of catch-based and length-based methods. The WPNT **NOTED** that collecting data for neritic tuna in the Indian Ocean presents challenges due to the diverse

species and fishing gear involved, making it very difficult to obtain unbiased catch series for the entire stock. In contrast, size data are simpler and less costly to collect, and a representative sample can provide a snapshot of the fishery and population. Moreover, while catch data must encompass the entire fishery, size data require coverage of only a small portion.

116. In this context, the WPNT **DISCUSSED** potential future assessment options for neritic tuna species. The WPNT **NOTED** that each method requires certain assumptions. For catch-only methods, the assumption is relatively simple and widely used in fisheries applications (functional form for surplus production). Therefore, if the catch estimates are accurate, the application of catch-only methods can prove effective and easy to implement. Furthermore, these methods can yield management metrics required by the IOTC, and the results are more easily understood by managers.

117. Conversely, the inputs for the length-based approach are more likely to be of better quality, especially considering the widespread implementation of sampling programs among coastal countries. There has also been considerable recent advancement and emphasis on the length-based approach, which can estimate stock status and serve as a valuable monitoring tool for various fisheries. The WPNT thus **ENCOURAGED** the continued exploration and utilization of both methods and **RECOMMENDED** that the SC urge the Commission to put greater focus on urging CPCs to collect more representative length composition data for the effective assessment of these species. The WPNT also **REQUESTED** that CPCs summarize the size data from their sampling programs for the next WPNT meeting.

118. The WPNT **AGREED** that indicators such as CPUE and average weight, derived from significant fisheries for longtail tuna, kawakawa, and Spanish Mackerel (e.g., Iran, Sri Lanka, and Pakistan), could serve as indicators for monitoring the status of these stocks during the intervals between assessment years.

6.3 Development of management advice for neritic tuna species

119. The WPNT **AGREED** that due to concerns regarding the overall quality of frigate tuna and bullet tuna catches, the C-MSY shall not serve as a basis for management advice. For the Indo-Pacific king mackerel, the WPNT **AGREED** that the C-MSY assessment (IOTC-2024-WPNT14-19), based on the Secretariat's best scientific estimates, is suitable for management recommendations.

120. The WPNT **ADOPTED** the management advice developed for Indo-Pacific king mackerel (*Scomberomorus guttatus*) – Appendix XI, frigate tuna (*Auxis thazard*) - Appendix VIII, and bullet tuna (*Auxis rochei*) – Appendix VII as provided in the draft resource stock status summary (the stock status of frigate tuna and bullet tuna remained to be undermined), and **REQUESTED** that the IOTC Secretariat update the draft stock status summary for the three species with the latest 2022 catch data, and for the summary to be provided to the SC as part of the draft Executive Summary, for its consideration.

7. Programme of Work (Research and Priorities)

7.1 Revision of the WPNT Program of Work 2025–2029

121. The WPNT **NOTED** paper IOTC–2024–WPNT14–08 on Revision of the WPNT Program of Work (2025-2029).

122. The WPNT **SUGGESTED** that both stock structure work and the collection and analysis of length-frequency data should be priority topics for the coming year and for inclusion on next year’s agenda.

123. The WPNT **NOTED** that it is important to assign high priority to the most important work that is required from the WPNT in order to secure funding for this work when the Program of Work is presented by the SC to the Commission. The WPNT **AGREED** that the following work streams will be presented as high priority in the Program of Work:

- Stock structure: Genetic research to determine the connectivity of neritic tunas throughout their distributions;
- Improvement of stock assessment methodology, in particular further investigations of the effect of input priors and parameters on model outputs and further model validation analyses;
- Data mining and collation to improve stock assessments;
- Biological information (parameters for stock assessment): Review and summarise information on key biological parameters for neritic species.

124. The WPNT **RECOMMENDED** that the SC consider and endorse the WPNT Program of Work (2025–2029), as provided in Appendix VI.

7.2 Development of priorities for an Invited Expert at the next WPNT meeting

125. The WPNT **AGREED** to the following core areas of expertise and priority areas for contribution that need to be enhanced for the next meeting of the WPNT in 2025, by an Invited Expert:

1) Stock structure/genetics
2) data poor assessment approaches (e.g., catch only methods, length-based approaches);
3) CPUE standardisations.

8. Other Business

8.1 Date and place of the 15th and 16th Working Party on Neritic Tunas

126. The WPNT **SUGGESTED** holding the meeting during the first two weeks in July as per the usual schedule.

127. The WPNT **REQUESTED** CPCs that may be interested in hosting the 15th and 16th Working Party on Neritic tunas to contact the Secretariat.

8.2 Review of the draft, and adoption of the Report of the 14th Working Party on Neritic Tunas

128. The WPNT **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPNT14, provided in Appendix XIII, as well as the management advice provided in the draft resource stock status summary for each of the six neritic tuna (and mackerel) species under the IOTC mandate, and the combined Kobe plot for the species assigned a stock status in 2024:
   - Bullet tuna (*Auxis rochei*) – Appendix VII
   - Frigate tuna (*Auxis thazard*) – Appendix VIII
   - Kawakawa (*Euthynnus affinis*) – Appendix IX
   - Longtail tuna (*Thunnus tonggol*) – Appendix X
   - Indo-Pacific king mackerel (*Scomberomorus guttatus*) – Appendix XI
   - Narrow-barred Spanish mackerel (*Scomberomorus commerson*) – Appendix XII

129. The report of the 14th Session of the Working Party on Neritic Tunas (IOTC–2024–WPNT14–R) was **ADOPTED** by correspondence.

APPENDIX I
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APPENDIX II
AGENDA FOR THE 14TH WORKING PARTY ON NERITIC TUNAS

Date: 8–12 July 2024
Location: Seychelles
Venue: Story Hotel, Seychelles
Time: 09:00 – 17:00 daily (Seychelles time)
Chair: Dr Farhad Kaymaram; **Vice-Chair:** Mr Bram Setyadji

1. **OPENING OF THE MEETING** (Chair)
2. **ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION (Chair)**
3. **THE IOTC PROCESS: OUTCOMES, UPDATES AND PROGRESS**

    3.1. Outcomes of the 26th Session of the Scientific Committee (IOTC Secretariat)
    3.2. Outcomes of the 27th Session of the Commission (IOTC Secretariat)
    3.3. Review of Conservation and Management Measures relevant to neritic tunas (IOTC Secretariat)
    3.4. Progress on the recommendations of WPNT13 and SC26 (IOTC Secretariat)

4. **NEW INFORMATION ON FISHERIES AND ASSOCIATED ENVIRONMENTAL DATA FOR NERITIC TUNAS**

    4.1. Review of the statistical data available for neritic tunas (IOTC Secretariat)
    4.2. Review new information on fisheries and associated environmental data (general CPC papers)

5. **NERITIC TUNA SPECIES – REVIEW OF NEW INFORMATION ON STOCK STATUS**

    5.1. Review new information on the biology, stock structure, fisheries and associated environmental data (all)
    5.2. Data for input into stock assessments (all)

6. **STOCK ASSESSMENT UPDATES**

    6.1. Stock assessment updates (all)
    - Indo-Pacific king mackerel
    - Bullet tuna
    - Frigate tuna

    6.2. Stock status indicators for other neritic tuna species (all)
    6.3. Development of management advice for neritic tuna species (all)

7. **PROGRAM OF WORK (RESEARCH AND PRIORITES)**

    7.1. Revision of the WPNT Program of Work 2025–2029 (Chair)
    7.2. Development of priorities for an Invited Expert at the next WPNT meeting

8. **OTHER BUSINESS**

    8.1. Date and place of the 15th and 16th Working Party on Neritic Tunas (Chair)
    8.2. Review of the draft, and adoption of the Report of the 14th Working Party on Neritic Tunas (Chair)

APPENDIX III
LIST OF DOCUMENTS

Document	Title
IOTC–2024–WPNT14–01a	Agenda of the 14th Working Party on Neritic Tunas
IOTC–2024–WPNT14–01b	Annotated agenda of the 14th Working Party on Neritic Tunas
IOTC–2024–WPNT14–02	List of documents of the 14th Working Party on Neritic Tunas
IOTC–2024–WPNT14–03	Outcomes of the 26th Session of the Scientific Committee (IOTC Secretariat)
IOTC–2024–WPNT14–04	Outcomes of the 27th Session of the Commission (IOTC Secretariat)
IOTC–2024–WPNT14–05	Review of current Conservation and Management Measures relating to neritic tuna species (IOTC Secretariat)
IOTC–2024–WPNT14–06	Progress made on the recommendations and requests of WPNT13 and SC26 (IOTC Secretariat)
IOTC–2024–WPNT14-07	Review of the statistical data available for the neritic tuna species (IOTC Secretariat)
IOTC–2024–WPNT14–08	Revision of the WPNT Program of Work (2025–2029) (IOTC Secretariat)
IOTC-2024–WPNT14-09	The role and importance of neritic tuna fishing in I. R. Iran's fisheries (R. A. Naderi)
IOTC-2024–WPNT14-10	Artisanal fishing gears efficiency on kawakawa (*Euthynnus affinis*) (I. W. Barasa and S. Ndegwa)
IOTC-2024–WPNT14-11	Overview of neritic tuna fishery in Madagascar (M. A. Rasolomampionona)
IOTC-2024–WPNT14-12	Small scale purse seine with FADs fishery in the Andaman Sea of Thailand (S. Pheaphabrattana, K. Maeroh and P. Naranarttragoon)
IOTC-2024–WPNT14-13	Biological parameters of *Auxis* sp. in some part of Indonesian waters (R. K. Sulistyaningsih, B. Setyadji, M. Annas and P. Suadela)
IOTC-2024–WPNT14-14	Preliminary analysis on the abundance indices of neritic tuna species from Indonesian fleets in the north-eastern Indian Ocean 2012-2023 (B. Setyadji, M. Spencer, L. Kell, S. Wright and S. Ferson)
IOTC-2024–WPNT14-15	Assessment of Indian Ocean Bullet tuna (*Auxis rochei*) using data-limited methods (D. Fu)
IOTC-2024–WPNT14-16	Catch-based data-limited stock assessment of Indian Ocean Frigate tuna (*Auxis thazard*, Lacepède, 1800) (S. A. Hashemi, F. Kaymaram and M. Doustdar)
IOTC-2024–WPNT14-17	Assessment of Indian Ocean Frigate tuna (*Auxis thazard*) using data-limited methods (D. Fu)
IOTC-2024–WPNT14-18	Stock assessment of Indian Ocean Indo-Pacific king mackerel (*Scomberomorus guttatus*) using CMSY data poor methods (S. A. Hashemi, F. Kaymaram, A. Salarpouri and M. Doustdar)

APPENDIX IV
STATISTICS FOR NERITIC TUNAS AND SEERFISH

Extract from IOTC–2024–WPNT14–07

Historical trends (1950-2022)

In the past two decades, the contribution of neritic tunas and seerfish species to the total catch has shown a significant increase, rising from 26% in the 1990s to 36% by 2010. 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.

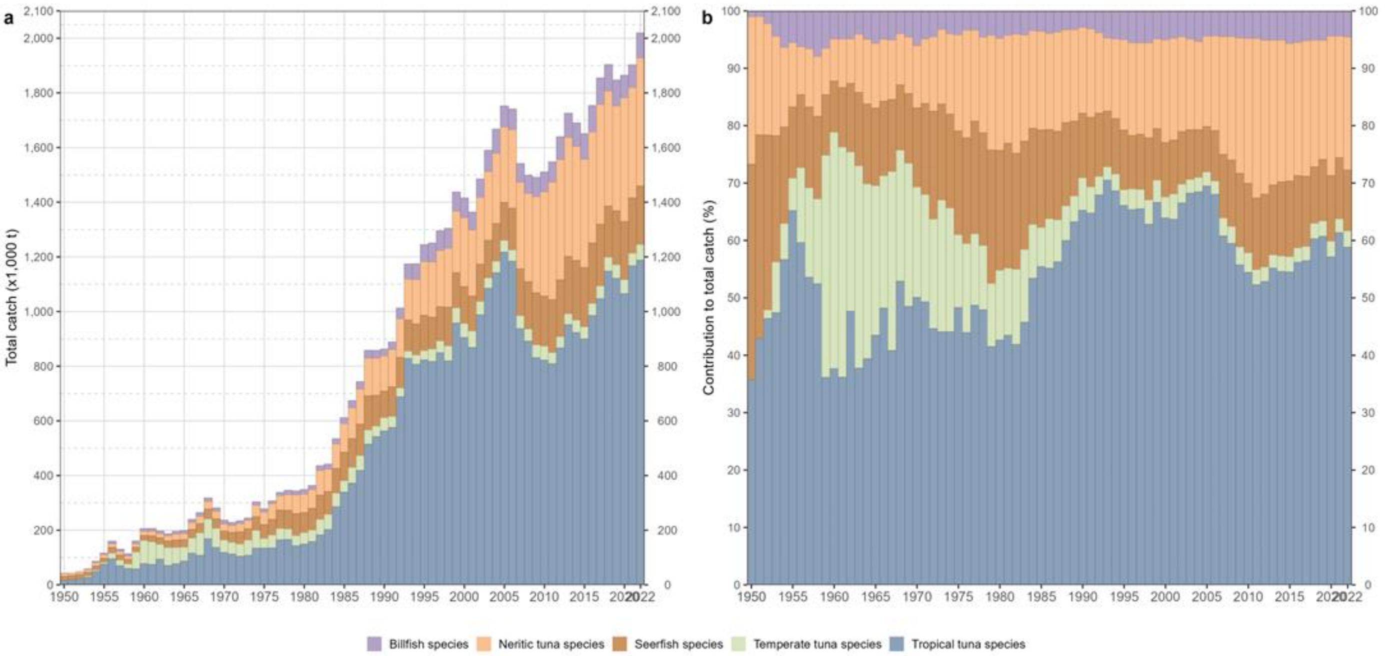

Fig. A 1: Annual time series of (a) cumulative retained catches (metric tonnes; t) and (b) contribution to the total retained catches (percentage; %) of IOTC tuna and tuna-like species by species category for the period 1950-2022

Neritic tunas and seerfish species are primarily caught by coastal fisheries, with drifting gillnets playing a predominant role, accounting for over 57% 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.

Overall, the catches of the neritic and seerfish species peaked at 683,000 t in 2022, following a decline in 2019 (**Fig. A2**). This recent increase is primarily attributed to higher catches from India (46%), Indonesia (22%) and Sri Lanka (92%) in 2022 compared to neritic catch data from 2021.

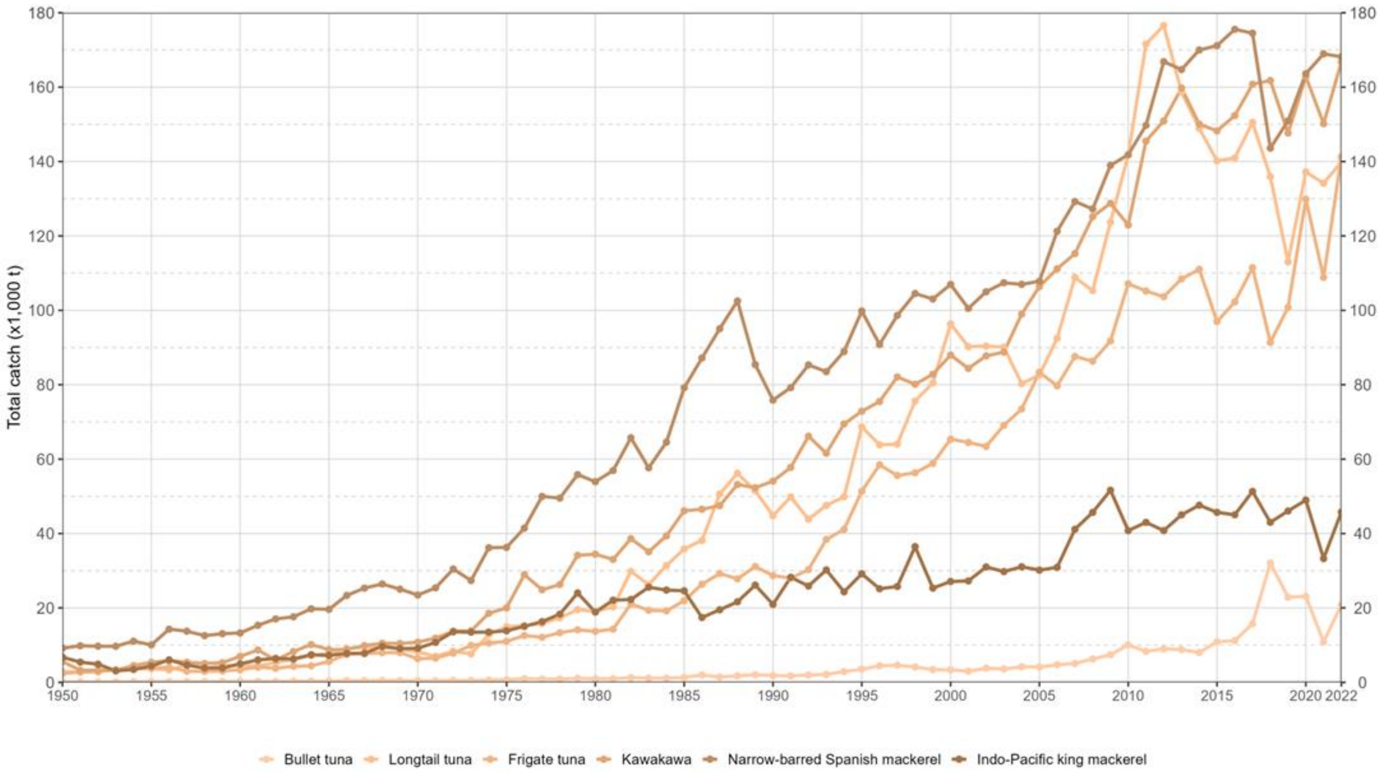

Fig. A 2: Annual time series of retained catches (metric tonnes; t) of IOTC neritic tunas and seerfish by species for the period 1950-2022

Recent fishery features (2018-2022)

Between 2018 and 2022, the mean annual retained catches of the IOTC neritic tunas and seerfish were heavily influenced by a few Contracting Parties and Cooperating Non-Contracting Parties (CPCs), Specifically, approximately 71% of all catches was accounted for by three distinct fleets: Indonesia and India, which are characterized by a large diversity of coastal gears and fisheries, and I.R. Iran, where gillnet represents the large majority of the catches (**Fig. A 3**).

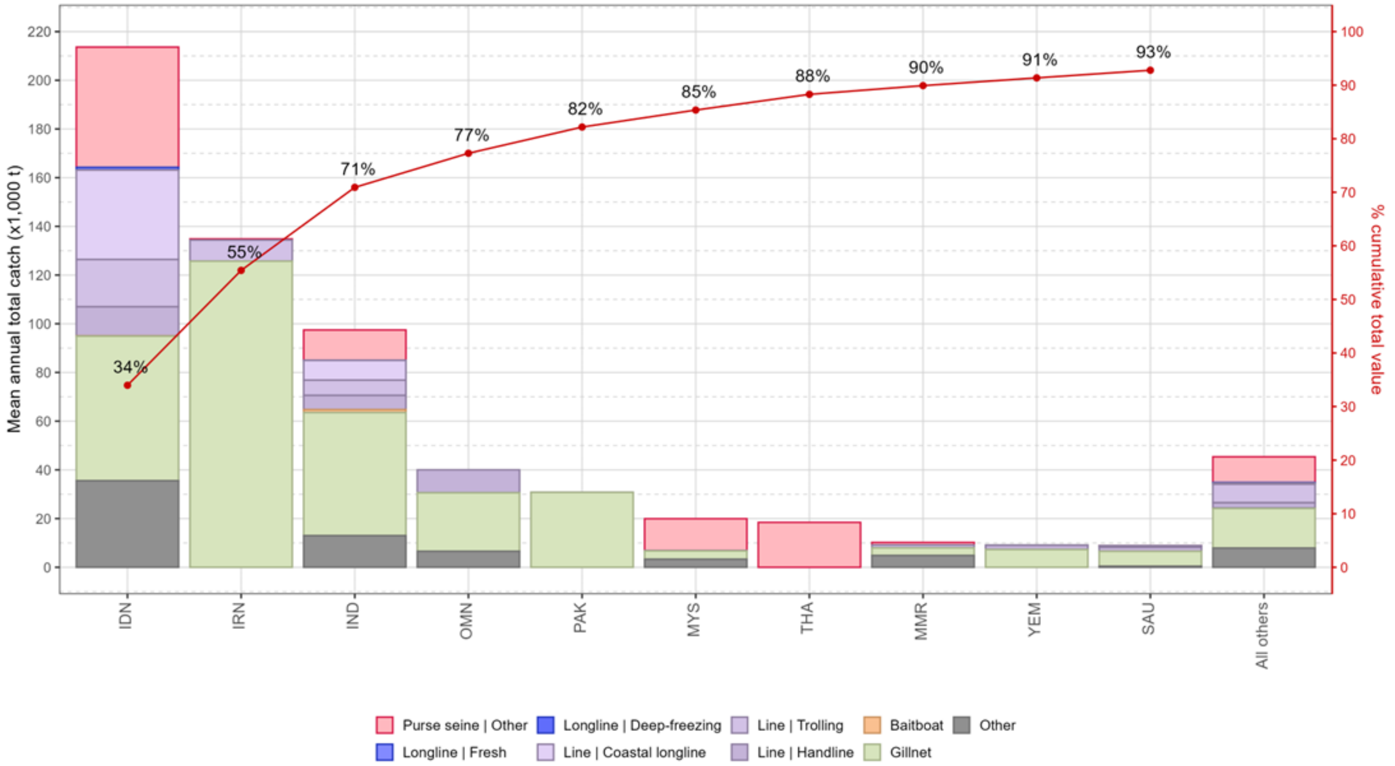

Fig. A 3: Mean annual retained catches (metric tonnes; t) of IOTC neritic tunas and seerfish by fleet and fishery between 2018 and 2022, with indication of cumulative contribution (percentage; %) of catches by fleet

In the last five years, the catch dynamics of neritic tuna and seerfish species across different fishing gears in the Indian Ocean have shown notable trends (**Fig. A 4**): (i) Total gillnet catches in the last five years fluctuated between 300,000t and 340,000t, with least catch recorded in 2019; (ii) Line fisheries show an increasing trend, with highest catch at 148,000t in 2020;(iii) Purse seine fisheries Purse seine fisheries experienced fluctuations, with catches dropping to their lowest point of 80,000t in 2021, but recovery significantly in 2022 at 123,000t; (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.

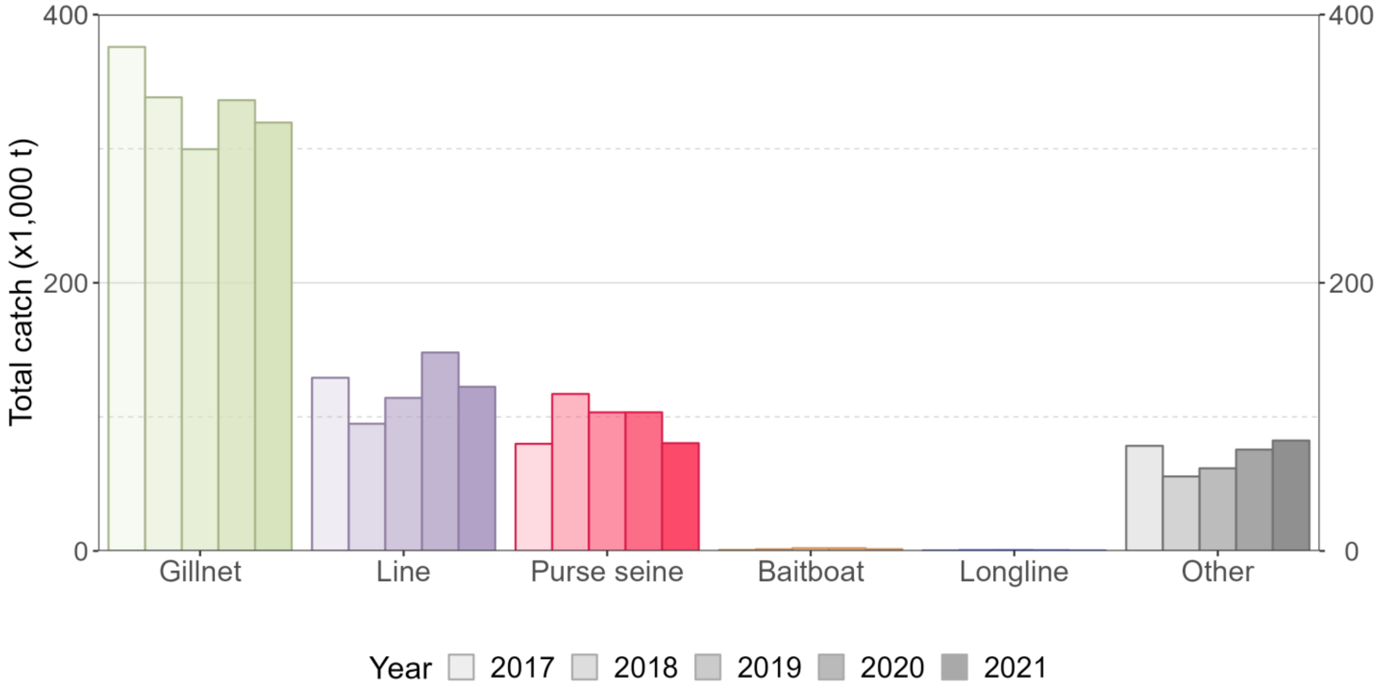

Fig. A 4: Annual trends in retained catch (metric tonnes; t) of IOTC neritic tunas and seerfish by fishery group between 2018 and 2022

Uncertainties in nominal catch data

Uncertainty in catch data available in the IOTC databases is increasingly concerning to scientists (Cappa et al. 2024). The Secretariat, supported by supplementary funds from its members, is actively collaborating with CPCs that face challenges in meeting reporting requirements through workshops; https://iotc.org/meetings/iotc-eastern-regional-workshop-enhancing-fisheries-data-reporting), aimed at enhancing data quality reporting and tools are being developed to assist CPCs in this effort. Indian Ocean catches from national jurisdictions are on the rise, but this increase is accompanied by high uncertainty. Challenges include:

- Poor or non-existent data collection systems,
- Limited emphasis on recording catches of tuna and tuna-like species due to low catch rates,
- Aggregation and misidentification of tuna species,
- Simultaneous application of diverse fishing techniques that are difficult to monitor.

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 Indonesia and India.

The percentage of nominal catches fully or partially reported to the Secretariat (quality score between 0 and 2) has varied between 37.2% and 72.2% of total catches over time, showing an encouraging increasing trend since the mid-1990s. However, the reporting quality has decreased since then and 62.4% of all retained catch was fully or partially reported to the Secretariat in 2022

Spatial distribution of catch and effort

Geo-referenced catch and effort data for major fisheries targeting neritic species in the Indian Ocean 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.

Overall, the reporting quality of geo-referenced catch and effort data submitted to the Secretariat remains notably low, particularly for the main fisheries targeting neritic tunas and seerfish in the Indian Ocean. However, there has been an encouraging upward trend in data quality since the mid-2000s, driven by increased reporting from key fishing nations such as Iran, Thailand, and Sri Lanka. In 2022, the percentage of retained catches with sufficient geo-referenced catch and effort data stood at 41.3% in 2022, down from 47.4% in 2021.

Size composition of the catch

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 purse seine (1985-2022), baitboat (1983-2022), and trolling line (1983-2022) fisheries, albeit in smaller numbers compared to gillnet fisheries, while very few samples are available from all other fisheries9 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.

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 5,000 samples annually between 2018 and 2022. 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 103,000 fish in 2022 while the total catch levels have remained quite stable.

The number of size samples by species is very unbalanced and not representative of the importance of each species in the retained catches. About two thirds of all samples available are for kawakawa (32.96%) and frigate tuna (31.3%). Samples for narrow-barred Spanish mackerel only represent 14.75% 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 613 fish samples are available for Indo-Pacific kingfish when more than 1.4 million t of catch have been reported for this species since 1980.

Uncertainties in size-frequency data

The reporting quality of size-frequency data is 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 6.5% over the last decade.

APPENDIX V

MAIN ISSUES IDENTIFIED RELATING TO THE STATISTICS OF NERITIC TUNAS AND SEERFISH

Data type(s)	Fisheries	Issue	Progress
Nominal catch, catch-and-effort, size data	Coastal fisheries of Madagascar, Myanmar, and Yemen	Non-reporting countries Catches of neritic tunas and seerfish for these fisheries have been entirely estimated by the IOTC Secretariat in recent years – however the quality of estimates is thought to be poor due to a lack of reliable information on the fisheries operating in these countries	• Madagascar: a new sampling programme was in place in Madagascar from 2017 to 2021. The country submitted nominal catch, catch and effort and size data for the years 2017 to 2020. However, the sampling level is very low, and the data do not cover all fishing regions. Furthermore, there are variations in the data over the years, due to annual changes in sampling regions triggered by socio-economic factors: for these reasons, the information is still pending incorporation in the IOTC database as it cannot be adequately raised by the Secretariat. The sampling programme ended in 2021, and Madagascar has not collected any sample since the termination of the project. Madagascar resumed data collection in 2023, but not sampling of fish. • Myanmar (non-reporting, non-IOTC member): catch data for some years are based on estimates published by SEAFDEC and FAO • Yemen: catches are systematically based on information provided by FAO
Nominal catch, catch-and-effort, size data	Coastal fisheries of India, Indonesia, Kenya, Malaysia, Mozambique, Oman, Tanzania, and Thailand	Partially reported data These fisheries do not fully report catches of neritic tunas and seerfish by species and/or gear, as per the reporting standards of IOTC Res. 15/02. For example: ● Nominal catches may have been partially allocated by gear and species by the IOTC Secretariat, where necessary. ● Catch -and-effort and size data may also be missing, or not fully reported according to Res. 15/02 standards	• India: catch-and-effort and size data for coastal fisheries have not been reported at all or are not reported according to standards • Indonesia: catch-and-effort and size data have been collected for coastal fisheries (with support from the IOTC-OFCF pilot sampling project), albeit for a very small number of landing sites (i.e., less than 10). Catch-and-effort data have been reported by Indonesia for some industrial, semi-industrial, and coastal fisheries since 2019 (reference year 2018) but the coverage remains very low (<5% of total catches) • Kenya: Kenya has recently undertaken a Catch Assessment Survey to improve catch estimates for artisanal fisheries and with the help of the IOTC Secretariat, Kenya was able to report catch-and-effort and size data for their coastal fisheries for 2019. However, there still are inconsistencies in species between the two datasets and Kenya has stopped providing data for coastal fisheries since 2020. Kenya is requesting assistance to help in improving report of data. • Mozambique: an IOTC Data Compliance mission was conducted by the IOTC Secretariat in June 2014 and data reporting has improved since then, although some issues remain with the reporting of catch-and-effort data for coastal fisheries and Mozambique is currently facing difficulties to submit the coastal fisheries statistics. Mozambique received assistance in 2024 to review their data collection and reporting systems. The data collection systems are in transition from manual to an electronic format, however there are still gaps in the reporting of data.

			• Oman: no size data have been submitted, although it is understood that some data have been collected. In fact, biological information for some neritic species is known to have been collected in the past by national research institutions and could potentially be shared with the IOTC Secretariat. Oman planned to liaise with the Secretariat to review their data. • Tanzania: following a compliance mission held in 2019 and liaison between a compliance expert and Tanzanian liaison officers, Tanzania managed to report catch-and-effort data for the different artisanal fisheries for the year 2019 only, although some key information is still missing, and there are some variations in catch data between sources. It is also still important to confirm if catches for Zanzibar are included in the reported data. Although Tanzania has introduced an e-CAS system to collect data directly through mobile phones at the landing sites, the system does not cover the entire country's fishing regions and data is still collected through paper forms at Zanzibar landing sites. Overall, data from Tanzania – when reported – is thought to be very incomplete. Tanzania is trying to centralize the data processing system on a single platform to capture data from landing sites.
	Coastal fisheries of Indonesia, Malaysia, and Thailand	Reliability of catch estimates Several issues have been identified for the following fisheries, which compromise the quality of the data in the IOTC database	• Indonesia (nominal catch): catch estimates for neritic tunas are considered highly uncertain due to issues of species misidentification and aggregation of juvenile neritic and tropical tunas species reported as commercial category *tongkol*. Between 2014-2017 the IOTC Secretariat supported a pilot sampling project of artisanal fisheries in North and West Sumatra to improve estimates of neritic tunas and juvenile tuna species in particular. Following a recent data compliance mission in Indonesia, Indonesia is in the process of revising the catch data allocated by fisheries and species. It is important to note that the logbook coverage in coastal fisheries is low and estimates of neritic species are highly uncertain and likely under-estimated. • Malaysia (catch-and-effort): issues regarding the reliability of catch-and-effort reported in recent years have been raised by the IOTC Secretariat and, to date, remain unresolved (e.g., large fluctuations in the nominal CPUE, and inconsistencies between different units of effort recorded in recent years). Data submitted for 2019 included two fishing regions, however Malaysia was unable to break down the catch and effort data by region, and data for 2021 and 2022 were processed using one single area as reported by the national focal points. Malaysia needs therefore to revise their data for previous years and re-submit the time series to the Secretariat.
Catch and effort, size data	(Offshore) Surface and longline fisheries: I.R. Iran and Pakistan	Non-reported or partially reported data A substantial component of these fisheries is thought to operate in offshore waters, including waters	• I.R. Iran – drifting gillnets (coastal / offshore): Following an IOTC Data Compliance mission in November 2017, I.R. Iran started submitting catch-and-effort data in accordance with the reporting requirements of Resolution 15/02 leading to substantial

		beyond the EEZs of the flag countries concerned: although the fleets have reported total catches of neritic tunas, they have not reported catch-and-effort data as per the reporting standards of IOTC Res.15/02	improvements in the data available for the Iranian fisheries in the IOTC database also for what concerns the newly developed coastal-longliners fleet. There are, however, some inconsistencies in catches, which could relate to low coverage. • Pakistan – drifting gillnets: Only in 2018 Pakistan reported size data for some neritic tuna species (e.g., frigate tuna and kawakawa). However, no catch-and-effort has been reported to date, due to deficiencies in port sampling and absence of logbooks on-board vessels. WWF-Pakistan has been coordinating a crew-based data collection programme for over four years, which includes information on total enumeration of catches and fishing location (for sampled vessels) that could potentially be used to estimate catch-and-effort for Pakistan gillnet vessels in the absence of a national logbook program for its gillnet fleet. The information collected through this programme has been used to re-estimate the total catches of several species from 1987 onwards, and the IOTC Secretariat is currently liaising with WWF-Pakistan to evaluate the quality of the fine-grained data collected by the programme to determine whether it could be effectively used to officially provide C-E data according to Resolution 15/02. WWF-Pakistan informed WPNT that data are available, and they will try to provide it for Scientific use only.
Nominal catch, catch-and-effort, size data	All industrial purse seine fisheries	The total catches of frigate tuna, bullet tuna and kawakawa reported for industrial purse seine fleets are considered to be very incomplete, as they do not account for all catches retained onboard or include amounts of neritic tunas discarded. The same applies to catch-and-effort data.	There is a general lack of information on retained catches, catch-and-effort, and size data for neritic tunas retained by all purse seine fleets – in particular frigate tuna, bullet tuna, and kawakawa. Discard levels of neritic tunas by purse seiners are also only available for the EU purse seine fisheries during 2003-2021. Update: reporting coverage of the ROS is increasing, and this might trigger an improvement in the estimates of catches for neritic species (both retained and discarded). In 2019 (with 2018 as reference year) Indonesia started reporting nominal catches as well as catch-and-effort data for a new industrial purse seine component of their fleet that seems to explicitly target neritic tunas (leading to remarkable increases in catches of bullet tuna reported for the year). Considering the relatively small dimensions (on average) of the Indonesian purse seine vessels listed in the IOTC Record of Authorised Vessels, it is still questionable whether this component of the fleet (as well as its associated catches) shall be properly considered as 'industrial' purse seiners rather than small, coastal ones; in any case, further clarification is required to properly attribute these catches to the originating fishery and determine the accuracy of the reported estimates. In 2024, EU-Italy revised the RC and CE data from 2016 to 2022, which also included the bycatch data of neritic tunas.

			Following three data support mission in Indonesia undertaken by the Secretariat from July to March 2023, Indonesia is in the process of revising their catches using georeferenced data from their national logbooks, which could change the catch allocated to industrial fisheries. The recent visit to Indonesia in February 2024, Indonesia indicated progress in revising the whole nominal catch series from 1950, which will affect catch data of all species.
Discards	All fisheries	Although discard levels of neritic species are believed to be low for most fisheries, with the exception of industrial purse seiners, very little information is available on the level of discards.	The total amount of neritic tunas discarded at sea remains unknown for most fisheries and time periods, other than EU, Seychelles, and Mauritian purse seine fisheries during 2003–2021. Update: no update, although as reporting coverage of the ROS improves, there is the potential for an improvement in the estimates of catches of neritic species (retained and discarded).
Biological data	All fisheries	There is a general lack of biological data for neritic tuna and seerfish species in the Indian Ocean, in particular basic data that can be used to establish length-weight-age keys, non-standard measurements-fork length keys and processed weight-live weight keys.	Collection of biological information, including size data, remains very low for most neritic species. Update: The IOTC has been coordinating a Stock Structure Project, which commenced in 2016 and was completed in 2020. The project aimed to supplement gaps in the existing knowledge on biological data and provide an insight on whether neritic tuna and tuna like species should be considered as a single Indian Ocean stock.

APPENDIX VI
WORKING PARTY ON NERITIC TUNAS PROGRAM OF WORK (2025–202)

The following is the Draft WPNT Program of Work (2023 to 2027) and is based on the specific requests of the Commission and Scientific Committee as well as topics identified during the WPNT12. The Program of Work consists of the following, noting that a timeline for implementation would be developed by the SC once it has agreed to the priority projects across all of its Working Parties:

- **Table 1**: Priority topics for obtaining the information necessary to develop stock status indicators for neritic tunas in the Indian Ocean;
- **Table 2**: Stock assessment schedule.

In selecting the priority projects, the SC is **REQUESTED** to take into consideration the data poor nature of the neritic tuna species and the potentially already fully exploited status of the species. Improved length frequency as well as improved abundance time series would improve stock assessments for these stocks so is a high priority.

Table 1. Priority topics for obtaining the information necessary to develop stock status indicators for neritic tunas in the Indian Ocean

Topic in order of priority	**Sub-topic and project**	**Timing**				
		2025	**2026**	**2027**	**2028**	**2029**
1. Stock structure (connectivity)	Genetic research to determine the connectivity of neritic tunas throughout their distributions (This should build on the stock structure work conducted in other previous studies): 1. Review of stock structure methodologies with genetic expert during WPNT15 in order to determine the best approach to regional stock structure studies. Based on discussions develop and implement regional genetic sampling collection programme: • Sampling of tissue samples • DNA extraction and storage for preservation • Carry out genetic sequencing on extracted DNA					
2. Stock assessment / Stock indicators	Explore alternative assessment approaches and develop improvements where necessary based on the data available to determine stock status for longtail tuna, kawakawa and Spanish mackerel					

	1) The Weight-of-Evidence approach should be used to determine stock status, by building layers of partial evidence, such as CPUE indices combined with catch data, life-history parameters and yield-per recruit metrics, as well as the use of data poor assessment approaches (e.g. CMSY, OCOM, LB-SPR, Risk based methods). 2) Exploration of priors and how these can be quantifiably and transparently developed. 3) Review size data and their suitability for monitoring stock status. Improve the presentation of management advice from different assessment approaches to better represent the uncertainty and improve communication between scientists and managers in the IOTC.					
3. Data mining and collation	Collate and characterize operational level data for the main neritic tuna fisheries in the Indian Ocean to investigate their suitability to be used for developing standardised CPUE indices. The following data should be collated and made available for collaborative analysis: ➢ catch and effort by species and gear by landing site; ➢ operational data: stratify this by vessel, month, and year for the development as an indicator of CPUE over time; and ➢ operational data: collate other information on fishing techniques (i.e. area fished, gear specifics, depth, environmental condition (near shore, open ocean, etc.) and vessel size (length/horsepower)). ➢ Reconstruction of historical catch by CPCs using recovered or captured information. ➢ Re-estimation of historic catches (with consultation and consent of concerned CPCs including India, Pakistan, Bangladesh, Mozambique, Tanzania, Madagascar) for assessment purposes (taking into account updated identification of uncertainties and knowledge of the history of the fisheries)					

Other Future Research Requirements		**2025**	**2026**	**2027**	**2028**	**2029**
4. Biological information (parameters for stock assessment)	Review and summarise information on key biological parameters for neritic species. Review of studies for all neritic tunas throughout their range to determine key biological parameters including age-at-maturity, and fecundity-at-age/length relationships, age-length keys, age and growth, longevity which will be fed into future stock assessments.					
5. Social economic study	1. Undertake quantitative studies on socio-economic aspects of all neritic tunas throughout their range, to determine and explore other sources of data, such as but not limited to trade data from individual countries, nominal catch or other catch data on neritic tuna, information on important and significance of neritic for food security (animal protein), nutrition, contribution to national GDP. (priority countries, Indonesia, Iran, India, Malaysia, Thailand, Pakistan)					

	2. Identify and utilise other sources of information, by engaging with other bodies such as SEAFDEC, SEAFO, RECOFI, BOBLME, SWIOFC, IOC, among others. 3. Integrate or evaluate market support and recognition for neritic tuna (sub-regional markets) with a focus on data acquisition. 4. Explore alternate sources of data collection, including the rapid use of citizen science-based approaches which are reliable and verified by the SC. 5. Assess/scope/explore the significance and importance of neritic species for food security, nutrition and contribution to national GDP. 6. Strengthen the data collection of catches and species complexes and develop socio-economic indicators of neritic species, related to the national and regional livelihoods and economics of coastal CPCs. 7. Collate information and address data gaps and challenges by taking advantage of regional programmes or joint collaboration with NGOs/CPCs in order to support and facilitate data collection for neritic species.					

Table 2. Proposed assessment schedule for the IOTC Working Party on 2025-2029

Working Party on Neritic Tunas					
Species	**2025****	**2026***	**2027***	**2028**	**2029***
Bullet tuna	Data preparation	Data preparation	**Assessment**	Data preparation	Data preparation
Frigate tuna	Data preparation	Data preparation	**Assessment**	Data preparation	Data preparation
Indo-Pacific king mackerel	Data preparation	Data preparation	**Assessment**	Data preparation	Data preparation
Kawakawa	Data preparation	**Assessment**	Data preparation	Data preparation	**Assessment**
Longtail tuna	Data preparation	**Assessment**	Data preparation	Data preparation	**Assessment**
Narrow-barred Spanish mackerel	Data preparation	**Assessment**	Data preparation	Data preparation	**Assessment**

* Including data-limited stock assessment methods.
** Including species-specific catches, CPUE, biological information and size distribution as well as identification of data gaps and discussion of improvements to the assessments (stock structure); one day may be reserved for capacity building activities.

Note: the assessment schedule may be changed dependent on the annual review of fishery indicators, or SC and Commission requests

APPENDIX VII
EXECUTIVE SUMMARY: BULLET TUNA

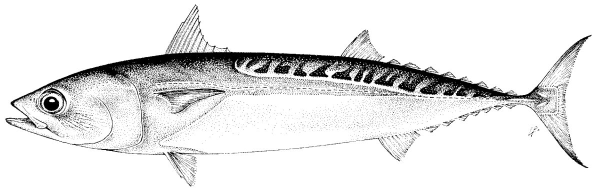

TABLE 1. Status of bullet tuna (*Auxis rochei*) in the Indian Ocean

Area[1]	Indicators		2024 stock status determination[3]
Indian Ocean	Catch 2022[2] (t) Mean annual catch (2018-2022) (t)	20,794 21,949	
	MSY (1,000 t) (80% CI) F_{MSY} (80% CI) B_{MSY} (1,000 t) (80% CI) $F_{current}/F_{MSY}$ (80% CI) $B_{current}/B_{MSY}$ (80% CI) $B_{current}/B_0$ (80% CI)	Unknown	

[1]Stock boundaries defined as the IOTC area of competence; [2]Proportion of catch fully or partially estimated for 2022: 39.6%; [3]Status relates to the final year data are available for assessment (2022).

Colour key	Stock overfished (SB_{year}/SB_{MSY}< 1)	Stock not overfished (SB_{year}/SB_{MSY}≥ 1)
Stock subject to overfishing (F_{year}/F_{MSY}> 1)		
Stock not subject to overfishing (F_{year}/F_{MSY}≤ 1)		
Not assessed/Uncertain		

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Stock status. A new assessment was carried out in 2024 using data-limited techniques (CMSY,LB-SPR, and fishblicc). However, the catch data for bullet tuna are very uncertain given the high percentage of the catches that had to be estimated due to a range of reporting issues. The size-based assessment methods LB-SPR and fishblicc using size data from gillnet and purse seine fisheries both estimated the current spawning potential ratio to be below the reference level of SPR40% (a proxy for 40% depletion often considered as the risk averse target in many data-poor fisheries). Due to a lack of fishery data for several fisheries, only preliminary stock status indicators (CPUE and average weight) can be used. Aspects of the fisheries for bullet tuna combined with the lack of data on which to base an assessment of the stock are a cause for concern. Stock status in relation to the Commission's B_{MSY} and F_{MSY} reference points remains unknown (**Table 1**).

Outlook. Annual catches of bullet tuna have steadily increased from around 2,000 t in the early 1990s to around 13,000 t in 2015-2017. In 2018, catches sharply increased to 33,000 t – mostly due to an increase in catches reported by Indonesian industrial purse seine fisheries (**Fig. 1**). In 2019, the catches of bullet tuna decreased to less than 24,000 t despite a major increase in the number of Indonesian industrial purse seiners in operation. There is considerable uncertainty around bullet tuna catches and insufficient information to evaluate the effect that these catch levels may have on the resource. Research emphasis should be focused on improving the data collection and reporting systems in place and collating catch per unit effort (CPUE) time series for the main fleets, size compositions and life trait history parameters (e.g., estimates of growth, natural mortality, maturity, etc.).

Management advice. For assessed species of neritic tunas and seerfish in the Indian Ocean (longtail tuna, kawakawa and narrow-barred Spanish mackerel), the MSY was estimated to have been reached between 2009 and 2011 and both F_{MSY} and B_{MSY} were breached thereafter. Therefore, in the absence of a stock assessment of bullet tuna a limit to the catches should be considered by the Commission, by ensuring that future catches do not exceed the average catches estimated between 2009 and 2011 (8,590 t). This catch advice should be maintained until an assessment of bullet tuna is available. Considering that MSY-based reference points for assessed species can change over time, the stock should be closely monitored. Mechanisms need to be developed by the Commission to improve current statistics by encouraging CPCs to comply with their recording and reporting requirements, so as to better inform scientific advice.

The following should be also noted:

- The Maximum Sustainable Yield estimate for the Indian Ocean stock is unknown;
- Limit reference points: the Commission has not adopted limit reference points for any of the neritic tunas under its mandate;
- Further work is needed to improve the reliability of the catch series. Reported catches should be verified or estimated, based on expert knowledge of the history of the various fisheries or through statistical extrapolation methods;
- Research emphasis should be focused on collating catch per unit effort (CPUE) time series for the main fleets, size compositions and life trait history parameters (e.g. estimates of growth, natural mortality, maturity, etc.).
- Species identification, data collection and reporting urgently need to be improved;
- There is limited information submitted by CPCs on total catches, catch and effort and size data for neritic tunas, despite their mandatory reporting status. In the case of 2022 catches (reference year 2021), 50.3% of the total catches was either fully or partially estimated by the IOTC Secretariat, which increases the uncertainty of the stock assessments using these data. Therefore, the management advice to the Commission includes the need for CPCs to comply with IOTC data requirements per Resolution 15/01 and 15/02.

Fisheries overview.

- **Main fisheries (mean annual catch 2018-2022)**: bullet tuna is caught using purse seine (61.1%), followed by line (17.2%) and gillnet (13.9%). The remaining catches taken with other gears contributed to 7.8% of the total catches in recent years (**Fig. 1**);
- **Main fleets (mean annual catch 2018-2022)**: the majority of bullet tuna catches are attributed to vessels flagged to Indonesia (41.3%) followed by India (30.3%) and Thailand (20.7%). The remaining other fleets catching bullet tuna contributed to 7.7% of the total catch in recent years (**Fig. 2**).

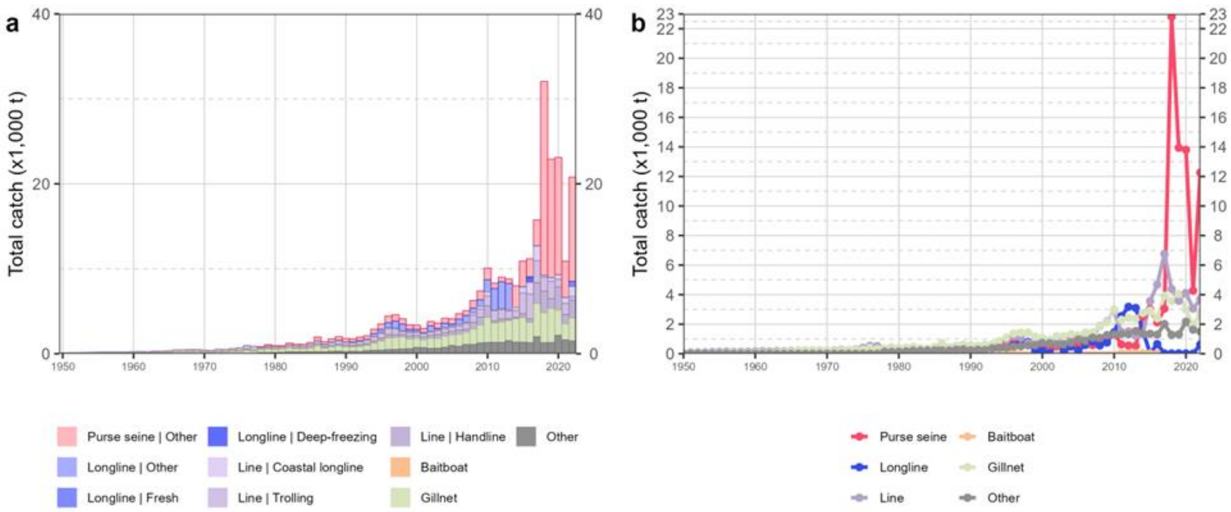

Fig. 1. Annual time series of (a) cumulative nominal catches (t) by fishery and (b) individual nominal catches (t) by fishery group for bullet tuna during 1950-2022

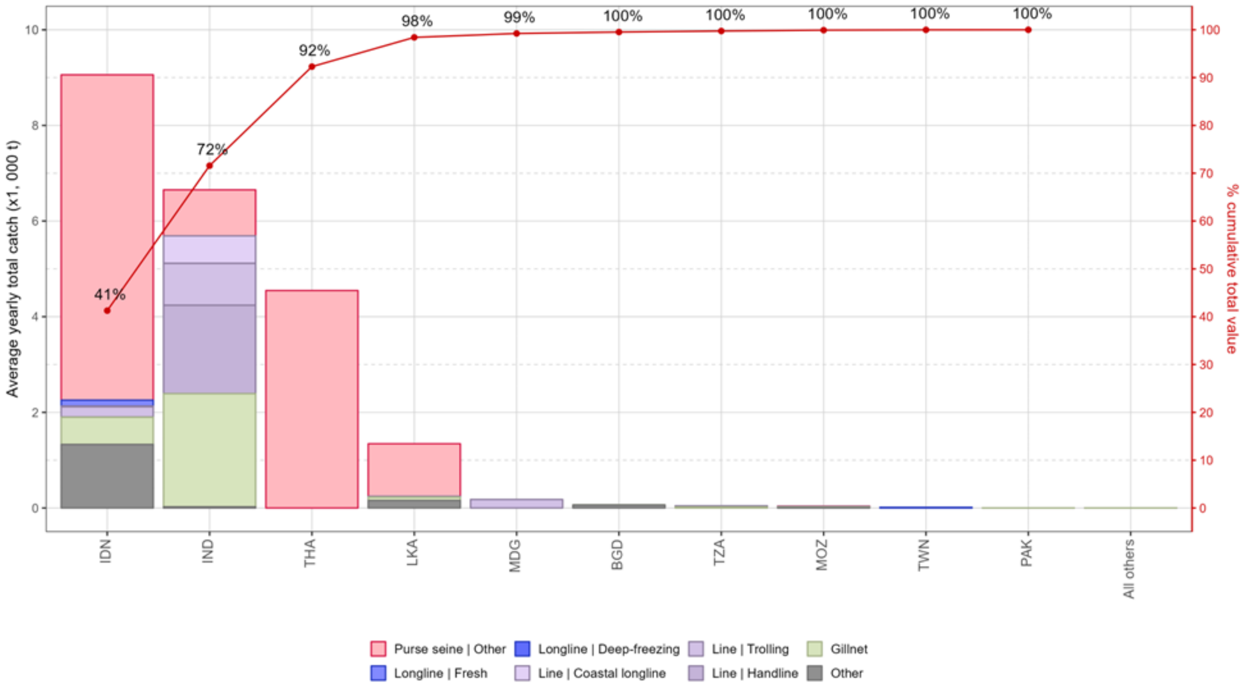

Fig. 2. Mean annual catches (t) of bullet tuna by fleet and fishery between 2017 and 2022, with indication of cumulative catches by fleet

APPENDIX VIII
EXECUTIVE SUMMARY: FRIGATE TUNA

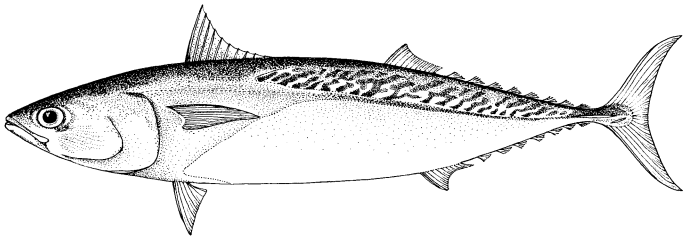

TABLE 1. Status of frigate tuna (*Auxis thazard*) in the Indian Ocean

Area[1]	Indicators		2024 stock status determination[3]
Indian Ocean	Catch (2022) (t)[2]	141,279	
	Mean annual catch (2018-2022) (t)	114,431	
	MSY (1,000 t) (80% CI)	Unknown	
	F_{MSY} (80% CI)		
	B_{MSY} (1,000 t) (80% CI)		
	$F_{current}/F_{MSY}$ (80% CI)		
	$B_{current}/B_{MSY}$ (80% CI)		
	$B_{current}/B_0$ (80% CI)		

[1]Stock boundaries defined as the IOTC area of competence; [2]Proportion of catch fully or partially estimated for 2022: 61.1%; [3]Status relates to the final year data are available for assessment (2022)

Colour key	Stock overfished ($SB_{year}/SB_{MSY} < 1$)	Stock not overfished ($SB_{year}/SB_{MSY} \geq 1$)
Stock subject to overfishing ($F_{year}/F_{MSY} > 1$)		
Stock not subject to overfishing ($F_{year}/F_{MSY} \leq 1$)		
Not assessed/Uncertain		

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. A new assessment was carried out in 2024 using data-limited techniques (CMSY,OCOM, LB-SPR and fishblicc). However, the catch data for frigate tuna are very uncertain given the high percentage of the catches that had to be estimated due to a range of reporting issues. Due to a lack of fishery data for several gears, only preliminary stock status indicators can be used. However, the size-based assessment showed results with considerable uncertainty - LB-SPR estimated a SPR greater than the reference level of SPR40%, (a proxy for 40% depletion often considered as risk averse target in many data-poor fisheries) whereas the fishblicc estimated a SPR below the reference level. Aspects of the fisheries for frigate tuna combined with the lack of data on which to base an assessment of the stock are a cause for considerable concern. Stock status in relation to the Commission's B_{MSY} and F_{MSY} reference points remains **unknown** (**Table 1**).

Outlook. Estimated catches have increased steadily since the late-1970s, reaching around 30,000 t in the late-1980s, to between 51,000 and 58,000 t by the mid-1990s, and steadily increasing to over 90,000 t in the following ten years. Between 2010 and 2014 catches have increased to over 105,000 t, rising to the highest levels recorded, although catches have since decline marginally to between 90,000 – 141,000 t since 2014. There is insufficient information to evaluate the effect that this level of catch or a further increase in catches may have on the resource. Research emphasis should be focused on collating catch per unit effort (CPUE) time series for the main fleets, size compositions and life trait history parameters (e.g., estimates of growth, natural mortality, maturity, etc.).

Management advice. For assessed species of neritic tunas in Indian Ocean (longtail tuna, kawakawa and narrow-barred Spanish mackerel), the MSY was estimated to have been reached between 2009 and 2011 and both F_{MSY} and B_{MSY} were breached thereafter. Therefore, in the absence of an accepted stock assessment for frigate tuna, a limit to the catches should be considered by the Commission, by ensuring that future catches do not exceed the average catches estimated between 2009 and 2011 (101,260 t). The reference period (2009-2011) was chosen based on the most recent assessments of those neritic species in the Indian Ocean for which an assessment is available under the assumption that MSY for frigate tuna was also reached between 2009 and 2011. This catch advice should be maintained until an assessment of frigate tuna is available. Considering that MSY-based reference points for assessed species can change over time, the stock should be closely monitored. Mechanisms need to be developed by the Commission to improve current statistics by encouraging CPCs to comply with their recording and reporting requirements, so as to better inform scientific advice.

The following should be also noted:

- The Maximum Sustainable Yield estimate for the Indian Ocean stock is unknown;
- Limit reference points: the Commission has not adopted limit reference points for any of the neritic tunas under its mandate;
- Further work is needed to improve the reliability of the catch series, such as verification or estimation based on expert knowledge of the history of the various fisheries or through statistical extrapolation methods;
- Research emphasis should be focused on collating catch per unit effort (CPUE) time series for the main fleets, size compositions and life trait history parameters (e.g., estimates of growth, natural mortality, maturity, etc.)
- Species identification, data collection and reporting urgently need to be improved;
- There is limited information submitted by CPCs on total catches, catch and effort and size data for neritic tunas, despite their mandatory reporting status. In the case of 2022 catches (reference year 2021), 80% of the total catches were either fully or partially estimated by the IOTC Secretariat, which increases the uncertainty of the stock assessments using these data. Therefore, the management advice to the Commission includes the need for CPCs to comply with IOTC data requirements per Resolution 15/01 and 15/02.

Fisheries overview.

- **Main fisheries (mean annual catch 2018-2022)**: frigate tuna is caught using gillnet (35%), followed by line (31.6%) and purse seine (19.7%). The remaining catches taken with other gears contributed to 13.8% of the total catches in recent years (**Fig. 1**);
- **Main fleets (mean annual catch 2018-2022)**: the majority of frigate tuna catches are attributed to vessels flagged to Indonesia (58.4%) followed by Pakistan (9.1%) and I. R. Iran (8.5%). The 24 other fleets catching frigate tuna contributed to 23.7% of the total catch in recent years (**Fig. 2**).

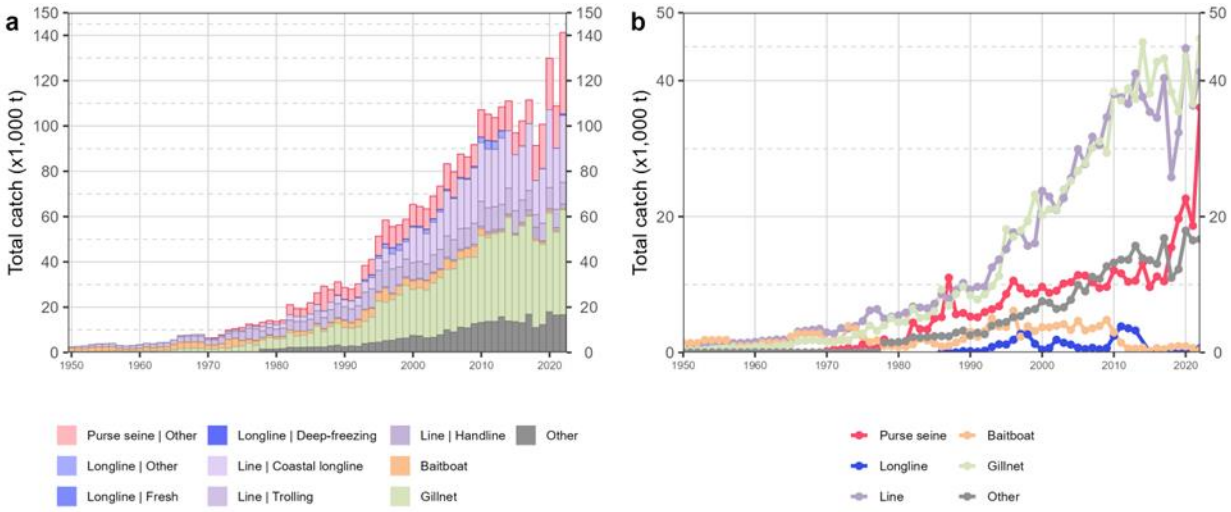

Fig. 1. Annual time series of (a) cumulative nominal catches (t) by fishery and (b) individual nominal catches (t) by fishery group for frigate tuna during 1950-2022

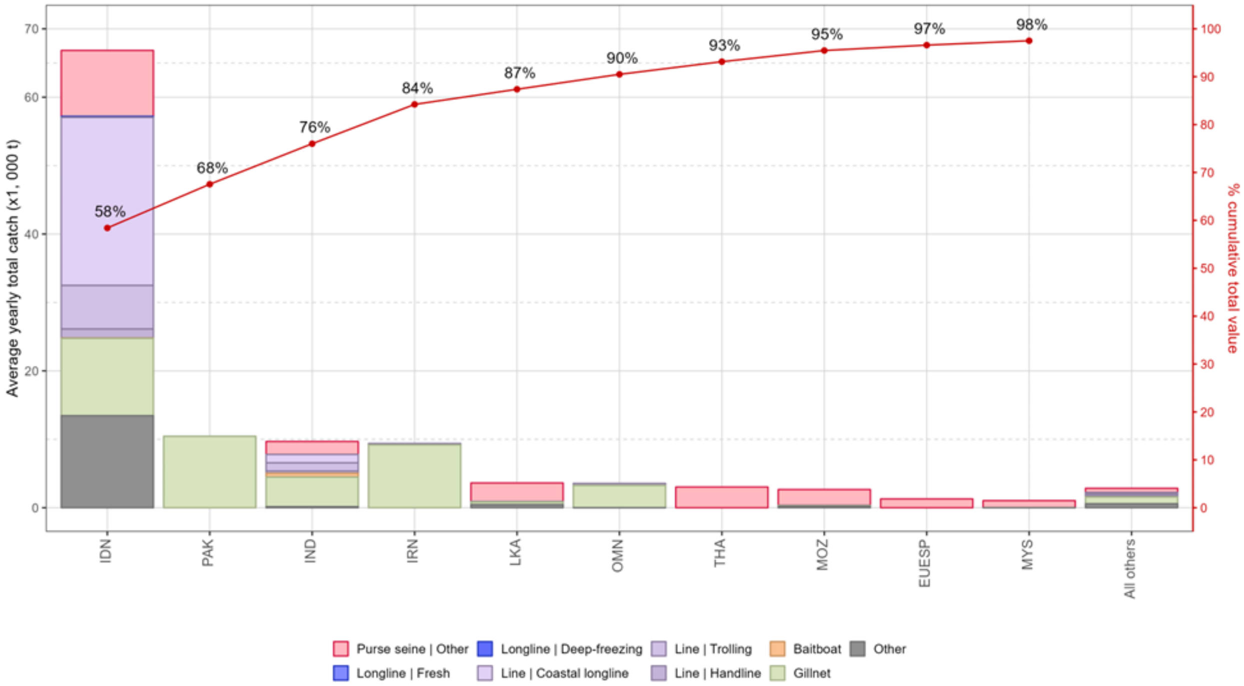

Fig. 2. Mean annual catches (t) of frigate tuna by fleet and fishery between 2017 and 2022, with indication of cumulative catches by fleet

APPENDIX IX
EXECUTIVE SUMMARY: KAWAKAWA

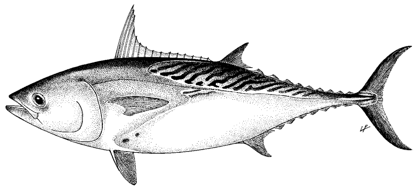

TABLE 1. Status of kawakawa (*Euthynnus affinis*) in the Indian Ocean

Area[1]	Indicators		2023 stock status determination[3]
Indian Ocean	Catch 2022[2] (t) Mean annual catch 2018-2022 (t)	166,777 157,852	**27%**
	MSY (t) (80% CI) F_{MSY} (80% CI) B_{MSY} (t) (80% CI) $F_{current}/F_{MSY}$ (80% CI) $B_{current}/B_{MSY}$ (80% CI)	154,000 (122,000 – 193,000) 0.60 (0.48 – 0.74) 258,000 (185 – 359) 0.98 (0.82–2.20) 0.99 (0.45 – 1.20)	

[1]Stock boundaries defined as the IOTC area of competence; [2]Proportion of catch fully or partially estimated for 2022: 60.1%; [3]Status relates to the final year data are available for assessment (2021).

Colour key	Stock overfished (SB_{year}/SB_{MSY}< 1)	Stock not overfished (SB_{year}/SB_{MSY}≥ 1)
Stock subject to overfishing (F_{year}/F_{MSY}> 1)	25%	23%
Stock not subject to overfishing (F_{year}/F_{MSY}≤ 1)	27%	25%
Not assessed/Uncertain		

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. No new stock assessment was conducted in 2024 for kawakawa and so the results are based on the results of the assessment carried out in 2023 which examined a number of data-limited methods include C-MSY, OCOM, and JABBA models (based on data up to 2021). These models produced stock estimates that are not drastically divergent because they shared similar dynamics and assumptions. The C-MSY model has been explored more fully and therefore is used to obtain estimates of stock status. The C-MSY model indicated that the fishing mortality F was very close to F_{MSY} (F/F_{MSY}=0.98), and the current biomass B was also very close to B_{MSY} (B/B_{MSY}=0.99). The estimated probability of the stock currently being in yellow quadrant of the Kobe plot is about 27%. The analysis using OCOM model is more pessimistic and using JABBA incorporating gillnet CPUE indices is more optimistic. Due to the quality of the data being used, the simple modelling approach employed in 2020 and 2023, and the large increase in kawakawa catches over the last decade (**Fig. 1**), measures need to be taken in order to reduce the level of catches which have surpassed the estimated MSY levels for most years since 2011. Based on the weight-of-evidence available, the kawakawa stock for the Indian Ocean is classified as **overfished** but **not subject to overfishing** (**Table 1**, **Fig. 1**). However, the assessment using catch-only method is subjected to high uncertainty and is highly influenced by several prior assumptions.

Outlook. There is considerable uncertainty about stock structure and the estimate of total catches. Due to the uncertainty associated with catch data (e.g., 60.1% of catches partially or fully estimated by the IOTC Secretariat for 2022) and the limited number of CPUE series available for fleets representing a small proportion of total catches, only data poor assessment approaches can currently be used. Aspects of the fisheries for this species, combined with the lack of data on which to base a more complex assessment (e.g., integrated models) are a cause for considerable concern. In the interim, until more traditional approaches are developed, data-poor approaches will be used to assess stock status. Continued increase in the annual catches for kawakawa is also likely to further increase the pressure on the Indian Ocean stock. Research emphasis should be focused on collating catch per unit effort (CPUE) time series for the main fleets, size compositions and life trait history parameters (e.g., estimates of growth, natural mortality, maturity, etc.).

Management Advice. The assessment models rely on catch data, which are considered to be highly uncertain. The catch in 2022 was just above the estimated MSY. The available gillnet CPUE of kawakawa showed a somewhat increasing trend although the reliability of the index as abundance indices remains unknown. Despite the substantial uncertainties, the stock is probably very close to being fished at MSY levels and that higher catches may not be sustained in the longer term. A precautionary approach to management is recommended.

The following should be also noted:

- The Maximum Sustainable Yield estimate for the Indian Ocean is estimated to be 154,000 t with a range between 122,000 t and 193,000 t and so catch levels should be reduced in future to prevent the stock becoming overfished;
- Further work is needed to improve the reliability of the catch series. Reported catches should be verified or estimated, based on expert knowledge of the history of the various fisheries or through statistical extrapolation methods;
- Improvement in data collection and reporting is required if the stock is to be assessed using integrated stock assessment models;
- Limit reference points: the Commission has not adopted limit reference points for any of the neritic tunas under its mandate;
- Research emphasis should be focused on collating catch per unit effort (CPUE) time series for the main fleets, size compositions and life trait history parameters (e.g., estimates of growth, natural mortality, maturity, etc.);
- Given the limited information submitted by CPCs on total catches, catch and effort and size data for neritic tunas, despite their mandatory reporting status, the IOTC Secretariat was required to estimate 55.6% of the catches (in 2023, with reference year 2021), which increases the uncertainty of the stock assessments using these data. Therefore, the management advice to the Commission includes the need for CPCs to comply with IOTC data requirements per Resolution 15/01 and 15/02.

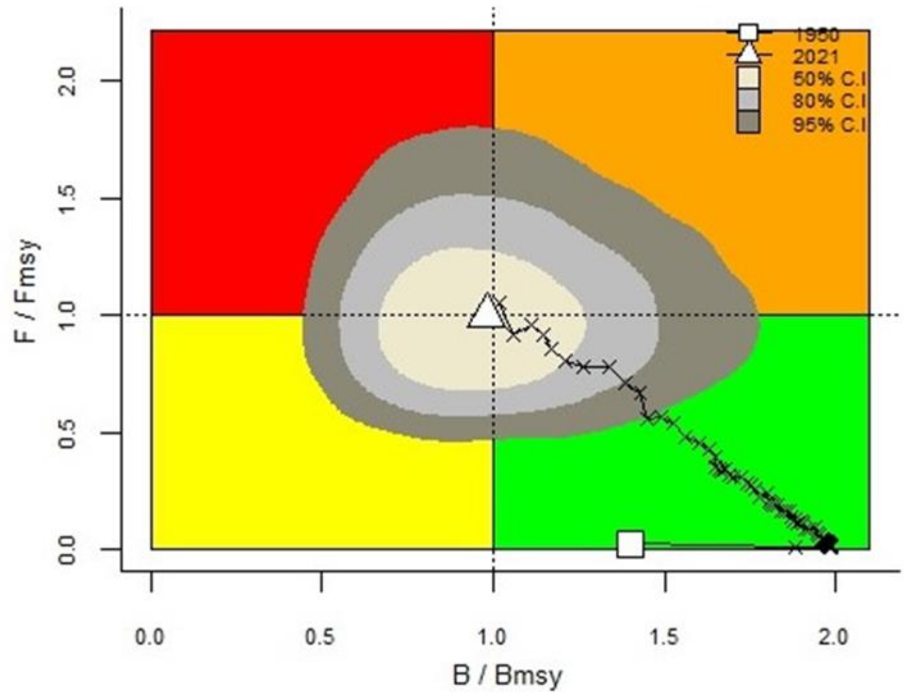

Fig. 1. C-MSY Indian Ocean assessment Kobe plot for kawakawa. The Kobe plot presents the trajectories (median) for the range of plausible model trajectories included in the formulation of the final management advice. The shaded contour lines represent 50%, 80%, and 95% confidence intervals of estimated stock status in 2021

Fisheries overview.

- **Main fisheries (mean annual catch 2018-2022)**: kawakawa are caught using gillnet (48.4%), followed by purse seine (30.4%) and line (16.2%). The remaining catches taken with other gears contributed to 4.9% of the total catches in recent years (**Fig. 2**).
- **Main fleets (mean annual catch 2018-2022)**: the majority of kawakawa catches are attributed to vessels flagged to Indonesia (30.8%) followed by I. R. Iran (23.1%) and India (21.8%). The 31 other fleets catching kawakawa contributed to 24.5% of the total catch in recent years (**Fig. 3**).

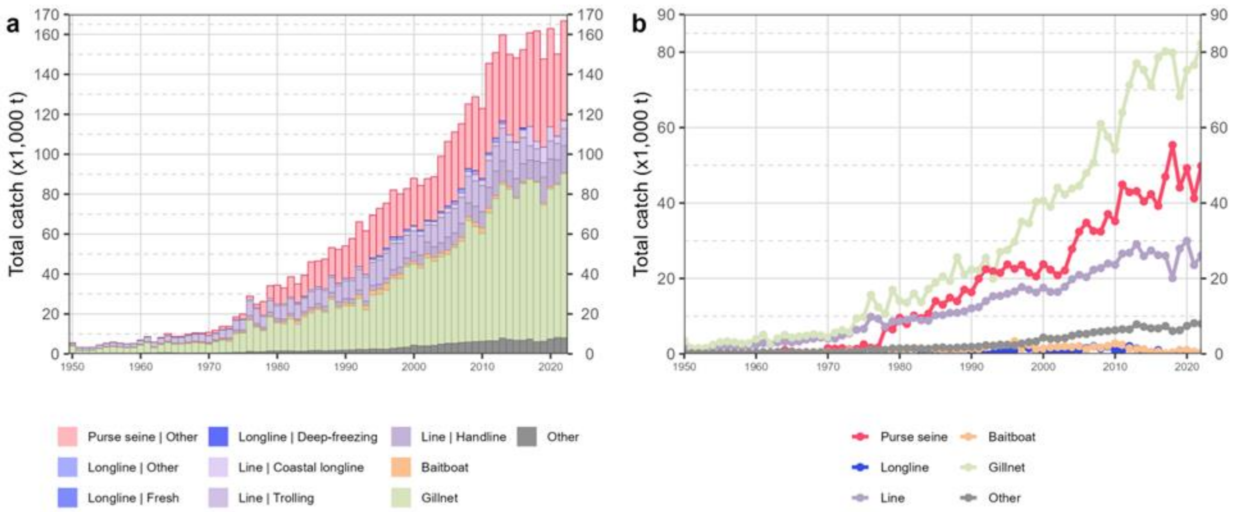

Fig. 2. Annual time series of (a) cumulative nominal catches (t) by fishery and (b) individual nominal catches (t) by fishery group for kawakawa during 1950-2022

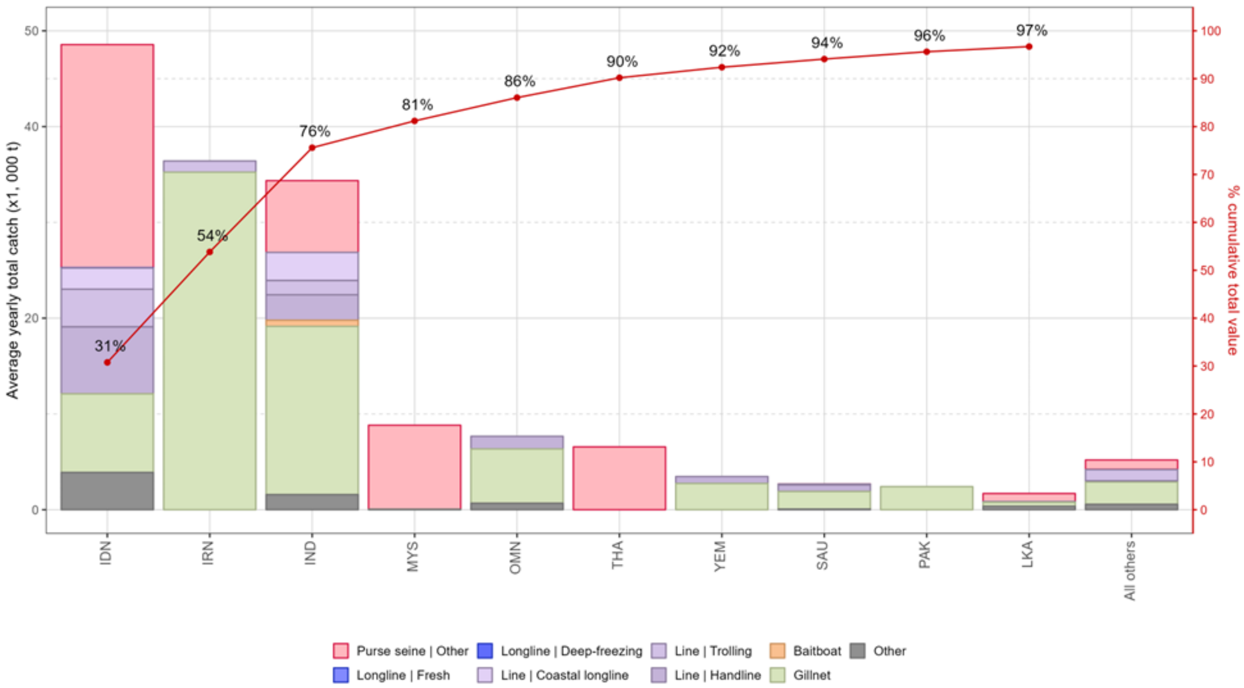

Fig 3. Mean annual catches (t) of kawakawa by fleet and fishery between 2017 and 2022, with indication of cumulative catches by fleet

APPENDIX X
EXECUTIVE SUMMARY: LONGTAIL TUNA

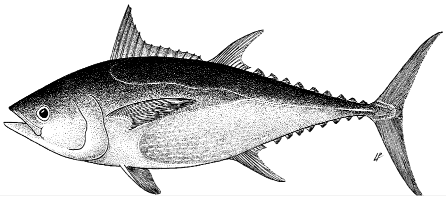

TABLE 1. Status of longtail tuna (*Thunnus tonggol*) in the Indian Ocean

Area[1]	Indicators		2023 stock status determination[3]
Indian Ocean	Catch 2022[2] (t) Mean annual catch (2018-2022) (t)	139,879 132,042	**34.7%**
	MSY (t) (80% CI) F_{MSY} (80% CI) B_{MSY} (t) (80% CI) $F_{current}/F_{MSY}$ (80% CI) $B_{current}/B_{MSY}$ (80% CI)	133,000 (108 –165) 0.31 (0.22 – 0.44) 433,000 (272,000 – 690,000) 1.05 (0.84 – 2.31) 0.96 (0.44 – 1.19)	

[1]Stock boundaries defined as the IOTC area of competence; [2]Proportion of catch fully or partially estimated for 2021: 31.1%; [3]Status relates to the final year data are available for assessment.

Colour key	Stock overfished (SB_{year}/SB_{MSY}< 1)	Stock not overfished (SB_{year}/SB_{MSY}≥ 1)
Stock subject to overfishing (F_{year}/F_{MSY}> 1)	35%	25%
Stock not subject to overfishing (F_{year}/F_{MSY}≤ 1)	23%	17%
Not assessed/Uncertain		

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. No new stock assessment was conducted for longtail in 2024 and so the results are based on the results of the assessment carried out in 2023which examined a number of data-limited methods including C-MSY, OCOM, and JABBA models (based on data up to 2021). These models produced stock estimates that are not drastically divergent because they shared similar dynamics and assumptions. The C-MSY model has been explored more fully and therefore is used to obtain estimates of stock status. The C-MSY analysis indicates that the stock is being exploited at a rate that exceeded F_{MSY} in recent years and that the stock appears to be below B_{MSY} and above F_{MSY} (35% of plausible models runs) (**Fig. 2**). Catches between 2017 and 2021 were slightly above MSY but steadily declined from 2012 to less than 113,000 t in 2019, (**Fig. 1**). The F_{2021}/F_{MSY} ratio is lower than previous estimates and the B_{2021}/B_{MSY} ratio was higher than in previous years. The analysis using the OCOM model is more pessimistic and using JABBA incorporating gillnet CPUE indices is more optimistic. The JABBA model, however, is unable to estimate carrying capacity with a fair degree of certainty without additional prior constraints, indicating the fact that the CPUE is either not informative or is conflicting with catch data. While the precise stock structure of longtail tuna remains unclear, recent research (IOTC-2020-SC23-11_Rev1) provides strong evidence of population structure of longtail tuna within the IOTC area of competence, with at least 3 genetic populations identified. This increases the uncertainty in the assessment, which currently assumes a single stock of longtail tuna. Based on the C-MSY assessment, the stock is considered to be both **overfished** and **subject to overfishing** (**Table 1**; **Fig. 1**). However, the assessment using catch-only method is subjected to high uncertainty and is highly influenced by several prior assumptions.

Outlook. There remains considerable uncertainty about the total catches of longtail tuna in the Indian Ocean. The increase in annual catches to a peak in 2012 increased the pressure on the longtail tuna Indian Ocean stock, although the catch trend has reversed since then. As noted in 2015, the apparent fidelity of longtail tuna to particular areas/regions is a matter for concern as overfishing in these areas can lead to localised depletion. Research emphasis should be focused on collating catch per unit effort (CPUE) time series for the main fleets, size compositions, exploring alternative approaches for estimating abundance (e.g., close-kin mark-recapture), and gaining a better understanding of stock structure and life trait history parameters (e.g. estimates of growth, natural mortality, maturity, etc.).

Management advice. The catch in 2022 was above the estimated MSY and the exploitation rate has been increasing over the last few years, as a result of the declining abundance. Despite the substantial uncertainties, this suggests that the stock is being fished above MSY levels and that higher catches may not be sustained. A precautionary approach to management is recommended.

The following should be also noted:

- The Maximum Sustainable Yield for the Indian Ocean is estimated to be 133,000t with a range of 108,000 –165,000t and so catch levels should be reduced in future to bring the stock back into the green quadrant;
- Limit reference points: the Commission has not adopted limit reference points for any of the neritic tunas under its mandate;
- Further work is needed to improve the reliability of the catch series. Reported catches should be verified or estimated, based on expert knowledge of the history of the various fisheries or through statistical extrapolation methods;
- Improvements in data collection and reporting are required if the stock is to be assessed using integrated stock assessment models;
- Research emphasis should be focused on collating catch per unit effort (CPUE) time series for the main fleets (I.R. Iran, Indonesia, Pakistan, Sultanate of Oman and India), size compositions and life trait history parameters (e.g., estimates of growth, natural mortality, maturity, etc.);
- There is limited information submitted by CPCs on total catches, catch and effort and size data for neritic tunas, despite their mandatory reporting status. In the case of 2022 catches 27.2% of the total catches of longtail were either fully or partially estimated by the IOTC Secretariat, which increases the uncertainty of the stock assessments using these data. Therefore, the management advice to the Commission includes the need for CPCs to comply with IOTC data requirements per Resolution 15/01 and 15/02.

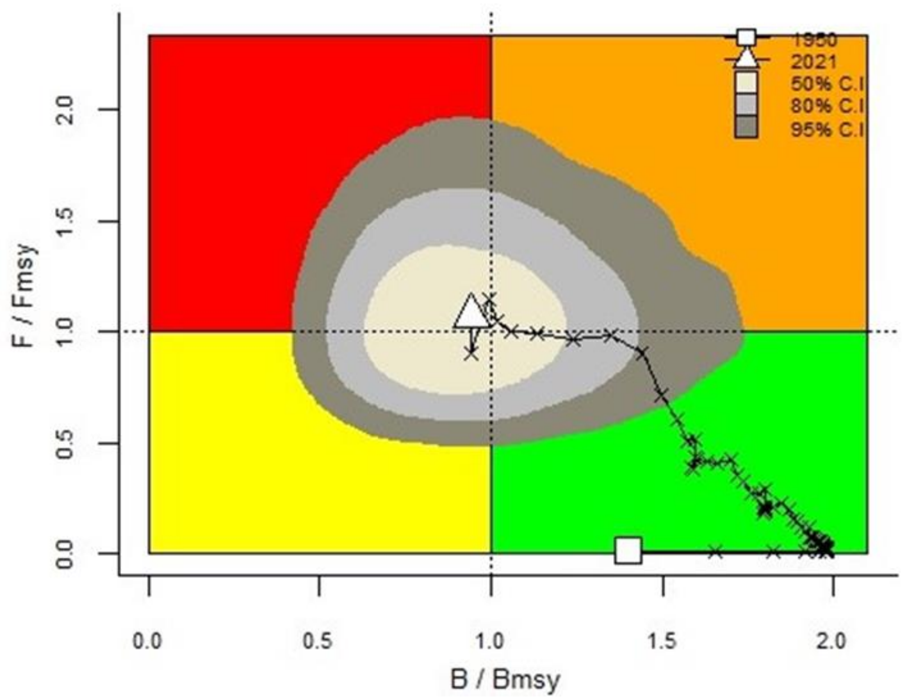

Fig. 1. Longtail tuna C-MSY Indian Ocean assessment Kobe plot. The Kobe plot presents the trajectories (median) for the range of plausible model trajectories included in the formulation of the final management advice. The shaded contour lines represent 50%, 80%, and 95% confidence intervals of estimated stock status in 2021

Fisheries overview.

- **Main fisheries (mean annual catch 2018-2022)**: longtail tuna are caught using gillnet (65.3%), followed by line (16.4%) and 'other' gears (9.3%). The remaining catches taken with purse seine, longline and pole-and-line contributed to 8.9% of the total catches in recent years (**Fig. 2**).
- **Main fleets (mean annual catch 2018-2022)**: the majority of longtail tuna catches are attributed to vessels flagged to I. R. Iran (40.4%) followed by Indonesia (22.1%) and Sultanate of Oman (18.2%). The 21 other fleets catching longtail tuna contributed to 19.1% of the total catch in recent years (**Fig. 3**).

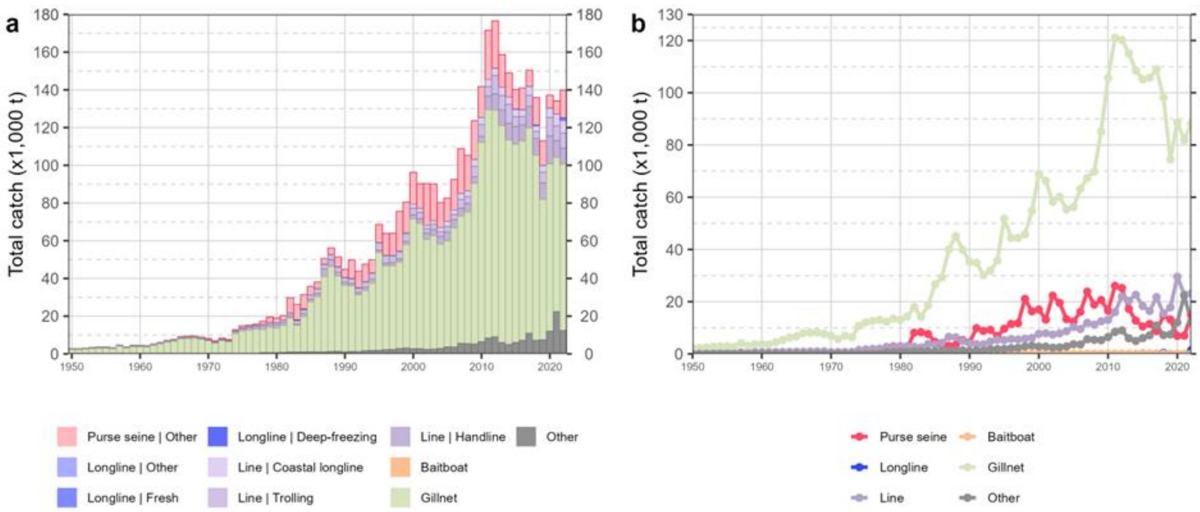

Fig. 2. Annual time series of (a) cumulative nominal catches (t) by fishery and (b) individual nominal catches (t) by fishery group for longtail tuna during 1950-2022

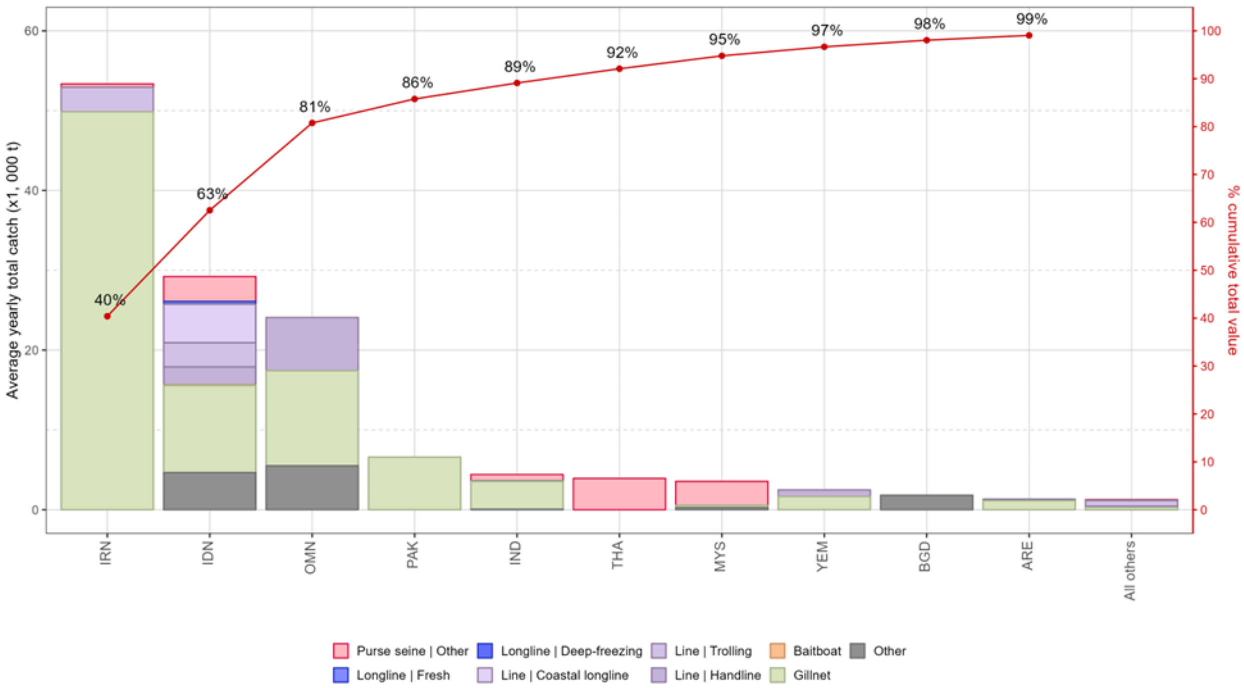

Fig. 3. Mean annual catches (t) of longtail tuna by fleet and fishery between 2017 and 2022, with indication of cumulative catches by fleet

APPENDIX XI
EXECUTIVE SUMMARY: INDO-PACIFIC KING MACKEREL

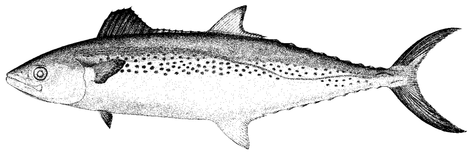

TABLE 1. Status of Indo-Pacific king mackerel (*Scomberomorus guttatus*) in the Indian Ocean

Area[1]	**Indicators**		**2024 stock status determination**[3]
Indian Ocean	Catch (2022) (t)[2]	45, 769	**27%**
	Mean annual catch (2018-2022) (t)	43, 416	
	MSY (1,000 t)	47 (39–56)	
	F_{MSY}	0.74 (0.56–0.99)	
	B_{MSY} (1,000 t)	63.1 (43.1–92.4)	
	$F_{current}/F_{MSY}$	0.95 (0.82–2.13)	
	$B_{current}/B_{MSY}$	1.02 (0.46–1.19)	
	$B_{current}/B_0$	0.51 (0.23–0.60)	

[1]Stock boundaries defined as the IOTC area of competence;
[2]Proportion of catch fully or partially estimated for 2022: 74.8%;
[3]2022 is the final year that data were available for this assessment

Colour key	Stock overfished (SB_{year}/SB_{MSY}< 1)	Stock not overfished (SB_{year}/SB_{MSY}≥ 1)
Stock subject to overfishing (F_{year}/F_{MSY}> 1)	24%	24%
Stock not subject to overfishing (F_{year}/F_{MSY}≤ 1)	25%	27%
Not assessed/Uncertain		

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. A new assessment was conducted in 2024 using the data-limited techniques (CMSY and CMSY++) (using data up to 2022). Analysis using the catch only method CMSY indicates the stock is being exploited at a rate that is below F_{MSY} in recent years and that the stock appears to be above B_{MSY}, although the estimates would be more pessimistic if the stock productivity is assumed to be less resilient. An assessment using CMSY++was also explored in 2024. The stock estimates with CMSY++ are estimated to be very close to the biomass target even though the stock status is more pessimistic than with CMSY. Despite some of the caveats of the underlying assumptions, the catch-only model has provided a more defensible approach in addressing the uncertainty of key parameters and the currently available catch data for the Indo-Pacific king mackerel appear to be of sufficient quality. Based on the weight-of-evidence currently available, the stock is considered to be **not overfished and not subject to overfishing** (**Table 1; Fig. 1**).

Outlook. Total annual catches for Indo-Pacific king mackerel have increased steadily over time, reaching a peak of 51,600 t in 2009 and have since fluctuated between around 40,000 t and 51,300 t. There is considerable uncertainty about stock structure and total catches. Aspects of the fisheries for this species, combined with the limited data on which to base a more complex assessment (e.g., integrated models), are a cause for concern. Although data-poor methods are used to provide stock status advice, further refinements to the catch-only methods and application of additional data-poor approaches may improve confidence in the results. Research emphasis should be focused on collating catch per unit effort (CPUE) time series for the main fleets, size compositions and life trait history parameters (e.g., estimates of growth, natural mortality, maturity, etc.).

Management advice. Reported catches of Indo-Pacific king mackerel in the Indian Ocean has increased considerably since the late 2000s with recent catches fluctuating around estimated MSY, although the catch in 2021 and 2022 was below the estimated MSY. This suggests that the stock is close to being fished at MSY levels and that higher catches may not be sustained despite the substantial uncertainty associated with the assessment, a precautionary approach to management is recommended.

The following should be also noted:

- The Maximum Sustainable Yield for the Indian Ocean is estimated to be 47,000 t with a range between 39,000–56,000 t
- Limit reference points: the Commission has not adopted limit reference points for any of the neritic tunas under its mandate;
- Research emphasis should be focused on collating catch per unit effort (CPUE) time series for the main fleets, size compositions and life trait history parameters (e.g. estimates of growth, natural mortality, maturity, etc.).
- Further work is needed to improve the reliability of the catch series. Reported catches should be verified or estimated, based on expert knowledge of the history of the various fisheries or through statistical extrapolation methods;
- Data collection and reporting urgently needed to be improved, given the limited information submitted by CPCs on total catches, catch and effort and size data for neritic tunas, despite their mandatory reporting status. In the case of 2022 74.8% of the total catches of Indo-Pacific king mackerel was either fully or partially estimated by the IOTC Secretariat, which increases the uncertainty of the stock assessments using these data. Therefore, the management advice to the Commission includes the need for CPCs to comply with IOTC data requirements per Resolution 15/01 and 15/02.

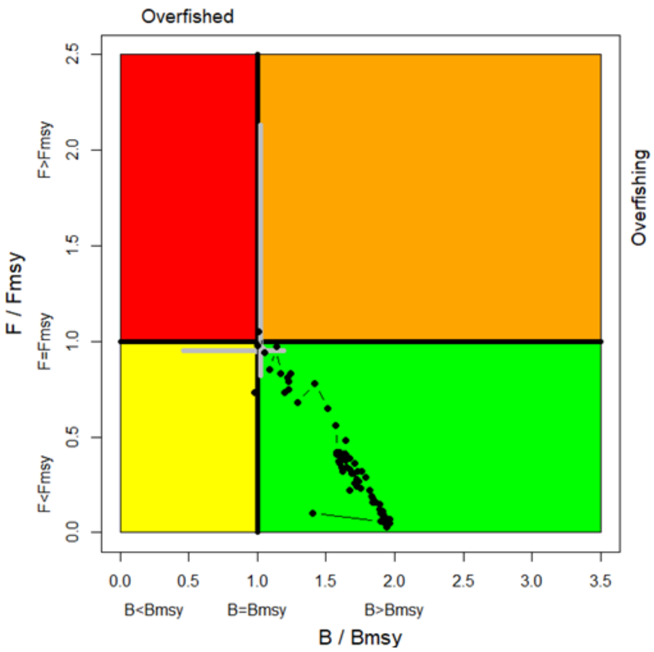

Fig. 1 Kobe plot of the CMSY assessment for the Indian Ocean spotted kingfish. The Kobe plot shows the trajectories (geometric mean) of the range of plausible model options included in the formulation of the final management advice. The grey cross represents the estimated stock status in 2022 (median and 80% confidence interval).

Fisheries overview.

- **Main fisheries (mean annual catch 2018-2022)**: Indo-Pacific king mackerel are caught using gillnet (66%), followed by other (20.9%) and line (9.6%). The remaining catches taken with other gears contributed to 3.4% of the total catches in recent years (**Fig. 2**).
- **Main fleets (mean annual catch 2018-2022)**: the majority of Indo-Pacific king mackerel catches are attributed to vessels flagged to Indonesia (32.6%) followed by India (28.7%) and I. R. Iran (23.5%). The 13 other fleets catching Indo-Pacific king mackerel contributed to 15.1% of the total catch in recent years (**Fig. 3**).

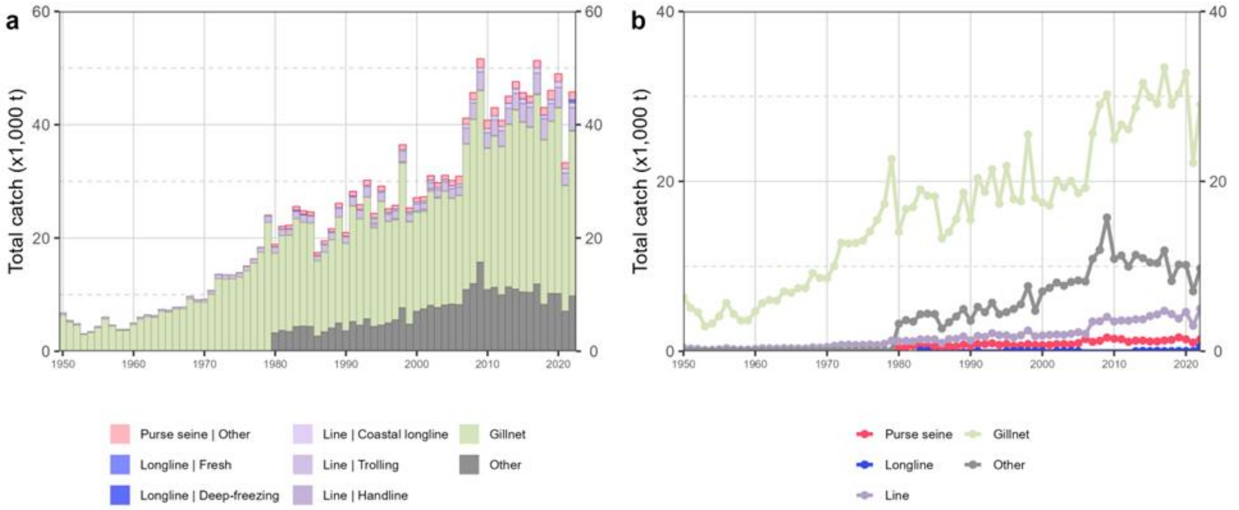

Fig. 2. Annual time series of (a) cumulative nominal catches (t) by fishery and (b) individual nominal catches (t) by fishery group for Indo-Pacific king mackerel during 1950-2022

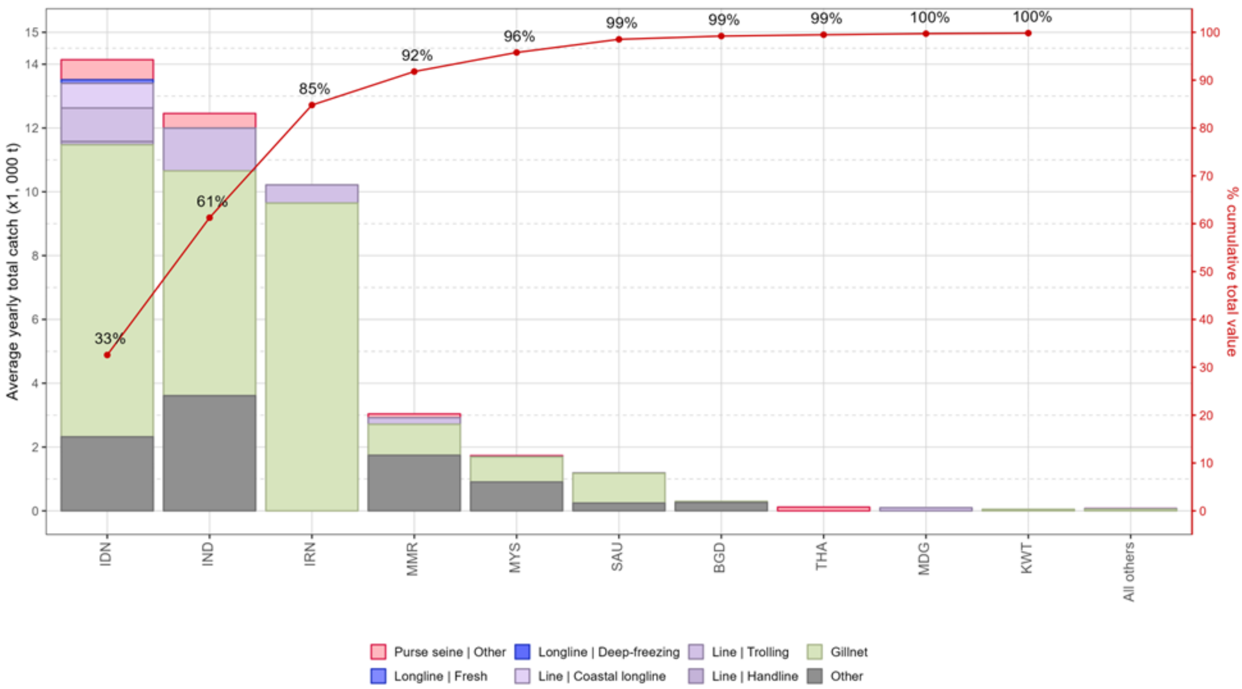

Fig. 3. Mean annual catches (t) of Indo-Pacific king mackerel by fleet and fishery between 2017 and 2022, with indication of cumulative catches by fleet

APPENDIX XII

EXECUTIVE SUMMARY: NARROW-BARRED SPANISH MACKEREL

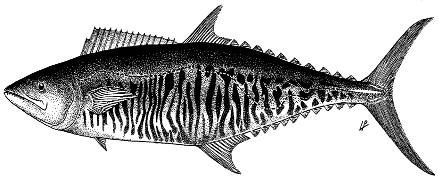

TABLE 1. Status of narrow-barred Spanish mackerel (*Scomberomorus commerson*) in the Indian Ocean

Area[1]	Indicators		2023 stock status determination[3]
Indian Ocean	Catch (2022)[2] (t) Mean annual catch (2018-2022) (t)	168,167 159,064	31%
	MSY (t) (80% CI) F_{MSY} (80% CI) B_{MSY} (t) (80% CI) $F_{current}/F_{MSY}$ (80% CI) $B_{current}/B_{MSY}$ (80% CI)	161,000 (132,000 – 197,000) 0.60 (0.48–0.74) 271,000 (197,000 – 373,000) 1.07 (0.88 – 2.38) 0.98 (0.44 – 1.19)	

[1]Stock boundaries defined as the IOTC area of competence;
[2]Proportion of catch fully or partially estimated for 2022: 65.9%;
[3]2021 is the final year that data were available for this assessment

Colour key	Stock overfished (SB_{year}/SB_{MSY}< 1)	Stock not overfished (SB_{year}/SB_{MSY}≥ 1)
Stock subject to overfishing (F_{year}/F_{MSY}> 1)	31%	28%
Stock not subject to overfishing (F_{year}/F_{MSY}≤ 1)	22%	19%
Not assessed/Uncertain		

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Stock status. No new stock assessment was conducted in 2024 for narrow-barred Spanish mackerel and so the results are based on the results of the assessment carried out in 2023which examined a number of data-limited methods including C-MSY, OCOM, and JABBA models (based on data up to 2021). These models produced stock estimates that are not drastically divergent because they shared similar dynamics and assumptions. The C-MSY model has been explored more fully and therefore is used to obtain estimates of stock status. The C-MSY analysis indicates that the stock is being exploited at a rate that exceeded F_{MSY} in recent years and that the stock appears to be below B_{MSY} and above F_{MSY} (31% of plausible models runs). The analysis using OCOM model is more pessimistic and using JABBA incorporating gillnet CPUE indices is more optimistic. The JABBA model, however, is unable to estimate carrying capacity with a fair degree of certainty without additional prior constraints, indicating that the CPUE is either not informative or is conflicting with catch data. An analysis undertaken in 2013 in the Northwest Indian Ocean (Gulf of Oman) indicated that overfishing is occurring in this area and that localised depletion may also be occurring[1]. While the precise stock structure of Spanish mackerel remains unclear, recent research (IOTC-2020-SC23-11_Rev1) provides strong evidence of population structure of Spanish mackerel within the IOTC area of competence, with at least 4 genetic populations identified. This increases the uncertainty in the assessment, which currently assumes a single stock of Spanish mackerel. Based on the C-MSY assessment, the stock appears to be **overfished** and **subject to overfishing** (**Table 1**, **Fig. 1**). However, the assessment using catch-only method is subjected to high uncertainty and is highly influenced by several prior assumptions.

Outlook. There is considerable uncertainty about the estimate of total catches. The continued increase in annual catches in recent years has further increased the pressure on the Indian Ocean narrow-barred Spanish mackerel stock.

[1] IOTC-2013-WPNT03-27

The apparent fidelity of narrow-barred Spanish mackerel to particular areas/regions is a matter for concern as overfishing in these areas can lead to localised depletion.

Management advice. The catch in 2022 was above the estimated MSY and the available gillnet CPUE shows a somewhat increasing trend in recent years although the reliability of the index as an abundance index remains unknown. Despite the substantial uncertainties, the stock is being fished above MSY levels and higher catches may not be sustained.

The following should also be noted:

- Maximum Sustainable Yield for the Indian Ocean stock was estimated at 161,000 t (ranging between 132,000 t and 197,000 t, with catches for 2022 (178,403 t) exceeding this level;
- Limit reference points: the Commission has not adopted limit reference points for any of the neritic species under its mandate;
- Further work is needed to improve the reliability of the catch series. Reported catches should be verified or estimated, based on expert knowledge of the history of the various fisheries or through statistical extrapolation methods;
- Improvement in data collection and reporting is required if the stock is to be assessed using integrated stock assessment models;
- Given the increase in narrow-barred Spanish mackerel catch in the last decade, measures need to be taken to reduce catches in the Indian Ocean;
- Research emphasis should be focused on collating catch per unit effort (CPUE) time series for the main fleets, size compositions, exploring alternative approaches for estimating abundance (e.g., close-kin mark-recapture), and gaining a better understanding of stock structure and life trait history parameters (e.g. estimates of growth, natural mortality, maturity, etc.);
- There is a lack of information submitted by CPCs on total catches, catch and effort and size data for neritic tunas, despite their mandatory reporting status. In the case of 2022 catches, 65.9% of the total catches of narrow-barred Spanish mackerel were either fully or partially estimated by the IOTC Secretariat, which increases the uncertainty of the stock assessments using these data. Therefore, the management advice to the Commission includes the need for CPCs to comply with IOTC data requirements per Resolution 15/01 and 15/02.

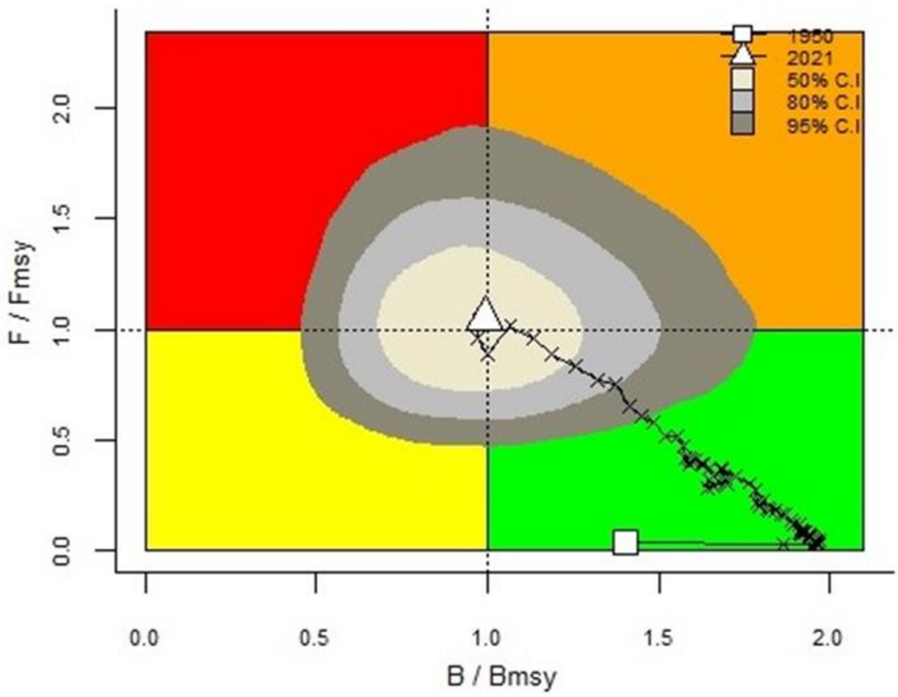

Fig. 1. Narrow-barred Spanish Mackerel OCOM Indian Ocean assessment Kobe plot. The Kobe plot presents the trajectories (median) for the range of plausible model trajectories included in the formulation of the final management advice. The shaded contour lines represent 50%, 80%, and 95% confidence intervals of estimated stock status in 2021

Fisheries overview.

- **Main fisheries (mean annual catch 2018-2022)**: narrow-barred Spanish mackerel are caught using gillnet (58%), followed by line (19.4%) and other (16.8%). The remaining catches taken with other gears contributed to 5.8% of the total catches in recent years (**Fig. 2**).

- **Main fleets (mean annual catch 2018-2022)**: the majority of narrow-barred Spanish mackerel catches are attributed to vessels flagged to Indonesia (28.8%) followed by India (18.8%) and I. R. Iran (16%). The 27 other fleets catching narrow-barred Spanish mackerel contributed to 36.4% of the total catch in recent years (**Fig. 3**).

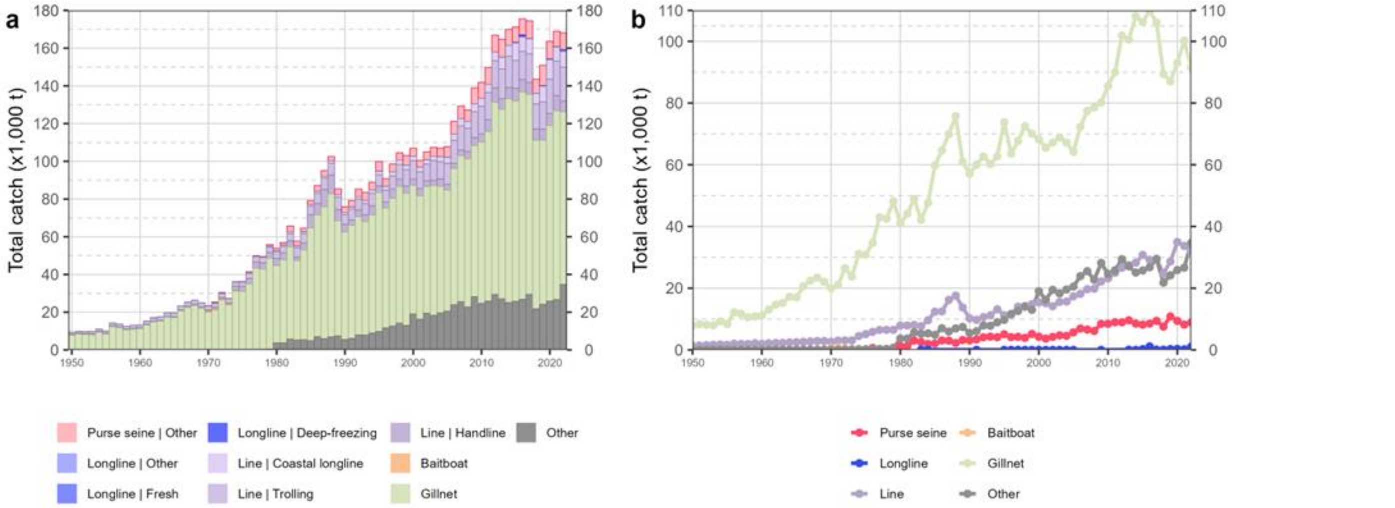

Fig. 2. Annual time series of (a) cumulative nominal catches (t) by fishery and (b) individual nominal catches (t) by fishery group for narrow-barred Spanish mackerel during 1950-2022

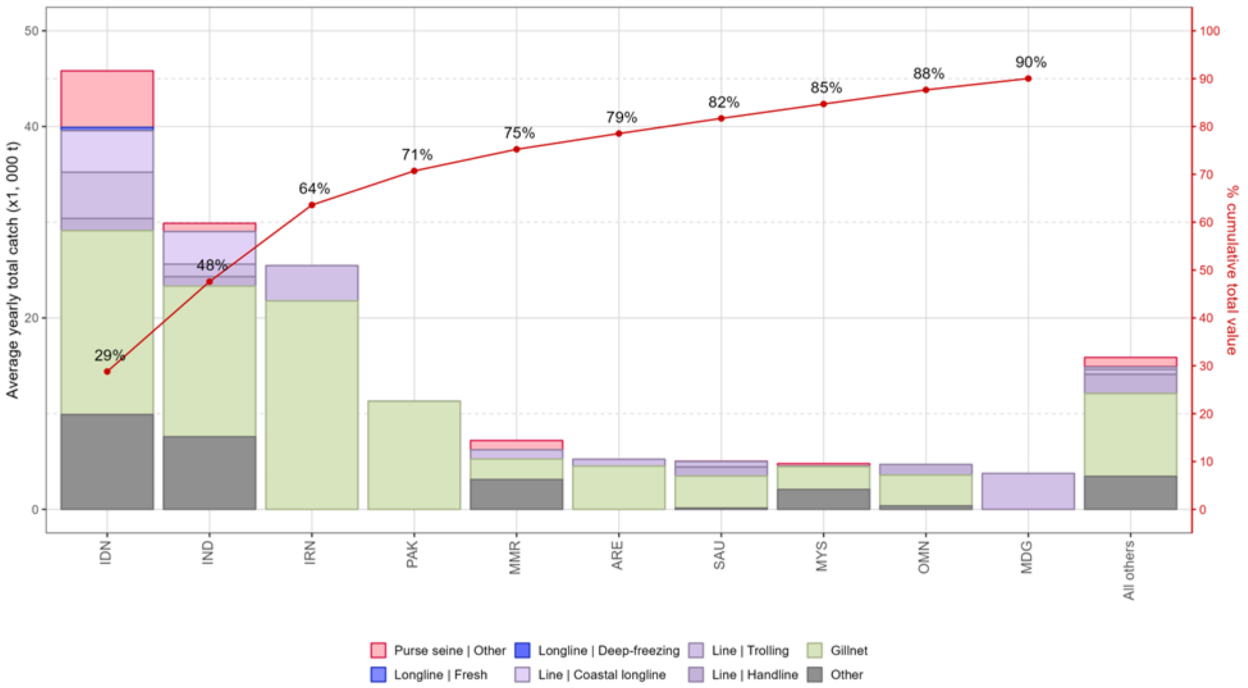

Fig. 3. Mean annual catches (t) of narrow-barred Spanish mackerel by fleet and fishery between 2017 and 2022, with indication of cumulative catches by fleet

APPENDIX XIII
CONSOLIDATED RECOMMENDATIONS OF THE 14TH SESSION OF THE WORKING PARTY ON NERITIC TUNAS

Note: Appendix references refer to the Report of the 14th Session of the Working Party on Neritic Tunas (IOTC–2024–WPNT14–R)

Section 3.4 Progress on the Recommendations of WPNT13 and SC26

WPNT14.01 (para 20) The WPNT **RECOMMENDED** that the SC urge all coastal CPCs to join future WPNT meetings, **NOTING** the high level of catches of neritic species from CPCs such as India and Pakistan who regularly do not attended these meetings.

Section 4.1 Review of the statistical data available for neritic tunas

WPNT14.02 (para 28) **ACKNOWLEDGING** the difficulties associated with deriving geo-referenced size-frequency data at the spatial resolution of 5° grids in most coastal fisheries, and the fact that most analyses, including stock assessments, do not require such fine resolution, the WPNT **RECOMMENDED** the SC to urge the Commission to align the spatial resolution of size-frequency data with that of geo-referenced catch and effort data. Consequently, the data may be provided using an alternative geographical area if it better represents the fishery concerned.

Section 4.2 Review new information on fisheries and associated environmental data

WPNT14.03 (para 40) The WPNT **RECOMMENDED** that the SC **ENCOURAGE** CPCs to evaluate the socio-economic status of their fisheries involved in catching neritic tunas.

WPNT14.04 (para 66) Therefore, the WPNT **RECOMMENDED** that the SC **ENCOURAGE** collaboration between CPCs to carry out stock identification by the application of genetics in order to better understand the structure of all neritic stocks for improved management plans.

Section 6.2 Stock status indicators for other neritic tuna species

WPNT14.05 (para 116 & 117) In this context, the WPNT **DISCUSSED** potential future assessment options for neritic tuna species. The WPNT **NOTED** that each method requires certain assumptions. For catch-only methods, the assumption is relatively simple and widely used in fisheries applications (functional form for surplus production). Therefore, if the catch estimates are accurate, the application of catch-only methods can prove effective and easy to implement. Furthermore, these methods can yield management metrics required by the IOTC, and the results are more easily understood by managers.

Conversely, the inputs for the length-based approach are more likely to be of better quality, especially considering the widespread implementation of sampling programs among coastal countries. There has also been considerable recent advancement and emphasis on the length-based approach, which can estimate stock status and serve as a valuable monitoring tool for various fisheries. The WPNT thus **ENCOURAGED** the continued exploration and utilization of both methods and **RECOMMENDED** that the SC urge the Commission to put greater focus on urging CPCs to collect more representative length composition data for the effective assessment of these species. The WPNT also **REQUESTED** that CPCs summarize the size data from their sampling programs for the next WPNT meeting.

Section 7.1 Revision of the WPNT Program of Work (2025–2029)

WPNT14.06 (para 124) The WPNT **RECOMMENDED** that the SC consider and endorse the WPNT Program of Work (2025–2029), as provided in Appendix VI.

Section 8.2 Review of the draft, and adoption of the Report of the 14th Working Party on Neritic Tunas

WPNT13.07 (para 128) The WPNT **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPNT14, provided in Appendix XIII, as well as the management advice provided in the draft resource stock status summary for each of the six neritic tuna (and seerfish) species under the IOTC mandate, and the combined Kobe plot for the species assigned a stock status in 2024:

- Bullet tuna (*Auxis rochei*) – Appendix VII
- Frigate tuna (*Auxis thazard*) – Appendix VIII
- Kawakawa (*Euthynnus affinis*) – Appendix IX
- Longtail tuna (*Thunnus tonggol*) – Appendix X
- Indo-Pacific king mackerel (*Scomberomorus guttatus*) – Appendix XI
- Narrow-barred Spanish mackerel (*Scomberomorus commerson*) – Appendix XII