Report of the First Session of the IOTC Working Party on Neritic Tunas

Chennai, India, 14–16 November 2011

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EXECUTIVE SUMMARY

The First Session of the Indian Ocean Tuna Commission (IOTC) WPNT was held in Chennai, India, from 14 to 16 November 2011. The meeting was attended by 28 individuals, including one Invited Expert, Dr. Shane Griffiths (CSIRO–Australia).

The following are a subset of the complete recommendations from the WPNT01 to the Scientific Committee, which are provided at Appendix XII.

The WPNT **RECOMMENDED** that the Scientific Committee note the management advice developed for each neritic tuna species as provided in the draft resource stock status summary for each neritic tuna species: (para. 86)

- longtail tuna (*Thunnus tonggol*) – Appendix VI
- narrow-barred Spanish mackerel (*Scomberomorus commerson*) – Appendix VII
- bullet tuna (*Auxis rochei*) – Appendix VIII
- frigate tuna (*Auxis thazard*) –Appendix IX
- kawakawa (*Euthynnus affinis*) – Appendix X
- Indo-Pacific king mackerel (*Scomberomorus guttatus*) – Appendix XI

Noting that at present very little is known about the population structure and migratory range of most neritic tunas in the Indian Ocean, the WPNT **RECOMMENDED** that the Scientific Committee develop a research plan that includes two separate research lines; i) genetic research to determine the connectivity of neritic tunas throughout their distributions, and ii) tagging research to better understand the movement dynamics, possible spawning locations, and post-release mortality of neritic tunas from various fisheries in the Indian Ocean. These should be considered high priority research projects for 2012 and 2013. (para. 89)

The WPNT **RECOMMENDED** that quantitative biological studies are required to determine maturity-at-age and fecundity-at-age relationships, and age and growth for all neritic tunas throughout their range. (para. 90)

The WPNT **RECOMMENDED** that where feasible, support should be provided by the IOTC Secretariat and other CPCs, to aid in the development of standardised CPUE series for each neritic tuna species. (para. 92)

The WPNT **AGREED** that there was an urgent need to carry out stock assessments for neritic tunas in the Indian Ocean, however at present the data held at the IOTC Secretariat would be insufficient to undertake this task. As such, the WPNT **RECOMMENDED** that the Scientific Committee consider recommending that the Commission consider allocating appropriate funds to further increase the capacity of coastal states to collect, report and analyse catch data on neritic tunas. (para. 94)

The WPNT **RECOMMENDED** that the Commission consider providing funds for IOTC scientists to develop stock status indicators and possibly stock assessments for neritic tunas, with narrow-barred Spanish mackerel, kawakawa and longtail tuna as priority species. (para. 99)

The WPNT **RECOMMENDED** that the Scientific Committee note the new Chair, Dr. Prathibha Rohit (India) and Vice-Chair, Mr. Farhad Kaymaram (I.R. Iran), of the WPNT for the next *biennium*. (para. 109)

1. Opening of the Meeting

1. The First Session of the Indian Ocean Tuna Commission's (IOTC) WPNT was held in Chennai, India, from 14 to 16 November 2011. A total of 28 participants attended the Session. The list of participants is provided at Appendix I.

2. The meeting was opened on 14 November, 2011 by Dr. Vijayakumaran, Director General of the Fishery Survey of India, who subsequently welcomed participants to India.

2. Election of a Chair and Vice-Chair

3. The Secretariat notified participants that as there was no current Chair for the Working Party on Neritic Tunas (WPNT), they would need to consider electing an acting-Chair for the duration of the meeting. Dr. Prathibha Rohit from India was nominated and elected as the acting-Chair of the First Session of the WPNT.

3. Adoption of the Agenda

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

4. Outcomes of the Thirteenth Session of the Scientific Committee and the Fifteenth Session of the Commission

5. The WPNT **NOTED** paper IOTC–2011–WPNT01–03 which outlined the main outcomes of the Thirteenth Session of the Scientific Committee, specifically related to the work of the WPNT.

6. The WPNT **NOTED** the recommendations of the Thirteenth Session of the Scientific Committee on data and research related to neritic tunas and agreed to consider how best to progress these issues at the present meeting.

7. The WPNT **NOTED** paper IOTC–2011–WPNT01–04 which outlined the main outcomes of the Fifteenth Session of the Commission, specifically related to the work of the WPNT.

8. The WPNT **NOTED** the outcomes of the Fifteenth Session of the Commission, and agreed to consider how best to provide the Scientific Committee with the information it needs, in order to satisfy the Commission's requests, throughout the course of the meeting.

9. The WPNT **NOTED** paper IOTC–2011–WPNT01–08 which aimed to encourage the WPNT to review the existing Conservation and Management Measures (CMMs) relating to neritic tunas, and as necessary to 1) provide recommendations to the Scientific Committee on whether modifications may be required; and 2) recommend whether other CMMs may be required.

5. Review of Data Available For Neritic Tuna Species

10. The WPNT **NOTED** paper IOTC–2011–WPNT01–05 which provided an overview of the standing of a range of information received by the IOTC Secretariat for neritic tunas, in accordance with IOTC Resolution 10/02 *Mandatory statistical requirements for IOTC Members and Cooperating non-Contracting Parties (CPC's)*, for the period 1960–2010. Statistics for 2010 represent preliminary catch information. A summary is provided at Appendix IV.

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

5.2 Data from other sources

Malaysia

12. The WPNT **NOTED** paper IOTC–2011–WPNT01–09 which provided an overview of the neritic tuna fisheries in the Strait of Malacca, including the following abstract provided by the authors:

> *"Tuna fisheries are getting increasing important for future deep-sea fisheries contributions in the fisheries sector in Malaysia. Apart from oceanic tuna from the Indian Ocean, neritic tuna species are among the important pelagic fish caught by commercial and traditional fishing*

gears. The main neritic tuna found in Malaysian waters were longtail (Thunnus tonggol) and kawakawa (Euthynnus affinis) and a frigate (Auxis thazard). They were caught by commercial fishing gears, trawl nets and purse seines and several other traditional fishing gear. The Strait of Malacca in the west coast of Peninsular Malaysia is the only Malaysian continental shelf that fall under IOTC areas of competent. About 45% of the neritic catch in Malaysia were from the Malacca Strait (west coast of Peninsular Malaysia) and 28% from the east coast of Peninsular Malaysia. Neritic tuna, Spanish mackerel and sharks constituted about 0.36%, 0.34% and 0.15% of the catch by trawl nets in Malacca Strait and in purse seines, neritic tuna represented 9% of the catch. Annual catch of neritic tuna in the Malacca Strait showed increasing trends but the opposite trends occurred in the South China Sea. From catch of purse seines in the Malacca Strait, the vessels of size 25 – 39.9 GRT and 40 - 69.9 GRT contributed 21% and 76% respectively to the catch. There are between 48 and 56 species of sharks that inhibit in Malaysian waters. They constituted 0.62% of the marine catch in Malaysia and 0.2% in the Malacca Strait. The widely distributed sharks in the Malaysian marine waters include spot-tail shark (Carcharhinus sorrah), blackspot shark (Carcharhinus sealei), Milk shark (Rhizoprionodon acutus), Scalloped hammered shark (Sphryna lewini) and Sicklefin weasel shark (Hemigaleus mirostoma). Most of the catch were from trawl nets."

13. Noting that the nominal catch (NC) data provided at the WPNT01 meeting was found to conflict with the NC data history provided by Malaysia to the IOTC Secretariat, the WPNT **RECOMMENDED** that Malaysia liaise with the IOTC Secretariat in order to verify and provide a revised catch history which will replace the data currently held by the IOTC Secretariat before the next WPNT meeting in 2012.

India

14. The WPNT **NOTED** paper IOTC–2011–WPNT01–10 which provided an overview of the tuna fishery of India with special reference to biology and population characteristics of neritic tunas exploited from the Indian EEZ, including the following abstract provided by the authors:

    "Tuna fishery along the mainland coast of Indian and its Island territories were monitored to study the biology, population characteristics and level of exploitation especially of neritic tunas. Study showed that the exploitation levels for neritic tunas are low and there is considerable scope for improving the production through targeted fishing."

15. Noting that substantial data sets, i.e. catch and length frequencies, have been collected in India and that several studies analysing these data sets have already been undertaken, the WPNT **RECOMMENDED** that this data be reported to the IOTC Secretariat as per the requirements adopted by all IOTC Members through Resolution 10/02 *mandatory statistical requirements for IOTC Members and Cooperating non-Contracting Parties*.

16. Noting that the paper presented by Indian scientists did not contain information on narrow-barred Spanish mackerel (*Scomberomorus* commerson) and Indo-Pacific king mackerel (*S. guttatus*) which are covered under the mandate of the WPNT, the WPNT **RECOMMENDED** that fishery information on these mackerel species caught in Indian fisheries be presented at the next meeting of the WPNT.

17. The WPNT **AGREED** that at present very little is known about the population structure and migratory range of most of the neritic tuna species caught in the Indian fisheries, and they are likely to be shared among neighbouring countries. As such, any stock assessment of these species would need to be carried out on a biologically relevant scale, once appropriate management units and associated data sets had been identified.

18. The WPNT **AGREED** that the IOTC Secretariat should work with India in order to add all the relevant biological information presented into the draft Executive Summaries of neritic tunas before the next Session of the Scientific Committee.

Thailand

19. The WPNT **NOTED** paper IOTC–2011–WPNT01–11 which provided a review of the status of small tunas along the Andaman Sea coast of Thailand, including the following abstract provided by the authors:

    "The annual production of small tunas in the Andaman Sea varies from 13,093 to 49,243 tons during 1996-2008. It was contributed 10-36 % in total small tunas production in Thai Waters. After 2005, the production decreased rapidly from 40,488 to 13,093 tons in 2008. The percentage of small tunas in pelagic catches during 1985-1993 was about 10 percent by purse seine and king mackerel gillnet. The peak fishing season for small tunas in the Andaman Sea

took place during Northeast monsoon period. Main species of small tunas commercially caught are bullet tuna, kawakawa, longtail tuna, frigate tuna and skipjack. The size of longtail tuna, kawakawa and frigate tuna caught by light luring purse seine were smaller compared with those caught by Thai purse seine and king mackerel gill net. It is clear that small tunas resources are satisfactory. The stock size of tuna cannot be estimated from limited area only in the Thai waters because tunas are highly migratory species. They migrate beyond the Thai waters to the entire Malacca Strait or throughout the Andaman Sea. More studies are required to explain their distributions. To assess the stock size of tuna, an appropriate production analysis should be carried out based on data from whole areas."

20. The WPNT **NOTED** that the very large catches reported in the mid-90s was due to joint ventures with Myanmar and Indonesia resulting in an increase of effort, and therefore catches.

21. The WPNT **NOTED** the catches of small fishes reported in the Andaman sea by Thai vessels and that these sizes are not reported in Andaman and Nicobar islands by Indian vessels. It was thought that this was probably due to the difference in the gear used, i.e. purse seine by Thailand and gillnets in the Andaman and Nicobar islands by India.

22. The WPNT **AGREED** with the study's findings that the stock size cannot be estimated from Thai waters only as these species are migratory and likely to be shared among a number of countries coastal waters.

Indonesia

23. The WPNT **NOTED** paper IOTC–2011–WPNT01–21 which provided an overview of the status of the neritic tuna fishery in Indonesia, including the following abstract provided by the authors:

"Drifting gillnet was one of the tuna fishing gears which highly developed in Cilacap since tens year ago. The drifting gillnets was nylon multifilament with mesh size 5 inch and operated by wooden boat 20–30 GT. Each gillnetter operates about 50–60 piece of net. In order to obtain data and information in regard to the fishery and fish biology aspect, Balai Riset Perikanan Laut (Research Institute for Marine Fisheries) – Jakarta was carried out research through a serial onboard observation in the year 2008, 2009 and 2010. Result of the research shows that: drifting gillnet for tuna caught neritic tuna and sheerfish as by product about 9 % of total catch. The neritic tuna and sheerfish consist of longtail tuna (Thunnus tonggol), frigate tuna (Auxis thazard), bullet tuna (Auxis rochei), narrow-barred Spanish mackerel (Scomberomorus commerson) and Indo-Pacific king mackerel (Scomberomorus guttatus). Catch rate seems decreased year by year where in 2008, 2009 and 2010 were 285.60, 170.65 and 106.31 kg/setting respectively. The decreasing caused by many purse seiners start fishing in the fishing ground where gillnet fishing."

24. The WPNT **AGREED** that there was a clear need to determine the degree of shared stocks for all neritic tunas under the IOTC mandate in the Indian Ocean, so as to better equip the Scientific Committee in proving management advice based on defensible management units. The WPNT **AGREED** that stock structure delineation should be added to the research plan for the WPNT.

5.3 Recommendations to the Scientific Committee

25. The WPNT **AGREED** that the data held by the IOTC Secretariat on neritic tuna species is very poor, despite the mandatory reporting requirements that were adopted by the members of the Commission under Resolution 10/02, and **URGED** CPCs to improve their reporting on these species.

26. The WPNT **AGREED** that there appears to be large datasets available on neritic tuna species caught by fleets of the coastal countries, in particular from India, Indonesia, Malaysia and Thailand, however most of this information has not been provided to the IOTC Secretariat. As such, the WPNT **RECOMMENDED** that these countries, as well as other CPCs, provide these data sets for neritic tunas, noting that this is already a mandatory requirement as per the IOTC Resolution 10/02 adopted by the IOTC Members, as this would allow a better assessment of the status of these stocks.

6. INFORMATION ON BIOLOGY, ECOLOGY, FISHERIES, ENVIRONMENTAL DATA AND STOCK STRUCTURE RELATING TO NERITIC TUNAS

6.1 Longtail tuna: Review new information on the biology, stock structure, their fisheries and associated environmental data

27. The WPNT **NOTED** paper IOTC–2011–WPNT01–12 which provided an overview of the phylogenetic relationships of coastal tunas inferred from mitochondrial DNA sequences in the cytochrome C oxidase I gene, including the following abstract provided by the authors:

    "India has rich diversity of fish resources which are to be explored and exploited on sustainable basis. To accomplish the task there is a need to identify the species through DNA barcoding which is the ultimate tool for species identification. Tunas are highly migratory fish having commercial importance and some are extremely important. As tuna meat demand in the world market has witnessed an increasing trend, research on tuna resources and their exploitation patterns have also been actively pursued. Tuna and tuna like fishes belonging to the Tribe Thunnini, family Scombridae have four genera viz Thunnus, Euthynnus, Katsuwonus and Auxis with 13 species. The present study is attempted to know the sequence diversity in the mitochondrial Cytochrome c oxidase I (COI) gene as a tool to understand the differences among the genus and species occurring in the North-Western Indian EEZ Viz. Thunnus tonggol, Euthynnus affinis, Auxis thazard and Auxis rochei. Sequence divergences revealed that there is not much variation within the species and there reported large variations between the species. While analysing phylogenetic relationships of these coastal tunas using NJ (Neighbour – joining) method indicated shallow intra-specific and deep inter-specific divergence. The study provides an understanding of phylogenetic relationships existing among these tuna species and also helpful in retrieving reliable information about the species and would provide requisite solution to the current problem of species identification."

28. The WPNT **AGREED** that the study was a useful preliminary analysis that used modern molecular genetics techniques, combined with taxonomic expertise, to provide a means to provide insights into the relatedness of fish species. The WPNT **URGED** further research be undertaken to examine the potential genetic stock structure for neritic tunas around India.

29. The WPNT **NOTED** paper IOTC–2011–WPNT01–14 which provided an overview of the feeding dynamics, consumption rates and daily ration of longtail tuna (*Thunnus tonggol*) in Australian waters, with emphasis on the consumption of commercially important prawns, including the following abstract provided by the authors:

    "*The feeding ecology of longtail tuna was studied in northern and eastern Australia. Diet biomass data were used to estimate daily ration and consumption of individual prey taxa, particularly penaeids targeted by Australia's valuable Northern Prawn Fishery (NPF). Overall, the 497 stomachs contained 101 prey taxa. In both regions, small pelagic and demersal fishes comprised the majority of the diet biomass. Fish in both regions showed a marked increase in prey diversity, variation in prey composition and stomach fullness index in autumn and winter (March–August). This increase in apparently opportunistic feeding behaviour and feeding intensity showed an inverse relationship with reproductive activity, indicating a possible energy investment for gonad development. Daily ration decreased with increasing fish size, while annual consumption by fish increased with size. Total prey consumption in the Gulf of Carpentaria was estimated at 148,178 t year^{-1}. This includes 599 t year^{-1} of penaeids, equivalent to 11% of the annual NPF catch. This study demonstrated that longtail tuna play an important ecological role in neritic ecosystems. Their interaction with commercial fisheries highlights the need for targeted dietary studies of high order predators to better understand trophic pathways to facilitate ecosystem-based fisheries management.*"

30. Noting that the study aimed to: 1) quantitatively assess the spatial, temporal and size-related differences in the diet and feeding intensity of longtail tuna in northern and eastern Australia; 2) investigate size-related differences in consumption rate and daily ration; and 3) to estimate the annual prey consumption, the WPNT **AGREED** that:
    - ecosystem models are becoming increasingly used to guide ecosystem-based fisheries management initiatives.
    - good dietary information is an important basis for many models (e.g. Ecopath), especially for high-level predators such as longtail tuna.

- sampling is essential over the entire year to capture temporal variability – prey availability or reproductive effects.
- size-related differences in diet composition and daily ration (Q/B) highlights the importance of understanding the system before modelling.

31. The WPNT **NOTED** paper IOTC–2011–WPNT01–16 which outlined a study of age and growth of longtail tuna (*Thunnus tonggol*) in tropical and temperate waters of the central Indo-Pacific, including the following abstract provided by the authors:

    "Age and growth of longtail tuna (Thunnus tonggol) were assessed by examination of annual growth increments in sectioned sagittal otoliths from 461 fish (238–1250 mm fork length, LF) sampled from tropical and temperate waters in the central Indo-Pacific between February 2003 and April 2005. Edge and microincrement analyses (presumed daily increments) suggest that longtail tuna deposit a single annual growth increment mainly between August and October. Age was, therefore, estimated for all fish by counting assumed annual growth increments. Ages ranged from 154 d to 18.7 years, with most fish being 3–9 years. Five growth models were fitted to length-at-age data, all of which indicated that the species is relatively slow-growing and long-lived. Recaptures of two tagged fish at liberty for 6.2 and 10.5 years support this notion. A bias-corrected form of Akaike's Information Criterion determined that the Schnute–Richards model provided the best fit to length-at-age data, with model parameter estimates (sexes combined) of Linf = 135.4 cm LF, K = 22.3 year^{-1}, t0 = 0.120 years, d = 150.0, v = 0.019, and g = 2.7x 10^{-8}. There was no significant difference in growth between sexes. The results suggest that longtail tuna grow more slowly and live longer than other tuna species of similar size. Coupled with their restricted neritic distribution, longtail tuna may be vulnerable to overexploitation by fisheries, and caution needs to be exercised in managing the species until more reliable biological and catch data are collected to assess the status of the population."

32. The WPNT **NOTED** that small fish are rare in Australian waters (<50 cm FL) which may suggest ontogenetic movements from areas outside the Australian EEZ, most likely from the area north-west of Australia.

33. The WPNT **NOTED** that:
    - before increasing commercial and/or recreational fishing pressure on longtail tuna in Australia, additional basic biological information is required to inform management.
    - from this study, longtail tuna appears to be a slow-growing and long-lived (18 years) species – like other large *Thunnus* spp. and as a result is considered highly susceptible to overfishing.

34. The WPNT **AGREED** that further work should focus on collecting juvenile fish from the region to improve the level of biological information available, as well as a true validation study of age and growth, e.g. using oxytetracycline.

35. The WPNT **AGREED** that in light of the slow growth of longtail tuna relative to other tropical tuna species found in this study, coupled with its restricted coastal distribution throughout its worldwide distribution, this species may be vulnerable to overexploitation if not managed in a precautionary manner until reliable quantitative biological data are collected (e.g. length at sexual maturity).

36. The WPNT **NOTED** paper IOTC–2011–WPNT01–29 which outlined a study of the restricted vertical and cross-shelf movements of longtail tuna (*Thunnus tonggol*) in Australian waters as determined by pop-up archival tags, including the following abstract provided by the authors:

    "*Nine longtail tuna (Thunnus tonggol) were tagged with miniature pop-up archival tags ('miniPAT', Wildlife Computers) between 6 August 2009 – 28 April 2010 within the neritic regime along Australia's eastern coast. Tags collected data for a total of 324 days (2.5–84 d). Fish primarily utilised depths of 0-15m with maximum recorded depth of 79 m. Water temperature preference differed with fish size with small (85–95 cm FL) and large (>100 cm FL) preferring 24–28 °C and 18–22 °C, respectively. Geolocation from raw light data revealed fish exclusively utilised the neritic zone restricted to depths of less than ~200m. In contrast to commercial and recreational fisheries catch data and anecdotal evidence that suggests fish move south during summer and autumn with the southward expanding East Australia Current, all nine fish moved north for linear distances of up to 650 km. Two fish tagged moved 450 km and 650 km north to a common area inside the Great Barrier Reef at times where spawning has been previously documented (Oct–Mar). When these fish arrived at the reef they displayed possible spawning behaviour consisting of continual 'bounce' diving between 5–75m for 2 and 6.5 days, respectively. This study has highlighted the marked differences in habitat preferences* *and behaviour of longtail tuna in comparison to other Thunnus species. Their movements are likely to be related to physiology and restricted dives may explain the loss of a swim bladder in this species.*"

37. The WPNT **NOTED** the utility of using pop-up archival tags to determine movements and potential stock structure for neritic tunas, and **URGED** national scientists to consider collaborative research projects with scientists who have used this method of tagging previously.

38. The WPNT **NOTED** that future studies should be undertaken using conventional tagging methods, as well as genetic studies to aid in delineating the stock structure of longtail tuna.

39. The WPNT **NOTED** paper IOTC–2011–WPNT01–30 which outlined a study of the reproductive biology of longtail tuna (*Thunnus tonggol*) from coastal waters off Taiwan, including the following abstract provided by the authors:

    "A total of 588 longtail tuna ranging in size from 30.0 to 74.5 cm fork length (FL) and 0.43 to 5.9 kg rounded weight (RW) were collected from Taiwan waters between December 2005 and May 2011. Gonads were collected from 231 female fish, which comprised 40% of the sample. Gonads were classified into four stages of maturity, based on histological structures. Histological analysis indicated that the length-at-first maturity was 37 cm for females. Monthly variation in gonadosomatic indices peaked at December, but no gonads contained hydrated oocytes to indicate spawning was imminent. We rarely found longtail tuna larger than 80 cm, which may be due to a mis-match of spatial and/or temporal sampling effort for longtail tuna as they apparently migrate through the Taiwan region, or possibly selectivity of sampling gears. These artefacts may have contributed to an underrepresentation of the largest and smallest fish present in our sample."

40. The WPNT **AGREED** that although this study was carried out on longtail tuna from waters around Taiwan.China, it provided useful comparative reproductive biological data, and **URGED** the authors to consider collaborative research on longtail tuna from the Indian Ocean.

6.2 Narrow-barred Spanish mackerel: Review new information on the biology, stock structure, their fisheries and associated environmental data

41. The WPNT **NOTED** paper IOTC–2011–WPNT01–20 which provided information regarding narrow-barred Spanish mackerel caught in Mozambique, including the following abstract provided by the authors:

    "Narrow-barred Spanish mackerel or kingfish is mainly caught in line and game fishing. Some information regarding catch and size composition obtained during competitions in some fishing grounds are presented. Until 2009, the gamefish coverage was only in the southern part of the country. This is one of the prioritized species in the SWIOFP project component 4, so it is expected to have some studies carried out on the end of the project in 2012."

42. The WPNT **URGED** Mozambique to continue the program of data collection on narrow-barred Spanish mackerel, expand the study along the coast of Mozambique, and to provide an update at the next meeting of the WPNT.

43. The WPNT **NOTED** paper IOTC–2011–WPNT01–24 which outlined a study of the temporal and size-related variation in the diet, consumption rate, and daily ration of kawakawa (*Euthynnus affinis*) in neritic waters of eastern Australia, including the following abstract provided by the authors:

    "The diet, food consumption, and ration of mackerel tuna (Euthynnus affinis) were studied in Australian neritic waters. Overall, 43 prey taxa were identified from 271 stomachs. The diet was primarily pelagic clupeoids (78% by wet weight, WW; 71% by frequency of occurrence, FO) and demersal fish (19% WW; 32% FO). Multivariate regression tree analysis revealed that temporal differences, followed by fish size, explained most of the variation in the diet composition. Autumn diets differed from those in other seasons because tuna ate virtually only engraulids then. During other seasons, engraulids were still the dominant taxon in the diet, but fish also consumed a greater variety of other prey. Small tuna seemed to target small pelagic crustaceans and teleosts, and medium and large tuna to consume larger pelagic and demersal teleosts. Prey consumption increased with tuna size from 26.42 to 108.03 g d^{-1} for small and large tuna, respectively. Conversely, daily ration decreased with increasing tuna size from 4.10 to 1.95% body weight per day for medium and large tuna, respectively. Mackerel tuna consumed an estimated 25,036 t $year^{-1}$ in the study region (170,990 km^2). Diet studies are becoming increasingly important in informing ecosystem models, and this study confirmed the

need for sampling regimes to capture temporal and size-related variation in diet composition, to maximize the utility of data for use in such models."

44. Noting that the study aimed to: 1) explore the temporal and size-related variability in the diet composition and feeding intensity of kawakawa in the neritic regime of eastern Australia; 2) estimate the consumption rate and daily ration for three size classes; and 3) estimate the annual biomass of prey consumed in the neritic Central Eastern Shelf Transition Bioregion in eastern Australia, the WPNT **AGREED** that the study provided a useful example of the type of research that could be undertaken on kawakawa and other neritic tuna species in the Indian Ocean.

6.3 Other neritic tuna species: Review new information on the biology, stock structure, their fisheries and associated environmental data

45. The WPNT **NOTED** paper IOTC–2011–WPNT01–13 which outlined a study of the preliminary demographic structure parameters of frigate tuna through landings in Antsiranana, including the following abstract provided by the authors:

"It has been recorded for years that purse seiners landing in the Antsiranana harbor represente an important economic impact to this town. That is why USTA (Unité Statistique Thonière d'Antsiranana) would gather biologic and quantitative data during the unloading or transshipment. This paper shows the preliminary population dynamic parameters on Frigate tuna as a by-product. The overall by product recorded in the harbor in 2011 reached 764. 785 tons where 26% were Frigate tuna (Auxis thazard). This study pointed out that Frigate tuna starts being entangled at 1 year and 2 months by purse seiners in the Mozambique Channel."

46. The WPNT **NOTED** that frigate tuna begin to recruit to the purse seine fishery in the Mozambique channel at approximately 1 year and 2 months of age.

47. The WPNT **NOTED** paper IOTC–2011–WPNT01–25 which outlined a study of the population biology and assessment of kawakawa in coastal waters of the Persian Gulf and Sea of Oman, including the following abstract provided by the authors:

"Length composition data (fork length) of kawakawa (<u>Euthynnus</u> <u>affinis</u>), landed between April 2003 to March 2005 in Coastal Waters of Hormozgan province in Iran (Persian Gulf and Sea of Oman), were monthly used to estimate the population parameters and for the assessment of the stock. The growth parameters of von Bertalanffy equation were estimated as L_∞: 87.66 cm, K: 0.51 per year and t0: -0.23 year. The estimated value of total mortality, natural mortality and fishing mortality were Z: 2.37, M: 0.65, F: 1.72 per year, respectively. Exploitation ratio (E) and Exploitation rate (U) were estimated as 0.72 and 0.65. The Annual total stock at beginning of year was calculated to be 7924 t and annual average standing stock (S) was equal to 2994 t. By using analyses knife-edge selection method, biological reference points for kawakawa stock was calculated as, Y'/R (relative yield per recruitment) =0.062, B'/R (relative biomass per recruitment) =0.13,F_{max} (Fishing mortality at maximum sustainable yield)=1.6,E_{max} (Exploitation ratio at maximum sustainable yield)=0.68 F_{opt} (Precautionary average target)=0.33 $year^{-1}$ and F_{limit}=0.43 $year^{-1}$. As the exploitation ratio of kawakawa stock in this study was calculated to be over 0.5, it strongly recommended minimizing the fishing activity in this area.

48. The WPNT **REQUESTED** that catch and size data should be made available to the IOTC Secretariat, noting that IOTC Members, including the I.R. Iran, have already agreed that this is a mandatory reporting requirement.

49. The WPNT **NOTED** that kawakawa is not a targeted species but a bycatch of the Iranian gillnet fishery, and that the difference observed in growth parameters from other studies is related to the sampling method, the area and gear used.

50. The WPNT **NOTED** paper IOTC–2011–WPNT01–26 which outlined the status of frigate tuna in the Maldives, including the following abstract provided by the authors:

"Maldivian tuna fishery exploits about 20% of the Indian Ocean catch with the majority of it comprising of skipjack and yellowfin. Neritic species such as frigate are caught incidentally in the pole and line skipjack fishery of the country. Nominal catch of frigate tuna has dropped to 2900 t in 2010 from 5200 t in 2009. However, a general increasing trend in nominal catch can be observed though there is a small decline in proportion of this species in the total tuna caught. Live-bait pole-and-line fishery landed 93% of the frigate tuna caught in 2010. Effort (number of trips) and the number of mechanized vessels in the fishery are in decline, most

probably due to low catches and rising fuel prices in recent years. Fork lengths of FRI caught were in the range 25–48cm FL during the early years of the data period (1997–2009), and contracted to 27–38cm FL in the recent few years.

51. The WPNT **NOTED** that the nominal CPUE series for mechanized fishing vessels catching frigate tuna shows a slight increasing trend for the period 1995–2010, although nominal CPUE for 2010 was the lowest recorded since 2004.

52. The WPNT **NOTED** paper IOTC–2011–WPNT01–31 which outlined the status of kawakawa in the Maldives, including the following abstract provided by the authors:

    "Maldivian tuna fisheries have predominantly exploited skipjack and yellowfin tuna throughout history. Hence, kawakawa has been a minor proportion of all the tuna caught in the country. Despite fluctuations, kawakawa landings have gradually increased since 1970. This increase however, is disproportionately small compared to the growth in landings of skipjack and yellowfin tuna. Majority of kawakawa is caught by pole-and-line gear in the north of the country. Effort (number of trips) by mechanized vessels has been slowly declining although CPUE is on the rise. Length data show increased catches in the 50-60cm FL range in recent years compared to late 1990s."

53. The WPNT **NOTED** that nominal CPUE of kawakawa for mechanized vessels in the Maldives has gradually increased over the period 1995–2010 with the exception of 2006 and 2008. The low catch in 2006 could be due to targeting of skipjack tuna because of the extraordinarily high catch rates of skipjack tuna in those years. Highest CPUE for this fleet was recorded in 2010 with 18 kg/trip. However, it should be noted that the actual CPUE could be higher as mechanized vessels include those that carryout handline fishing which targets large yellowfin tuna and this fishery could have a negligible proportion of kawakawa in their catch.

54. The WPNT **NOTED** that while the completion of logbooks has been made mandatory by the Maldives, it is very difficult to separate catches from pole-and-line vessels fishing on FADs versus free swimming schools, and therefore, to estimate the effect of the FAD association on the catches of frigate tuna and kawakawa.

7. REVIEW OF INFORMATION ON THE STATUS OF LONGTAIL TUNA

7.1 Data for input into stock assessments:

55. The WPNT **NOTED** paper IOTC–2011–WPNT01–18 which provided population dynamic parameters of *Thunnus tonggol* in the north of the Gulf and Oman Sea, including the following abstract provided by the authors:

    "Yearly tuna and tuna-like catches in Iran are of the order of 163,991 t, close to 40% of which are longtail tuna. Fork length was measured on a total of 4313 longtail tuna by the technicians of the research centers of the IFRO at a number of sample sites along the north part of the Persian Gulf and Oman Sea from Oct 2006 to Sept 2007.Total fresh weight was recorded for a sub-sample of individuals. Monthly length –frequency distributions grouped in three centimeters class intervals. The Von Bertalanffy parameters were then estimated by the software of FISAT. The length–weight relationship was estimated as: $W=0.00002\ L^{2.83}$. Total mortality (Z) was estimated by using the Powell-Wetherall plot as 1.82 per year. Natural mortality was obtained by Pauly equation (M=0.44). Fishing mortality (F) then estimated from Z-M=1.38. Regarding to the presentation, determining of spawning season, GSI, Lm 50% and feeding habits were studied as follow: Sex ratio was not significantly different from 1:1. The percentages of matured stages (3rd and 4th stages) were increased from February and spawning season was started from Aug for female and July for male but there were two peaks, one in spring and the other in summer. Lm 50% was estimated 73.3 cm for female. The study showed that teleost fishes were dominant prey as food items.

56. The WPNT **NOTED** that longtail tuna caught in the I.R. Iran fisheries in the Gulf and Oman Sea range in size from 26–128 cm (FL), with an average length of 74 cm (TL).

57. The WPNT **NOTED** that longtail tuna caught in gillnet fisheries are generally caught before they have had a chance to spawn (73.3 cm FL size at first maturity of females).

58. The WPNT **NOTED** the suggestion that longtail tuna in the study area was considered to be under heavy fishing pressure, which may lead to localised depletion if connectivity with surrounding areas was limited.

59. The WPNT **NOTED** paper IOTC–2011–WPNT01–19 which outlined a study on the biology, fisheries and status of longtail tuna (*Thunnus tonggol*), with special reference to recreational fisheries in Australian waters, including the following abstract provided by the authors:

> *"Longtail tuna (Thunnus tonggol) is a commercially-important species throughout the Indo-Pacific. Global catches have increased substantially over the past decade to around 276,000 t yr^{-1} in 2008. In contrast, commercial landings in Australia averaged only 34 t since 1974. However, their importance to the recreational fishery was recognised in 2006 when it was declared a "recreational only" species, with a total bycatch allowance of 70 t yr^{-1} for commercial fisheries. This project collated existing information on key biological parameters and trialled two innovative methods – online diaries and time-location sampling (TLS) – for collecting national-level recreational catch data for stock assessment. Surveys intercepted 4600 individuals, of which catch and effort data were obtained from 1182 sport fishers, who undertook 4596 fishing trips and expended 25,138 hours of effort. Surveyed fishers caught 892 longtail tuna (30–150 cm TL) totalling ~80 t in 2010. In light of the results from the survey and the literature review, it is recommended that: i) urgent research is required to determine the stock structure of longtail tuna using genetics and tagging, ii) biological studies be undertaken to determine maturity-at-age, fecundity-at-age and length-at-age relationships, and iii) a long-term monitoring program be established to collect a time series of catch and effort data that is representative of the recreational sector."*

60. The WPNT **AGREED** that the new information on longtail tuna biology should be incorporated into the draft Executive Summary for the consideration of the Scientific Committee, and that urgent research is required to determine the stock structure of longtail tuna throughout its Indo-Pacific distribution.

7.2 Stock assessment

61. The WPNT **NOTED** paper IOTC–2011–WPNT01–15 which outlined a stock assessment and efficacy of size limits on longtail tuna (*Thunnus tonggol*) caught in Australian waters, including the following abstract provided by the authors:

> "*A stock assessment of longtail tuna (Thunnus tonggol) in Australian waters was undertaken using per-recruit analyses to assess: (i) the current stock status, and (ii) the effect of Minimum Legal Lengths (MLL) as a management tool. Exploited age compositions differed between the commercial (age classes 3–4 years) and sport fishery (4–6 years). The fishing mortality ($F_{current}$) from these fisheries for 2004–2006 was estimated as 0.167–0.320 $year^{-1}$. Yield-per-recruit analyses revealed that size limits and improving post-release survival had no significant effect on the population. This was due to fish becoming vulnerable to both fisheries at age 2–3 years, after fish presumably had the opportunity to spawn. Under all MLL scenarios, the current fishing mortality rate did not exceed biological reference points. However, any significant increase in fishing mortality may result in recruitment overfishing due to longtail tuna being slow-growing and the stock currently in the vicinity of the F40% reference point. Since longtail tuna are now a "recreational-only" species in Australia with minimal commercial bycatch, investigation of daily catch limits for the sport fishery requires exploration using more sophisticated age-structured stock assessment models.*"

62. The WPNT **NOTED** the preliminary nature of the stock assessment for longtail tuna, as the structure of the stock, the age-at-maturity, age and growth (validation studies including small fish), post-release survival (commercial and recreational) are largely unknown and that time series of representative annual commercial and recreational catch, effort, and size/age frequency data for all fisheries catching longtail tuna are needed.

7.3 Stock status indicators

63. The WPNT **AGREED** that a quantitative stock assessment of the longtail tuna resource cannot be undertaken at present due to the paucity of the information available.

64. Noting that some countries have collected large data sets over long time periods, the WPNT **RECOMMENDED** that this data, as well as data from other countries, be submitted to the IOTC Secretariat as per the requirements adopted by its members in Resolution 10/02. This would allow the

WPNT to develop stock status indicators or a more comprehensive stock assessment of longtail tuna in the future.

65. The WPNT **URGED** cooperation and collaboration by national scientists among the countries catching longtail tuna, as most of the data used in the studies presented at the WPNT01 meeting were limited in their geographical extent.

8. REVIEW OF INFORMATION ON THE STATUS OF NARROW-BARRED SPANISH MACKEREL

8.1 Data for input into stock assessments

66. The WPNT **NOTED** paper IOTC–2011–WPNT01–23 which outlined a study on the population dynamic and biological aspects of *Scombermorus commerson* in the Gulf and Oman Sea (Iranian coastal), including the following abstract provided by the author:

"*Scombermorus commerson is one of the most important and commercial species in the Persian Gulf and Oman Sea. In order to come up with the responsible fishing pattern, there was a need to identify some of the biological characteristics and population dynamic parameters. Data were collected randomly from five major traditional fish-landing sites Chabahar, Jask , Bandar Abbas, Bandar Lengeh and Parsian in the north of Persian Gulf and Oman Sea coastal(I.R. Iranian EEZ), from October 2006 to September 2007. The average of fork length estimated 79cm. The b parameters in both female and male in this present study (W = a.FLb) were close to 3 and indicating that S. commerson has isometric growth. The growth parameters of L∞ and K were computed 175.26(cm) and 0.45 (1/year) respectively and result showed that S. commerson grew very fast in the first 2 years. These parameters indicated that S. commerson is found to attain a fork length of 63cm at the end of first year. The fork length attained at the end of 2, 3 and 4 year to be 104, 129 and 146 cm respectively. Growth performance index (ǿ) calculated 4.1 which were in agreement with the finding of the other studies in the Indian Ocean. Total mortality, natural mortality, fishing mortality and exploitation rate were estimated 1.98,0.5,1.48(1/ year) and 0.74 respectively. The sex ratio was no significantly different from 1:1.The fork length at first maturity estimated 83.6 cm. GSI for both male and females increased rapidly during May and June with spawning occurred from June to September, although small short spawning took place during April to May. The major food groups were Osteichthyes, Crustacea and Cephalopoda. Basic foods in Osteichthyes group were Engraulidae and Clupeidae. Based on empirical equation between body length of females at first maturity and fork length, the stretch mesh size of gillnet 14.6 cm suggested for catch of S. commerson.*"

67. The WPNT **NOTED** the conclusion by the authors that it may be necessary to increase the mesh size of gillnets used in the fishery, and by implementing time-area closures that may include known spawning grounds.

68. The WPNT **NOTED** that more data is required, from different fisheries and gears, in order to estimate accurate biological parameters for narrow-barred Spanish mackerel, and **URGED** the authors to work in collaboration with scientists from other countries bordering the Gulf, Oman Sea and broader Indian Ocean.

8.2 Stock assessment

69. The WPNT **NOTED** paper IOTC–2011–WPNT01–22 which provided a preliminary assessment of the biology and fishery for narrow-barred Spanish mackerel *Scomberomorus commerson*, in the southern Gulf, including the following abstract provided by the authors:

"*The population biology and fishery for Scomberomorus commerson in the southern Gulf were investigated using a combination of size frequency, biological and size-at-age data. Transverse sections of sagittal otoliths showed structural increments consisting of alternating translucent and opaque bands, which were used to estimate age. Edge analysis revealed an annual periodicity of formation with opaque zones being deposited between May and July in association with increasing seawater temperatures. The maximum absolute age estimates were 16.2 years (males) and 15.3 years (females). Initial growth was rapid with fish reaching more than half the asymptotic size by their second year and there were no significant differences in growth characteristics between sexes. Parameter values of the von Bertalanffy growth function fit to size-at-age data (males and females combined) were: k = 0.21, L∞ = 138.6 cm (LF) and t0 =−1.9 years. Spawning occurred between April and August, the mean sizes and ages at first* *sexual maturity were 72.8 cm LF (1.9 years) for males and 86.3 cm LF (2.1 years) for females. The size at which fish were fully recruited to the fishery (62.6 cm LF) was considerably smaller than both the mean size at first sexual maturity for females and the size at which yield per recruit would be maximised (95.6 cm LF). Furthermore, the annual instantaneous fishing mortality rate of 0.62 year*$^{-1}$ *(0.46–0.79 year*$^{-1}$ *95% CI) was by far in excess of the precautionary target (*$F_{opt} = 0.13$ *year*$^{-1}$*) and limit (*$F_{limit} = 0.17$ *year*$^{-1}$*) biological reference points, indicating that the resource is heavily over-exploited. The results suggest that an increase in mesh size regulations for gillnets in combination with a substantial reduction in fishing effort will be required if resource conservation and stock rebuilding objectives are to be achieved. The study also highlights the need for a strategic regional approach to the assessment and management of this highly migratory species."*

70. The WPNT **NOTED** that current evidence suggesting that there is a single stock of narrow-barred Spanish mackerel in the Gulf and neighbouring area, i.e. Oman and Arabian Seas.

71. The WPNT **AGREED** that to delineate management units for narrow-barred Spanish mackerel in the Gulf and the broader Indian Ocean, a multi-pronged approach would be necessary, involving otolith microchemistry, genetic tagging and possible external tagging techniques.

72. The WPNT **NOTED** the key findings of the study which indicated that the narrow-barred Spanish mackerel resource in the southern Gulf is characterized by both growth and recruitment overfishing, the stock may be at approximately 13% of its unexploited size.

73. The WPNT also **NOTED** that the fishery, in the southern Gulf, is based on the harvest of immature fish that have not contributed to the reproductive capacity of the population or achieved their full growth potential.

74. While recognizing the potential positive impacts of closured areas on neritic tunas, the WPNT **AGREED** that where feasible, closured areas should take into account the full migratory range of the species, so as to ensure appropriate life history stages are protected within the management unit. Management objectives are unlikely to be achieved by the unilateral initiatives of any one of the littoral states. Regional collaboration in assessment and management are imperative in this context.

8.3 Stock status indicators

75. The WPNT **AGREED** that a full stock assessment of the narrow-barred Spanish mackerel resource cannot be made at present due to the paucity of the information available from the entire range of the stock.

76. Noting that some countries have collected large data sets over long time periods, the WPNT **RECOMMENDED** that this data, as well as data from other CPCs, be submitted to the IOTC Secretariat as per the requirements adopted by its members in Resolution 10/02. This would allow the WPNT to develop stock status indicators or a more comprehensive stock assessment for narrow-barred Spanish mackerel in the future.

77. The WPNT **ENCOURAGED** cooperation and collaboration among scientists from all countries catching narrow-barred Spanish mackerel, as most of the data used in the studies presented to the WPNT meeting were limited in their geographical extent.

9. REVIEW OF INFORMATION ON THE STATUS OF OTHER NERITIC TUNA SPECIES

9.1 Data for input into stock assessments:

78. The WPNT **NOTED** paper IOTC–2011–WPNT01–28 which outlined a study on the trends of sportfishing catches of kawakawa and frigate tuna between 1990 and 2006 in Kenya, including the following abstract provided by the author:

"*This report presents the CPUE for frigate tuna (Auxis thazard) and kawakawa (Euthynnus affinis), caught by the sports fishers in Malindi sport fishing club. The catch data is for 18 years from 1987 to 2006 with over 22,000 trips recorded. The years 1988 and 1999 are not included as the data was missing. The CPUE for Kawakawa was on average 1.6 fish per trip except in 1995 to 1999 when the catches increased reaching a peak of 3.4 in 1998. The frigate tuna CPUE averaged at 0.4 fish per trip except in 2002 and 2004 when the catches recorded 1.5 and 1.7 fish per trip respectively. The temporal distribution of the catches shows that kawakawa were caught more during the first quarter of the year (Jan to Mar) and also in the fourth* *quarter (Oct to Dec) with 46% and 31% of the catches respectively. The frigate tuna on the other hand are more abundant in the first quarter with 70% of the total catch recorded during this period. The average weight of frigate tuna was 1.1 kgs whereas the kawakawa had two periods of 2.1 and 1.5 kgs per fish caught. The use of sport fishing catches as an indicator of stocks abundance should be encouraged.*"

9.2 Stock assessment

79. The WPNT **NOTED** that no stock assessment papers for other neritic tuna species was presented during the meeting and encouraged work on these species prior to the next WPNT meeting.

9.3 Stock status indicators

80. The WPNT **AGREED** that a quantitative stock assessment of the other neritic tuna resources cannot be made at present due to the scarcity and paucity of the information available.

81. Noting that some countries have collected large data sets over long time periods, the WPNT **RECOMMENDED** that this data, as well as data for other CPCs, be submitted to the IOTC Secretariat as per the requirements adopted by its members in Resolution 10/02. This would allow the WPNT to develop stock status indicators or a more comprehensive stock assessments of other neritic tuna species in the future.

82. The WPNT **ENCOURAGED** cooperation and collaboration among scientists from countries catching other neritic tuna species, so as to ensure any future stock assessment is based on datasets from biologically relevant spatial scales.

10. Development of Technical Advice on the Status of the Stocks

83. The WPNT **NOTED** paper IOTC–2011–WPNT01–07 which aimed to encourage the WPNT to develop clear and concise draft Executive Summaries for each neritic tuna species for the consideration of the Scientific Committee.

84. The WPNT **NOTED** that the IOTC currently uses the reference points of SB_{MSY} (or B_{MSY}) and F_{MSY} in providing its advice on stock status to the Commission and typically represents the advice as a ratio of current spawning biomass (SB_{curr}), total biomass (B_{curr}) or fishing rates/mortality to SB_{MSY}, B_{MSY} and F_{MSY} respectively; species with current spawning biomass estimates $<SB_{MSY}$ or $<B_{MSY}$ are considered overfished, and fishing mortality $>F_{MSY}$ is considered overfishing. There are currently no agreed harvest strategies, explicit target of limit reference points or decision rules that are followed when reference points are being approached or have been reached. Stocks of tuna and tuna-like species under the IOTC mandate are currently classified independently in each of the two categories described above (overfished and overfishing). Within these two categories there is a positive and a negative, as well as an uncertain status.

85. The WPNT **NOTED** the new Executive Summary format (IOTC–2011–WPNT01–07) which will be used in developing the draft neritic tuna species resource Executive Summaries for the Scientific Committee's consideration.

86. The WPNT **RECOMMENDED** that the Scientific Committee note the management advice developed for each neritic tuna species as provided in the draft resource stock status summary for each neritic tuna species:
    - longtail tuna (*Thunnus tonggol*) – Appendix VI
    - narrow-barred Spanish mackerel (*Scomberomorus commerson*) – Appendix VII
    - bullet tuna (*Auxis rochei*) – Appendix VIII
    - frigate tuna (*Auxis thazard*) –Appendix IX
    - kawakawa (*Euthynnus affinis*) – Appendix X
    - Indo-Pacific king mackerel (*Scomberomorus guttatus*) – Appendix XI

87. The WPNT **REQUESTED** that the IOTC Secretariat update the draft stock status summary for each neritic tuna species with the latest 2010 catch data, and for these to be provided to the Scientific Committee as part of the draft Executive Summaries, for its consideration.

11. Effect of piracy on neritic tuna catches

88. The WPNT **NOTED** that the effect of piracy in the western Indian Ocean, although not quantitatively assessed for the present meeting, is having direct and substantial impacts on the neritic tuna fisheries of east African countries.

12. Research Recommendations and Priorities

12.1 Development recommendations to the Scientific Committee

Stock structure

89. Noting that at present very little is known about the population structure and migratory range of most neritic tunas in the Indian Ocean, the WPNT **RECOMMENDED** that the Scientific Committee develop a research plan that includes two separate research lines; i) genetic research to determine the connectivity of neritic tunas throughout their distributions, and ii) tagging research to better understand the movement dynamics, possible spawning locations, and post-release mortality of neritic tunas from various fisheries in the Indian Ocean. These should be considered high priority research projects for 2012 and 2013.

Biological information

90. The WPNT **RECOMMENDED** that quantitative biological studies are required to determine maturity-at-age and fecundity-at-age relationships, and age and growth for all neritic tunas throughout their range.

CPUE standardisation

91. The WPNT **AGREED** that there was an urgent need to develop standardised CPUE series for each neritic tuna species for the Indian Ocean as a whole or by sub-region as appropriate, once stock structure and management units have been determined.

92. The WPNT **RECOMMENDED** that where feasible, support should be provided by the IOTC Secretariat and other CPCs, to aid in the development of standardised CPUE series for each neritic tuna species.

93. The WPNT **ENCOURAGED** CPCs catching neritic tunas to participate in the CPUE standardisation workshop that will be organized by the IOTC Secretariat in 2012, pending approval by the Scientific Committee.

Stock assessment

94. The WPNT **AGREED** that there was an urgent need to carry out stock assessments for neritic tunas in the Indian Ocean, however at present the data held at the IOTC Secretariat would be insufficient to undertake this task. As such, the WPNT **RECOMMENDED** that the Scientific Committee consider recommending that the Commission consider allocating appropriate funds to further increase the capacity of coastal states to collect, report and analyse catch data on neritic tunas.

12.2 Development a draft work plan

Stock structure

95. The WPNT **AGREED** that Table 1 should be used as a starting point for research project development to delineate potential stock structure for neritic tunas in the Indian Ocean.

Table 1. Neritic tunas (and tuna-like species) under the IOTC mandate with potential sub-regions/stock identified.

<table>
<tr><th rowspan="2">Species</th><th colspan="5">Possible sub-regions and countries</th></tr>
<tr><th>East Africa
(Kenya, Tanzania, Mozambique, Madagascar, Seychelles, Mauritius, La Réunion, Comoros, Somalia)</th><th>Gulf, Oman Sea
(I.R. Iran, Oman, Pakistan, U.A.E., Yemen, Somalia, Qatar)</th><th>West India
(India, Pakistan, Sri Lanka, Maldives)</th><th>East India/Bay of Bengal
(India, Sri Lanka, Malaysia, Indonesia, Thailand, Myanmar, Bangladesh)</th><th>Indonesia and Australia
(Australia, Indonesia, Thailand)</th></tr>
<tr><td>Longtail tuna
(Thunnus tonggol)</td><td>▬▬▬</td><td colspan="2">▬▬▬</td><td colspan="2">▬▬▬</td></tr>
<tr><td>Narrow-barred Spanish mackerel
(Scomberomorus commerson)</td><td>▬▬▬</td><td colspan="3">▬▬▬</td><td>▬▬▬</td></tr>
<tr><td>Bullet tuna
(Auxis rochei)</td><td>–</td><td>–</td><td colspan="2">▬▬▬</td><td>▬▬▬</td></tr>
<tr><td>Frigate tuna
(Auxis thazard)</td><td>▬▬▬</td><td>▬▬▬</td><td colspan="2">▬▬▬</td><td>▬▬▬</td></tr>
<tr><td>Kawakawa
(Euthynnus affinis)</td><td>▬▬▬</td><td>▬▬▬</td><td colspan="2">▬▬▬</td><td>▬▬▬</td></tr>
<tr><td>Indo-Pacific king mackerel
(Scomberomorus guttatus)</td><td>▬▬▬</td><td>▬▬▬</td><td colspan="2">▬▬▬</td><td>▬▬▬</td></tr>
</table>

Black bars refer to potential management units for further examination/research, by species. Countries in red text are not yet Members of the IOTC, however collaborative research is encouraged.

Priority research projects

96. The WPNT **RECOMMENDED** that the Scientific Committee note the list of priority research topics for neritic tunas as provided in Table 2.

Table 2. Priority research projects for obtaining the information necessary to develop stock status indicators for neritic tuna species in the Indian Ocean.

Research project	Sub-projects	Priority
Stock structure (connectivity)	Conventional and satellite tagging studies to better understand the movement dynamics, possible spawning locations, and post-release mortality (species dependent)	High
	Genetic research to determine the connectivity of neritic tunas throughout their distributions	High
	Otolith microchemistry/isotope research	Medium
Biological information	Age and growth research – all species	High
	Maturity-at-age – all species	High
	Fecundity-at-age relationships – all species	Medium
Ecological information	Feeding ecology	Low
	Life history research	Low
CPUE standardisation	Develop standardised CPUE series for each neritic tuna species for the Indian Ocean as a whole or by sub-region as appropriate, once stock structure and management units have been determined. This will be entirely dependent upon the fisheries data that is collected and reported to the IOTC Secretariat.	High
Stock assessment / Stock indicators	At present the data held at the IOTC Secretariat would be insufficient to undertake stock assessments. Consider allocating appropriate funds to further increase the capacity of coastal states to collect, report and analyse catch data on neritic tunas.	High

97. The WPNT **NOTED** that the data held by the IOTC Secretariat on neritic tuna species is very poor, despite the mandatory reporting requirements that were adopted by the Members of the Commission under Resolution 10/02, and **URGED** CPCs to improve their reporting on these species (see also paras. 15, 25, 26, 64, 76 and 81).

98. The WPNT **NOTED** a range of national research programs on neritic tunas discussed at the meeting and **URGED** participants to ensure that information on these important research projects are included in the National Reports to the Scientific Committee, which is due to be submitted to the IOTC Secretariat by 28 November, 2011.

99. The WPNT **RECOMMENDED** that the Commission consider providing funds for IOTC scientists to develop stock status indicators and possibly stock assessments for neritic tunas, with narrow-barred Spanish mackerel, kawakawa and longtail tuna as priority species.

13. OTHER BUSINESS

13.1 Development of priorities for the Second Session of the Working Party on Neritic Tunas

100. The WPNT **AGREED** that narrow-barred Spanish mackerel, kawakawa and longtail tuna should be the priority species for research in 2012, although research should continue on other neritic tuna species.

101. The WPNT **AGREED** that any datasets for neritic tuna species held by various CPCs and other groups (e.g. SWIOFP) be provided to the IOTC Secretariat before the next meeting of the WPNT.

13.2 Development of priorities for an Invited Expert at the next Working Party on Neritic Tunas meeting

102. The WPNT **NOTED** with thanks, the outstanding contributions of the invited expert for the meeting, Dr. Shane Griffiths (CSIRO – Australia) who although could not attend the meeting in person, was able to attend via electronic conferencing. The WPNT **ENCOURAGED** him to maintain links with IOTC scientists to aid in the improvement of research approaches for IOTC neritic tuna stocks.

103. The WPNT **RECOMMENDED** the following core areas of expertise and priority areas for contribution that need to be enhanced for the next meeting of the WPNT in 2012, by an Invited Expert:
    - Expertise: stock structure/connectivity; including from regions other than the Indian Ocean.
    - Priority areas for contribution: narrow-barred Spanish mackerel, kawakawa and longtail tuna biology, ecology and fisheries.

13.3 Date and place of the Second Session of the Working Party on Neritic Tunas meeting

104. The WPNT participants were unanimous in thanking India for hosting the First Session of the WPNT and **COMMENDED** India on the warm welcome, the excellent facilities and assistance provided to the IOTC Secretariat in the organisation and running of the Session.

105. Following a discussion on who would host the Second Session of the WPNT, the WPNT **RECOMMENDED** that the IOTC Secretariat liaise with Malaysia to determine if it would be feasible to hold the next meeting of the WPNT in Kuala Lumpur or Penang in 2012. The exact dates and meeting location will be confirmed and communicated by the IOTC Secretariat to the Scientific Committee for its consideration at its next session to be held in December 2011.

106. The WPNT **NOTED** that the Meeting Participation Fund set up by the Commission in 2010 (Resolution 10/05) allowed the participation of most of the participants to this meeting, as neritic tunas are an important resource for coastal countries of the Indian Ocean, and **RECOMMENDED** that this fund be maintained in the future.

13.4 Election of a Chairperson and a Vice-Chairperson for the next biennium

107. The WPNT **THANKED** the acting-Chair for the First Session of the WPNT, Dr. Prathibha Rohit for her outstanding chairpersonship throughout the meeting.

108. The WPNT **CONSIDERED** candidates for the positions of Chair and Vice-Chair of the WPNT for the next *biennium*. Dr. Prathibha Rohit was nominated and elected as Chair, and Mr. Farhad Kaymaram was nominated and elected as Vice-Chair of the WPNT for the next *biennium*.

109. The WPNT **RECOMMENDED** that the Scientific Committee note the new Chair, Dr. Prathibha Rohit (India) and Vice-Chair, Mr. Farhad Kaymaram (I.R. Iran), of the WPNT for the next *biennium*.

14. REVIEW OF THE DRAFT, AND ADOPTION OF THE REPORT OF THE FIRST SESSION OF THE WORKING PARTY ON NERITIC TUNAS

110. The WPNT **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPNT01, provided at Appendix XII.

111. The report of the First Session of the Working Party on Neritic Tunas (IOTC–2011–WPNT01–R) was **ADOPTED** on the 16 November 2011.

APPENDIX I
LIST OF PARTICIPANTS

Chairperson
Dr. Prathibha **Rohit**
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APPENDIX II
AGENDA FOR THE FIRST WORKING PARTY ON NERITIC TUNAS

Date: 14–16 November 2011

Location: GRT Grand, Chennai, India

Time: 09:00 – 17:00 daily

Acting-Chair: Dr. Prathibha Rohit

1. **OPENING OF THE MEETING** (Secretariat)
2. **ELECTION OF A CHAIR FOR THE SESSION** (Secretariat)
3. **ADOPTION OF THE AGENDA** (Chair)
4. **OUTCOMES OF THE THIRTEENTH SESSION OF THE SCIENTIFIC COMMITTEE AND OF THE FIFTEENTH SESSION OF THE COMMISSION** (Chair)
5. **REVIEW OF DATA AVAILABLE FOR NERITIC TUNA SPECIES**
   - 5.1 Review of the statistical data available for neritic tuna species (Secretariat)
   - 5.2 Data from other sources (papers from CPCs)
   - 5.3 Develop recommendations to the Scientific Committee.
6. **INFORMATION ON BIOLOGY, ECOLOGY, FISHERIES, ENVIRONMENTAL DATA AND STOCK STRUCTURE RELATING TO NERITIC TUNAS**
   - 6.1 Longtail tuna: Review new information on the biology, stock structure, fisheries and associated environmental data (CPC papers).
   - 6.2 Narrow-barred Spanish mackerel: Review new information on the biology, stock structure, fisheries and associated environmental data (CPC papers).
   - 6.3 Other neritic tuna species: Review new information on the biology, stock structure, fisheries and associated environmental data (CPC papers).
7. **REVIEW OF INFORMATION ON THE STATUS OF LONGTAIL TUNA**
   - 7.1 Data for input into stock assessments:
     - Catch and effort
     - Catch at size
     - Growth curves and age-length key
     - Catch at age
     - CPUE indices and standardised CPUE indices
   - 7.2 Stock assessments
   - 7.3 Selection of Stock Status indicators
8. **REVIEW OF INFORMATION ON THE STATUS OF NARROW-BARRED SPANISH MACKEREL TUNA**
   - 8.1 Data for input into stock assessments:
     - Catch and effort
     - Catch at size
     - Growth curves and age-length key
     - Catch at age
     - CPUE indices and standardised CPUE indices
   - 8.2 Stock assessments
   - 8.3 Selection of Stock Status indicators
9. **REVIEW OF INFORMATION ON THE STATUS OF OTHER NERITIC TUNA SPECIES**
   - 9.1 Data for input into stock assessments:
     - Catch and effort
     - Catch at size
     - Growth curves and age-length key
     - Catch at age
     - CPUE indices and standardised CPUE indices
   - 9.2 Stock assessment updates
   - 9.3 Selection of Stock Status indicators

10. DEVELOPMENT OF THE TECHNICAL ADVICE ON THE STATUS OF THE STOCKS

11. EFFECT OF PIRACY ON NERITIC TUNA CATCHES

12. RESEARCH RECOMMENDATIONS AND PRIORITIES

12.1 Develop recommendations to the Scientific Committee

12.2 Develop a draft work plan.

13. OTHER BUSINESS

13.1 Development of priorities for the 2nd Session of the Working Party on Neritic Tunas

13.2 Development of priorities for an Invited Expert at the next Working Party on Neritic Tunas meeting

13.3 Date and place of the Second Session of the Working Party on Neritic Tunas meeting

13.4 Election of a Chairperson and a Vice-Chairperson for the next biennium

14. REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE FIRST SESSION OF THE WORKING PARTY ON NERITIC TUNAS.

APPENDIX III
LIST OF DOCUMENTS

Document	Title	Availability
IOTC–2011–WPNT01–01a	Draft agenda of the First Working Party on Neritic Tunas	✓(26 August)
IOTC–2011–WPNT01–01b	Draft annotated agenda of the First Working Party on Neritic Tunas	✓(4 November)
IOTC–2011–WPNT01–02	Draft List of documents	✓(4 November)
IOTC–2011–WPNT01–03	Outcomes of the Thirteenth Session of the Scientific Committee (Secretariat)	✓(4 November)
IOTC–2011–WPNT01–04	Outcomes of the Fifteenth Session of the Commission (Secretariat)	✓(4 November)
IOTC–2011–WPNT01–05	Review of the statistical data available for the neritic tuna species (M. Herrera and L. Pierre — Secretariat)	✓(4 November)
IOTC–2011–WPNT01–06	Withdrawn	Withdrawn
IOTC–2011–WPNT01–07	Template for a resource Executive Summary	✓(3 November)
IOTC–2011–WPNT01–08	Review of current Conservation and Management Measures relating to neritic tuna species (Secretariat)	✓(4 November)
IOTC–2011–WPNT01–09 Rev_1	Anaysis of catch of neritic tuna and sharks in Malacca Strait, west coast of Malaysia Peninsula. (B. Samsudin and N. Abu Bakar)	✓(10 November) ✓(11 November)
IOTC–2011–WPNT01–10	Tuna fishery of India with special reference to biology and population characteristics of neritic tunas exploited from Indian EEZ (P. Rohit, E.M. Abdussamad, K.P. Said Koya, M. Sivadas and S. Gosh)	✓(13 September)
IOTC–2011–WPNT01–11	Review on the status of small tunas along the Andaman Sea Coast of Thailand (P. Nootmorn, T. Jaiyen and C. Sangangam)	✓(25 October)
IOTC–2011–WPNT01–12	Phylogenetic relationships of coastal tunas inferred from mitochondrial DNA sequences in the cytochrome C oxidase I (COI) gene - a study on DNA barcoding. (V.K. Mudumala, V.S. Somvanshi and W. S. Lakra)	✓(28 September)
IOTC–2011–WPNT01–13	Preliminary demographic structure parameters of frigate tuna through landings in Antsiranana. (D.M. Rahombanjanaharay)	✓(28 October)
IOTC–2011–WPNT01–14	Feeding dynamics, consumption rates and daily ration of longtail tuna (*Thunnus tonggol*) in Australian waters, with emphasis on the consumption of commercially important prawns. (S.P. Griffiths, G.C. Fry, F.J. Manson and R.D. Pillans)	✓(15 September)
IOTC–2011–WPNT01–15	Stock assessment and efficacy of size limits on longtail tuna (*Thunnus tonggol*) caught in Australian waters. (S.P. Griffiths)	✓(15 September)
IOTC–2011–WPNT01–16	Age and growth of longtail tuna (*Thunnus tonggol*) in tropical and temperate waters of the central Indo-Pacific. (S.P. Griffiths, G.C. Fry, F. J. Manson and D.C. Lou)	✓(15 September)
IOTC–2011–WPNT01–17	Withdrawn	Withdrawn
IOTC–2011–WPNT01–18	Population dynamic parameters of *Thunnus tonggol* in the north of the Persian Gulf and Oman Sea. (F. Kaymaram, M. Darvishi, F. Parafkandeh, Sh. Ghasemi and S.A. Talebzadeh)	✓(26 October)
IOTC–2011–WPNT01–19	Biology, fisheries and status of longtail tuna (*Thunnus tonggol*), with special reference to recreational fisheries in Australian waters. (S.P. Griffiths, J. Pepperell, M. Tonks, W. Sawynok, L. Olyott, S. Tickell, M. Zischke, J. Burgess, E. Jones, D. Joyner, J. Lynne, C. Makepeace and K. Moyle)	✓(15 September)
IOTC–2011–WPNT01–20	Some information regarding narrow barred Spanish mackerel caught in Mozambique. (B.P. de Sousa)	✓(13 November)
IOTC–2011–WPNT01–21 Rev_1	Neritic tuna species caught drifting gillnet in Indian Ocean base in Cilacap-Indonesia. (A. Widodo, F. Satria, L. Sadiah and J. Riyanto)	✓(8 November) ✓(14 November)

Document	Title	Availability
IOTC–2011–WPNT01–22	Preliminary assessment of the biology and fishery for the narrow-barred Spanish mackerel, *Scomberomorus commerson* (Lacépède, 1800), in the southern Arabian Gulf. (E.M. Grandcourt, T.Z. Al Abdessalaam, F. Francis and A.T. Al Shamsi)	✓(31 August)
IOTC–2011–WPNT01–23	Population dynamic and biological aspects of *Scombermorus commerson* in the Persian Gulf and Oman Sea (Iranian coastal). (M. Darvishi, F. Kaymaram, A. Salarpouri, S. Behzadi and B. Daghooghi)	✓(25 October)
IOTC–2011–WPNT01–24	Temporal and size-related variation in the diet, consumption rate, and daily ration of mackerel tuna (*Euthynnus affinis*) in neritic waters of eastern Australia. (S.P. Griffiths, P.M. Kuhnert, G.F. Fry and F.J. Manson)	✓(15 September)
IOTC–2011–WPNT01–25	Population biology and assessment of Kawakawa (*Euthynnus affinis*) in Coastal Waters of the Persian Gulf and Sea of Oman (Hormozgan province). (S.A. Taghavi Motlagh, S.A. Hashemi and P. Kochanian)	✓(01 September)
IOTC–2011–WPNT01–26	Status of frigate tuna (*Auxis thazard*) fishery in the Maldives. (M. Ahusan and M.S. Adam)	✓(13 November)
IOTC–2011–WPNT01–27	Withdrawn	Withdrawn
IOTC–2011–WPNT01–28	Kenyan sports fishing Kawakawa and Frigate Tuna CPUE. (S. Ndegwa)	✓(7 November)
IOTC–2011–WPNT01–29 (presentation only)	Restricted vertical and cross-shelf movements of longtail tuna (*Thunnus tonggol*) in Australian waters as determined by pop-up archival tags. (S. Griffiths)	✓(13 November)
IOTC–2011–WPNT01–30	Reproductive biology of longtail tuna (*Thunnus tonggol*) from coastal waters off Taiwan. (W-C. Chiang, H-H. Hsu, S.-C. Fu, S.-C. Chen, C.-L. Sun, W.-Y. Chen, D.-C. Liu and W.-C. Su)	✓(4 November)
IOTC–2011–WPNT01–31	Status of kawakawa (*Euthynnus affinis*) fishery in the Maldives. (M. Ahusan and M.S. Adam)	✓(13 November)
Information papers		
IOTC–2011–WPNT01–INF01	IOTC SC - Guidelines for the Presentation of Stock Assessment Models	✓(21 October)
IOTC–2011–WPNT01–INF02	FAO Fisheries and Aquaculture Report No. 970 2009. Workshop on fishery stock indicators and stock status. Tehran, Islamic Republic of Iran, 26–29 July 2009	✓(21 October)
IOTC–2011–WPNT01–INF03	The Surveying of Biological Characteristics of Longtail tuna (*Thunnus tonggol*) in the Southern Coasts of Iran. (M. Hedayatifard)	✓(21 October)
IOTC–2011–WPNT01–INF04	A per-recruit assessment of the kingfish (*Scomberomorus commerson*) resource of Oman with an evaluation of the effectiveness of some management regulations. (A. Govender, H. Al-Oufi, J.L. McIlwain and M.C. Claereboudt)	✓(31 August)
IOTC–2011–WPNT01–INF05	Fisheries exploitation pattern of narrow-barred Spanish mackerel, *Scomberomorus commerson*, in Oman and potential management options. (S. Ben Meriem, A. Al-Marzouqi and J. Al-Mamry)	✓(31 August)
IOTC–2011–WPNT01–INF06	Mitochondrial DNA analyses of narrow-barred Spanish mackerel (*Scomberomorus commerson*) suggest a single genetic stock in the ROPME sea area (Arabian Gulf, Gulf of Oman, and Arabian Sea). (J.P. Hoolihan, P. Anandh and L. van Herwerden)	✓(31 August)
IOTC–2011–WPNT01–INF07	Assessment of the fishery for Kingfish (Kanaad/Khabat), *Scomberomorus commerson*, in the waters off Abu Dhabi Emirate. (E. Grandcourt, T. Z. Al Abdessalaam, F. Francis, A. T. Al Shamsi, S. Al Ali, K. Al Ali, S. Hartmann and A. Al Suwaidi)	✓(31 August)

Document	Title	Availability
IOTC–2011–WPNT01–INF08	Spatial variation in age and growth of the kingfish (*Scomberomorus commerson*) in the coastal waters of the Sultanate of Oman. (J.L. McIlwain, M.R. Claereboudt, H.S. Al-Oufi, S. Zaki and J.S. Goddard)	✓(31 August)
IOTC–2011–WPNT01–INF09	Patterns of reproduction and spawning of the kingfish (*Scomberomorus commerson*, Lacépède) in the coastal waters of the Sultanate of Oman. (M.R. Claereboudt, J.L. McIlwain, H.S. Al-Oufi and A.A. Ambu-Ali)	✓(31 August)
IOTC–2011–WPNT01–INF10	Reproduction and spawning patterns of the *Scomberomorus commerson* in the Iranian coastal waters of the Persian Gulf & Oman Sea. (F. Kaymaram, S.A. Hossainy, M. Darvishi, S.A. Talebzadeh and M.S. Sadeghi)	✓(9 November)
IOTC–2011–WPNT01–INF11	Sustainability Assessment Report for Tonggol/longtail tuna (*Thunnus tonggol*) taken in the Gulf of Thailand and Andaman Sea. (Poseidon Aquatic Resource Management Ltd. for Abba Seafood AB and Sustainable Fisheries Partnership)	✓(9 November)

APPENDIX IV
SUMMARY OF DATA AVAILABLE AT THE IOTC SECRETARIAT

Extract from IOTC–2011–WPNT01–05

Longtail tuna

Longtail tuna – Catch trends

Longtail tuna is caught mainly using gillnets and, to a lesser extent, purse seine and trolling (Fig. 1). The catch estimates for longtail tuna were derived from small amounts of information and are therefore uncertain. Estimated catches of longtail tuna increased steadily from the mid 1950's, reaching around 20,000 t in the mid-1970's and over 50,000 t by the mid-1980's. Catches reached record levels in 2010, at 141,000 t (preliminary estimate). The average annual catch estimated for the period 2006–2010 is 116,000 t.

In recent years, the countries attributed with the highest catches of longtail tuna are the I.R. Iran (34%) and Indonesia (31%) and, to a lesser extent, Oman, Pakistan, Malaysia and India (22%) (Fig. 2). In particular, I.R. Iran has reported large increases in the catch of longtail tuna in 2009 and 2010. This may be the consequence of increased drifting gillnet effort in coastal waters due to the threat of Somali piracy in the western tropical Indian Ocean.

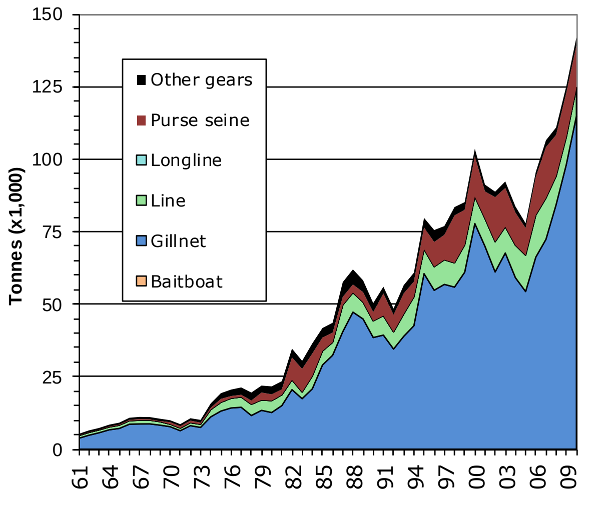

Fig. 1. Longtail tuna: Catches by gear recorded in the IOTC Database (1961–2010)

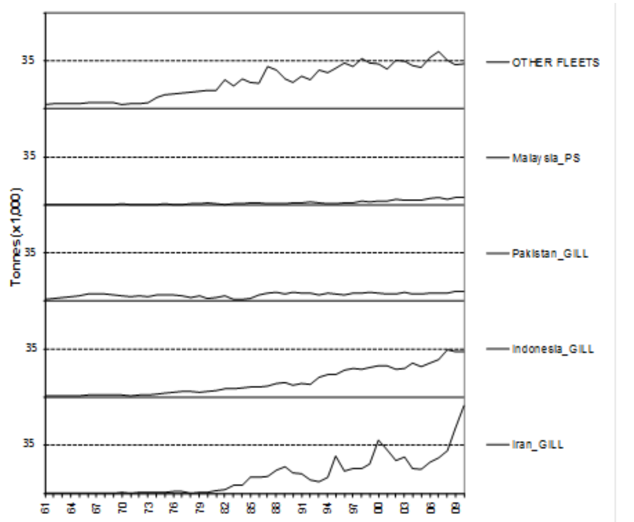

Fig. 2. Longtail tuna: Catches recorded in the IOTC Database for main fishing fleets (1961–2010)

Longtail tuna – Uncertainty of catches

Retained catches are uncertain (Fig. 3), notably for the following fisheries:

- Artisanal fisheries of Indonesia: Indonesia did not report catches of longtail tuna by species or by gear for 1950–2004; catches of longtail tuna, kawakawa and other species were reported aggregated for this period. The IOTC Secretariat used the catches reported since 2005 to break the aggregates for 1950–2004 by gear and species. The Indonesian catches estimated for longtail tuna represent more than 30% of the total catches of this species in the Indian Ocean in recent years.
- Artisanal fisheries of India and Oman: Although these countries report catches of longtail tuna, until recently the catches have not been reported by gear. The IOTC Secretariat used alternative information to assigning the catches reported by species. The catches of longtail tuna that had to be allocated by gear represented 12% of the total catches of this species in recent years.
- Artisanal fisheries of Mozambique, Myanmar, and Somalia: None of these countries have reported catches to the IOTC Secretariat. Catch levels are unknown but are not considered large.
- Other artisanal fisheries: The IOTC Secretariat estimated catches of longtail tuna for the artisanal fisheries of Yemen (no data reported to the IOTC Secretariat) and Malaysia (catches not reported

by species). The catches estimated for longtail tuna represent 9% of the total catches of this species in recent years.

- Discard levels are believed to be very low although they are unknown for most fisheries.
- Changes to the catch series: There have been significant changes to the catches of longtail tuna since December 2010, following two reviews of catches for the coastal fisheries of India and, to a lesser extent, Indonesia, involving marked changes in catches by species. The new catches estimated are markedly lower than those previously recorded representing overall 65% and 75% of the catches recorded in the past for India and Indonesia, respectively.

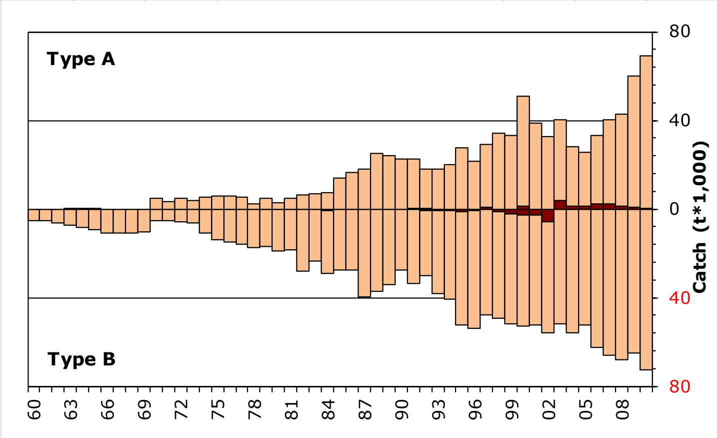

Fig. 3. Longtail tuna: Uncertainty of annual catch estimates (1961–2010) (Data as of October 2011)

*Catches below the zero-line (**Type B**) refer to fleets that do not report catch data to the IOTC (estimated by the IOTC Secretariat), do not report catch data by gear and/or species (broken by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document. Catches over the zero-line (**Type A**) refer to fleets for which no major inconsistencies have been found to exist. Light bars represent data for artisanal fleets and dark bars represent data for industrial fleets.*

Longtail tuna – Effort trends

Effort trends are unknown for longtail tuna in the Indian Ocean.

Longtail tuna – Catch–per–unit–effort (CPUE) trends

Standardised CPUE series have not yet been developed. Nominal CPUE series are however available from some fisheries but they are considered highly incomplete. In most cases catch-and-effort data are only available for short periods of time. Reasonably long catch and effort series (extending for more than 10 years) are only available for Thailand small purse seines and gillnets (Fig. 4). No catch and effort data are available from sports fisheries, other than for partial data from the sports fisheries of Kenya.

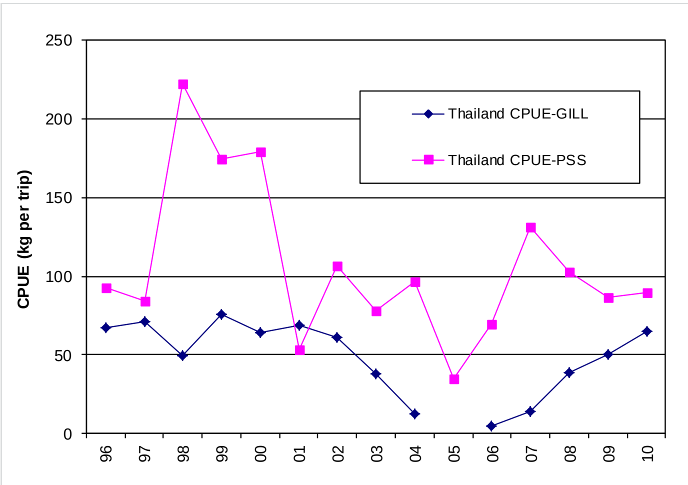

Fig. 4. Longtail tuna: Nominal CPUE series for the gillnet (GILL) and coastal purse seine (PSS) fisheries of Thailand derived from the available catches and effort data (1996–2010)

Longtail tuna – Fish size or age trends (e.g. by length, weight, sex and/or maturity)

- The size of longtail tuna taken by the Indian Ocean fisheries typically ranges between 15–120 cm depending on the type of gear used, season and location. The fisheries operating in the Andaman Sea (coastal purse seines and troll lines) tend to catch longtail tuna of small size (15–55cm) while the drifting gillnet fisheries operating in the Arabian Sea catch larger specimens (40–100cm).
- Trends in average weight can only be assessed for I.R. Iran drifting gillnets but the amount of specimens measured has been very low in recent years. The length frequency data available from the mid-eighties to the early nineties was obtained with the support of the IPTP (Indo-Pacific Tuna Programme). Unfortunately, data collection did not continue after the end of the IPTP activities.
- Catch-at-Size(Age) tables are not available for the longtail tuna due to the paucity of size data available from most fleets and the uncertain status of the catches for this species.
- Sex ratio data have not been provided to the Secretariat by CPCs.

Frigate tuna

Frigate tuna – Catch trends

Frigate tuna is taken from across the Indian Ocean area using drifting gillnets, pole-and-lines, handlines and trolling (Fig. 5). This species is also an important bycatch for industrial purse seiners and is the target of some ring net fisheries. The catch estimates for frigate tuna were derived from very small amounts of information and are therefore highly uncertain.

Estimated catches have increased steadily since the late 1970’s, reaching around 15,000 t in the early 1980’s and over 45,000 t by the mid-1990’s. Catches increased markedly from 2006 and have been in excess of 65,000 t since 2007 (Fig. 6). The average annual catch estimated for the period 2006 to 2010 is 64,200 t with the highest catches recorded in 2010 of 71,000 t.

In recent years, the countries attributed with the highest catches are Indonesia (60%), India (17%), I.R. Iran (8%) and the Maldives (6%) (Fig. 7).

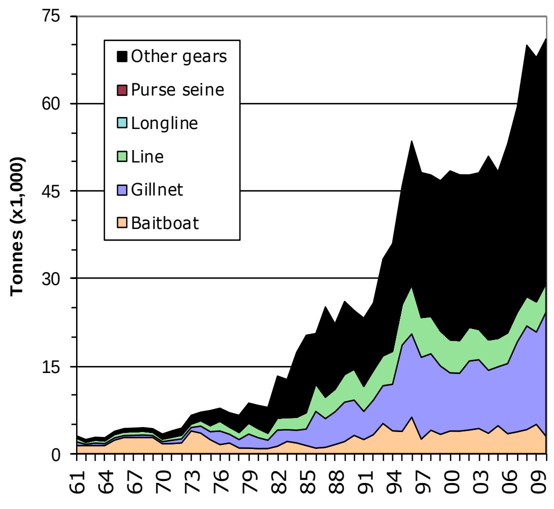

Fig. 5. Frigate tuna: Catches by gear recorded in the IOTC Database (1961–2010)

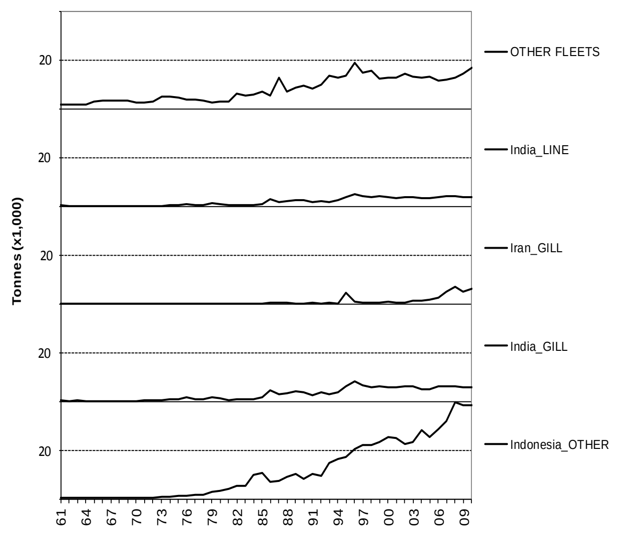

Fig. 6. Frigate tuna: Catches recorded in the IOTC Database for main fishing fleets (1961–2010)

Frigate tuna – Uncertainty of catches

Retained catches are uncertain (Fig. 7), notably for the following fisheries:

- Artisanal fisheries of Indonesia: Indonesia did not report catches of frigate tuna by species or by gear for 1950–2004; catches of frigate tuna, bullet tuna and other species were reported aggregated for this period. The IOTC Secretariat used the catches reported since 2005 to break the aggregates for 1950–2004 by gear and species. The Indonesian catches estimated for frigate tuna represent around 60% of the total catches of this species in the Indian Ocean in recent years.

- Artisanal fisheries of India: Although India reports catches of frigate tuna they are not always reported by gear. The IOTC Secretariat has allocated the catches of frigate tuna by gear for years in which this information was not available. In recent years, the catches of frigate tuna in India have represented 17% of the total catches of this species in the Indian Ocean.
- Artisanal fisheries of Mozambique, Myanmar and Somalia: None of these countries have reported catches to the IOTC Secretariat, thus catch levels are unknown.
- Other artisanal fisheries: The catches of frigate tuna and bullet tuna are seldom reported by species and, when reported by species, they usually refer to both species (due to mislabelling, with all catches assigned to the frigate tuna).
- Industrial fisheries: The catches of frigate tuna recorded for industrial purse seiners are thought to be a fraction of those retained on board. Due to this species being a bycatch, its catches are seldom recorded in the logbooks, nor can they be monitored in port. The EU recently reported catch levels of frigate tuna for its purse seine fleet, for 2003–2007, estimated using observer data.
- Discard levels are moderate for industrial purse seine fisheries. The EU recently reported discard levels of frigate tuna for its purse seine fleet, for 2003–2007, estimated using observer data.
- Changes to the catch series: The catch series of frigate tuna has changed substantially from those estimated in 2010, following reviews of catches for the coastal fisheries in Indonesia and, to a lesser extent India, involving marked changes in catches by species. Overall, the new catches estimated for Indonesian fisheries are three times higher than those recorded in the past.

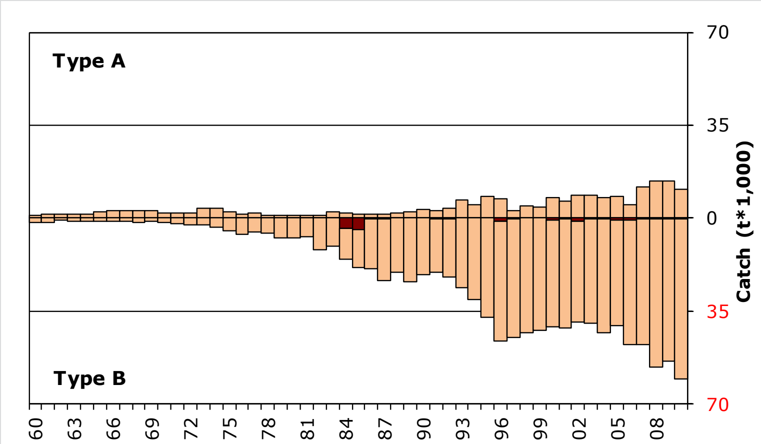

Fig. 7. Frigate tuna: Uncertainty of annual catch estimates (1960–2010) (Data as of October 2011)
Catches below the zero-line (Type B) refer to fleets that do not report catch data to the IOTC (estimated by the IOTC Secretariat), do not report catch data by gear and/or species (broken by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document. Catches over the zero-line (Type A) refer to fleets for which no major inconsistencies have been found to exist. Light bars represent data for artisanal fleets and dark bars represent data for industrial fleets.

Frigate tuna – Effort trends

Effort trends are unknown for frigate tuna in the Indian Ocean.

Frigate tuna – Catch–per–unit–effort (CPUE) trends

Standardised CPUE series have not yet been developed. Catch-and-effort series are available from some fisheries but they are considered highly incomplete. In most cases catch-and-effort data are only available for short periods. Reasonably long catch-and-effort series (extending for more than 10 years) are only available for Maldives baitboats and troll lines (Fig. 8) and Sri Lanka gillnets. The catches and effort recorded for Sri Lankan gillnets are, however, thought to be inaccurate due to the dramatic changes in CPUE recorded between consecutive years.

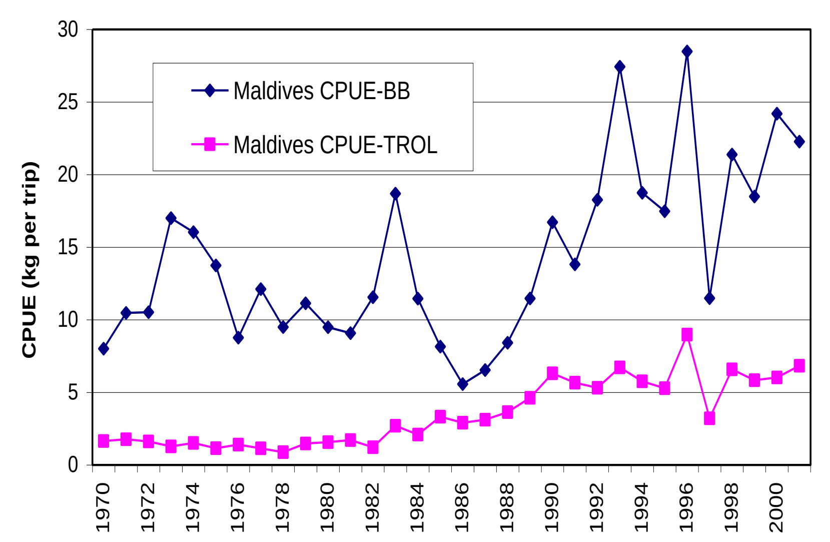

Fig. 8. Frigate tuna: Nominal CPUE series for the baitboat (BB) and line (LINE) fisheries of Maldives derived from the available catches and effort data (1970–2001)

Frigate tuna – Fish size or age trends (e.g. by length, weight, sex and/or maturity)

- The size of frigate tuna taken by Indian Ocean fisheries typically ranges between 20–50 cm depending on the type of gear used, season and location. The fisheries operating in the Andaman Sea (coastal purse seines and troll lines) tend to catch frigate tuna of small to medium size (15–40cm) while the gillnet, baitboat and other fisheries operating in the Indian Ocean catch usually larger specimens (25–50cm). Length frequency data for the bullet tuna is only available for some Sri Lanka fisheries and periods. These fisheries catch bullet tuna ranging between 15–35 cm.
- Trends in average weight can only be assessed for Sri Lankan gillnets and Maldivian pole-and-lines but the amount of specimens measured has been very low in recent years. The length frequency data available from the mid-eighties to the early nineties was obtained with the support of the IPTP (Indo-Pacific Tuna Programme). Unfortunately, data collection did not continue in most countries after the end of the IPTP activities.
- Catch-at-Size(Age) tables are not available for the frigate tuna due to the paucity of size data available from most fleets and the uncertain status of the catches for this species.
- Sex ratio data have not been provided to the Secretariat by CPCs.

Bullet tuna

Bullet tuna – Catch trends

Bullet tuna is caught mainly using gillnet, handline, and trolling gears across the broader Indian Ocean area (Fig. 9). This species is also an important catch for artisanal purse seiners. The catch estimates for bullet tuna were derived from very small amounts of information and are therefore highly uncertain.

Estimated catches of bullet tuna reached around 1,000 t in the early 1990's, increasing markedly in the following years to reach a peak in 1998, at around 2,800 t. The catches decreased sharply in the following years and remained at values of around 2,000 t until the mid-2000's, to increase again sharply up to the 4,200 t recorded in 2010, the highest catches ever recorded for this species. The average annual catch estimated for the period 2006 to 2010 is 2,900 t. However, the high catches of bullet tuna recorded since 2006, compared to previous years, are thought to be unrealistic. The difference in catches may come from improved identification of specimens of frigate tuna and bullet tuna in recent years, leading to higher catches of bullet tuna reported to the IOTC. Bullet tuna and frigate tuna are very similar and mislabelling is thought to be overspread. In recent years, the countries attributed with the highest catches of bullet tuna are Sri Lanka and India (Fig. 10).

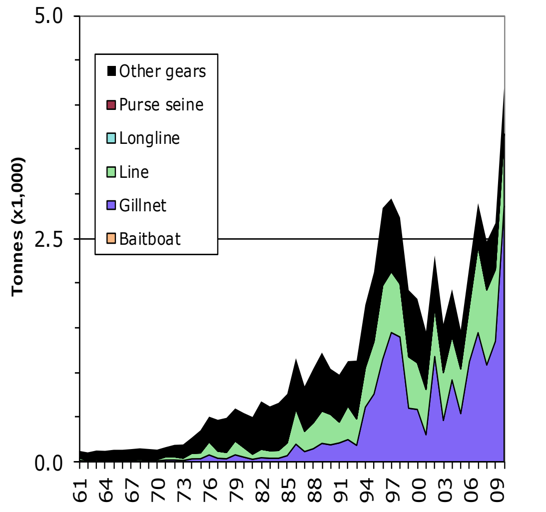

Fig. 9. Bullet tuna: Catches of by gear recorded in the IOTC Database (1961–2010)

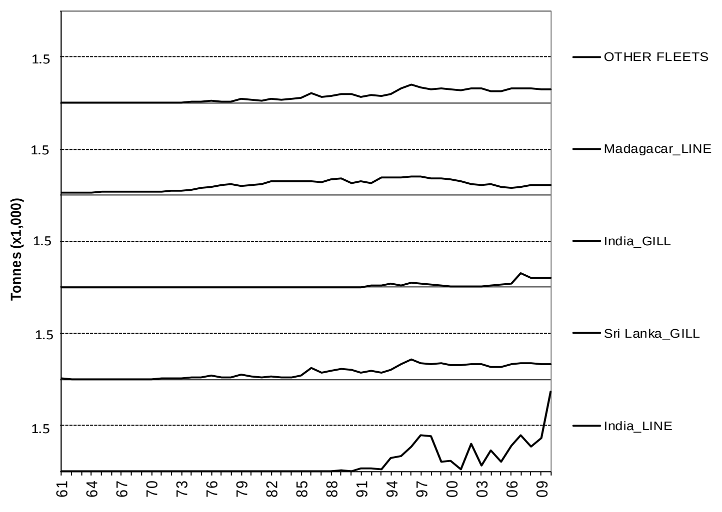

Fig. 10. Bullet tuna: Catches recorded in the IOTC Database for main fishing fleets (1960–2010)

Bullet tuna – Uncertainty of catches

Retained catches are highly uncertain (Fig. 11), for all fisheries:

- Aggregation: Bullet tunas are usually not reported by species, being aggregated with frigate tunas or, less frequently, other small tuna species.
- Mislabelling: Bullet tunas are usually mislabelled as frigate tuna, their catches reported under the latter species.
- Under reporting: the catches of bullet tuna by industrial purse seiners are rarely, if ever, reported.

It is for the above reasons that the catches of bullet tuna in the IOTC database are thought to represent only a small fraction of the total catches of this species in the Indian Ocean. In particular, catches reported by India in recent years are unreliable and need to be verified.

- Discard levels are moderate for industrial purse seine fisheries. The EU recently reported discard levels of bullet tuna for its purse seine fleet, for 2003–2008, estimated using observer data.
- Changes to the catch series: The catch series of bullet tuna has changed substantially since estimates made in 2010, following reviews of catches for the coastal fisheries in Indonesia and, to a lesser extent India, involving marked changes in catches by species.

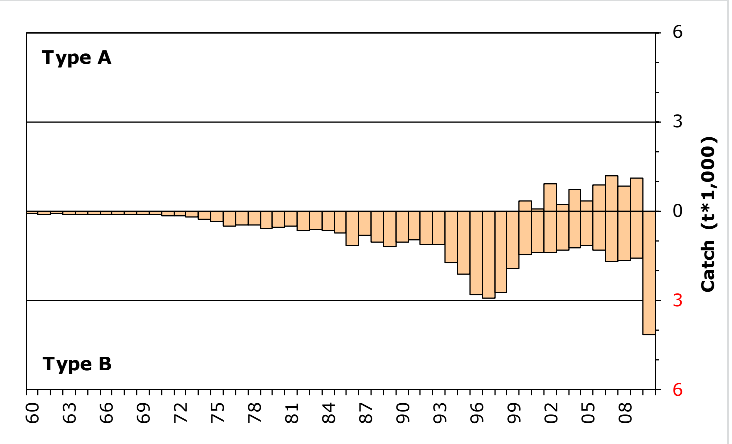

Fig. 11. Bullet tuna: Uncertainty of annual catch estimates (1960–2010) (Data as of October 2011)
Catches below the zero-line (Type B) refer to fleets that do not report catch data to the IOTC (estimated by the IOTC Secretariat), do not report catch data by gear and/or species (broken by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document. Catches over the zero-line (Type A) refer to fleets for which no major inconsistencies have been found to exist. Light bars represent data for artisanal fleets and dark bars represent data for industrial fleets.

Bullet tuna – Effort trends

Effort trends are unknown for bullet tuna in the Indian Ocean.

Bullet tuna – Catch–per–unit–effort (CPUE) trends

Standardised CPUE series have not yet been developed. Nominal CPUE series are however available from some fisheries but they are considered highly incomplete and are usually considered to be of poor quality for the fisheries having reasonably long catch-and-effort data series, as it is the case with the gillnet fisheries of Sri Lanka (Fig. 12).

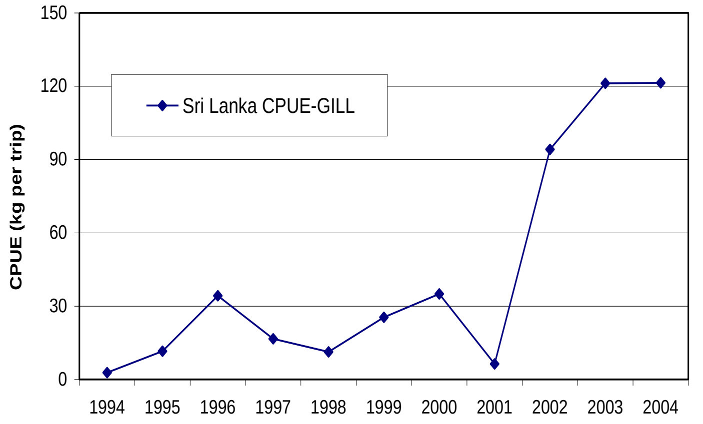

Fig. 12. Bullet tuna: Nominal CPUE series for the gillnet fishery of Sri Lanka derived from the available catches and effort data (1994–2004)

Bullet tuna – Fish size or age trends (e.g. by length, weight, sex and/or maturity)

- The size of bullet tuna taken by the Indian Ocean fisheries typically ranges between 13–48 cm depending on the type of gear used, season and location.
- Trends in average weight cannot be assessed for most fisheries. Reasonable long series of length frequency data are only available for Sri Lankan gillnets and lines but the amount of specimens measured has been very low in recent years.
- Catch-at-Size(Age) tables are not available for bullet tuna due to the paucity of size data available from most fleets and the uncertain status of the catches for this species.
- Sex ratio data have not been provided to the Secretariat by CPCs.

Kawakawa

Kawakawa – Catch trends

Kawakawa is caught mainly by coastal purse seines, gillnets and, to a lesser extent, handlines and trolling (Fig. 13) and may be also an important by-catch of the industrial purse seiners. The catch estimates for kawakawa were derived from very small amounts of information and are therefore highly uncertain.

Annual estimates of catches for kawakawa increased markedly from around 10,000 t in the mid-1970’s to reach the 50,000 t mark in the mid-1980’s and 131,000 t in 2009, the highest catches ever recorded for this species. Since 1997, catches have been over 100,000 t. The average annual catch estimated for the period 2006 to 2010 is 123,000 t. Catches in 2010 were around 130,000 t. The majority of catches of kawakawa are taken in the East Indian Ocean, representing around 60% of the total catches in recent years. In recent years, the countries attributed with the highest catches are Indonesia (35%), India (19%), Iran (13%), and Malaysia (10%) (Fig. 14).

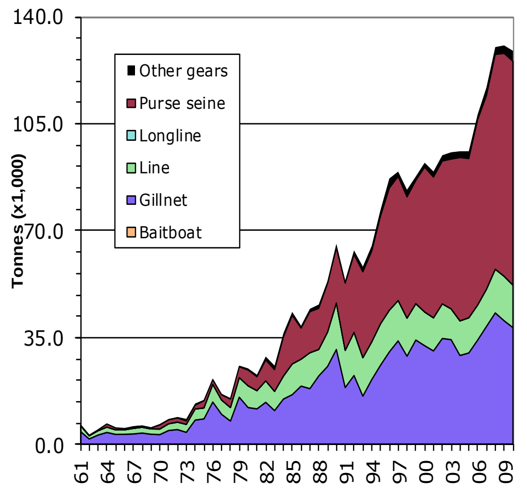

Fig. 13. Kawakawa: Catches by gear recorded in the IOTC Database (1960–2010)

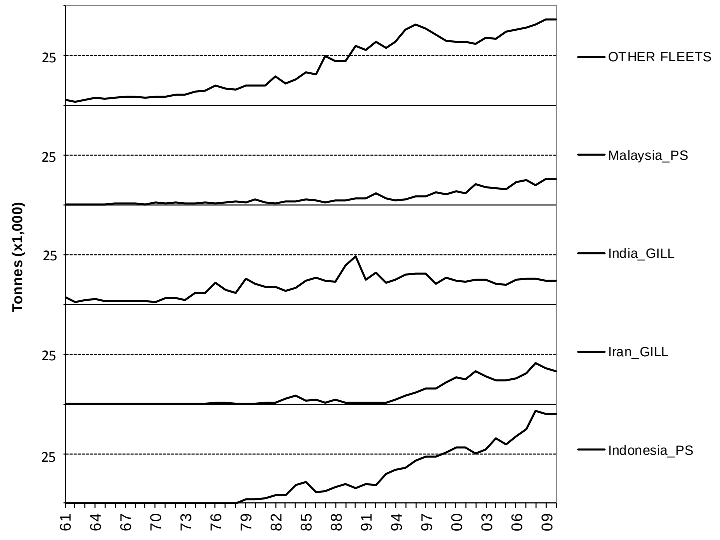

Fig. 14. Kawakawa: Catches recorded in the IOTC Database for main fishing fleets (1960–2010)

Kawakawa – Uncertainty of catches

Retained catches are uncertain (Fig. 15), notably for the following fisheries:

- Artisanal fisheries of Indonesia: Indonesia did not report catches of kawakawa by species or by gear for 1950–2004; catches of kawakawa, longtail tuna and, to a lesser extent, other species were reported aggregated for this period. The IOTC Secretariat used the catches reported since 2005 to break the aggregates for 1950–2004 by gear and species. The catches of kawakawa estimated for this component represent around 35% of the total catches of this species in recent years.
- Artisanal fisheries of India: Although India reports catches of kawakawa they are not always reported by gear. The IOTC Secretariat has allocated the catches of kawakawa by gear for years in which this information was not available. The catches of kawakawa have represented 19% of the total catches of this species in the Indian Ocean in recent years.
- Artisanal fisheries of Mozambique, Myanmar and Somalia: None of these countries have ever reported catches to the IOTC Secretariat. Catch levels are unknown.
- Other artisanal fisheries: The catches of kawakawa are usually not reported by species, being combined with catches of other small tuna species like skipjack tuna and frigate tuna (coastal purse seiners of Malaysia and Thailand).
- Industrial fisheries: The catches of kawakawa recorded for industrial purse seiners are thought to be a fraction of those retained on board. Due to this species being a bycatch, its catches are seldom recorded in the logbooks, nor are they monitored in port. The EU recently reported catch levels of frigate tuna for its purse seine fleet, for 2003–2007, estimated using observer data.
- Discard levels are moderate for industrial purse seine fisheries. The EU recently reported discard levels of kawakawa for its purse seine fleet, for 2003–2007, estimated using observer data.
- Changes to the catch series: The catch series of kawakawa has changed substantially since those estimated in 2010, following reviews of catches for the coastal fisheries in Indonesia and, to a lesser extent India, involving marked changes in catches by species. Overall, the new catches estimated for Indonesian fisheries represent the 60% of those recorded in the past.

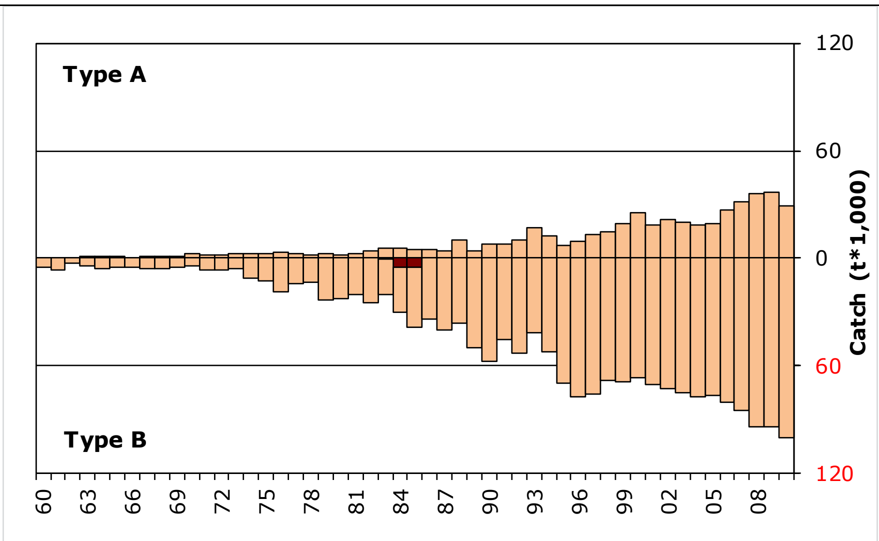

Fig. 15. Kawakawa: Uncertainty of annual catch estimates (1960–2010)
*Catches below the zero-line (**Type B**) refer to fleets that do not report catch data to the IOTC (estimated by the IOTC Secretariat), do not report catch data by gear and/or species (broken by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document. Catches over the zero-line (**Type A**) refer to fleets for which no major inconsistencies have been found to exist. Light bars represent data for artisanal fleets and dark bars represent data for industrial fleets.*

Kawakawa – Effort trends

Effort trends are unknown for kawakawa in the Indian Ocean.

Kawakawa – Catch–per–unit–effort (CPUE) trends

Standardised CPUE series have not yet been developed. Nominal CPUE series are however available from some fisheries but they are considered incomplete. In most cases catch-and-effort data are only available for short periods. Reasonably long catch-and-effort data series (extending for more than 10 years) are only available for Maldives baitboats and troll lines and Sri Lanka gillnets (Fig. 16). The catch-and-effort data recorded for Sri Lankan gillnets are, however, thought to be inaccurate due to the dramatic changes in CPUE recorded between consecutive years.

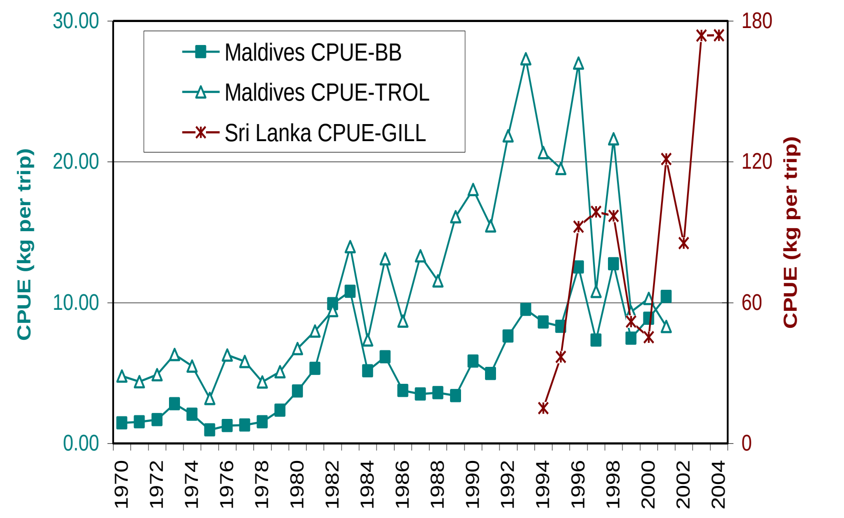

Fig. 16. Kawakawa: Nominal CPUE series for the baitboat (BB) and troll line (TROL) fisheries of Maldives (left axis; 1970–2001) and the gillnet fishery of Sri Lanka (right axis; 1994–2004) derived from the available catches and effort data

Kawakawa – Fish size or age trends (e.g. by length, weight, sex and/or maturity)

- Trends in average weight can only be assessed for Sri Lankan gillnets but the amount of specimens measured has been very low in recent years. The length frequency data available from the mid-eighties to the early nineties was obtained with the support of the IPTP (Indo-Pacific Tuna Programme). Unfortunately, data collection did not continue after the end of the IPTP activities..

- The size of kawakawa taken by the Indian Ocean fisheries typically ranges between 20–60 cm depending on the type of gear used, season and location. The coastal purse seine fisheries operating in the Andaman Sea tend to catch kawakawa of small size (15–30 cm) while the gillnet, baitboat and other fisheries operating in the Indian Ocean catch usually larger specimens (25–55 cm).
- Catch-at-Size(Age) tables are not available for kawakawa due to the paucity of size data available from most fleets and the uncertain status of the catches for this species.
- Sex ratio data have not been provided to the Secretariat by CPCs.

Narrow-barred Spanish mackerel

Narrow-barred Spanish mackerel – Catch trends

Narrow-barred Spanish mackerel is targeted throughout the Indian Ocean by artisanal and recreational fishers. The main method of capture is gillnet, but significant numbers of are also caught trolling (Fig. 17).

The catch estimates for narrow-barred Spanish mackerel were derived from very small amounts of information and are therefore highly uncertain. The catches of narrow-barred Spanish mackerel increased from around 50,000 t the mid-1970’s to over 100,000 t by the mid-1990’s. The highest catches of Spanish mackerel were recorded in 2010, amounting to 124,000 t. In recent years, catches have been increasing, with average annual catches for 2006–2010 estimated to be at around 116,000 t. Spanish mackerel is caught in both Indian Ocean basins, with higher catches recorded in the West.

In recent years, the countries attributed with the highest catches of Spanish mackerel are India (29%) and Indonesia (23%) and, to a lesser extent, Iran, Pakistan, and Madagascar (20%) (Fig. 18).

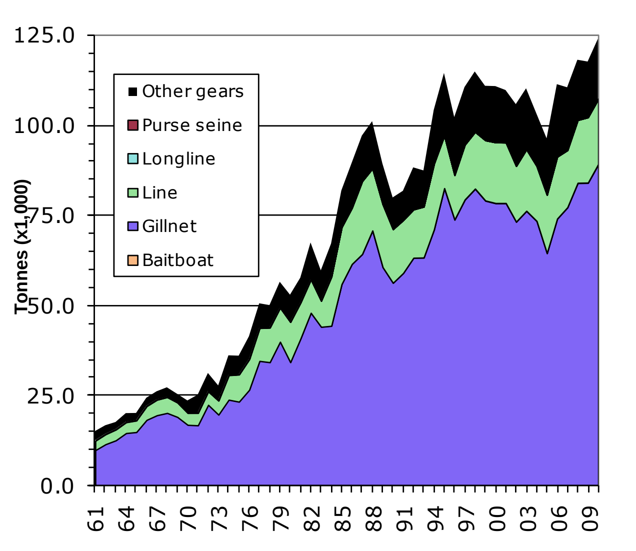

Fig. 17. Narrow-barred Spanish mackerel: Catches by gear recorded in the IOTC Database (1961–2010)

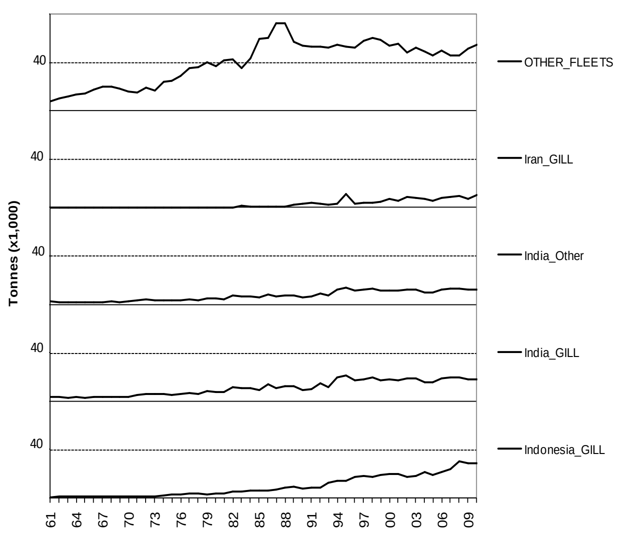

Fig. 18. Narrow-barred Spanish mackerel: Catches recorded in the IOTC Database for main fishing fleets (1961–2010)

Narrow-barred Spanish mackerel – uncertainty of catches

Retained catches are uncertain (Fig. 19), notably for the following fisheries:

- Artisanal fisheries of India and Indonesia: India and Indonesia have only recently reported catches of narrow-barred Spanish mackerel by gear, including catches by gear for the years 2005–2008 and 2007–2008, respectively. In both cases, the IOTC Secretariat used the catches reported by gear to break previous catches of this species by gear. The catches of narrow-barred Spanish mackerel estimated for this component represent more than 52% of the total catches of this species in recent years.

- Artisanal fisheries of Madagascar: Madagascar has never reported catches of narrow-barred Spanish mackerel to the IOTC Secretariat. During 2010 the IOTC Secretariat conducted a review aiming to break the catches recorded in the FAO database as narrow-barred Spanish mackerel by species, on the assumption that all catches of neritic tunas had been combined under this name. The new catches estimated are thought to be very uncertain.
- Artisanal fisheries of Mozambique, Myanmar and Somalia: None of these countries have ever reported catches to the IOTC Secretariat. Catch levels are unknown.
- Other artisanal fisheries: Oman and the United Arab Emirates do not report catches of narrow-barred Spanish mackerel by gear. Although most of the catches are believed to be taken by gillnets, some fish may be also caught by using small surrounding nets, lines or other artisanal gears. Thailand and Malaysia report catches of narrow-barred Spanish mackerel and Indo-Pacific king mackerel aggregated.
- All fisheries: In some cases the catches of seerfish species are mislabelled, the catches of Indo-Pacific king mackerel and, to a lesser extent, other seerfish species, labelled as narrow-barred Spanish mackerel. Similarly, the catches of wahoo in some longline fisheries are thought to be mislabelled as narrow-barred Spanish mackerel. This mislabelling is thought to have little impact in the case of the narrow-barred Spanish mackerel but may be important for other seerfish species.
- Discard levels are believed to be low although they are unknown for most fisheries.
- Changes to the catch series: The catch series of narrow-barred Spanish mackerel has changed since those estimated in 2010, following reviews of catches for the coastal fisheries in Indonesia and India, involving marked changes in catches by species. Overall, the new catches estimated represent the 98% of those recorded in the past.

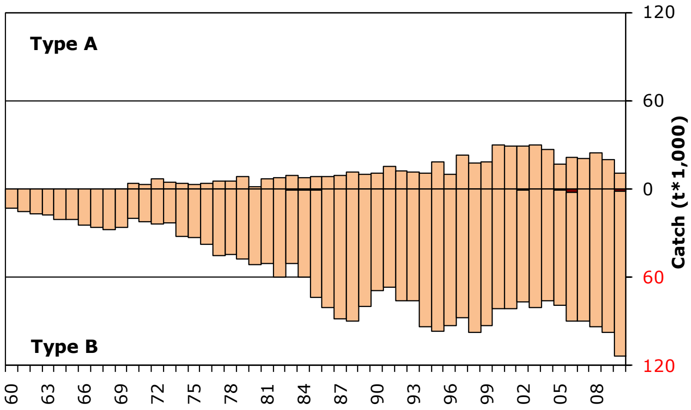

Fig. 19. Narrow-barred Spanish mackerel: Uncertainty of annual catch estimates (1960–2010) (Data as of November 2011)

Catches below the zero-line (Type B) refer to fleets that do not report catch data to the IOTC (estimated by the IOTC Secretariat), do not report catch data by gear and/or species (broken by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document. Catches over the zero-line (Type A) refer to fleets for which no major inconsistencies have been found to exist. Light bars represent data for artisanal fleets and dark bars represent data for industrial fleets

Narrow-barred Spanish mackerel – Effort trends

Effort trends are unknown for narrow-barred Spanish mackerel in the Indian Ocean.

Narrow-barred Spanish mackerel – Catch–per–unit–effort (CPUE) trends

Standardised CPUE series have not yet been developed. Nominal CPUE series are however available from some fisheries but they are considered highly incomplete. In most cases catch-and-effort data are only available for short periods. Reasonably long catch-and-effort data series (extending for more than 10 years) are only available for Sri Lanka gillnets (Fig. 20). The catches and effort recorded are, however, thought to be unrealistic due to the dramatic changes in CPUE recorded in 2003 and 2004.

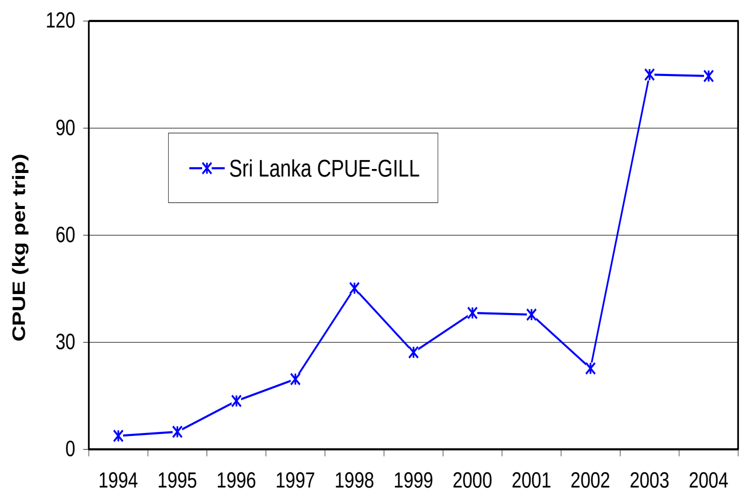

Fig. 20. Narrow-barred Spanish mackerel: Nominal CPUE series for the gillnet fishery of Sri Lanka derived from the available catches and effort data (1994–2004)

Narrow-barred Spanish mackerel – Fish size or age trends (e.g. by length, weight, sex and/or maturity)

- The size of narrow-barred Spanish mackerel taken by the Indian Ocean fisheries typically ranges between 30–140 cm depending on the type of gear used, season and location. The size of narrow-barred Spanish mackerel taken varies by location with 32–119 cm fish taken in the Eastern Peninsular Malaysia area, 17–39 cm fish taken in the East Malaysia area and 50–90 cm fish taken in the Gulf of Thailand. Similarly, Spanish mackerel caught in the Oman Sea are typically larger than those caught in the Persian Gulf.
- Trends in average weight can only be assessed for Sri Lankan gillnets but the amount of specimens measured has been very low in recent years. The length frequency data available from the mid-eighties to the early nineties was obtained with the support of the IPTP (Indo-Pacific Tuna Programme). Unfortunately, data collection did not continue after the IPTP activities came to an end.
- Catch-at-Size(Age) tables are not available for narrow-barred Spanish mackerel due to the paucity of size data available from most fleets and the uncertain status of the catches for this species.
- Sex ratio data have not been provided to the Secretariat by CPCs.

Indo-Pacific king mackerel

Indo-Pacific king mackerel – Catch trends

Indo-Pacific king mackerel is mostly caught by gillnet fisheries in the Indian Ocean but significant numbers are also caught trolling (Fig. 21). The catch estimates for Indo-Pacific King mackerel were derived from very small amounts of information and are therefore highly uncertain.

Estimated catches have increased steadily since the mid 1960's, reaching around 10,000 t in the early 1970's and over 25,000 t since the mid-1990's. Catches increased steadily since then until 1995, the year in which the highest catches for this species were recorded, at around 43,000 t. The catches of Indo-Pacific king mackerel between 1997 and 2005 were more or less stable, estimated at around 30,000 t. Current catches have been higher, close to 40,000 t. The average annual catch estimated for the period 2006 to 2010 is 38,000 t.

In recent years, the countries attributed with the highest catches are India (47%) and Indonesia (28%) and, to a lesser extent, Iran and Thailand (15%) (Fig. 22).

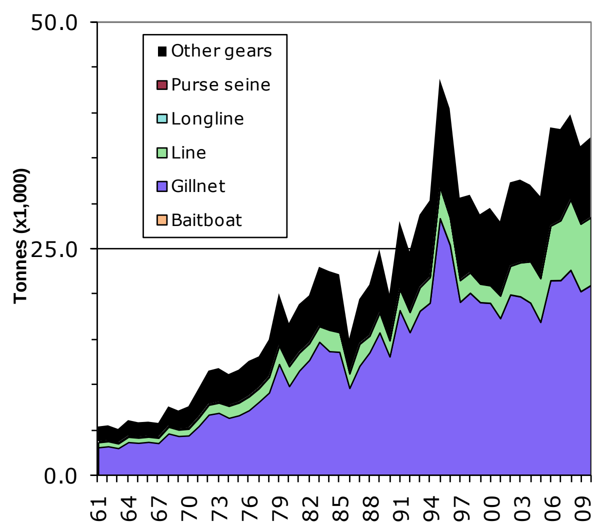

Fig. 21. Indo-Pacific king mackerel: Catches by gear recorded in the IOTC Database (1960–2010)

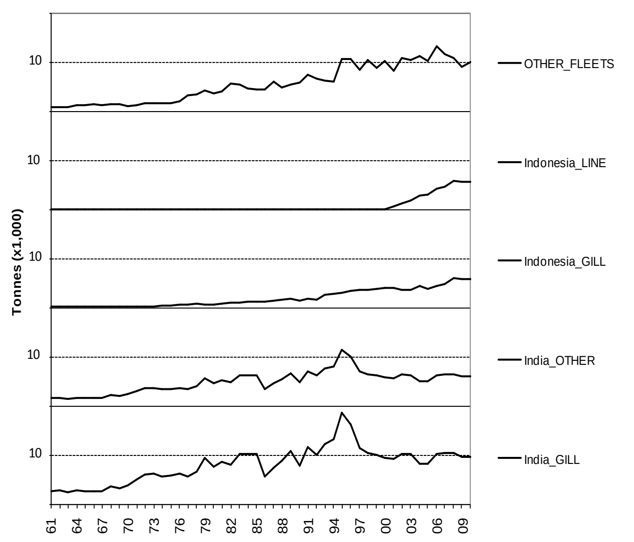

Fig. 22. Indo-Pacific king mackerel: Catches recorded in the IOTC Database for main fishing fleets (1960–2010)

Indo-Pacific king mackerel – Uncertainty of catches

Retained catches are highly uncertain (Fig. 23) for all fisheries due to:

- Aggregation: Indo-Pacific King mackerel is usually not reported by species, being aggregated with narrow-barred Spanish mackerels or, less frequently, other small tuna species.
- Mislabelling: Indo-Pacific King mackerels are usually mislabelled as narrow-barred Spanish mackerel, their catches reported under the latter species.
- Under reporting: the catches of Indo-Pacific King mackerel may be not reported for some fisheries catching them as a bycatch.
- It is for the above reasons that the catches of Indo-Pacific King mackerel in the IOTC database are thought to represent only a small fraction of the total catches of this species in the Indian Ocean.
- Discard levels are believed to be low although they are unknown for most fisheries.
- Changes to the catch series: There have not been significant changes to the estimated catches of Indo-Pacific King mackerel since 2010.

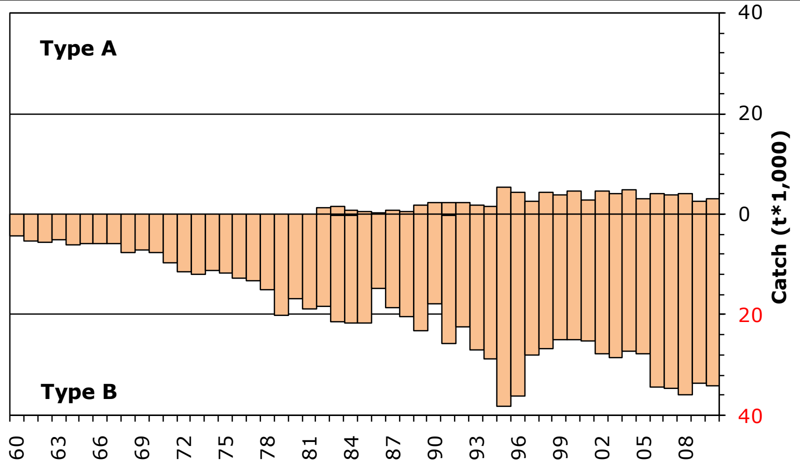

Fig. 23. Indo-Pacific king mackerel: Uncertainty of annual catch estimates (1960–2010) (Data as of October 2011)

*Catches below the zero-line (**Type B**) refer to fleets that do not report catch data to the IOTC (estimated by the IOTC Secretariat), do not report catch data by gear and/or species (broken by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document. Catches over the zero-line (**Type A**) refer to fleets for which no major inconsistencies have been found to exist. Light bars represent data for artisanal fleets and dark bars represent data for industrial fleets.*

Indo-Pacific king mackerel – Effort trends

Effort trends are unknown for Indo-Pacific King mackerel in the Indian Ocean.

Indo-Pacific king mackerel – Catch–per–unit–effort (CPUE) trends

Standardised CPUE series have not yet been developed. Nominal CPUE series are however available from some fisheries but they are considered highly incomplete. In most cases catch-and-effort data are only available for short periods of time. This makes it impossible to derive any meaningful CPUE from the existing data.

Indo-Pacific king mackerel – Fish size or age trends (e.g. by length, weight, sex and/or maturity)

- Trends in average weight cannot be assessed for most fisheries. Samples of king mackerel are only available for the coastal purse seiners of Thailand and gillnets of Sri Lanka but they refer to very short periods and the numbers sampled are very small.
- Catch-at-Size(Age) tables are not available for the Indo-Pacific King mackerel due to the paucity of size data available from most fleets and the uncertain status of the catches for this species.
- Sex ratio data have not been provided to the Secretariat by CPCs.

APPENDIX V
MAIN ISSUES IDENTIFIED RELATING TO THE STATISTICS OF NERITIC TUNAS

Extract from IOTC–2011–WPNT01–05

The following list is provided by the IOTC Secretariat for the consideration of the WPNT. The list covers the main issues which the IOTC Secretariat considers affect the quality of the statistics available at the IOTC, by type of dataset and type of fishery.

1. Catch-and-Effort data from Coastal Fisheries:

- **Coastal** fisheries of **Yemen, Madagascar, Mozambique,** and **Myanmar**: The catches of neritic tunas for these fisheries have been estimated by the Secretariat in recent years. The quality of the estimates is thought to be very poor due to the paucity of the information available about the fisheries operating in these countries.
- **Coastal** fisheries of **Sri Lanka, Indonesia, India, Oman, Thailand** and **Malaysia:** These countries do not report catches of neritic tunas by species and/or gear, as required by the IOTC. The IOTC Secretariat estimated allocated catches by gear and species where necessary.

2. Catch-and-Effort data from Surface and Longline Fisheries:

- **Drifting gillnet** fisheries of **Iran** and **Pakistan,** and **Gillnet** and **Longline** fishery of **Sri Lanka**: A component of these fleets operate in offshore waters, including waters beyond the EEZs of the flag countries concerned although it is not believed that this component is catching large quantities of neritic tuna species. Although all countries have reported total catches of neritic tunas, they have not reported catch-and-effort data as per the IOTC standards.
- **All industrial tuna 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 and do not include amounts of neritic tuna discarded at all[1]. The same applies to catch-and-effort data.
- **Discard levels for all fisheries**: The total amount of neritic tunas discarded at sea remains unknown for most fisheries and time periods.

3. Size data from All Fisheries:

- **Coastal** fisheries of **Sri Lanka, Indonesia, India, Oman, Thailand, Malaysia, Yemen, Madagascar, Mozambique,** and **Myanmar:** None of these countries has reported length frequency data for neritic tuna species in recent years.
- **Drifting gillnet** fisheries of **Iran** and **Pakistan,** and **Gillnet** and **Longline** fishery of **Sri Lanka**: A significant component of these fleets operate in offshore waters, including waters beyond the EEZs of the flag countries concerned. Although all countries have reported total catches, and Iran and Sri Lanka have provided some data on the sizes of neritic tunas caught by their fisheries, the length frequency data has not been provided as per the IOTC standards.
- **All industrial tuna purse seine** fisheries: There is a generalized lack of length frequency data of neritic tuna species retained catches and discards from industrial purse seiners, in particular longtail tuna (purse seiners from Iran operating in the Arabian Sea), and frigate tuna, bullet tuna, and kawakawa (all purse seine fleets).

4. Biological data for all tropical tuna species:

- All fisheries: There is a generalized lack of biological data for most neritic tuna species, in particular the basic data that would be used to establish length-weight-age keys, non-standard measurements-fork length keys and processed weight-live weight keys for these species.

[1] This information is available for purse seiners operating under EU flags for 2003-07, as estimated using data collected by observers.

APPENDIX VI
LONGTAIL TUNA – DRAFT RESOURCE STOCK STATUS SUMMARY

DRAFT: STATUS OF THE INDIAN OCEAN LONGTAIL TUNA (*THUNNUS TONGGOL*) RESOURCE

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

Area[1]	Indicators – 2011 assessment		2011 stock status determination 2010[2]
Indian Ocean	Catch[3] 2010:	141,900 t	**UNCERTAIN**
	Average catch[3] 2006–2010:	115,980 t	
	MSY:	unknown	
	F_{2010}/F_{MSY}:	unknown	
	SB_{2010}/SB_{MSY}:	unknown	
	SB_{2010}/SB_0:	unknown	

[1]Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence.
[2]The stock status refers to the most recent years' data used for the assessment.
[3]Nominal catches represent those estimated by the IOTC Secretariat. If these data are not reported by CPCs, the IOTC Secretariat estimates total catch from a range of sources including: partial catch and effort data; data in the FAO FishStat database; catches estimated by the IOTC from data collected through port sampling; data published through web pages or other means; data reported by other parties on the activity of vessels; and data collected through sampling at the landing place or at sea by scientific observers.

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)	(red)	(orange)
Stock not subject to overfishing (F_{year}/F_{MSY}≤ 1)	(yellow)	(green)

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

The WPNT **RECOMMENDED** the following management advice for longtail tuna in the Indian Ocean, for the consideration of the Scientific Committee, noting that there remains considerable uncertainty about stock structure and about the total catches.

Stock status. No quantitative stock assessment is currently available for longtail tuna in the Indian Ocean, and due to a lack of fishery data for several gears, only preliminary stock indicators can be used. Therefore stock status remains *uncertain* (Table 1). However, aspects of the biology, productivity and fisheries for this species combined with the lack of data on which to base a more formal assessment are a cause for considerable concern.

Outlook. The continued increase of annual catches for longtail tuna in recent years has further increased the pressure on the Indian Ocean stock as a whole, however there is not sufficient information to evaluate the effect this will have on the resource. 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 on improving indicators and exploration of stock structure and stock assessment approaches for data poor fisheries are warranted.

The WPNT **RECOMMENDED** that the Scientific Committee consider the following:

- the Maximum Sustainable Yield estimate for the whole Indian Ocean is unknown.
- annual catches urgently need to be reviewed.
- improvement in data collection and reporting is required to assess the stock.

APPENDIX VII
NARROW-BARRED SPANISH MACKEREL – DRAFT RESOURCE STOCK STATUS SUMMARY

DRAFT: STATUS OF THE INDIAN OCEAN NARROW-BARRED SPANISH MACKEREL (*SCOMBEROMORUS COMMERSON*) RESOURCE

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

Area[1]	Indicators – 2011 assessment		2011 stock status determination 2010[2]
Indian Ocean	Catch[3] 2010:	124,100 t	UNCERTAIN
	Average catch[3] 2006–2010:	116,460 t	
	MSY:	unknown	
	F_{2010}/F_{MSY}:	unknown	
	SB_{2010}/SB_{MSY}:	unknown	
	SB_{2010}/SB_0:	unknown	

[1]Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence.
[2]The stock status refers to the most recent years' data used for the assessment.
[3]Nominal catches represent those estimated by the IOTC Secretariat. If these data are not reported by CPCs, the IOTC Secretariat estimates total catch from a range of sources including: partial catch and effort data; data in the FAO FishStat database; catches estimated by the IOTC from data collected through port sampling; data published through web pages or other means; data reported by other parties on the activity of vessels; and data collected through sampling at the landing place or at sea by scientific observers.

Colour key	Stock overfished($SB_{year}/SB_{MSY} < 1$)	Stock not overfished ($SB_{year}/SB_{MSY} \geq 1$)
Stock subject to overfishing($F_{year}/F_{MSY} > 1$)	(red)	(orange)
Stock not subject to overfishing ($F_{year}/F_{MSY} \leq 1$)	(yellow)	(green)

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

The WPNT **RECOMMENDED** the following management advice for narrow-barred Spanish mackerel in the Indian Ocean, for the consideration of the Scientific Committee, noting that there remains considerable uncertainty about stock structure and about the total catches.

Stock status. No quantitative stock assessment is currently available for narrow-barred Spanish mackerel in the Indian Ocean, and due to a lack of fishery data for several gears, only preliminary stock indicators can be used. Therefore stock status remains *uncertain* (Table 1). However, aspects of the fisheries for this species combined with the lack of data on which to base a more formal assessment are a cause for considerable concern. Although indicators from the Gulf and Oman Sea suggest that overfishing is occurring in this area, the degree of connectivity with other regions remains unknown.

Outlook. The continued increase of annual catches for narrow-barred Spanish mackerel in recent years has further increased the pressure on the Indian Ocean stock as a whole, however there is not sufficient information to evaluate the effect this will have on the resource. 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. Research emphasis on improving indicators and exploration of stock structure and stock assessment approaches for data poor fisheries are warranted.

The WPNT **RECOMMENDED** that the Scientific Committee consider the following:

- the Maximum Sustainable Yield estimate for the whole Indian Ocean is unknown.
- annual catches urgently need to be reviewed.
- improvement in data collection and reporting is required to assess the stock.

APPENDIX VIII
BULLET TUNA – DRAFT RESOURCE STOCK STATUS SUMMARY

DRAFT: STATUS OF THE INDIAN OCEAN BULLET TUNA (*AUXIS ROCHEI*) RESOURCE

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

Area[1]	Indicators – 2011 assessment		2011 stock status determination 2010[2]
Indian Ocean	Catch[3] 2010:	4,200 t	UNCERTAIN
	Average catch[3] 2006–2010:	2,900 t	
	MSY:	unknown	
	F_{2010}/F_{MSY}:	unknown	
	SB_{2010}/SB_{MSY}:	unknown	
	SB_{2010}/SB_0:	unknown	

[1]Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence.
[2]The stock status refers to the most recent years' data used for the assessment.
[3]Nominal catches represent those estimated by the IOTC Secretariat. If these data are not reported by CPCs, the IOTC Secretariat estimates total catch from a range of sources including: partial catch and effort data; data in the FAO FishStat database; catches estimated by the IOTC from data collected through port sampling; data published through web pages or other means; data reported by other parties on the activity of vessels; and data collected through sampling at the landing place or at sea by scientific observers.

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)	(red)	(orange)
Stock not subject to overfishing (F_{year}/F_{MSY}≤ 1)	(yellow)	(green)

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

The WPNT **RECOMMENDED** the following management advice for bullet tuna in the Indian Ocean, for the consideration of the Scientific Committee, noting that there remains considerable uncertainty about stock structure and about the total catches.

Stock status. No quantitative stock assessment is currently available for bullet tuna in the Indian Ocean, and due to a lack of fishery data for several gears, only preliminary stock indicators can be used. Therefore stock status remains *uncertain* (Table 1). However, aspects of the fisheries for this species combined with the lack of data on which to base a more formal assessment are a cause for considerable concern.

Outlook. The continued increase of annual catches for bullet tuna is likely to have further increased the pressure on the Indian Ocean stock as a whole, however there is not sufficient information to evaluate the effect this will have on the resource. Research emphasis on improving indicators and exploration of stock structure and stock assessment approaches for data poor fisheries are warranted.

The WPNT **RECOMMENDED** that the Scientific Committee consider the following:

- the Maximum Sustainable Yield estimate for the whole Indian Ocean is unknown.
- annual catches urgently need to be reviewed.
- improvement in data collection and reporting is required to assess the stock.

APPENDIX IX
FRIGATE TUNA – DRAFT RESOURCE STOCK STATUS SUMMARY

DRAFT: STATUS OF THE INDIAN OCEAN FRIGATE TUNA (*AUXIS THAZARD*) RESOURCE

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

Area[1]	**Indicators – 2011 assessment**		**2011 stock status determination**
			2010[2]
Indian Ocean	Catch[3] 2010:	71,000 t	**UNCERTAIN**
	Average catch[3] 2006–2010:	64,240 t	
	MSY:	unknown	
	F_{2010}/F_{MSY}:	unknown	
	SB_{2010}/SB_{MSY}:	unknown	
	SB_{2010}/SB_0:	unknown	

[1]Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence.
[2]The stock status refers to the most recent years' data used for the assessment.
[3]Nominal catches represent those estimated by the IOTC Secretariat. If these data are not reported by CPCs, the IOTC Secretariat estimates total catch from a range of sources including: partial catch and effort data; data in the FAO FishStat database; catches estimated by the IOTC from data collected through port sampling; data published through web pages or other means; data reported by other parties on the activity of vessels; and data collected through sampling at the landing place or at sea by scientific observers.

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)	(red)	(orange)
Stock not subject to overfishing ($F_{year}/F_{MSY}\leq$ 1)	(yellow)	(green)

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

The WPNT **RECOMMENDED** the following management advice for frigate tuna in the Indian Ocean, for the consideration of the Scientific Committee, noting that there remains considerable uncertainty about stock structure and about the total catches.

Stock status. No quantitative stock assessment is currently available for frigate tuna in the Indian Ocean, and due to a lack of fishery data for several gears, only preliminary stock indicators can be used. Therefore stock status remains *uncertain* (Table 1). However, aspects of the fisheries for this species combined with the lack of data on which to base a more formal assessment are a cause for considerable concern.

Outlook. The continued increase of annual catches for frigate tuna is likely to have further increased the pressure on the Indian Ocean stock as a whole, however there is not sufficient information to evaluate the effect this will have on the resource. Research emphasis on improving indicators and exploration of stock structure and stock assessment approaches for data poor fisheries are warranted.

The WPNT **RECOMMENDED** that the Scientific Committee consider the following:

- the Maximum Sustainable Yield estimate for the whole Indian Ocean is unknown.
- annual catches urgently need to be reviewed.
- improvement in data collection and reporting is required to assess the stock.

APPENDIX X
KAWAKAWA – DRAFT RESOURCE STOCK STATUS SUMMARY

DRAFT: STATUS OF THE INDIAN OCEAN KAWAKAWA (*EUTHYNNUS AFFINIS*) RESOURCE

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

Area[1]	Indicators – 2011 assessment		2011 stock status determination 2010[2]
Indian Ocean	Catch[3] 2010:	128,900 t	**UNCERTAIN**
	Average catch[3] 2006–2010:	122,900 t	
	MSY:	unknown	
	F_{2010}/F_{MSY}:	unknown	
	SB_{2010}/SB_{MSY}:	unknown	
	SB_{2010}/SB_0:	unknown	

[1]Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence.
[2]The stock status refers to the most recent years' data used for the assessment.
[3]Nominal catches represent those estimated by the IOTC Secretariat. If these data are not reported by CPCs, the IOTC Secretariat estimates total catch from a range of sources including: partial catch and effort data; data in the FAO FishStat database; catches estimated by the IOTC from data collected through port sampling; data published through web pages or other means; data reported by other parties on the activity of vessels; and data collected through sampling at the landing place or at sea by scientific observers.

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)		

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

The WPNT **RECOMMENDED** the following management advice for kawakawa in the Indian Ocean, for the consideration of the Scientific Committee, noting that there remains considerable uncertainty about stock structure and about the total catches.

Stock status. No quantitative stock assessment is currently available for kawakawa in the Indian Ocean, and due to a lack of fishery data for several gears, only preliminary stock indicators can be used. Therefore stock status remains *uncertain* (Table 1). However, aspects of the fisheries for this species combined with the lack of data on which to base a more formal assessment are a cause for considerable concern.

Outlook. The continued increase of annual catches for kawakawa is likely to have further increased the pressure on the Indian Ocean stock as a whole, however there is not sufficient information to evaluate the effect this will have on the resource. Research emphasis on improving indicators and exploration of stock structure and stock assessment approaches for data poor fisheries are warranted.

The WPNT **RECOMMENDED** that the Scientific Committee consider the following:

- the Maximum Sustainable Yield estimate for the whole Indian Ocean is unknown.
- annual catches urgently need to be reviewed.
- improvement in data collection and reporting is required to assess the stock.

APPENDIX XI
INDO-PACIFIC KING MACKEREL – DRAFT RESOURCE STOCK STATUS SUMMARY

DRAFT: STATUS OF THE INDIAN OCEAN INDO-PACIFIC KING MACKEREL (*SCOMBEROMORUS GUTTATUS*) RESOURCE

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

Area[1]	Indicators – 2011 assessment		2011 stock status determination 2010[2]
Indian Ocean	Catch[3] 2010:	37,300 t	UNCERTAIN
	Average catch[3] 2006–2010:	38,000 t	
	MSY:	unknown	
	F_{2010}/F_{MSY}:	unknown	
	SB_{2010}/SB_{MSY}:	unknown	
	SB_{2010}/SB_0:	unknown	

[1]Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence.
[2]The stock status refers to the most recent years' data used for the assessment.
[3]Nominal catches represent those estimated by the IOTC Secretariat. If these data are not reported by CPCs, the IOTC Secretariat estimates total catch from a range of sources including: partial catch and effort data; data in the FAO FishStat database; catches estimated by the IOTC from data collected through port sampling; data published through web pages or other means; data reported by other parties on the activity of vessels; and data collected through sampling at the landing place or at sea by scientific observers.

Colour key	Stock overfished($SB_{year}/SB_{MSY}< 1$)	Stock not overfished ($SB_{year}/SB_{MSY}\geq 1$)
Stock subject to overfishing($F_{year}/F_{MSY}> 1$)	(red)	(orange)
Stock not subject to overfishing ($F_{year}/F_{MSY}\leq 1$)	(yellow)	(green)

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

The WPNT **RECOMMENDED** the following management advice for Indo-Pacific king mackerel in the Indian Ocean, for the consideration of the Scientific Committee, noting that there remains considerable uncertainty about stock structure and about the total catches.

Stock status. No quantitative stock assessment is currently available for Indo-Pacific king mackerel in the Indian Ocean, and due to a lack of fishery data for several gears, only preliminary stock indicators can be used. Therefore stock status remains *uncertain* (Table 1). However, aspects of the fisheries for this species combined with the lack of data on which to base a more formal assessment are a cause for considerable concern.

Outlook. The continued increase of annual catches for Indo-Pacific king mackerel is likely to have further increased the pressure on the Indian Ocean stock as a whole, however there is not sufficient information to evaluate the effect this will have on the resource. Research emphasis on improving indicators and exploration of stock structure and stock assessment approaches for data poor fisheries are warranted.

The WPNT **RECOMMENDED** that the Scientific Committee consider the following:

- the Maximum Sustainable Yield estimate for the whole Indian Ocean is unknown.
- annual catches urgently need to be reviewed.
- improvement in data collection and reporting is required to assess the stock.

APPENDIX XII
CONSOLIDATED RECOMMENDATIONS OF THE FIRST SESSION OF THE WORKING PARTY ON NERITIC TUNAS

Note: Appendix references refer to the Report of the First Session of the Working Party on Neritic Tunas (IOTC–2011–WPNT01–R)

Review of data available for neritic tuna species

WPNT01.01 (para. 11): The WPNT **NOTED** the main neritic tuna data issues that are considered to negatively affect the quality of the statistics available at the IOTC, by type of dataset and fishery, which are provided in Appendix V, and **RECOMMENDED** that the CPCs listed in the Appendix, make efforts to remedy the data issues identified and to report back to the WPNT at its next meeting.

WPNT01.02 (para. 13): Noting that the nominal catch (NC) data provided at the WPNT01 meeting was found to conflict with the NC data history provided by Malaysia to the IOTC Secretariat, the WPNT **RECOMMENDED** that Malaysia liaise with the IOTC Secretariat in order to verify and provide a revised catch history which will replace the data currently held by the IOTC Secretariat before the next WPNT meeting in 2012.

WPNT01.03 (para. 15): Noting that substantial data sets, i.e. catch and length frequencies, have been collected in India and that several studies analysing these data sets have already been undertaken, the WPNT **RECOMMENDED** that this data be reported to the IOTC Secretariat as per the requirements adopted by all IOTC Members through Resolution 10/02 *mandatory statistical requirements for IOTC Members and Cooperating non-Contracting Parties*.

WPNT01.04 (para. 16): Noting that the paper presented by Indian scientists did not contain information on narrow-barred Spanish mackerel (*Scomberomorus* commerson) and Indo-Pacific king mackerel (*S. guttatus*) which are covered under the mandate of the WPNT, the WPNT **RECOMMENDED** that fishery information on these mackerel species caught in Indian fisheries be presented at the next meeting of the WPNT.

WPNT01.05 (para. 26): The WPNT **AGREED** that there appears to be large datasets available on neritic tuna species caught by fleets of the coastal countries, in particular from India, Indonesia, Malaysia and Thailand, however most of this information has not been provided to the IOTC Secretariat. As such, the WPNT **RECOMMENDED** that these countries, as well as other CPCs, provide these data sets for neritic tunas, noting that this is already a mandatory requirement as per the IOTC Resolution 10/02 adopted by the IOTC Members, as this would allow a better assessment of the status of these stocks.

Review of information on the status of longtail tuna

WPNT01.06 (para. 64): Noting that some countries have collected large data sets over long time periods, the WPNT **RECOMMENDED** that this data, as well as data from other countries, be submitted to the IOTC Secretariat as per the requirements adopted by its members in Resolution 10/02. This would allow the WPNT to develop stock status indicators or a more comprehensive stock assessment of longtail tuna in the future.

Review of information on the status of narrow-barred Spanish mackerel

WPNT01.07 (para. 76): Noting that some countries have collected large data sets over long time periods, the WPNT **RECOMMENDED** that this data, as well as data from other CPCs, be submitted to the IOTC Secretariat as per the requirements adopted by its members in Resolution 10/02. This would allow the WPNT to develop stock status indicators or a more comprehensive stock assessment for narrow-barred Spanish mackerel in the future.

Review of information on the status of other neritic tuna species

WPNT01.08 (para. 81): Noting that some countries have collected large data sets over long time periods, the WPNT **RECOMMENDED** that this data, as well as data for other CPCs, be submitted to the IOTC Secretariat as per the requirements adopted by its members in Resolution 10/02. This would allow the WPNT to develop stock status indicators or a more comprehensive stock assessments of other neritic tuna species in the future.

Development of technical advice on the status of the stocks

WPNT01.09 (para. 86): The WPNT **RECOMMENDED** that the Scientific Committee note the management advice developed for each neritic tuna species as provided in the draft resource stock status summary for each neritic tuna species:

- longtail tuna (*Thunnus tonggol*) – Appendix VI
- narrow-barred Spanish mackerel (*Scomberomorus commerson*) – Appendix VII
- bullet tuna (*Auxis rochei*) – Appendix VIII
- frigate tuna (*Auxis thazard*) –Appendix IX
- kawakawa (*Euthynnus affinis*) – Appendix X
- Indo-Pacific king mackerel (*Scomberomorus guttatus*) – Appendix XI

Research recommendations and priorities

WPNT01.10 (para. 89): Noting that at present very little is known about the population structure and migratory range of most neritic tunas in the Indian Ocean, the WPNT **RECOMMENDED** that the Scientific Committee develop a research plan that includes two separate research lines; i) genetic research to determine the connectivity of neritic tunas throughout their distributions, and ii) tagging research to better understand the movement dynamics, possible spawning locations, and post-release mortality of neritic tunas from various fisheries in the Indian Ocean. These should be considered high priority research projects for 2012 and 2013.

WPNT01.11 (para. 90): The WPNT **RECOMMENDED** that quantitative biological studies are required to determine maturity-at-age and fecundity-at-age relationships, and age and growth for all neritic tunas throughout their range.

WPNT01.12 (para. 92): The WPNT **RECOMMENDED** that where feasible, support should be provided by the IOTC Secretariat and other CPCs, to aid in the development of standardised CPUE series for each neritic tuna species.

WPNT01.13 (para. 94): The WPNT **AGREED** that there was an urgent need to carry out stock assessments for neritic tunas in the Indian Ocean, however at present the data held at the IOTC Secretariat would be insufficient to undertake this task. As such, the WPNT **RECOMMENDED** that the Scientific Committee consider recommending that the Commission consider allocating appropriate funds to further increase the capacity of coastal states to collect, report and analyse catch data on neritic tunas.

WPNT01.14 (para. 96): The WPNT **RECOMMENDED** that the Scientific Committee note the list of priority research topics for neritic tunas as provided in Table 2.

WPNT01.15 (para. 99): The WPNT **RECOMMENDED** that the Commission consider providing funds for IOTC scientists to develop stock status indicators and possibly stock assessments for neritic tunas, with narrow-barred Spanish mackerel, kawakawa and longtail tuna as priority species.

Other business

WPNT01.16 (para. 103): The WPNT **RECOMMENDED** the following core areas of expertise and priority areas for contribution that need to be enhanced for the next meeting of the WPNT in 2012, by an Invited Expert:

- Expertise: stock structure/connectivity; including from regions other than the Indian Ocean.
- Priority areas for contribution: narrow-barred Spanish mackerel, kawakawa and longtail tuna biology, ecology and fisheries.

WPNT01.17 (para. 105): Following a discussion on who would host the Second Session of the WPNT, the WPNT **RECOMMENDED** that the IOTC Secretariat liaise with Malaysia to determine if it would be feasible to hold the next meeting of the WPNT in Kuala Lumpur or Penang in 2012. The exact dates and meeting location will be confirmed and communicated by the IOTC Secretariat to the Scientific Committee for its consideration at its next session to be held in December 2011.

WPNT01.18 (para. 106): The WPNT **NOTED** that the Meeting Participation Fund set up by the Commission in 2010 (Resolution 10/05) allowed the participation of most of the participants to this meeting, as neritic tunas are an important resource for coastal countries of the Indian Ocean, and **RECOMMENDED** that this fund be maintained in the future.

WPNT01.19 (para. 109): The WPNT **RECOMMENDED** that the Scientific Committee note the new Chair, Dr. Prathibha Rohit (India) and Vice-Chair, Mr. Farhad Kaymaram (I.R. Iran), of the WPNT for the next *biennium*.

WPNT01.20 (para. 110): The WPNT **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPNT01, provided at Appendix XII.