CCSBT-ESC/2308/14
(ESC Agenda item 7.1 and 11)

CSIRO

Australia's National Science Agency

SBT catch monitoring and capacity building for biological sampling of spawning ground catches in Indonesia

Campbell Davies[1], Fayakun Satria[2], Jessica Farley[1], Lilis Sadiyah[2], Putuh Suadela[3], Yayan Hernuryadin[3], Ririk Sulistyaningsih[2], Hety Hartaty[2], Bram Setyadji[2], and Satya Mardi[3]

[1] CSIRO (Commonwealth Scientific and Industrial Research Organisation) – Australia

[2]Research center for fishery-national research and innovation Agency (RCF - BRIN) Indonesia

[3]Ministry of Marine Affairs and Fisheries (MMAF) – Indonesia

CCSBT-ESC/2308/14

Prepared for the CCSBT Extended Scientific Committee for

the Twenty-Eighth Meeting of the Scientific Committee

28th August - 2nd September 2023

Copyright

© Commonwealth Scientific and Industrial Research Organisation 2023. To the extent permitted by law, all rights are reserved and no part of this publication covered by copyright may be reproduced or copied in any form or by any means except with the written permission of CSIRO.

Important disclaimer

CSIRO advises that the information contained in this publication comprises general statements based on scientific research. The reader is advised and needs to be aware that such information may be incomplete or unable to be used in any specific situation. No reliance or actions must therefore be made on that information without seeking prior expert professional, scientific and technical advice. To the extent permitted by law, CSIRO (including its employees and consultants) excludes all liability to any person for any consequences, including but not limited to all losses, damages, costs, expenses and any other compensation, arising directly or indirectly from using this publication (in part or in whole) and any information or material contained in it.

CSIRO is committed to providing web accessible content wherever possible. If you are having difficulties with accessing this document please contact csiroenquiries@csiro.au.

Abstract

Monitoring of the size and age distribution of catches of SBT landed by Indonesian longline vessels from the SBT spawning ground has been an important source of data since the early 1990's. The extension of this monitoring program to include collection of tissue samples, since the mid-2000's, was central to the application of Close-kin Mark Recapture (CKMR) for SBT. These data series form essential inputs to the regular CCSBT stock assessment and the Cape Town Procedure used to recommend the global TAC for the fishery. In 2021, the ESC recognised the need to review the length and age monitoring program due to changes in the fleet dynamics of the Indonesian longline fleet, with some vessels fishing well south of the spawning ground during the winter months. Differences were also apparent in the age structure generated from age length keys when comparing results using the length data from catch monitoring and Catch Document Scheme. In addition, a combination of COVID 19 impacts and recent institutional changes associated with the transfer of research capability from the Ministry of Marine Affairs and Fisheries to the new National Research and Innovation agency (BRIN) has impacted on the resourcing and availability of experienced staff to conduct the catch monitoring and biological sampling program. This paper summarises these issues and outlines the steps that need to be taken to address them and ensure the longer-term sustainability of this important monitoring program.

Introduction

The spawning ground for southern bluefin tuna (SBT) is located in an area between Indonesia and the northwest coast of Australia, where spawning occurs during September to April each year (Farley and Davis 1998). Historically, the Indonesian longline fishery has targeted bigeye and yellowfin tuna on the spawning ground, with SBT as a by-catch (Bram et al 2020). Obtaining an accurate estimate of the size and age composition of these SBT landings from the spawning ground fishery is central to population modelling and stock assessments and close-kin mark recapture (CKMR), which are used by CCSBT to monitor changes in the spawning population over time and in the Cape Town Procedure to recommend the TAC.

Over recent years, there have been noticeable shifts in the distribution of effort by the Indonesian longline fleet that have potential implications for the use and interpretation of the data derived from this important monitoring program. In addition, the transfer of research capability from the Ministry of Marine Affairs and Fisheries to the new National Research and Innovation agency (BRIN) has impacted on the resourcing and availability of experienced staff to conduct the catch monitoring and biological sampling program. This paper summarises these issues and outlines the steps that need to be taken to address them and ensure the longer-term sustainability of this important monitoring program. It is provided as background to the accompanying SRP Proposal (Attachment 1) to seek input from the ESC that may assist in addressing and resolving these important issues.

Summary of issues

Small fish on the spawning ground

Commencing in 2012/2013, there was a notable presence of small, young fish in the catches reported from the spawning ground (Area1). When this change was identified, it was noted that it would be important, if possible, to identify and separate those catches that were taken in Area 2 and exclude then from the spawning ground monitoring series (Farley et al 2018; paragraph 66, Anon 2018, Fahmi et al., 2020). A combination of vessel tracks and CDS data was used to identify catches taken predominantly from each of the two areas and create length compositions for each area (Fahmi et al., 2020). While this reduced the proportion of small/young fish from area 1, it did not remove them entirely (Sulistyaningsih et al., 2020). The uncertainty in the selectivity for the relevant fishery in the operating models was increased to accommodate this shift in the size/age frequency in Area 1, and the issue was noted as a potential basis for exceptional circumstances. It was subsequently removed for the list of exceptional circumstances as part of the 2020 stock assessment review of exceptional circumstances (paragraphs 136-137, Anon 2020).

Differences in estimated age composition

The method used to estimate the age distribution of SBT in the Indonesian catch is the age-length key method. The age-length key gives the proportion of fish at age in each length class, which enable us to infer the age composition of the catch from the length-frequency data. Central to developing and applying an age length key is obtaining (i) length data for a large random sample of the catch, and (ii) age estimates from a smaller subsample of fish randomly selected through length-stratified sampling. To monitor changes in the SBT spawning population, it is important to obtain a random sample of the Indonesian longline catch in CCSBT area 1 only. When generating the age distributions using both sources of length data (scientific catch monitoring and CDS) it was noted that there were differences in the estimated age distributions for Area 1 depending on which length frequency data set was used (Farley et al., 2021, See Figure 5 below).

Recent increases catches in Area 2

In addition, in the last 2 years (2021-2022), there has been a substantially larger shift in the proportion of the total Indonesian catch that is taken in Area 2, beyond that seen historically (Sadiyah et al 2023, Bram et al., 2022). In these two years, 57-87% of the Indonesian catch is reported to be taken in Area 2 (Table 2. Sadiyah et al., 2023). In 2022, the reported catch of SBT from Area 1 was 1,349 individuals, which is less that the n=1500 sampling objective for otolith and CKMR tissue collection.

Changes in institutional arrangements for research and monitoring

The institutional restructure associated with the creation of the new National Research and Innovation Agency (BRIN) and the lingering economic impacts of the COVID-19 pandemic has a number of implications for the monitoring of catches from the spawning ground and associated biological sampling: i) The historical administrative arrangements and monitoring and research capability has been disrupted by the new institutional arrangements, requiring new agreements and permitting arrangements, ii) there has been a loss of experienced personnel and access to facilities, iii) responsibility for routine fisheries monitoring remains with the Ministry, however, the responsibility for research and majority of the expertise is now with BRIN; and iv) there was a substantial reduction in the staff and resources available to undertake the monitoring during 21-22, which resulted in the disruption of the program. Progress has been made during 2023, including confirmation of responsibilities for the program, re-establishment of monitoring and sampling in Benoa and initial training and capacity building for new enumerators/samplers. However, there remains a need for increased investment in capacity building and experienced guidance and quality control over the coming year, or two, to ensure that the program is operating effectively and secure in the longer-term.

Data sources for length, age and tissue samples

The following sections summarise the issues associated with the length monitoring and the sampling of otoliths for age and tissue for CKMR. It is taken from Farley et al., (2021).

Catch monitoring program, Benoa

SBT size data has been collected since 1993 through a catch monitoring program in Benoa, Bali. The program was first established through a series of collaborative projects between Indonesia's marine fisheries research institutes[1] within the Ministry of Marine Affairs and Fisheries (MMAF) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The main location monitored for SBT was the Benoa Fishing Port in Bali. In 2002, the scope of research collaboration expanded to include all tuna species (yellowfin and bigeye tuna, and albacore) and related species (billfish and other bycatch species) landed by the longline fleet. This occurred with the addition of new partners to the collaboration, the Indian Ocean Tuna Commission (IOTC) and Japan's Overseas Fishery Cooperation Foundation (OFCF). The monitoring locations expanded to three fishing ports, including Muara Baru (Jakarta) and Cilacap (south cost Central Java), in addition to Benoa (Farley et al. 2007). The majority of targeted SBT sampling, however, still occurs at Benoa, as this is the port where the majority of Indonesian caught SBT are landed.

Length data

The catch monitoring program has a target to monitor at least 30% of landings by each fishing company in Benoa (Jatmiko et al. 2017), although monitoring is often >50%. When fish are landed, they are classified as either 'export' or 'reject' based on flesh quality. Enumerators from the Research Institute of Tuna Fisheries (RITF) record the dressed weight of each SBT landed and the

[1] Indonesian collaborating institutions, in chronological order: Central Research Institute for Fisheries Indonesia (CRIFI), Research Institute for Marine Fisheries (RIMF), Research Centre for Capture Fisheries (RCCF), Research Centre for Fisheries Management and Conservation (RCFMC), and currently Centre for Fisheries Research (CFR) in Jakarta, and Research Institute for Tuna Fisheries (RITF) in Bali.

length of as many fish as possible. Dressed weight is converted to round (whole) weight using the CCSBT agreed conversion value for SBT (x1.15). Measuring the length of fish classed as export grade can be difficult because access to the fish is limited. If the length of all fish in a landing cannot be measured, the reject (low-grade) fish are measured as they are assumed to be a random sample of the catch (Jatmiko et al. 2017).

In the late 1990s, Davis and Farley (2001) compared length data of 102 export and 102 reject SBT from 20 landings (in which all fish measured) and found no significant difference in the length distributions of export and reject fish (Davis and Farley 2001). This suggests there was no size-based bias in fish graded as reject at that time. The study also reported that, at the time, 30% of export-grade SBT were measured in the monitoring program, and 89% of reject-grade fish were measured (15,882 landings monitored between 1992 and 1999).

Otolith and tissue sampling

Since 1995, otoliths from SBT have also been collected through the Benoa catch monitoring program. In 2006, the sampling was expanded to muscle tissue samples for close-kin mark recapture (CKMR). Only fish graded as reject quality are available for sampling and they are assumed to be a random sample of all fish caught in CCSBT statistical area 1. Currently around 1500 otoliths and muscle tissue samples are collected each year. A subsample of 500 otoliths is selected for ageing. All fish sampled are classified into 1-cm length bins and a pre-specified number of fish are randomly selected to be aged from each length bin. This ensures enough age estimates for all length classes, including those with small sample sizes. All muscle tissue samples are sequenced for CKMR.

Since the fish with otoliths sampled each year are a subset of all SBT measured in the monitoring program, we compared length frequency distributions for the 2012/13 to 2015/16 seasons to determine if there was a difference. Although the length distributions are similar (Figure 1), we found a statistically significant difference for each season compared (Kolmogorov-Smirnov two sample test, $P<0.05$). In three of the four seasons, the proportion of small fish (<160 cm FL) was higher in the fish sampled for otoliths compared to all fish measured, and in the fourth season (2014/15), the proportion of large fish (<160 cm FL) was higher in the otolith sampled fish.

Catch Documentation Scheme (CDS)

In 2019 the Directorate General of Capture Fisheries (DGCF) (Indonesia) provided SBT length and weight data from the CDS for the 2015/16 to 2018/19 spawning seasons (Sulistyaningsih et al. 2019, 2020). The DGCF updated the data in 2020 and 2021 to include the 2020 calendar year.

The DGCF identified vessels operating in CCSBT statistical areas 1 and 2 using vessel monitoring system (VMS) tracking information. Vessels that had >70% of all tracks in area 1 were classes as operating on the spawning ground (Fahmi and Mardi, 2020a). Figure 2 shows the length frequency data for area 1 and area 2 in 2017/18 and 2018/19, as examples. It is evident that smaller fish comprise a greater proportion of the catch in area 2 compared to area 1, which is consistent with the fish being caught south of the spawning ground. However, the modes in the data vary between years.

Preliminary examination of the length-weight data showed that a reasonable proportion of the outliers had been removed (e.g., Figure 3) and that a proportion of fish were measured to the nearest 5-cm length class, rather than 1 cm, which has the potential to bias estimates of the size distribution of the catch (e.g., Figure 4). Since individual weight data were more likely to be accurate (as the data are used for export purposes), these data were used in the analysis, rather than the 5 cm binned data. Weight was converted to length using a weight-length relationship derived from SBT in the Benoa monitoring program over the same time period (see Sulistyaningsih et al. 2019).

Length frequency distribution

Figure 5A shows the length distribution of the Indonesian catch based on the Benoa catch monitoring. Length data for the last four spawning seasons were obtained from SBT with otoliths sampled. The data shows a mode of small fish progressively moving through the distribution starting in the 2012/13 season until 2015/16. After this time, the length distribution of SBT monitored appears relatively stable with a single mode between 150 and 170 cm fork length (FL).

Figure 5B (red box) shows the length frequency distribution of the Indonesian catch based on the CDS data for SBT caught in area 1 from 2015/16 to 2019/20. The CDS data shows a shift towards larger fish in the catch from 2016/17 and a single mode between 160 and 180 cm FL for the last three spawning seasons, which is not observed in the Benoa catch monitoring data (Figure 5). This mode of larger fish is more consistent with the mode in length data observed prior to 2012/13.

Effect of the dataset choice on age distribution

Figure 6 shows the age frequency distributions for SBT in the 2015/16 to 2019/20 seasons. The age distributions were estimated using an age-length-key developed for each spawning season applied to the length data from the catch monitoring program (Figure 6A) and the CDS (Figure 6B). Otolith age data were not available for the 2019/20 spawning season due to COVID-19 travel restrictions prevented the shipping of otoliths from Indonesia to Australia. The ALK developed using direct age data for the preceding spawning season (2018/19) was applied to the 2019/20 length frequency data. Although the age frequency distributions appear similar, there are differences particular in the relative abundance of SBT aged <10 years, which is higher in the catch monitoring data compared to the CDS data.

Changes in effort distribution of Indonesian longline fleet

The substantial shift in the distribution of the catch and, to a lesser degree, effort by the Indonesian longline fleet from Area 1 to Area 2 in 2021-2022 is evident in Table 1 of Sadiyah et al (2023), and figures 2 and 3 from Bram et al., (2022) (reproduced here in Figure 7 and 8). It is evident from these figures that there are substantial catches of SBT being reported from throughout Area 2 and into Area 8 during the spawning season between 2018-2021 and that the size distribution of these catches are similar to those from Area 1 between 2020 and 2022 (see figures 1 and 2 from Sadiyah et al 2023).

Summary and Recommendations

Obtaining an accurate estimate of the size and age composition of SBT landed by the Indonesian longline fishery is central to population modelling, stock assessments and close-kin mark recapture (CKMR), which are used by CCSBT to monitor changes in the spawning population over time. Until recently, the primary source of size data for SBT caught by Indonesia has been the catch monitoring program in Benoa. Length data were obtained from fish predominantly classed as reject quality (low grade), which were assumed to be a random sample of the landed catch. It is unclear if this is still the case. In addition, it was assumed that all fish measured were caught in CCSBT statistical areas 1; this is unlikely since vessels operating in CCSBT statistical areas 2 also land SBT in Benoa (Fahmi et al. 2020a, b). Finally, in the two most recent years there has been a substantial shift in the reported catches and, to a lesser extent, effort distributions of the Indonesian longline fleet, with the majority of catch and effort reported from Area 2, rather than Area 1. It is essential, given the importance of these data and the otolith and CKMR samples associated with them, to address these issues and ensure that the program is on a solid foundation for the future.

To support this outcome MMAF, BRIN and CSIRO have addressed a number of the institutional arrangements and recruitment and initial training of new enumerators to recommence the program late in the 2022/23 spawning season. This arrangement will continue into 2023/24. We are seeking dedicated funding (Attachment 1) for two activities to i) complete the training required for the recommencement of the biological sampling and, ii) the necessary capacity building to resolve the outstanding issues associated with the catch monitoring program following the disruption of the past 2 years:

1. Training and supervision for dedicated enumerators for SBT monitoring program in primary landing ports for SBT (e.g. Benoa, Cilicap and Muara Baru); and
2. Capacity building and analytical support for review of catch monitoring program, in particular, determining the most appropriate standard method for obtaining representative length and age frequency for the spawning ground catches and CKMR tissue samples and understanding the drivers and implications of the recent shifts in catch and effort between Area 1 and 2.

References

Anonymous (2016) Annual review of national SBT fisheries for the Scientific Committee. Report CCSBT-ESC/1609/SBT Fisheries - New Zealand prepared for the 21st Meeting of the CCSBT Scientific Committee, 5-10 September, Kaohsiung, Taiwan.

Anonymous (2018). Report of the 23rd Meeting of the Extended Scientific Committee, 3-8 September 2018, San Sebastian, Spain.

Anonymous (2020). Report of the 25th Meeting of the Extended Scientific Committee, 31 August- 7 September 2020. Online.

Bram Setyadji, Hety Hartaty, Sri Patmiarsih, Putuh Suadela (2022). Preliminary Analysis on Catch of Southern Bluefin Tuna (*Thunnus maccoyyi*) by Fishing Area from Indonesian Tuna Longline Fleet. CCSBT-ESC/2208/Info 01.

Fahmi Z., Mardi S. (2020) Proportion of SBT catches in spawning area from Indonesia fleet 2019. CCSBT-ESC/2008/16.

Farley, J., Sulistyaningsih, R., Setyadji, B., Mardi, S., Davies, C. (2021) Review of data to estimate the length and age distribution of SBT in the Indonesian longline catch. CCSBT-ESC/2108/07.

Sadiyah,L, Setyadji, B., Mardi, S., Hernuryadin,Y., Sudela,P., Budiarto,A., Patmiarsih,S., Pratiwi,I., and Satria,F. (2023). Indonesia's tuna longline fishery interacted with Southern Bluefin Tuna in CCSBT-ESC/2308/SBT Fisheries - Indonesia

Sulistyaningsih, R., Farley, J., and Proctor, C. (2018) Update on the length and age distribution of southern bluefin tuna (SBT) in the Indonesian longline catch. CCSBT-ESC/1809/09.

Sulistyaningsih, R., Proctor, C., and Farley, J. (2019) Update on the length and age distribution of southern bluefin tuna (SBT) in the Indonesian longline catch. CCSBT-ESC/1909/09.

Sulistyaningsih, R., Proctor, C., and Farley, J. (2020) Update on the length and age distribution of southern bluefin tuna (SBT) in the Indonesian longline catch. CCSBT-ESC/2008/08.

Figures

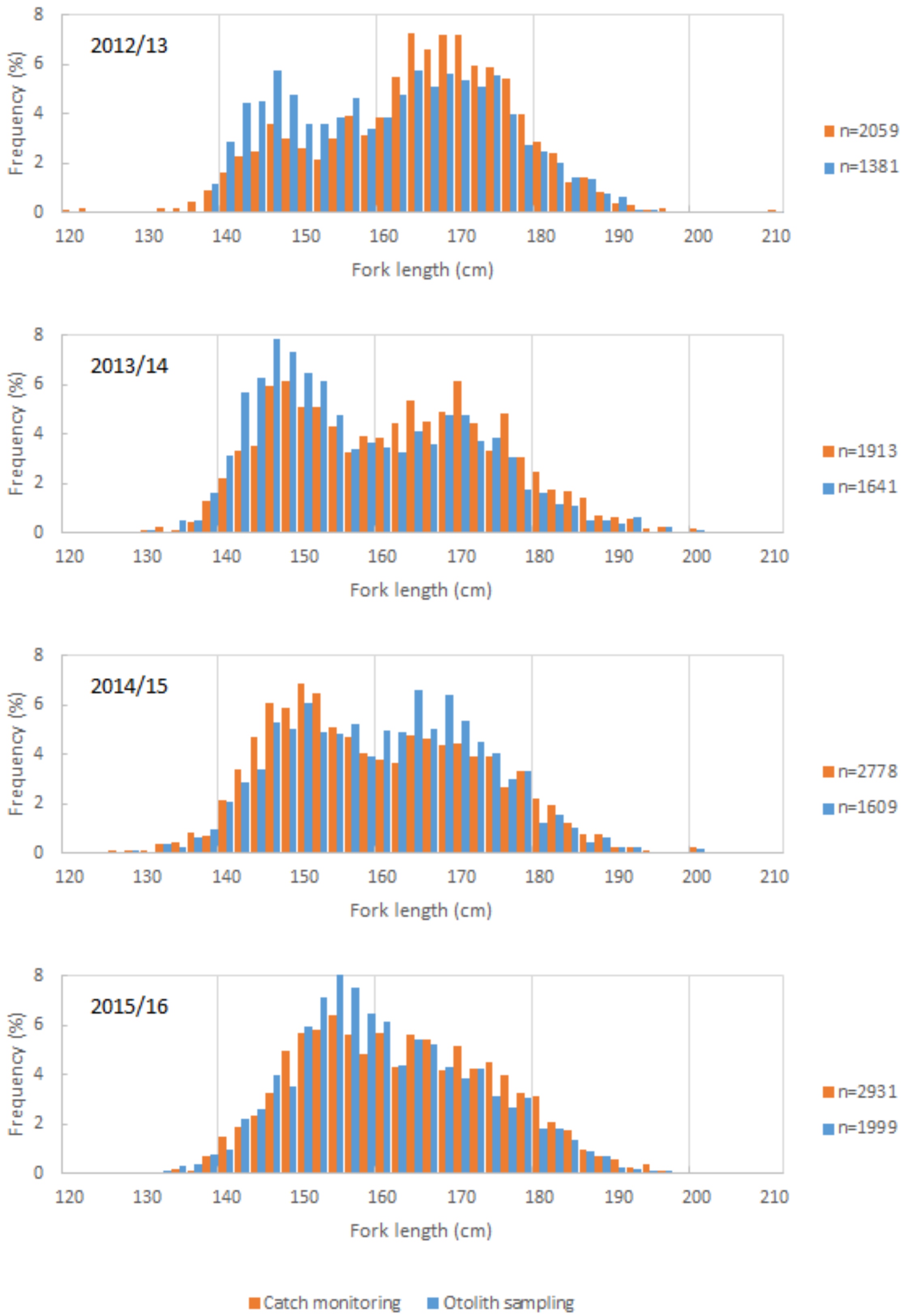

Figure 1. Comparison of length frequency distributins of SBT measured in the Benoa catch mornitoring program and SBT with otolthis sampled as part of the same program for the 2012/13 to 2015/16 spawning seasons.

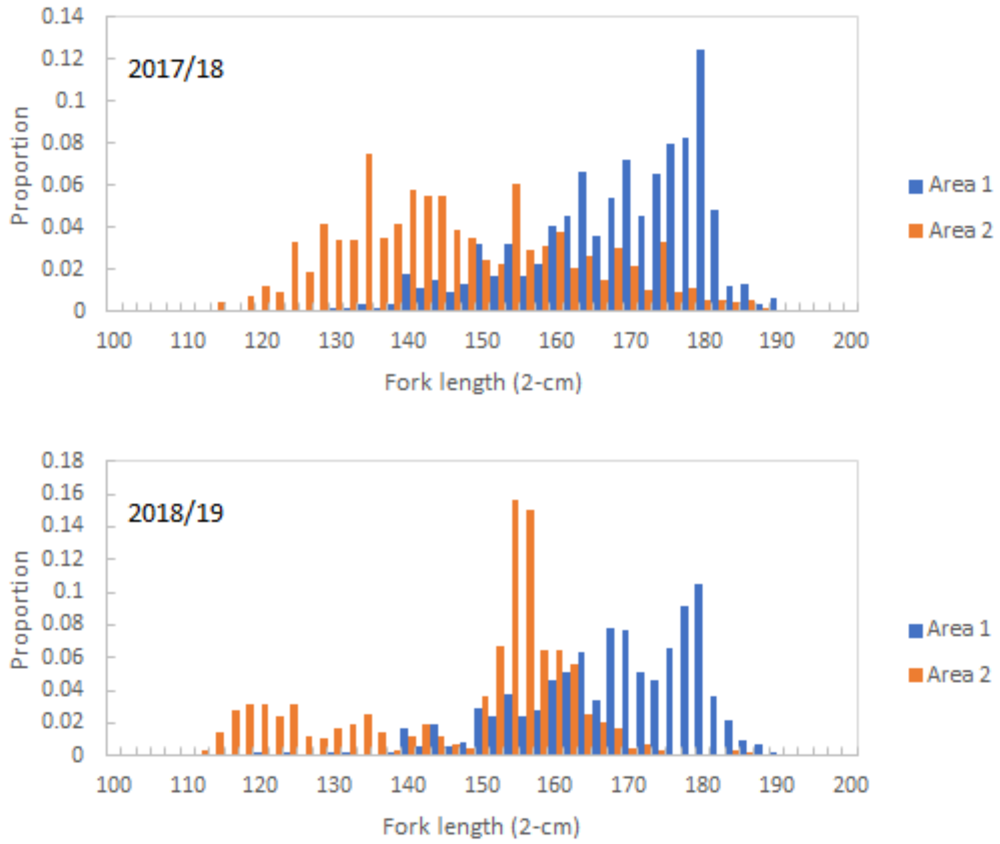

Figure 2. Length frequency distribution of SBT in CCSBT statistical area 1 and area 2 from the CDS dataset for 2017/18 and 2018/19 seasons.

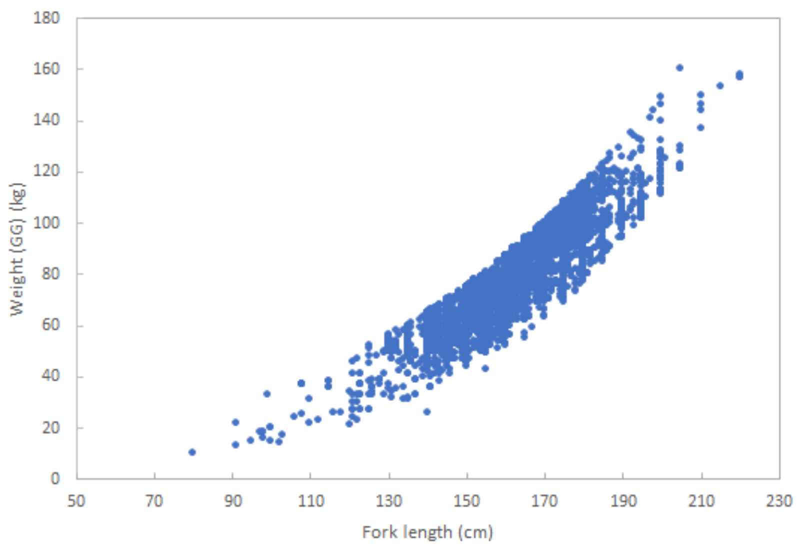

Figure 3. Weight-at-length data for SBT in the 2015/16 spawning season from the CDS dataset with outliers removed.

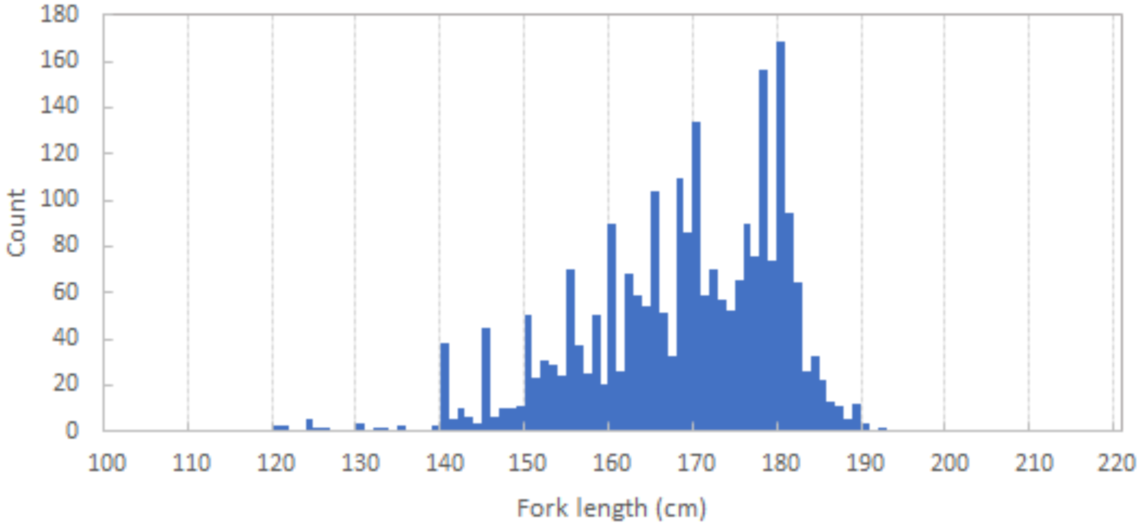

Figure 4. Length frequency distribution of SBT in 2018/19 from the CDS dataset.

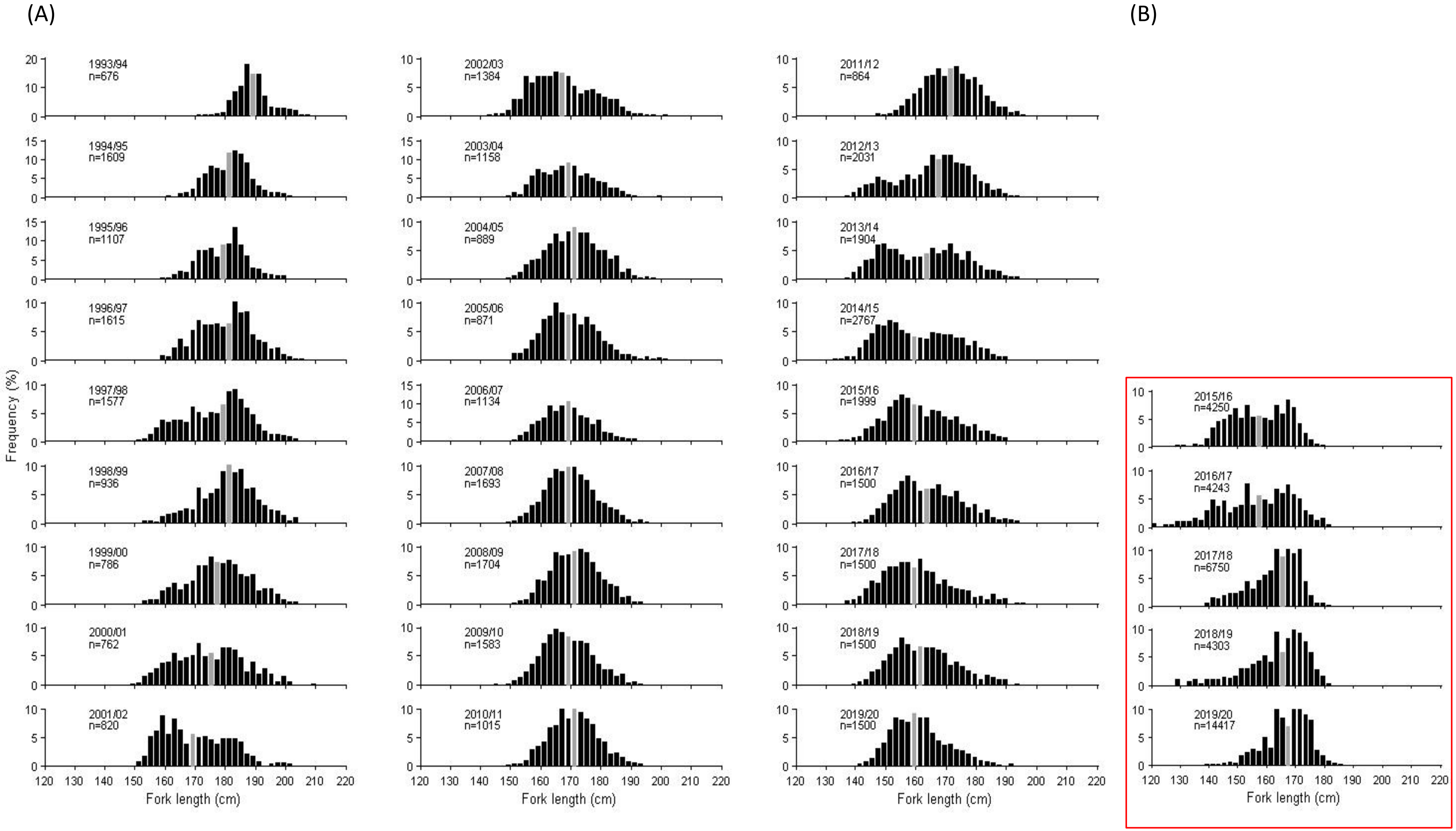

Figure 5. Length frequency (2 cm intervals) of SBT caught in the Indonesian longline catch estimated from (A) length data obtained in the Benoa catch monitoring program for all seasons, and (B) CDS individual weight data converted to length for 2015/16 to 2019/20 (red box). The grey bar shows the median size class.

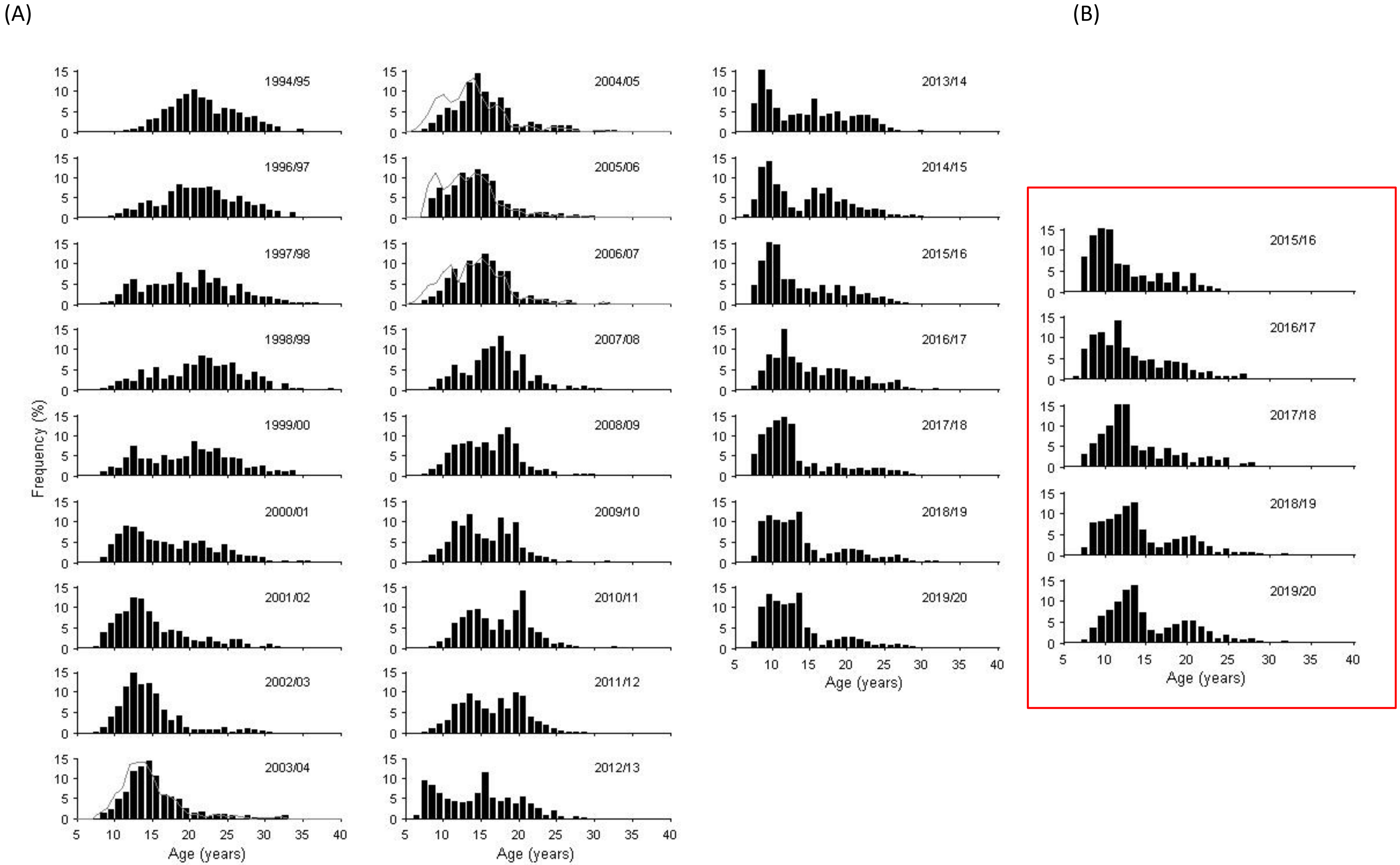

Figure 6. Age frequency distribution of SBT caught in the Indonesian longline catch estimated from (A) length data obtained in the Benoa catch monitoring program for all seasons, and (B) CDS individual weight data converted to length for 2015/16 to 2019/20 (red box).

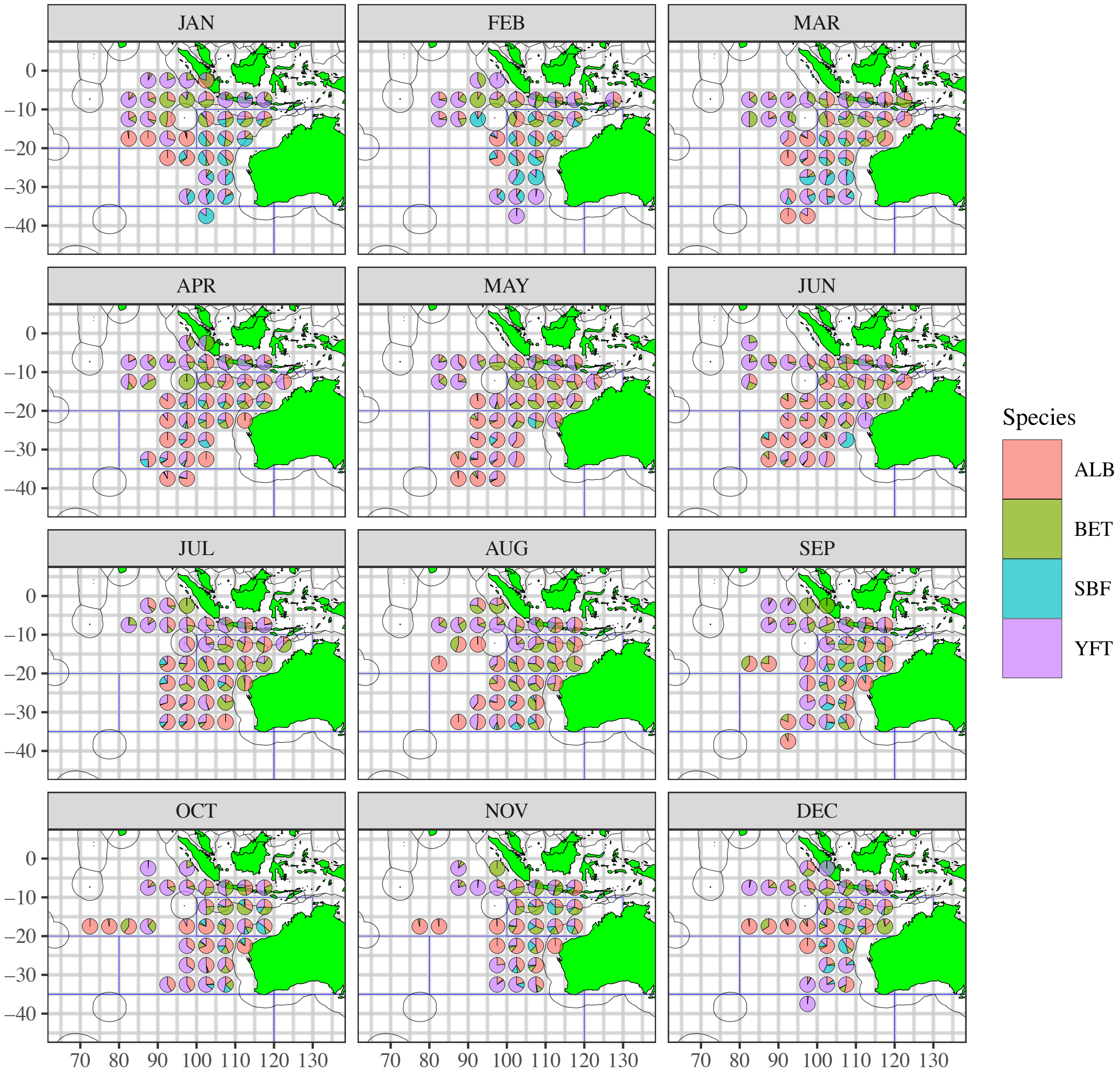

Figure 7: Catch composition of four main tuna species based on 5x5 degree blocks. Source: E-logbook data from 2019-2021. Reproduced from Figure 2, ESC27_Info01.

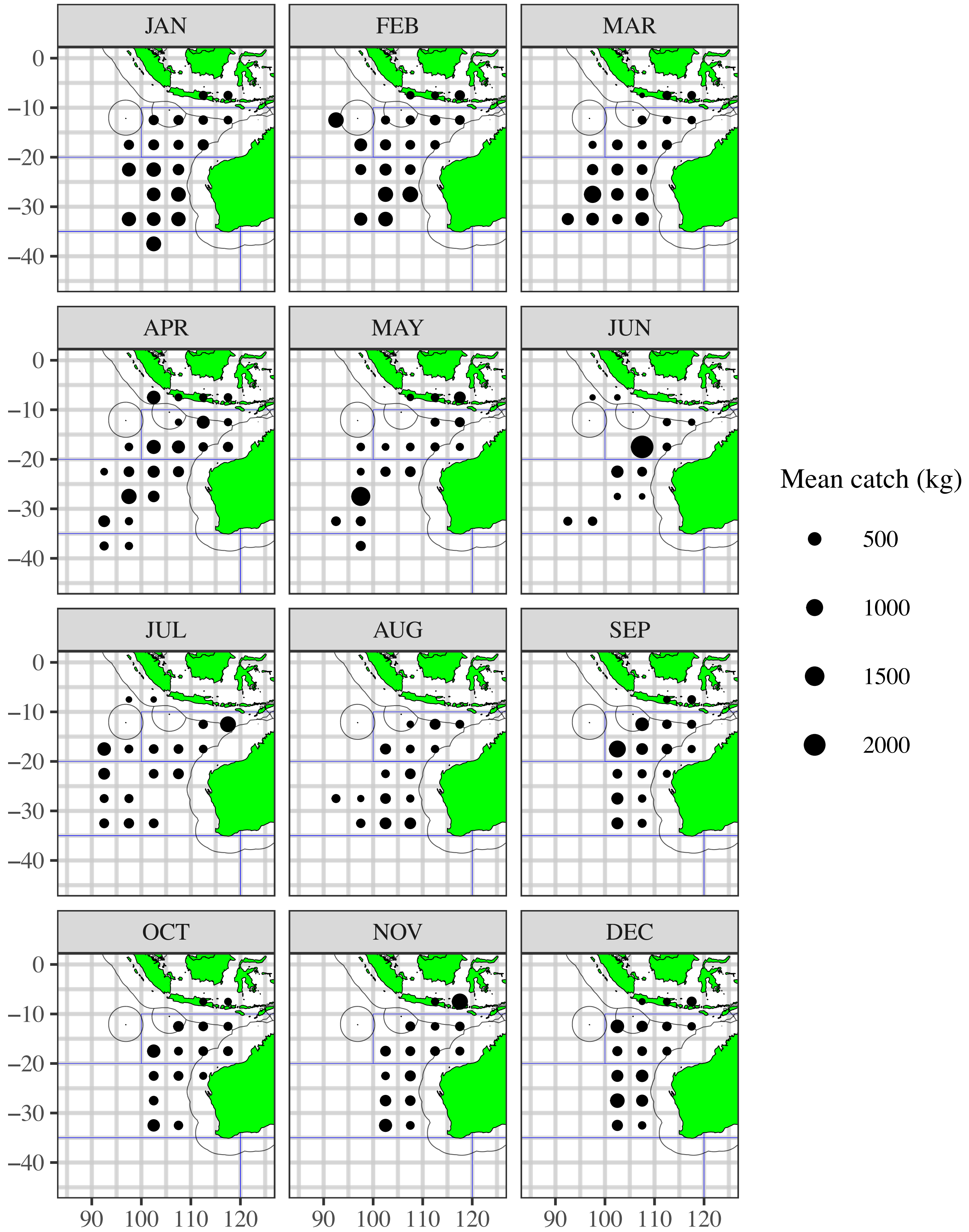

Figure 8: Monthly average catch of southern bluefin tuna based on 5x5 blocks. Source: E-logbook data from 2019-2021. Reproduced from Figure 3, ESC27_Info01.

Attachment 1: SRP Proposal (Indonesia and Australia)

Capacity building for Southern bluefin tuna (SBT) spawning ground monitoring program

Fayakun Satria[1], Lilis Sadiyah[1], Jessica Farley[2] , Putuh Suadela[3] and Campbell Davies[2]

Prepared for the CCSBT Extended Scientific Committee for the 28th Meeting of the Scientific Committee, 28 Augustus – 2 September 2023, Jeju, Korea

Abstract

The spawning ground for southern bluefin tuna (SBT) is in an area between Indonesia and the northwest coast of Australia, where spawning occurs during September to April each year. The Indonesian longline fishery targets bigeye and yellowfin tuna on the spawning ground, with a by-catch of southern bluefin tuna (SBT). In the past SBT tuna monitoring usually conducted by RITF-MMAF collaborated with CSIRO. In 2022, a new institutional arrangement that merged all research organisations into a new national research agency (BRIN). This institutional change, in combination with the impacts of COVID-19, has presented a number of challenges for the monitoring of SBT due to the lack of a dedicated budget to continue these activities under BRIN. Under BRIN there is the research center for Fishery-research, within the Research Organization for Earth and Maritime sciences that all scientists previously involved in the SBT monitoring have joined. The current proposal under these new institutional arrangements is that SBT Monitoring activities will be mainly conducted by MMAF and research activities will be conducted by RCF-BRIN. However, this transition phase will require a longer process i.e. estimated at least for 18 months and presents ongoing challenges for the continuation of SBT monitoring in the near future. This proposal is aimed to provide a bridging project to support the continuation for southern bluefin tuna (SBT) spawning ground monitoring program and necessary capacity building in new enumerators/samplers during MMAF-BRIN transition.

Introduction

The assessment of the spawning population of SBT is a key indicator of stock status for the annual Scientific Committee Meetings of the CCSBT. Obtaining accurate annual estimates of the size/age composition and catches of SBT landed by the Indonesian longline fishery is a central input to the SBT stock assessment, used by CCSBT to monitor changes in stock status over time, as well as, the CKMR model used in the Capetown Procedure to set the global Total Allowable Catch. Data on SBT from the Indonesian longline fishery is essential to monitor changes in the spawning population over time. It provides assessment inputs on the adult component of the stock, including (i) length data to estimate the size composition of adults; (ii) otoliths to estimate age-at-length and the age composition of adults; and (iii) tissue for estimating the abundance of adults using close-kin mark recapture (CKMR).

In the past the SBT monitoring has been conducted collaboratively by Research Institute for Tuna Fisheries (RITF) and CSIRO. In 2022 a new institutional arrangement that all research organisations merged into a new national research agency (BRIN) making the monitoring of SBT facing a challenging time due to the lack of a dedicated budget to continue this activity. All scientists previously involved in the SBT monitoring have joined BRIN under the new Research Centre for Fishery-Research (RCF), which sits within the Earth and Maritime Sciences Research Organisation.

In order to re-commence the catching monitoring and sampling, the RCF and DFRM-MMAF, collaboratively with CSIRO, have conducted an initial training workshop of new enumerators contracted to DGCF to continue the monitoring of SBT in Benoa in February 2023. There were 6 new recruited and trained enumerators in Late February 2023 and they recommenced sampling otoliths and tissue of SBT in Benoa Port in March 2023.

Observation on size distribution for SBT caught in the spawning area (Area 1) showed changes of size distribution towards smaller size since 2014 (Anonymous. 2022). It is unclear whether this due to changing longline fishing strategy or other reasons, such as stronger recruitment, that could explain the actual size SBT distribution pattern in the spawning area (Anonymous. 2023). To understand this, it is required to revisit and refresh the protocol of SBT monitoring in key landing sites (Benoa and Cilacap) and to undertake a more detailed assessment of the implications of the shift in fleet operations between CCSBT Statistical Area 1 and Statistical Area 2 over recent years and its potential implications for stock assessment.

Issues for consideration

The current transition phase may be need a longer process, i.e. estimated at least for 18 months, given the challenges facing the continuation of SBT monitoring due to these institutional and budgetary circumstances. There is the need to re-establish the necessary collaborative arrangements to be formalised between the relevant parties (BRIN, MMAF, CSIRO, CCSBT) for SBT monitoring. This includes the need to complete new MOU, project agreements and approvals for transport of samples between BRIN and CSIRO. Additional funding is required to complete the training of the new enumerators/samplers and provide supervision and regular quality control to ensure the collection, storage and transport of high-quality samples for ageing and CKMR genetics. In addition there will be a need to continue the transfer of capability from BRIN and CSIRO research staff to MMAF Enumerators to be able to conduct the ongoing monitoring of SBT in Benoa and Cilacap. The development of science for SBT monitoring including ACES and increased understanding of CKMR has been identified as an area that required capacity building for Indonesia scientists.

Collaborative arrangements under a new MoU need to formalised between the relevant parties (BRIN, MMAF, CSIRO). This arrangement is required as the new BRIN-MMAF-CSIRO arrangements are being considered in the context of the wider Indonesian-Australian research collaboration in need time to finalised to allow for: transfer of funds to Indonesia, training activities in Indonesia and transfer of biological samples and/or data from Indonesia to Australia.

Activities and Costs

The majority of these SBT monitoring related activities are able to be funded by Indonesia government through DGCF-MMAF (Table 1).

We are seeking funding for two activities to support the recommencement of the biological sampling and necessary capacity building to resolve the outstanding issues associated with the catch monitoring program following the disruption of the past 2 years:

1. Training and supervision for dedicated enumerators for SBT monitoring program in primary landing ports for SBT (e.g. Benoa, Cilacap and Muara Baru); and
2. Capacity building and analytical support for review of catch monitoring program, in particular, determining the most appropriate standard method for obtaining representative length and age frequency for the spawning ground catches and CKMR tissue samples.

Aims

To support the transition and recommencement of SBT monitoring, MMAF, RCF-BRIN collaboratively with CSIRO including the catch monitoring, biological sampling and capacity building in analyses and reporting.

Benefits

The project will support the transition of and improve rebuild the program of spawning ground monitoring for SBT back to the required level by CCSBT for input into stock assessment (catch and catch composition, age and CKMR) and the CapeTown Procedure (CKMR).

References

Anonymous. 2022. Report of the Twenty Seventh Meeting of the Scientific Committee, Commission for the Conservation of Southern Bluefin Tuna, 5 September, Online.

Anonymous. 2023. Report of the Thirteenth Operating Model and Management Procedure Technical Meeting 26-30 June Seattle, USA.

Annex

This Annex provides details of the activities and levels of resourcing and capacity building that are required to rebuild the program to at least back to the required level by CCSBT over the next 2 years (23/24-24/25 spawning seasons). Item 3 for training and capacity building in catch monitoring, sampling and analysis is the request from CCSBT SRP.

Table 1. The proposed activities for the continuation of SBT Monitoring in Indonesia (capacity building and catch monitoring for developing states).

No	Description	Data and samples	Issue	Action	Approach	Priority	Budget Required	Sources
1	Log-Book (All fishing Vessels above 5 GT shall report their log book to GOI)	Catch, Position	Low Coverage and Data Quality	Continue improve and strengthen log book Data By DGCF	Strengthen and improve of log book quality, including the records of fishing position, and ERS Data	Essential	Available	GOI (APBN)-DGCF
2	Observer	Catch, ERS, Fishing Position	Low Coverage and Data Quality	Continue to deploy wet observer to LL operated in the Indian Ocean. While looking for to improves EM and ER to those LL. DGCF & BRIN-RCF	Improved and increase the number of trained observers that assigned particularly to LL and with addition to PS, to collect operational data.	High	Available	GOI (APBN)-DGCF
3	Capacity building for Port monitoring for LF analysis and biological samples	Catch, Length frequency data and biological sampling	Consistency of long-term data for stock assessment	DGCF & BRIN-RCF to re-establish standard port monitoring protocols and resolve historical inconsistency in LF data with advice and support from CSIRO	Improved and increase the number of trained enumerators that assigned to key SBT ports, in particular Benoa, Cilicap and Muara Baru.	Essential	Request from CCSBT SRP USD 40,000 (for a year round Jan-Dec activity)	Proposed to be funded by CCSBT
4	Reporting to CCSBT (SC-ESC. ERS, CC)	National Reports to specific Meeting of the CCSBT	Data availability in time to produce national reports as required by the commission	MMAF-DGCF- BRIN-RCF	Coordination meeting, strengthen Exploratory and data analysis	High	Available	GOI (APBN)-DGCF
5	Stakeholders/association Involvement	CDS, Fishing Location, Effort (hooks), ERS, operational Cost, Socio economic data (incl market data)	Data transparency from industry, in particular, for socio economic data including market.	Close engagement to the industry with emphasizes for sustainability of the resource and their business.	Increase the Awareness of the vessel Owners and operators (Companies), with participatory approach and co-management principles	Medium	Available	GOI (APBN)-DGCF, Tuna Association (ATLI)

As Australia's national science agency and innovation catalyst, CSIRO is solving the greatest challenges through innovative science and technology.

CSIRO. Unlocking a better future for everyone.

Contact us

1300 363 400
+61 3 9545 2176
csiroenquiries@csiro.au
www.csiro.au

For further information

Environment
Campbell Davies
+61 3 6232 5044
Campbell.davies@csiro.au
csiro.au