



## **Current and future monitoring of Indonesia's Indian Ocean tuna fishery and SBT catch – Discussion paper**

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## Abstract

There has been a long history of collaboration between Indonesia and Australia for the monitoring of SBT landings in Indonesia. The monitoring program at fishing port of Benoa, Bali, commenced in 1992 and underwent a significant expansion in 2002. The catch data and information from the biological samples collected within the Benoa monitoring program have been, and continue to be, critically important in the annual assessments of the SBT spawning stock by the Scientific Committee of CCSBT. The long term data series and the results of biological sampling within the program have proved essential in identifying key trends in size/age structure of the spawning population and the likely decline in spawning capacity of the stock. The Benoa program has seen some significant developments during the past year, including the establishment of the new Benoa Tuna Research and Monitoring Station (BTRMS). In addition to daily monitoring of landings and biological sampling, the BTRMS is also a base for the trial observer program for the longline fleet which has been in operation since mid-2005. Capacity development activities planned for BTRMS for 2009 and beyond include the provision of training for reading of otoliths for age determinations and histology for studies of reproductive biology. During the past year Indonesia has significantly increased its share in the responsibility for the fiscal and operational management of the research and monitoring program, but is not in a position to cover the full costs of the operations and the associated analyses (including the costs of the age determinations from otoliths). Australia has a long history of providing financial contributions to support the monitoring and sampling program at Benoa. Funding is not yet assured for continuation of the monitoring and sampling for the 2009/2010 SBT spawning season, and it appears timely that discussions occur among CCSBT Member Countries, at the 2009 Scientific Committee Meeting, about how best to ensure the continuation of the program through the coming season and beyond.

## Introduction

Concerns over the impacts of fishing pressure on the only known spawning ground for southern bluefin tuna (SBT), *Thunnus maccoyii*, led Indonesia and Australia to begin a program of port-based monitoring and biological sampling for the Indian Ocean longline fishery at Benoa Fishing Port, Bali, in 1992. Benoa was then, and remains, the primary landing port for SBT caught by the Indonesia fleet. In general, SBT has been considered a bycatch of the Indonesian fishery which targets YFT, BET, and ALB. The proportion of SBT landings relative to total annual tuna landings at Benoa is usually only 4 – 12% with tonnages of annual catch of SBT by the Indonesian fleet in the range 550 – 1700 tonnes during the past 5 years (see Prisantoso et al. 2009).

The Central Research Institute of Fisheries (Indonesia) joined with CSIRO Division of Fisheries (Australia) to commence daily enumeration of landings at Benoa. During the period 1992 – 2002 the monitoring and biological sampling was done by 1 - 2 enumerators, and focus was largely on SBT. In collaboration with Indian Ocean Tuna Commission (IOTC) and Overseas Fishery Cooperation Foundation – Japan (OFCF), the program of daily monitoring of tuna longline landings expanded in 2002 to include two other key tuna landing ports – Muara Baru (Jakarta) and Cilacap (south coast Java). The focus widened to include enumeration of all major target tuna species, and ‘tuna-like’ species such as marlins and other billfish, and other bycatch species.

The catch data and information from the biological samples collected within the Benoa monitoring program have been, and continue to be, critically important in the annual assessments of the SBT spawning stock by the Scientific Committee of CCSBT. Among the most important outcomes is the 16 year time series in size and age distribution (see Fig 1 attached) of SBT catches taken on the spawning ground. This series continues to highlight the likely extent of the decline in spawning capacity of the stock. In the absence of research methods that can collect the necessary information directly from the live SBT spawning population, the Benoa port-based monitoring program and the current trial observer program (see below) remain essential for the monitoring and assessment of the SBT population.

The Bena monitoring program has undergone some major developments during the past 12 months, with the two most important being the uptake of responsibility by Indonesia for the operational management and funding of the program and the associated move of the monitoring office to a new location. The program's new formal status is as a Bena Tuna Research and Monitoring Station of the Agency of Marine and Fisheries Research (AMFR). However, although these positive developments are very significant and demonstrate Indonesia's commitment to the continuation of the program, AMFR is not in a position to cover the full operational costs of the sampling and the costs of analyses associated with the sampling (e.g. the cost of otolith readings for age determination). Until this current year, the majority of the operational funding for the Bena program had been provided by Australia, with contributions from Department of Agriculture, Fisheries and Forestry (DAFF, and formerly AFFA), Australian Centre for International Agricultural Research (ACIAR), and CSIRO. Australia's contribution has continued into 2009, with 'gap funding' provided by CSIRO to ensure continuity of monitoring through 2008/2009. The future security of the funding for the Bena program in its entirety is now unclear. The authors consider that it is appropriate to raise this as a discussion point for the 2009 CCSBT Scientific Committee Meeting and for the SC to make recommendations to the Commission on the relative priority of the SBT monitoring program in Bena. Below we provide an update on the current monitoring activities, outline some ideas for future research collaborations relevant to CCSBT and to ongoing development of the tuna monitoring and research capacity in Bena, and some discussion of key considerations for the future of the program.

## Current monitoring and sampling

Since mid-2002 the port-based monitoring program at Bena has had several core elements that have remained largely unchanged:

- A team of 6 - 7 enumerators who, on a daily basis, monitor vessel unloadings and select unloadings from either catcher or carrier vessels to enumerate. The Office of Control and Surveillance of Fishing Vessels (WASKI) and the processing companies in Bena provide information that assists in the monitoring of landings on any particular day.
- The enumeration of catch is conducted in the processing companies, not at the point of unloading. The enumerators' selection of which companies to sample on any particular day is based on the program objective of sampling at least 30% of landings at each processing plant for each month.
- For each unloading sampled the enumerators record weight of all individual tunas (YFT, BET, SBT) and the larger pelagic species (e.g. marlins, swordfish). Albacore most often arrive as frozen bycatch and individual fish weights or length measurements are not taken. For the other tunas every 10<sup>th</sup> fish (regardless of species) that passes along the processing line is measured for length.  
[Note – For further details of the IOTC sampling protocols and raising method, upon which the Bena program is based, see Andamari et al. (2004) - CCSBT-ESC/0409/11]
- The data from the daily enumerations were, up until recently, entered into the Fisheries Integrated Statistical System<sup>2</sup> (FINNS) database, at Gondol Mariculture Research Institute (GMRI). Data are now entered into the same database but the entry is done at the new Bena Tuna Research and Monitoring Station. Previously, copies of the data were sent to IOTC who, in turn, produced the annual catch estimates on behalf of Indonesia for submission to CCSBT. This no longer occurs and Indonesia independently produces the catch estimates which are submitted to CCSBT on a monthly basis.
- During the SBT spawning season, September – March, a minimum of 1000 SBT that are landed at Bena are sampled for otoliths for age determination (500 are subsequently selected for reading), and in recent years have also had a muscle sample removed for analysis as part of the CSIRO Close Kin Genetics project (Bravington et al. 2009 CCSBT-ESC/0909/21). Details

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<sup>2</sup> FINNS is a SQL database, formerly called "WINTUNA", developed by IOTC and with funding from OFCF (Japan).

of the methods associated with the age determinations can be found in Farley et al. (2009) - CCSBT-ESC/0909/15.

The port-based monitoring provides high quality data on the amount of fish landed, the species composition of the catch, and opportunities for biological sampling. However, it provides little information on the amount and spatial distribution of effort on which to base CPUE analyses. To address this issue, a trial scientific observer program for the longline fishery at Bena commenced in July 2005, funded by the ACIAR and CSIRO. To date the team of 5 - 6 observers have done around 70 trips to sea, with trips ranging in length from 16 - 150 days, and 8 - 54 sets/trip. Reports on the trial observer program have been provided to earlier CCSBT Scientific Committee Meetings (Sadiyah et al. 2007 & 2008 - CCSBT-ESC/0709/Info 04 and CCSBT-ESC/0809/20 respectively).

It was intended that the trial program would be a stepping stone to a formal national fisheries observer program. This remains the medium term objective and is considered a high priority. During recent years, discussions at meetings involving all key stakeholders, including the relevant departments and research institutes within Indonesia's Ministry of Marine Affairs and Fisheries, RFMOs, the tuna fishing industry, and NGOs (WWF) have progressed the development of a strategy to achieve the transition to a formal observer program. The next step in this process is to hold an 'Observer Program Development Workshop' which is planned for later this year.

A significant recent event that is highly relevant to the objectives of filling current information gaps with respect to CPUE in the Indonesian pelagic fisheries was the IOTC/Western and Central Pacific Fisheries Commission/Directorate General of Capture Fisheries (DGCF) coordinated workshop on development and implementation of an upgraded fisheries logbook system for Indonesia, which was held in Jakarta during 18 - 20 May 2009. The primary outcomes of that meeting were a set of newly developed logbooks for vessels that target pelagic species (for longline, purse-seine, pole & line and handline gears). The agreed plan, proposed by DGCF, is to initially introduce logbooks for vessels > 100GT, and then extend during 2011 and 2012 to also include vessels 30 - 100 GT.

## **Future collaborations in monitoring and research**

During the past 18 months there has been considerable discussion about future Indonesia - Australia collaborations on tuna fisheries in Indonesia, and with particular focus on Bena. These discussions have been directly linked to the establishment of the new Tuna Research and Monitoring Station at Bena and the consideration of activities for the current extension year to the Research Centre for Capture Fisheries (RCCF)/DGCF/CSIRO ACIAR funded tuna fisheries research project<sup>3</sup> and for beyond this project. Contingent on sufficient funding (see below), the Bena facility will retain its role as base for daily enumeration of the Bali-based longline fishery. The process of identifying suitable research activities that will supplement the daily monitoring is ongoing, but there appears to be universal agreement among all stakeholders that the new facility at Bena provides a valuable opportunity to do research that will assist in the understanding of SBT population dynamics, address some of the information gaps for the behaviour of tunas on the spawning ground, and further expand the knowledge of fleet operations and fishing behaviour.

As a first phase in development of research activities at Bena, the current ACIAR project extension includes capacity development in two key areas; the reading of otoliths for age determination, and the examination of aspects of reproductive biology through histological techniques. Up until now, all reading of the SBT otoliths sampled in Indonesia, for the annual assessment of age-length structure of the SBT spawning population, has been done by CSIRO and Central Aging Facility (Vic, Australia). Indonesia has expressed a strong desire to participate in these important assessment activities, beyond just the participation in the sampling of the otoliths. In October 2009, two trainees from RCCF will

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<sup>3</sup> ACIAR Project FIS/2002/074 "Capacity development to monitor, analyse and report on Indonesian tuna fisheries", due for completion in December 2009.

visit CSIRO and Fish Ageing Services<sup>4</sup> (FAS) to receive training in the preparation of otolith sections and the reading of those sections for age determination. It is hoped that, in time, the trainee(s) will develop skills to the point of being able to do age determinations of a subset of the otoliths for comparison to those of CSIRO and FAS readers.

Histological examination of gonads for investigation of mean size at maturity and recruitment into egg production was a key activity (funded by FRDC) in Bali during the 1990s and early 2000s (Davis et al. 2002). Several scientists at RCCF, Research Institute for Marine Fisheries (RIMF), and GMRI already possess the histological skills for such work, but there is agreement that this is an area of research that can be developed at Benoa for further reproductive biology studies for SBT, but also for other commercially important pelagic species (including YFT, BET, ALB, marlins, and swordfish). Later this year, training in histological techniques will be provided, in Bali, to one or more staff of the Benoa Tuna Research and Monitoring Station.

## Key considerations for the future

As mentioned above, the continuation of monitoring the landings of SBT caught by the Indonesian longline fishery is essential for the Scientific Committee of CCSBT's annual assessments of SBT spawning stock. Similarly, the sampling of otoliths and length measurements of the Indonesian-caught SBT are a long term dataset that has already proved important in those assessments over many years. If we make the assumption that CCSBT Member Countries will be in agreement at the 2009 Scientific Committee Meeting that continuation of the monitoring and sampling at Benoa continues to be central to the assessment process and development and evaluation of future management procedures for SBT, key considerations include:

- Indonesia is not currently in a position to cover the full operating costs of the Benoa monitoring program, nor in a position to cover the costs of the otolith sampling and subsequent analyses for age determinations.
- Australian agencies have, until present, covered the majority of the operating costs.
- CSIRO provided gap funding from July 2008 to February 2009 (inclusive) to enable continuation of the monitoring and sampling during the 2008/2009 spawning season.
- Some residual of those gap funds should be sufficient to cover the costs associated with age determinations and analysis of the data for the 2008/2009 spawning season.
- At present funding is not ensured for coverage of monitoring and sampling during the 2009/2010 spawning season.
- Indonesia has allocated around IDR 370,800,000 (approx USD 37,250) to the operational costs of the Benoa Tuna Research and Monitoring Station for 2009/2010, which includes basic salaries for the enumerators, electricity, water, and communications (phone and internet).
- An additional USD15,000 (approximately) is required to cover the balance of operating costs for the monitoring of landings, the otolith sampling during the SBT spawning season, and the otolith readings at FAS, but that figure excludes salaries for the monitoring program manager/supervisor in Bali and the salary components for CSIRO staff involved in the program.

## Recommendation:

We note that the CCSBT Extended Scientific Committee Meeting is not the appropriate place to comment on who should fund, but we recommend that the ESC comments on the relative priority of this data set as a general contribution to the assessment, and, if the ESC considers it appropriate, to recommend to the Commission that the monitoring program be continued and that funds be sought to ensure its continuation.

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<sup>4</sup> Fish Aging Services Pty Ltd, in Victoria, Australia, is a new fee-for-service ageing laboratory established in early 2009, with staff from Central Aging Facility.

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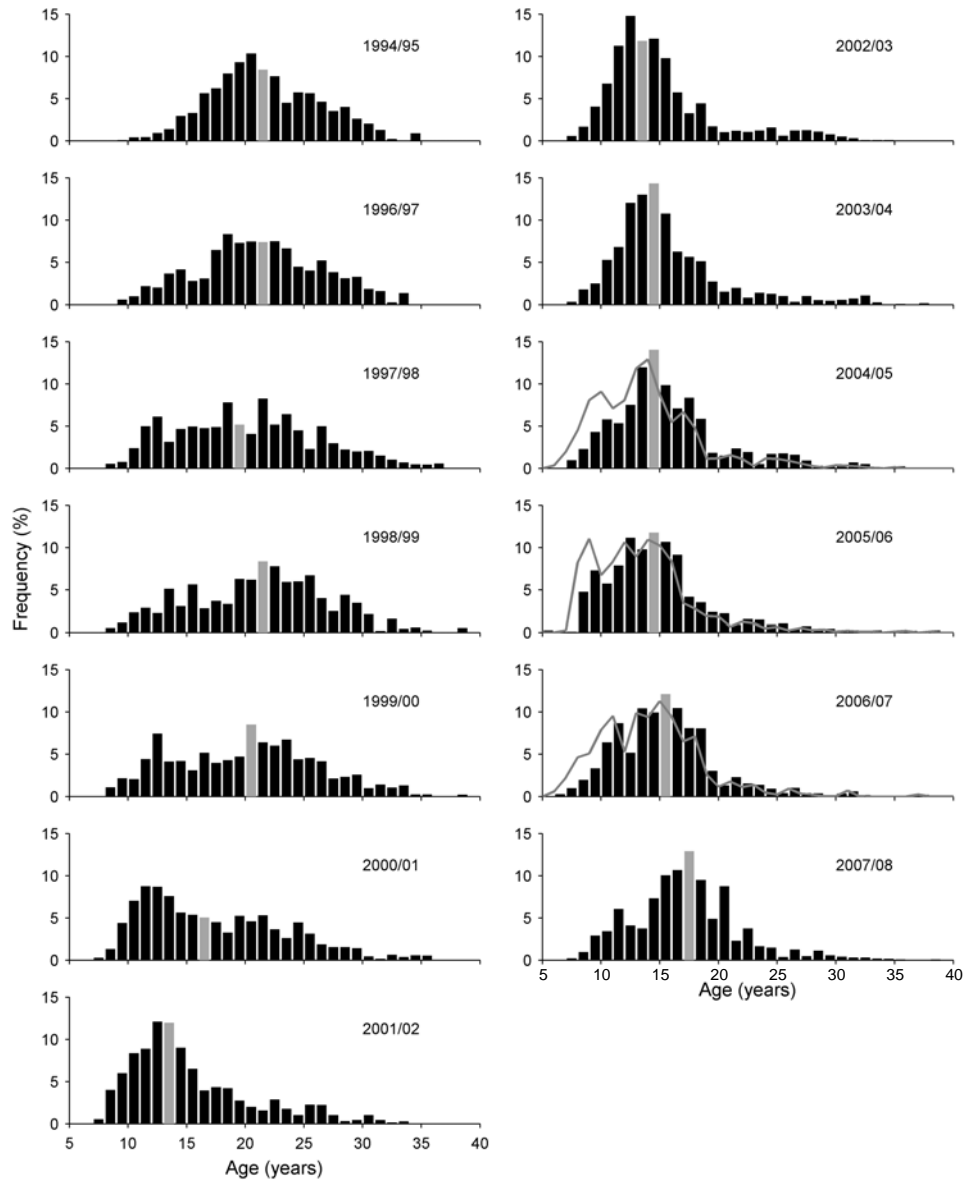


Figure 1. Age frequency distribution of SBT in the Indonesian catch on the spawning ground by spawning season estimated using age-length keys from our sub-samples of aged fish and length frequency data obtained through the Indonesian monitoring program. The grey bar shows the median age class. For comparison, the age distribution of SBT caught south of the spawning ground (Processor A) is shown for the 2004/05, 2005/06 and 2006/07 seasons (grey line). Source: Farley et al. (2009).