Report on Australia's SRP Tagging Activities in 2003/2004 and Plans for 2004/2005

Tom Polacheck, John Gunn and Thor Carter

CSIRO Marine Research

Jay Hender

Department of Agriculture, Forestry and Fisheries

CCSBT/ESC/0409/46

Summary

As part of the CCSBT SRP, Australia was involved in two tagging initiatives in 2003-04.

The first, a Global Spatial Dynamics project, involves archival tagging of juvenile (3-4 year old) SBT throughout their range (ie from South Africa to New Zealand) with the objective of determining movement and mixing rates, and periods of residency in different parts of this range. The project has been developed as collaboration between New Zealand, Taiwan and Australia, and it is our hope that the collaborative efforts will be expended to include collaborations with other CCSBT members. The early results of this program are described, with archival tags having been released in NZ, Australian and central Indian Ocean waters. It is planned to extend archival tagging operations to other parts of the Indian Ocean and possibly off the east coast of Australia depending upon the availability of suitable tagging platforms and availability of juvenile fish. This will likely see a doubling of the number of fish tagged. With this being the objective, the CCSBT is requested to provide 12 tonnes of research mortality allowance for the project.

The second, a Pop-Up and Conventional tagging project, involves tagging of adult SBT in the Tasman Sea. This year 154 fish were tagged with conventional tags, and 23 with Pop-up tags. Fish ranged in size from 95-195cm fork length. The 2004 activities bring the total number of fish tagged in the Tasman Sea with conventional and electronic tags over the last three years to more than 800. Pop-Up tagging data have allowed patterns of residency of large fish in the Tasman Sea to be determined, and shown large scale westerly movements of these fish into the Indian Ocean. The success of the project in tagging significant numbers of large SBT, and reductions in mortalities associated with tagging, suggest that ongoing tag releases of large SBT in the Tasman Sea are feasible and cost effective. Thus, Australia proposes to continue the tagging program, and requests the Commission allocate 15 tonnes of Research Mortality Allowance (RMA) in 2005 to cover mortalities associated with this program.

Introduction

As part of the CCSBT Scientific Research Program, Australia conducted two major tagging studies during 2003-04: (1) archival tagging of juvenile fish as part of a global spatial dynamics project and (2) conventional and pop-up satellite tagging of adult SBT in the Tasman Sea off the Australian east coast. This paper presents a summary on activities undertaken this year and of planned activities in 2004/2005.

Global Spatial Dynamics Project

CCSBT-ESC/0309/Info04 provided an overview of the global spatial dynamic project for juvenile SBT. The project is a multi-year, large scale project that CSIRO has initiated to improve our understanding of the global spatial dynamics of juvenile southern bluefin tuna (SBT). The project aims to archival tag 150 to 200 juvenile SBT per year for 3 years throughout the range of habitats in which they are exploited. The project aims to provide improved knowledge of, the basis for and an understanding of the implications of the incorporating spatial dynamics and habitat utilization information directly into the analyses of conventional tag return data, CPUE standardizations using habitat based approaches, the SBT stock assessments, and the management advice. The data collected in this spatial dynamics project will be useful in estimating mixing rates and should help to provide a robust basis for interpreting the conventional tagging results. The project is intended to be complementary to the current conventional tagging program under the CCSBT Scientific Research Program, and to take advantage of this program through recovery programs

and deployment opportunities. This project also builds upon previous and concurrently running archival and conventional tagging projects.

The project seeks to collaborate with other CCSBT members in all aspects of the work, including tag deployment, recovery and analysis of results. In the first year of the project, collaborative arrangements were developed with New Zealand and Taiwan for tag deployments and future analytical collaboration when data becomes available from returned tags. We would welcome extending this collaboration other CCSBT members and a proposal for this has been provided in a separate document (Polaceck et al 2004).

In 2003/004, archival tags have been released in 4 locations in collaboration with this project:

1. off New Zealand,
2. in high seas in the central Indian Ocean,
3. in the Great Australian Bight (GAB)
4. Off the south of West Australia.

Tagging was done in New Zealand by observers on chartered longliners. As part of this project, training in archival tagging was provided to observers by experienced CSIRO archival taggers. The aim was to release a total of 50 archival tags (half being supplied by this project and the other half being supplied by NZ). However, only 6 tags were able to be released because of a paucity of small fish. Training on tagging and deployment of archival tags was also provided to three Taiwanese observers. However, because of logistical problems with the delivery of the tags, archival tags were only to be delivered to two of the observers prior to their vessel departing from Mauritius. Each observer was provided with 25 tags (i.e. 50 in total). These observers are still at sea and tagging operations are continuing. To date, 35 tags have been deployed by these observers. Archival tags were also released in WA in conjunction with RMP activities and in the GAB in conjunction with the CCSBT conventional tagging activities.

As the Taiwanese vessels are still at sea, we are not able at this point to report on the amount of SPR research mortality occurred in these operations. A report will be prepared after the observers retune and provided in due course to the CCSBT. The other archival tagging operations did not have any mortality in conjunction with their tagging operations. It is anticipated that the total mortality will not exceed the 6t allocated to this project.

Pop-Up and Conventional tagging of adult SBT in the Tasman Sea

At CCSBT8 the Commission agreed to proceed with a tagging program as part of a Scientific Research Program. The structure agreed for the tagging program reflected the recommendations of a Tagging Program Workshop convened in early October 2001. There are three components to the program:-

1. Tagging 1-4 year olds in the waters off the South and Western Australia, to be managed by the CCSBT Secretariat
2. A pilot program to be conducted by Japan in the longline fishery in the western Indian Ocean,
3. A pilot program to be conducted by Australia in the western Tasman Sea.

This reports covers activities of the third component of the program.

Since the 1960's 133,525 SBT have been tagged as part of scientific tagging programs. The overwhelming majority of these releases have been made by CSIRO, in Western and South Australian coastal waters. Fish tagged have ranged in age from1-4 years old.

The data from 19,832 reported recaptures from these programs, along with recent data collected by archival tags on similar sized fish, have provided a comprehensive description of the spatial dynamics of juvenile fish that use southern Australian coastal waters as summer feeding grounds, and the interactions between surface and longline fisheries targeting these fish. However, we know virtually nothing of the spatial dynamics (movements, mixing rates, residency) of mature fish throughout the broad range of the species in the southern Pacific, Indian and Atlantic Oceans. It is assumed on the bases of our inability to reject the null hypothesis in mitochondrial DNA genetic studies and the continuous distribution of SBT across the Southern Ocean that SBT belong to a single genetic stock. However, over the last two decades there has been a contraction in the spatial extent of the SBT longline fisheries to the current situation where adults are caught only at a few spatially discrete fishing grounds. There are no data to examine whether these represent aggregations of fish that may show fidelity to these grounds, a situation that would require considerable review of current population models for the species.

The primary reasons behind the lack of movement data for adult fish are:

- they do not form large surface schools that would allow surface fishing to efficiently capture and tag large numbers of fish ,
- they tend to aggregate in remote areas, making tagging logistically difficult and expensive,
- their value to commercial fishermen mean that voluntary release of live fish from commercial vessels is not practical, and the purchase of fish to tag (a practise used in many scientific tagging studies) is not viable.
- they are difficult to handle and tag.

A pilot study was proposed to tag in the western Tasman Sea where each winter large SBT aggregate along frontal systems close to the Australian coast. In this area it is possible to use small domestic longliners to catch mature SBT to deploy tags.

Our objectives in the pilot study were:

1. develop tagging methods suitable for mature fish caught on longlines,
2. determine the incidental mortality associated with long line fishing for tagging operations,
3. tag, mark with strontium chloride and release 250-500 SBT with conventional tags and a small number with pop-up satellite archival tags,
4. determine the feasibility and cost parameters of a scaled-up program.

We have now tagged adult SBT in the Tasman Sea with conventional and pop-up archival tags for three years in a row.

Tagging logistics and methods.

An Australian longliner was chartered for the tagging program in 2004. The vessel was 20 m, used monofilament longline gear, combinations of live and dead bait , fished primarily at night and in all shots used soak times less than 4 hours and less than 500 hooks.

The fishing and tagging operations were the same as those described in CCSBT/ESC/0309/Info 2.

The vessel used in the program was dedicated to targeting and catching SBT for tagging (ie it was not fishing commercially). To minimize mortality associated with tagging, soak times and hook numbers were as much lower than those used in commercial operations. Mortalities associated with tagging were retained on board the vessel, processed as they would be on commercial operations, and sold on the Japanese market as product of the CCSBT. The summed weight of mortalities was decremented against the CCSBT Tagging Mortality Allowance.

Proceeds from the sale of these fish over and above the costs associated with handling, freight and sales were retained by the CCSBT Secretariat.

Tag Releases.

Over the 40 day charter, 154 fish were double tagged with conventional tags and 23 with Pop-Up tags. Forty-nine fish (21.7% of the total fish caught) died in the tagging operations. Figure 1 provides the size distribution for conventional and PAT tagged fish and mortalities in 2004. Figure 2 compares the size distributions of fish tagged over the last 3 years in the Tasman Sea.

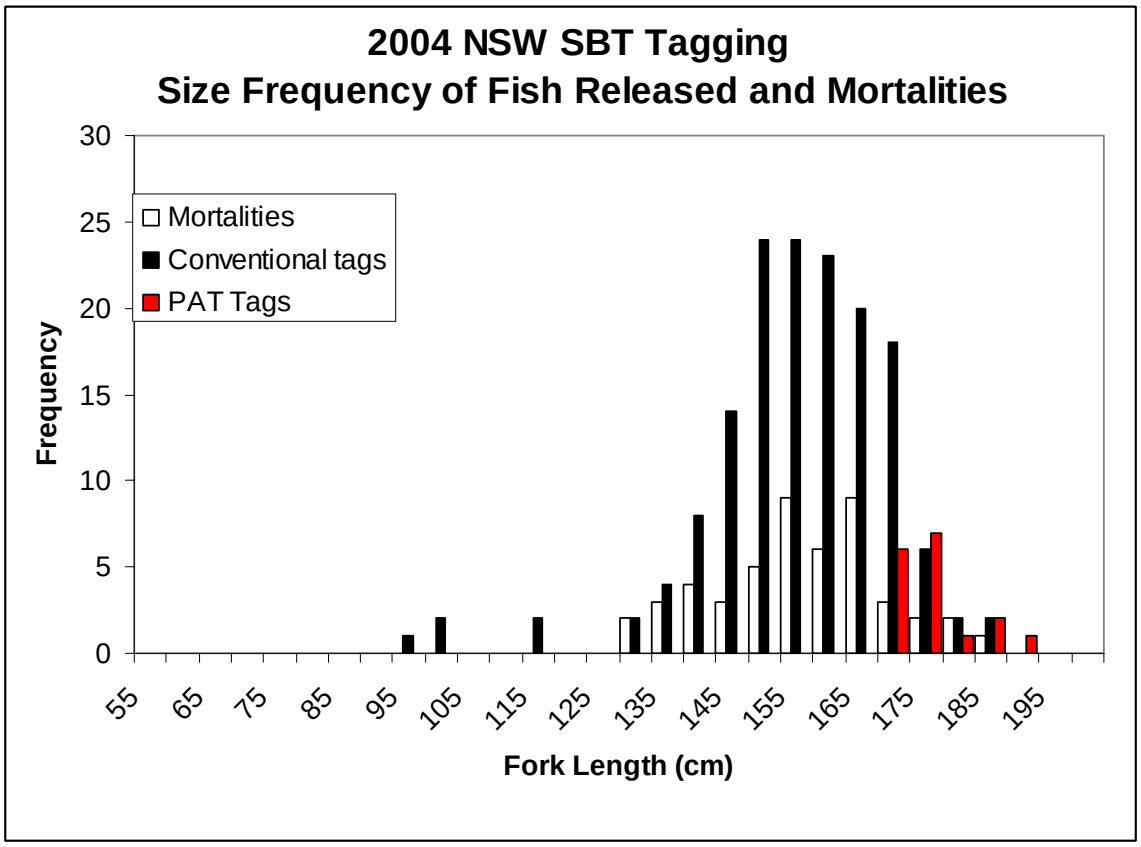

Figure 1. Size distribution of conventional and PAT tag releases and mortalities in 2004.

Plans for 2004/2005 and RMA/SRP Research Mortality Allowance Requests

Australia plans to continue both the Global Spatial Dynamics and Pop-up and Conventional Tagging of Adult SBT in the Tasman Sea programs in 2004-05. Archival tagging effort will again be undertaken in the GAB, WA, NZ waters and on the high seas in the Indian (the latter two in collaboration with NZ and Taiwan). We are also planning to extend archival tagging operations to other parts of the Indian Ocean and possibly off the east coast of Australia depending upon the availability of suitable tagging platforms and availability of juvenile fish. This will likely see a

doubling of the number of fish tagged. With this being the objective, we request that the research mortality allowance for the project be increased to 12 tonnes. The Pop-Up and conventional tagging of larger fish on the east coast of Australia will be continued and efforts will be made to expand this work to the West Coast, again depending upon the availability of tagging platforms and fish. We propose that the 15 tonnes of research mortality allowance supported by the CCSBT for this project over the last two years be continued in 2005.

References

Gunn, J., and T. Patterson. 2003. A pilot study to examine the potential for using pop-up satellite transmitting archival tags (PATs) to examine the migrations and behavior of adult Southern Bluefin Tuna (SBT). CCSBT-ESC/0309/Info 2

Polacheck, T., J.Gunn, and A. Hobday. 2003. Global Spatial Dynamic Project for Juvenile SBT. CCSBT-ESC/0309/Info 4.

Polacheck, T. J. Gunn and A. Hobday. 2004. A Proposal for Multi-lateral Co-ordination and Co-Operation in Electronic Tag Deployment under the CCSBT Scientific Research Programme. CCSBT-ESC/0409/19.

Acknowledgements

We wish to acknowledge and thank the collaboration provided by New Zealand and Taiwan fishing industry for assistance and collaboration with tag deployments. In addition, we thank the crew of the tagging vessel *Thylacine,* used for this year's pop-up tagging in the Tasman Sea, and Russel Bradford and Sophie Bestley who assisted with tagging. We also wish to thank the observers who have performed the tagging and the observer programs and fishery administrations in these two countries for their cooperation and help in facilitating the work. Brian McDonald of the CCSBT Secretariat provided invaluable logistic assistance with the vessel charter. Funding for these projects is being provided by the Australian Fisheries Research and Development Corporation (FRDC), the Australian Department of Agriculture, Forestry and Fisheries (DAFF) and CSIRO.

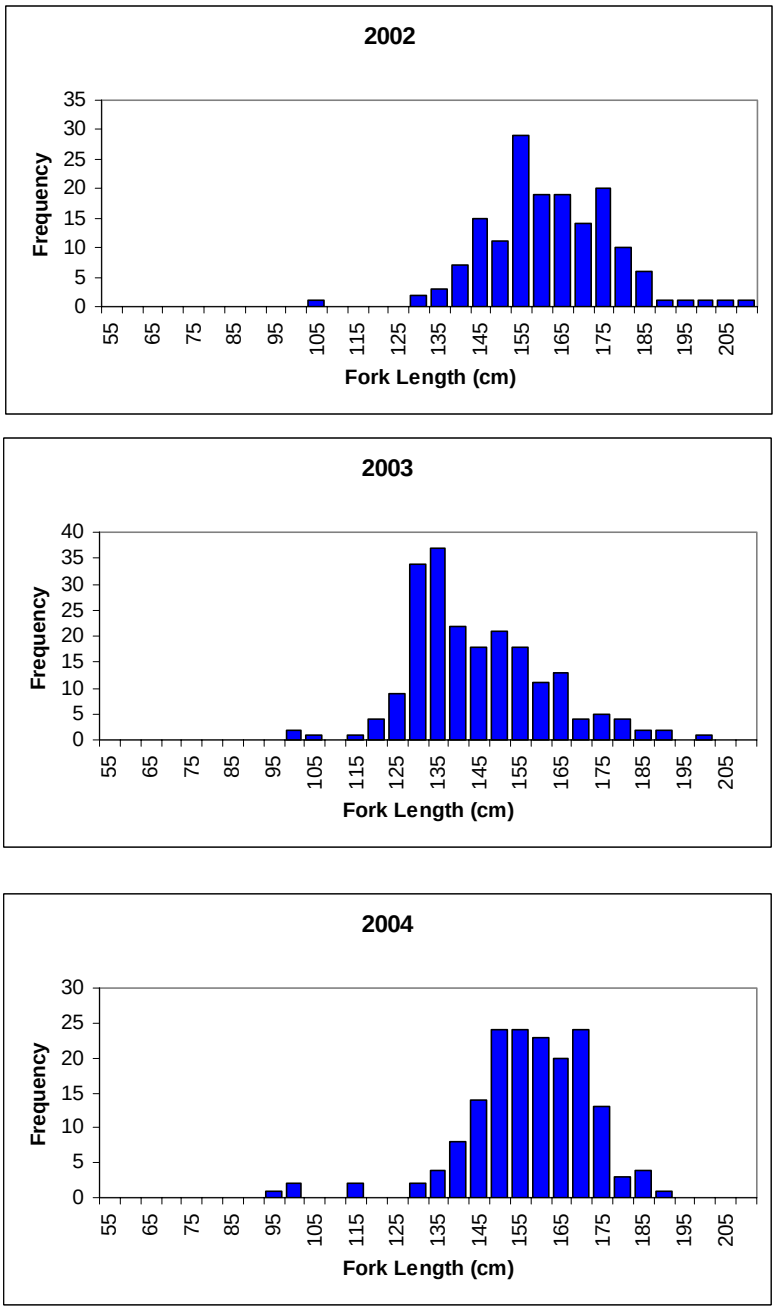

Figure 2 – Comparison of size distribution of SBT tagged in the Tasman Sea 2002-04.