



## **Update on the Global Spatial dynamics Archival Tagging project -2007**

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## Abstract

As part of the CCSBT SRP, Australia initiated a Global Spatial Dynamics project involving the archival tagging of juvenile (2–4 year old) SBT throughout their range (i.e. from South Africa to New Zealand) with the objective of estimating movement and mixing rates, and periods of residency in different parts of this range. The project has been implemented as a collaborative project between New Zealand (NZ), Taiwan and Australia. Attempts to expand the collaboration to other CCSBT members have been unsuccessful to date, but would be welcomed. Archival tags have been released in NZ, Australian, central Indian Ocean and South African waters. 88 tags were released in 2004, 103 in 2005, 129 in 2006 and 94 so far in 2007<sup>1</sup>. Out of the 88 released in 2004, 19 have been recaptured so far including the first recoveries ever from archival tags released in the central Indian Ocean and New Zealand. The movement patterns of the archival tags returned to date differs from those seen from the archival tagged fish released during the 1990s in the extent of their eastward movements. Thus, none of the recaptured fish from tags released in Western Australia or South Australia have moved into the Tasman Sea.

## Introduction

As part of the CCSBT SRP, Australia initiated a Global Spatial Dynamics project involving the archival tagging of juvenile (3–4 year old) SBT throughout their range (i.e. from South Africa to New Zealand). The primary objective of the project is the estimation of movement and mixing rates, and periods of residency in different parts of this range. The project has been implemented as a collaborative project between New Zealand (NZ), Taiwan and Australia. This paper presents a summary on activities undertaken in the archival tagging project and planned activities in 2007–2008.

## Global Spatial Dynamics Project - Overview

CCSBT-ESC/0309/Info04 provided an overview of the global spatial dynamics 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 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,

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<sup>1</sup> These years refers to the fishing season December to November.

collaborative arrangements were developed with New Zealand and Taiwan for tag deployments and future analytical collaboration when data becomes available from returned tags. These arrangements continued and were expanded during the second, third and fourth years of the project. We have attempted to extend this collaboration to other CCSBT members and a detailed proposal for this has been provided previously to the CCSBT Scientific Committee (Polacheck et al. 2004). This has not occurred. Collaboration with other members would still be welcomed. However, this is the last year that this project has resources for releasing tags so that opportunities for collaboration with those not already involved in the project will be limited, unless they are able to provide additional tags.

### Archival tag releases

So far during this project, archival tags have been released in 5 locations in collaboration with this project:

1. in high seas in the central Indian Ocean
2. off the south of West Australia (WA)
3. in the Great Australian Bight (SA)
4. off New Zealand
5. off South Africa

A summary of archival tag releases including those for previous years is shown in Table 1, together with recaptures to date.

**Table 1.** Numbers of archival-tagged SBT by area and year, together with recapture numbers. The number of recaptures is as of July 31, 2007. Note year refers to fishing year (December through November).

Year	Data	South Africa	Central Indian O.	WA	SA	Tasman Sea	Total
2004	No. released		37	22*	23	6	88
	No. recaptured		6	4	8	1	19
2005	No. released		48	15	40		103
	No. recaptured		4	2	5		11
2006	No. released		25	39	35	30	129
	No. recaptured				4		4
2007	No. released	1	20	50	24	19	94
	No. recaptured						0

\* Deployed as part of the RMP tagging.

A scarcity of suitable fish in New Zealand severely restricted the tagging of juvenile SBT from this area in the first two years of this project. Greatly improved success has been achieved during the last two seasons with a total of 55 tagged fish now released from waters around New Zealand (although some of the recent success has been achieved by tagging fish larger than the target range for this project). New Zealand will be providing additional information on the tagging activities in NZ waters later in the year 2007.

As part of this project, a charter of a South African longline vessel was undertaken during November/December of 2006 to attempt to achieve archival tag deployment off South Africa. This is the one targeted area where the project has been unsuccessful in achieving deployments. The time period selected for the charter was chosen because this is the only season when juvenile SBT have been commonly caught by longline vessels in this area. A 30 day cruise was undertaken from November 20 to December 19. While weather conditions were far from ideal, 21 longline sets were completed. Although historical information on individual sets from commercial and tagging cruises in the late 1990's and early 2000's by Japan and Taiwan were used to determine the area and environmental oceanographic conditions most appropriate for setting, a total of only 13 SBT were caught in the 21 sets undertaken. Of these seven were alive and in suitable state for tagging. However, only one of these was within the target size range for this project (juveniles, <125cm). Thus, the cruise resulted in only one archival tag release. (Note that the six other live SBT were tagged with either conventional (3) or PSAT (3) tags depending upon their size.) The SBT catch rates were extremely disappointing and unexpectedly very low. It is not clear if the cruise was simply unlucky or whether these extremely low catch rates reflect that juvenile SBT abundance in this area has become very low (adult abundance at this time of year has always been relatively low as this period is within the spawning season). The number of Taiwanese vessels choosing to fish in this area and season for SBT has been decreasing in the last few years. The major reason for the decrease is that vessels have shifted their target species to oilfish in the waters off South Africa as there have been abnormally good catch condition. Interpretation of the reason for the shift is also confounded with the observation that the SBT catches and catch rates are not as profitable as before.

In the central Indian Ocean, 37 SBT were tagged with archival tags in 2004, 48 SBT in 2005 and 25 in 2006. Observers trained in archival tagging are currently aboard Taiwan fishing vessels in the central Indian Ocean. The target is to release a further 50 tags this fishing season. To date, 20 tags have been released by two observers in the region. Given the success in previous years, we anticipate that the target of 50 should be realized. We also hope to have a trained Taiwanese observer release 25 archival tags off South Africa latter in the year, but this will depend upon fishing conditions for both SBT and oilfish. In recent years, Taiwanese vessels have chosen not to undertake much fishing for SBT because of comparatively poor reported fishing conditions. As such, it is not clear at this point, whether it will be possible to achieve the goal of 25 releases.

To date, the total SRP/RMA mortalities in 2005/2006 attributable to the release activities of associated with this project were 7 fish or 477kg. Additional SRP/RMA mortalities are not anticipated.

## Recaptures

As shown in Table 1, a total of 34 tags have been recaptured and returned to date (as of July 31, 2007). Additional archival tags have been reported as having been recaptured in the farm harvesting operations, which are currently in occurring. However, these have not yet been returned to CSIRO. As expected, the largest numbers of returns are from the releases in 2004 followed by the 2005 releases. It is too early to have had significant number of returns from the 2006 and 2007 releases (fish in the farms from the 2006/07 fishing season in South Australia are still being harvested). From the 88 releases in 2004, 19 or ~22% have been recovered to date. These include 6 from releases in the central Indian Ocean, 4 from releases in Western Australia, 8 from releases in South Australia and 1 from releases in the Tasman Sea (New Zealand). The recoveries from the releases in the Indian Ocean and New Zealand are the first recoveries ever of archival tags from releases in these two areas. For the 2005 releases, 11% have been recovered to date. The recovery rate is approximately half of those for the 2004 releases at this time last year. This suggests that reporting rates have likely declined. In this regard we note that most of the recoveries to date have been from the Australian surface fishery and there has been a paucity of returns from the Japanese<sup>2</sup> (0) and Korean longline fleets<sup>3</sup> (0).

Altogether ten recaptures have been made from the 85 fish tagged by Taiwanese observers in the central Indian Ocean in July–August 2004 and 2005 (6 of 37 from the 2004 releases and 4 of 48 from the 2005 releases). Two of these recaptures were made by the Taiwanese fleet. These results combined with the recapture of 1 out of 6 releases by observers in New Zealand in 2004 demonstrate the feasibility and viability of conducting archival tagging from longline vessels and using trained observers to do the tagging.

The movement patterns of the archival tags returned to date differs from those seen from the archival tagged fish released during the 1990s in the extent of their eastward movements. Thus, none of the recaptured fish from tags released in Western Australia or South Australia have moved into the Tasman Sea. Polacheck et al (2006) examined this initial pattern in more detail.

## Archival tag training

Training in archival tag insertion was carried out in Taiwan for a third year. Training took place in Taiwan between March 26-27, 2007 at the Deep Sea Fishery Research and Development Center (Fisheries Training Center) in Kaohsiung. A total of fourteen observers participated in the training, including the one continuing observer who tagged fish last year. A number of the trainees also participated in training in 2005 or 2006, and continue to improve their technique.

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<sup>2</sup> Since archival tagging commenced in Australia in 1993 the Japanese fishery has returned 33 archival tags, the most recent being return was captured in October 2006. However, it was from a release made prior to this current project. Since 2002 the Japanese fishery has not reported a recapture of a fish at liberty for less than 6 years.

<sup>3</sup> The Korean fishery has only ever reported one archival tag recapture, in September 2003 for a fish released in 1999.

## Plans for 2007–2008

Taiwan and Australia plan to continue release of archival tags under this Global Spatial Dynamics project during the remainder of 2007 and early 2008. The current plans are to complete the release of all archival tags currently available for this project by the end of the Austral summer (March 2008). It is anticipated that this will result in a total of ~60 additional tags in Western Australia and South Australia. The exact numbers will depend upon the success of releasing tags in other areas. Currently, there are no plans for further releases in the latter part of 2008. Only if additional tags were made available would additional releases be possible.

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