

## Report of 2002/2003 results and proposal for 2003/2004 activities on CCSBT tagging by Japan.

### 日本によるミナミマグロ標識放流の 2002/2003 調査活動報告 および 2003/2004 調査申請

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#### 要約

2001 年にも実施したケープ沖からの延縄船による標識放流試験を 2002 年 10 月から 12 月に実施した。2-5 歳魚を主体とした合計 318 個体に通常標識を付けて放流し、そのうち 5 個体と 40 個体にはそれぞれポップアップアーカイバルタグとアーカイバルタグも装着した。航海を通じて取り込んだ魚の合計重量は 3,848.8kg と推定された。2001 年放流魚のうち、通常標識装着魚 1 尾およびアーカイバルタグ装着魚 2 尾が 2002 年に再捕された。本文書には次回の標識放流計画も含めてある。

#### Summary

The pilot longline tagging program was conducted between October and December 2002 off Cape in the same way as in 2001. Total of 318 fish, mainly age 2-5, were released with conventional tags. Five and 40 of them were also attached with pop-up archival tags and archival tags, respectively. Estimated total weight of fish retained during the cruise is 3,848.8kg. One fish with conventional tags and two fish with archival tags released in 2001 were recaptured. Proposal for the next tagging cruise is also included in this paper.

#### 1. Japanese activity for the CCSBT Tagging Program (SRP) in 2002/2003.

##### 【Pilot longline tagging program】

No33 Fukuseki -maru (411 ton), a commercial longline vessel usually working for southern bluefin tuna (SBT) fishery, was chartered. Total of 61 longline operations was conducted off Cape from 20 October to 27 December 2002. The operated area was 33-40S, 30-44E (Fig. 1). The number of hooks used in each operation was reduced to 1500 hooks, roughly a half of commercial operations in order to increase a survival rate of fish caught by reducing total gear soaking time. Two field technicians were on board to place tags on SBT. They also collected data on size and species caught and some biological samples including otoliths.

Tagging procedure followed to those developed and agreed at the Tagging Workshop held in Canberra, October 2001. The standard CCSBT tags were used. Two tags were inserted in between pterygiophore at the base of the second dorsal fin from both side of fish. Fork length,

date and time of capture, the side where the first tag to be placed, the side where the odd number tag to be placed, the tagger's name, and condition of fish including bleeding were recorded. The odd tag ID number was the smallest between the two tags placed on one fish.

All tag placements were conducted on deck. In the other words, all SBT caught were pulled up on deck before tagging. Usually, small size fish (roughly <90cmFL, 15 kg) were pulled up by grabbing a branch line by hand, and middle size fish (<130cm FL, 50kg) were pulled up with a help of a scooping net. The scooping net was developed during the cruise last year (CCSBT-SC/0209/21) and further improved during this cruise. It was quite difficult to pull up (and release) large size fish (roughly >130cmFL, 50kg) on deck even with the scooping net. However, it was decided not to use a tagging technique with harpoon from deck side which was used for tagging of large pelagic fish. The main reasons were rough sea conditions and difficulty in controlling an exact position of tag placement.

Among total of 455 SBT hooked, 318 SBT were tagged and released with conventional tags (Table 1). The tag number used ranged from 535001 to 535708. One fish was released with only one tag because one of two tags was broken during tag placement. All the rest had two tags placed. In addition to two conventional tags, Pop-up archival tags (PAT: Wildlife Computers) were attached externally to dorsal muscle to five SBT, and archival tags (LTD2310: Lotek Wireless Inc.) were inserted into body cavities for 40 SBT. These additional tags are mainly placed on larger fish.

Length frequency distributions of SBT were shown in Table 2. Tagged fish ranged from 77 cmFL to 160 cmFL and more than 90% of tagged fish was in a range of 90-129 cmFL corresponding to age 2-5. No substantial differences in tagging rate (a proportion of number of tagged fish to total number of fish hooked) were found among different size classes.

Total 135 SBT were identified as not suitable for tagging. Although all fish retained were measured and weighted with whole weight in principle, four fish were retrieved as only head because of whale/shark bites and carried no size information. The average weight of those four fish was assumed to be the same as those caught and retained during the cruise. Estimated total weight for fish retained is 3,848.8 kg (Table 1). This is the amount utilized for this program from the quota assigned for the SRP (Scientific Research Program) of the CCSBT.

#### **【Tagging in the Recruitment Monitoring Program】**

In the acoustic survey of the Recruitment Monitoring Program, 36 SBT were released with conventional tags from 2 Taikei-maru and Shunyo-maru between December 2002 and February 2003 off southern Western Australia. Among the fish, eight and three individuals were also attached with archival tags and sonic tags. The fish ranged from 45 to 61 cmFL and estimated as

one year old.

During the cruises, a total of 22 tags with ID numbers of A07278-A07284 (7 tags), and A07286-A07300 (15 tags) have lost. They flew to the outside of the boat with a rapid wind.

#### **【Tag recapture】**

Three recapture of fish tagged under the CCSBT tagging program have been reported until 31 July, 2003. One report is for a fish with a conventional tag from a Taiwanese longline vessel. Two reports are for fish with archival tags from a Japanese longline vessel.

The total number of recaptured SBT released during the Experimental Fishing Program held between 1998 and 2000 is 21 (seven in 2000, seven in 2001, three in 2002, and four in 2003). Nineteen of them were recaptured by Australian purse seine vessels and those fish were farmed. Two fish were recaptured by Japanese longline vessels. The numbers of recaptured SBT released in the Recruitment Monitoring Program and reported via NRIFSF were 21 for conventional tags and two for archival tags since 1 January 2002.

All five PATs developed during the 2002/2003 Program popped up much earlier than the dates set for user defined pop-off and data were retrieved via satellite. Times of data acquisition from these PATs were 2, 20, 35, 39, and 40 days, respectively. To identify cause(s) of the premature pop-up, preliminary analysis of the data was done. "Premature release" function of PAT, which initiates data transmission when PAT detects constant depth for user defined period, worked in all tags. Possible causes are: 1) fish sank deeper than 1500m (due to dive or death?) and then an automatic tether cutting device (RD1500) of PAT worked; 2) PAT came off from fish due to any reason after release (such as breaking the tether, breaking the attachment device of PAT to the tether, or an anchor arrowhead coming out of fish). Obtained data of depth and temperature histograms, depth-temperature profiles, and location are being analyzed.

Of 45 SBT released with archival tags in 2001, 2 SBT were recaptured and the tags were returned to NRIFSF. Time at liberty of these SBT was approximately 6 months and 8 months, respectively. Data could be safely retrieved from the tags for the entire time at liberty. From preliminary analysis of these tag data, we found: 1) Diving behavior of fish varies with time and space; 2) Fish frequently dives closely to 500m depth; 3) Location estimates of one tag show that fish moved from 40E (off Cape) to around 100E (South Indian) over 4 months, and then returned to about 30E over 4 months. In contrast, data of the other tag show that fish did not move far from waters around 40E. Further analyses of depth and temperature data and errors in location estimates are being done.

## **2. Proposal for 2002/2003 activity.**

Although it is premature to draw any conclusion, the retrieved archival tags data and tag recapture pattern up to now suggested separation of fish between off Cape area and Australian coast in a higher level than expected. At the same time, the efforts to seed tags to middle to large size fish had initiated along the Australian coast. Simultaneous tag seeding from a wide area covering whole distributing area would be far more powerful to improve our understandings on global fish migration. Based on these two points, we propose to continue the same type of tagging cruise for the 2003/2004 season.

Commercial longline vessels will be chartered starting with late October or early November of 2003 and all SBT caught in an appropriate condition will be tagged and released. Actual period of cruises and number of vessels to be chartered will be decided by a level of funding available as well as an availability of vessels. For this activity, we would like to request 2000 CCSBT tags as a preliminary estimate of required number of tags. Expected SBT mortality is no larger than 10 tons.

Table 1 The number of catch and released and weight estimation for fish retained

	Number	Weight
Hooked	455	
Escaped	2	
Released with tags	318	
Retained and weighed <sup>1</sup>	131	3,734.8 <sup>3</sup>
Retained but damaged <sup>2</sup>	4	114.0 <sup>4</sup>
<b>N of fish retained</b>	<b>135</b>	
<b>W of all fish retained</b>		<b>3,848.8</b>

1: Weights are in whole weight.

2: Damaged by shark or killer whale.

3: Including one fish only its processed weight measured and converted to whole weight.

4: Total weight is estimated by  $(131+4) \times 3,734.8/131$ .

Table 2 Length frequency distribution of SBT

FL(cm)	Conventional tags only	With archival tag	With popup archival tag	Retained	Total (Tag release rate)
75-79	1				1 (1.00)
80-84					
85-89	1				1 (1.00)
90-94	3			1	4 (0.75)
95-99	12	2		6	20 (0.70)
100-104	17			7	24 (0.71)
105-109	68	7		38	113 (0.66)
110-114	59	4		25	88 (0.72)
115-119	56	10		23	89 (0.74)
120-124	36	4		16	56 (0.71)
125-129	10	6		6	22 (0.73)
130-134	3	2	1	3	9 (0.67)
135-139	2	1		2	5 (0.60)
140-144	1	3	2		6 (1.00)
145-149	2	1		1	4 (0.75)
150-154			1	1	2 (0.50)
155-159	1		1		2 (1.00)
160-164	1				1 (1.00)
<b>Total</b>	<b>273</b>	<b>40</b>	<b>5</b>	<b>129<sup>1</sup></b>	<b>447<sup>1</sup> (0.71)</b>

1: Length was not measured for six fish.

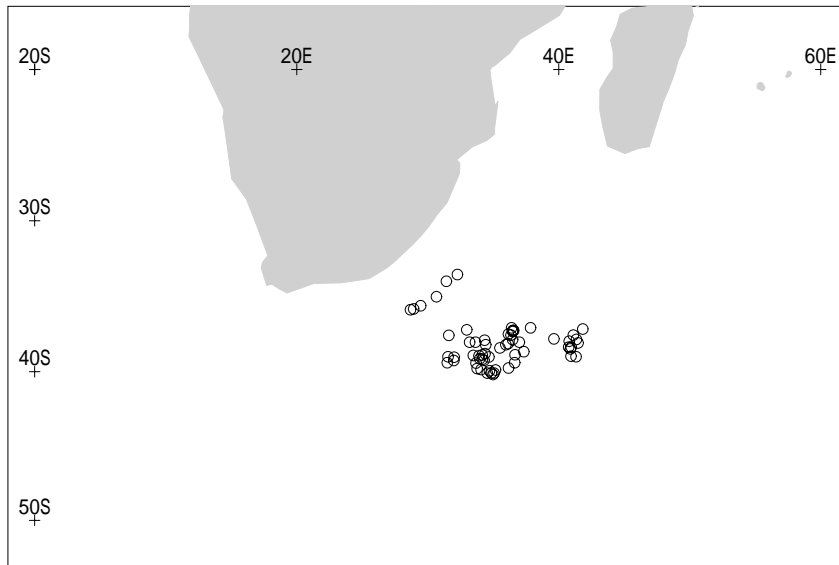


Fig. 1 Positions of the onset of line setting.