

## Report on the piston-line trolling survey in 2006/2007

### ピストンライン曳縄調査 2006/2007 の結果報告

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#### Summary

In January 2007, a research of trolling survey that provides the recruitment level of age one southern bluefin tuna with low cost was conducted in similar manner as in January 2006. In the survey, a chartered Australian vessel goes and back on a same straight line (piston-line) using trolling. In seven days for the piston-line survey, 34 SBT schools (assuming a distance of 2.0 km is needed for different schools) were found on the piston-line. It is equivalent to 7.7 schools for 100 km search distance. A total of 241 SBT individuals were caught during the whole survey and 189 (78%) of them were tagged and released with CCSBT conventional tags. The total amount of SBT mortality due to the survey was 43 individuals and 141.1 kg.

#### 要約

2007年1月に、ミナミマグロ1歳魚の加入レベルを低コストで提供する曳縄調査を、2006年1月と同様に実施した。この調査では、豪州船を用船し、単一ライン（ピストンライン）上を曳縄をしながら往復した。7日間に検出したミナミマグロ1歳魚群数は、群を漁獲間隔2kmで分離した場合、ピストンライン上で34群であった。探索100km当りの群れ数は7.7群であった。航海全体を通じて漁獲したミナミマグロは241個体で、その内189個体(78%)にはCCSBT標識を装着して放流した。調査のために死亡したミナミマグロは43個体、合計重量141.4kgであった。

#### 1. Introduction

Since the agreement of the Extended Committee of CCSBT in 2006, the largest catch of southern bluefin tuna (SBT) was attained by the Australian purse seine fishery (Anon. 2006). It was told that the Australian purse seine fishery catches SBT of age 2-4, mainly age 3, for farming, which is the earliest age in the SBT life stage compared to other nations' fisheries. Any fisheries can not provide reliable information of recruitment level of SBT younger than age 2. Because the catch of the Australian purse seine is concentrated on young fish, the importance of research activities for monitoring the recruitment level of SBT in their early life stage becomes higher than previous years.

Several research activities have been attempted for the recruitment monitoring of SBT.

Since 1989, Japan has been conducted series of recruitment monitoring surveys within a research framework with Australian scientists. Japan conducted a trolling and pole-and-line catch monitoring survey from 1989 to 1993, and then conducted an acoustic monitoring survey from 1995 to 2006 for age one SBT distributed off the southern coast of Western Australia (Itoh 2006). The researches provided the recruitment indices of age one SBT for years. Australia conducted the scientific aerial survey off the southern coast of South Australia since 1993 and also provided the recruitment indices (Eveson et al. 2006). However, because the Australian indices is for age 3 SBT which is the same age of the Australian purse seine catch, it gives little time to consideration to regulate the fishery based on the results of the survey. While CCSBT tagging since 2001 also provide catch information of age one SBT off the southern coast of Western Australia, the areas surveyed by the cruise were limited.

The acoustic index predicted the low recruitment levels of 1999 – 2001 year classes of SBT so that it was likely to be a reliable index in some extents. However, the survey was ceased after the final survey in 2006 due to the budget restriction. Alternatively, a type of survey that can be done with lower cost was sought. Last year, we conducted a feasibility survey that a chartered Australian vessel go-and-back on a single straight line and find SBT schools with trolling catch (Itoh and Kurota 2007). In January 2007, we conducted similar trolling monitoring survey and the methods and results of the survey are presented in this paper. The index of recruitment calculated from the survey data is presented in another paper (Itoh 2007).

## 2. Research method

An Australian vessel, St Gerard M, was chartered (Fig.1). The vessel was also used in the last survey. The vessel departed Esperance on 21 January 2007, and stayed off Bremer Bay from 22 to 28 January for research. The vessel left off Bremer Bay and arrived at Esperance on 29 January, and then the research survey was finished. Three researchers including Itoh and Sakai, and two Australian crew members were on board.

The research area was off the south coast of Western Australia between Esperance to Bremer Bay (Fig. 2). The piston-line lies between two points; one is at 34°28'S-119°24'E and the other was at 34°44'S-119°38'E. These are slightly different from those used in 2006 (34°31'S-119°27'E and 34°47'S-119°41'E); it was extended inshore side and shortened offshore side. In addition to the piston-line, adjacent areas east, west or south (offshore) of the piston-line were also surveyed so that evaluate whether the piston-line is a peculiar area in regard to SBT distribution (Fig. 3).

The vessel operated trolling at speed of 7 knots. Eight trolling lines at maximum were

trolled.

The index derived from the survey is based on the number of SBT schools, not the number of SBT individuals caught. Therefore, when catch was succeeded and reach 10 individuals presumably from single school, trolling was suspended and the vessel went forward around 1.0 mile without trolling the lines so that left from the school, in order to minimize mortality by the survey.

Individuals caught of any species were measured length. SBT were tagged and released with two CCSBT conventional tags, following the CCSBT tagging procedure. SBT with severe damage around its mouth or bleeding from gill were weighed and taken biological samples (stomach contents, otoliths and muscle tissue).

At 44 locations, vertical profile of temperature and salinity (conductivity) were measured down to just above sea bottom or 200 m in depth using a combination of devices for temperature-depth and temperature conductivity (Alec Electronics). Temperatures of sea surface were recorded successively throughout the survey. GPS positions were recorded every 10 seconds.

### 3. Result

Usually, the vessel conducted research survey from 6:00 to 18:00 and anchored in calm bay at night. While there are a few days in rough sea, most of the days were in calm sea and we could the survey in the successive nine days. Except the 1<sup>st</sup> and 9<sup>th</sup> day when the vessel cruised between Esperance and Bremer Bay with conducting troll at several locations, seven days were used for surveys on the piston-line and adjacent areas (Fig. 3, Fig. 4).

During the whole period, total of 288 fish individuals were hooked, including 241 SBT, 23 skipjack *Katsuwonus pelamis*, 9 bonito *Sarda orientaris*, and 9 blue mackerel *Scomber australasicus*. Among the 241 SBT, 189 SBT (78% of SBT catch) were tagged, 43 SBT were killed and remaining were escaped. Total weight of SBT sampled was 141.4 kg.

Locations of SBT caught are shown in Fig. 3 and Fig. 4. SBT were caught not only on the piston-line but also in the adjacent areas on the continental shelf. Relatively many SBT schools were found on shelf edge in spite of short survey durations were allocated. It was different from last year that SBT were also caught offshore area from self edge.

214 SBT (91.8 %) caught were age one 1 (<61 cm FL), followed by 19 SBT of age two (Fig. 4). Fork length distributions were compared among five area types, such as on continental shelf off Bremer Bay, on shelf edge off Bremer Bay, offshore of shelf edge off Bremer Bay, lumps off Esperance (34°03'S-121°22'E) and on shelf edge off Esperance

(around 34°031S-120°25'E). While all the fork length distributions are similar to each other, SBT caught on the shelf edge off Esperance were relatively larger age 1 SBT. In the offshore of the shelf edge off Bremer Bay, 10 out of 17 SBT were large SBT > 70 cmFL. These suggest that there are slight differences in distribution of SBT within age 1 and among various ages off the southern WA.

On the piston line, the total number of age 1 SBT school was 21 and 34 if the successive SBT catches more than 30 minutes and 2 km are defined from different schools, respectively. The total distance searched on the piston line was 444km. The mean trolling indices are calculated as 4.7 school/100 km (30 minutes definition) or 7.7 school/100 km (2 km definition), but detail calculation should be refer to the other paper (Itoh 2007).

### Acknowledgement

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### Reference

- Anon (2006) Report of the thirteenth annual meeting of the Commission. October 2006, Miyazaki Japan.
- Itoh, T. (2006) Acoustic index of age one southern bluefin tuna abundance by the acoustic survey in 2005/2006. CCSBT-ESC/0609/37.
- Itoh, T. and Kurota, H. (2006) Report on the piston-line trolling survey in 2005/2006. CCSBT-ESC/0609/38.
- Itoh, T. (2007) Some examination on the recruitment index derived from the trolling survey. CCSBT-ESC/0709/35.



Fig. 1 St Gerard M, used for the research (Photos were taken in 2006)

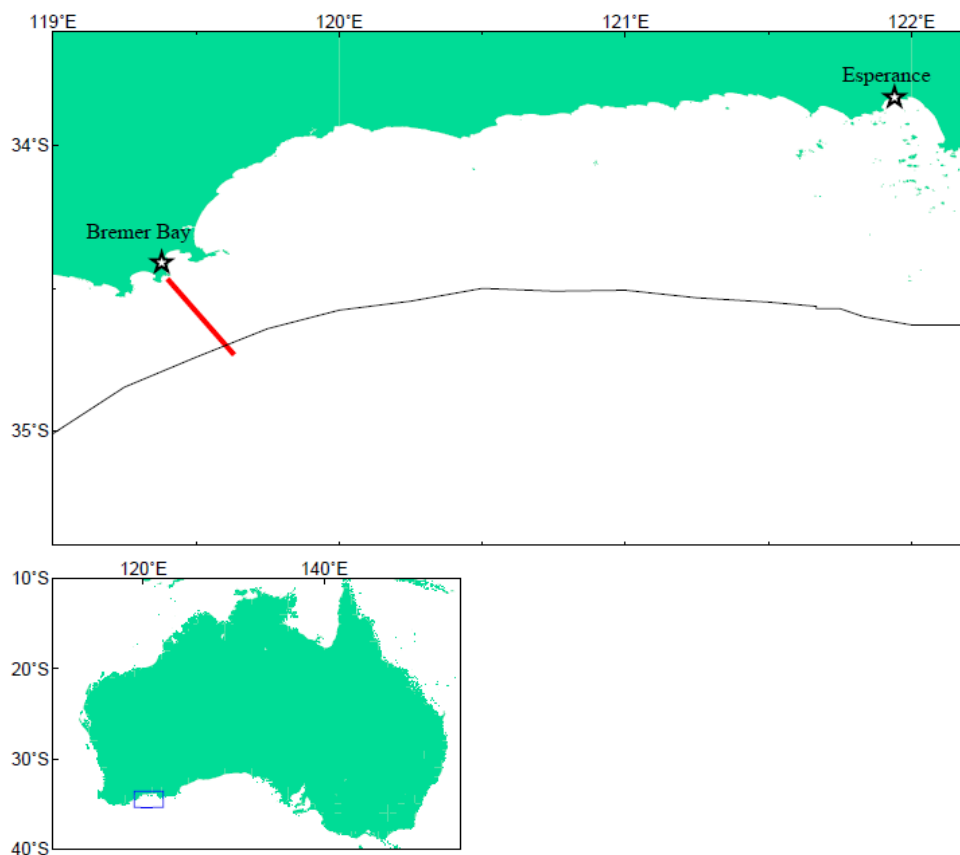


Fig. 2 Map of area researched

On the upper panel, a straight line is the piston-line and a narrow line is 200m isobath. A square in the lower panel is the area of the upper panel.

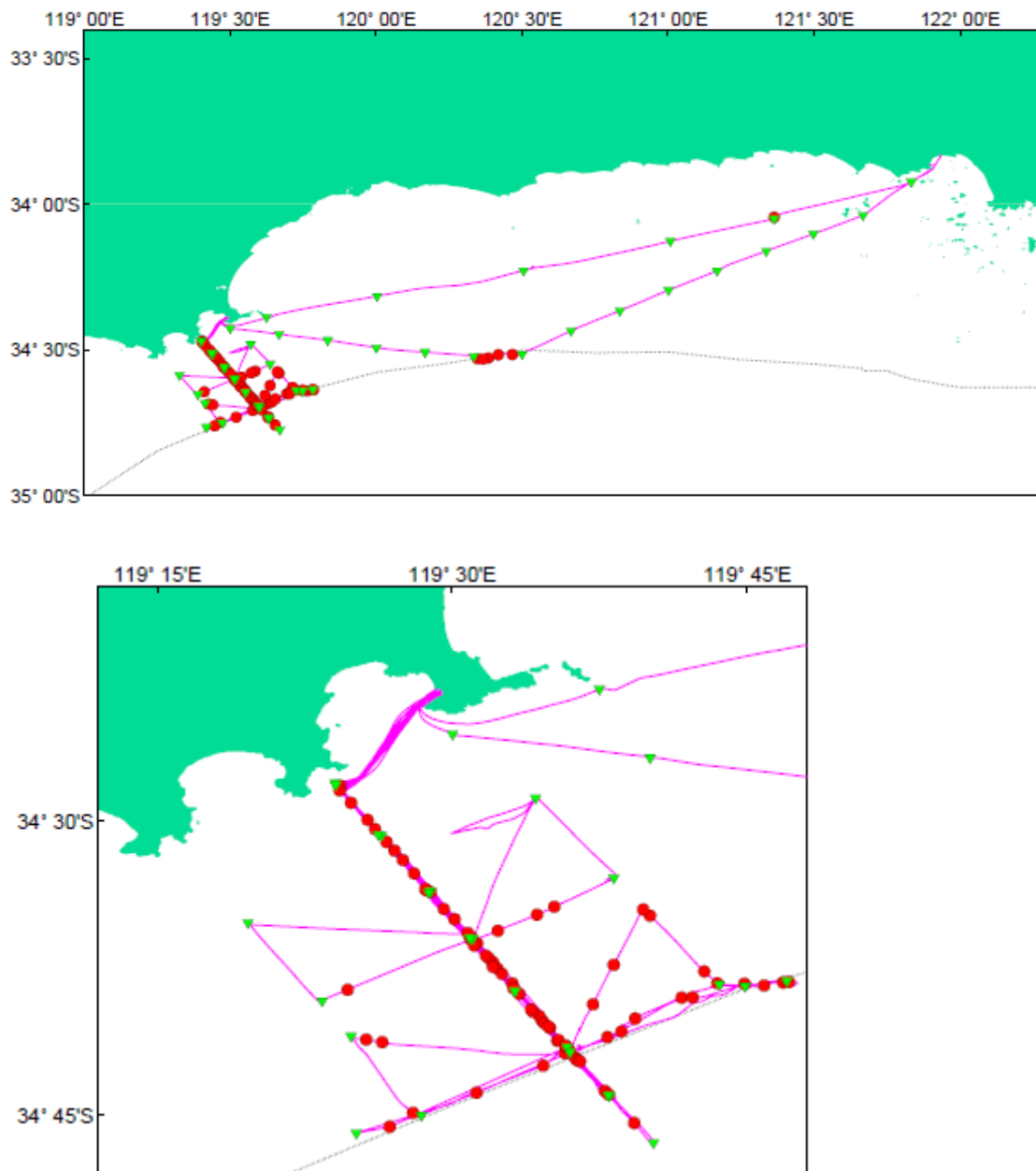


Fig. 3 Trajectory of the research survey vessel  
 Circles and triangles denote locations where southern bluefin tuna were caught and oceanographic observations were made, respectively. Dotted line is 200m isobath.

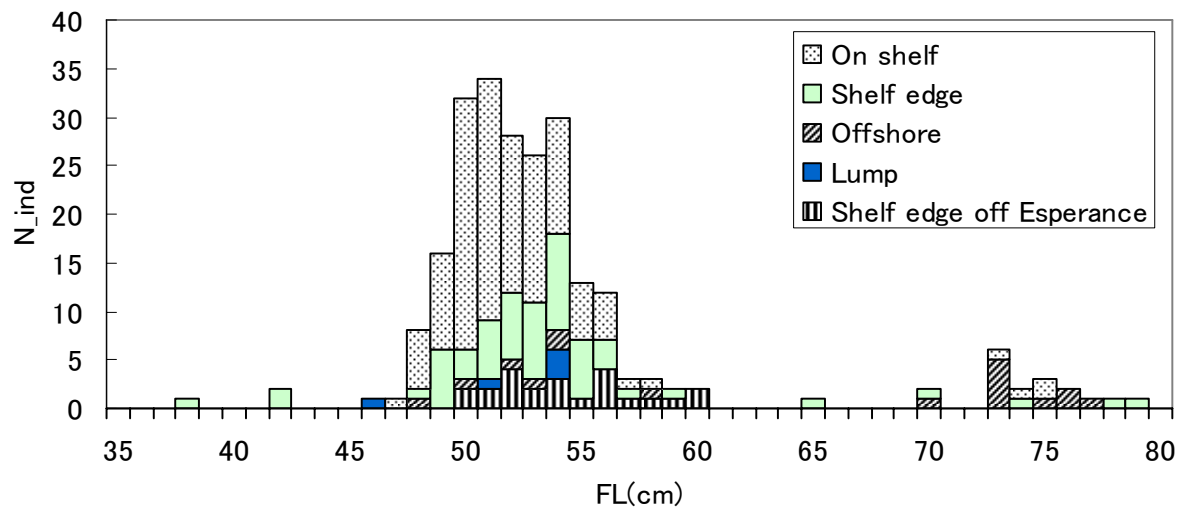


Fig. 4 Fork length frequency distribution of southern bluefin tuna caught by area type.