Review of recruitment indices obtained from the Recruitment Monitoring Program

ミナミマグロ加入量モニタリングによる加入量指標のレビュー

Tomoyuki ITOH and Sachiko Tsuji
伊藤智幸 ・ 辻祥子
National Research Institute of Far Seas Fisheries　遠洋水産研究所

Summary

This document summarizes several indices for recruitment level of southern bluefin tuna obtained form the Recruitment Monitoring Program. Four indices are from age one fish in southern Western Australia and three are from age two-to-four fish in South Australia. All indices largely decreased in 1999 or 2000 year class. All indices are low level in 2000 and 2001 year classes. There are two types of indices, still remain in low level and increased slightly, to 2002 year class.

要約

本文書は、加入量モニタリングプログラムで得られたミナミマグロ加入量レベルの指標をまとめたものである。4 指標は西オーストラリア州南部の 1 歳魚によるもので、3 指標は南オーストラリア州の 2-4 歳魚によるものである。全指標は 1999 年級または 2000 年級に大きく低下し、2000 年級および 2001 年級は低いままであった。2002 年級に対しては、依然として低レベルとする指標と若干揚がったとする指標が見られた。

Introduction

Southern bluefin tuna Recruitment Monitoring Program (RMP) is a research program that monitor recruitment level of southern bluefin tuna (SBT) in their early life stage began in 1988/1989 (referred as 1989 in the following). In 1991, RMP expanded as the collaborative research program between Australian and Japanese scientists and continued. In the first five years, RMP sought to establish a recruitment index based on trolling catch in western and southern Western Australia. A large scale conventional tagging was also carried out.

Since 1993, a recruitment index based on acoustic devises, such as echo sounder or sonar, was sought to establish for age one SBT in southern Western Australia. It had established in 1996 and had

presented the index every year until 2003. The field survey was suspended in 2004 to fully analyze data in previous years, but resumed in 2005.

On the other hand, an index for age 2-4 SBT (mainly age 3) off South Australia was also established (Farley et al. 2004). The index based on line transect survey observed by eye-sighting from an air plane. The index was presented between 1993 and 2000. It was suspended in 2001 and reduced line transect survey was carried out between 2002 and 2004. In 2005, same size survey as in 1993-2000 was resumed. In addition, an index based on commercial spotters' records (SAPUE) was presented between 2002 and 2005.

Detail of each index is written in documents for RMP workshop (Farley et al. 2004, Itoh and Tsuji 2004, Basson et al. 2005, Itoh 2004, Itoh and Tsuji 2005). This document presents the results only as follows.

1. Indices for age one SBT in southern Western Australia

Indices of SBT recruitment in southern Western Australia is that for age one SBT and based on a series of research cruises operated by a charter vessel, Taikei-maru. In the survey, the vessel conducted transect research on zigzag lines within a pre-defined survey area between Albany and Esperance, Western Australia.

From the data obtained, four indices were calculated. "Sonar biomass index" is the biomass of age one SBT found by sonar during 15 days in the survey area (9829km^2). Species and biomass of a school was estimated by sonar specialists. Trolling catch index, eye sighting index and sonar number index are defined as the number of SBT school of age one per 100 search hours. In all indices, age compositions were based on trolling catch and age one was usually more than 95% of all ages.

The results are shown in Table 1 and Fig. 1.

2. Indices for age two-to-four SBT in South Australia

Aerial survey, targeting age 2-4 SBT in South Australia, is that utilize spotters of commercial SBT purse seiners. An air plane fly above 15 straight transect lines and the spotters look for SBT schools. The spotters estimate species and biomass of the school found. In the reduced line transect survey between 2002 and 2004, about half of the line was surveyed. The values of SAPUE presented here are nominal ones. It will be standardized by taking account of environmental incidents, but a general trend of the index was not change largely in a tentative calculation (Basson et al. 2005).

The results are shown in Fig. 2.

3. All indices along with year class

Fig. 3 shows these seven indices along with year class. Indices in South Australia were assumed for age three. While reliability, confidence interval, sensitivity to the change of recruitment level may differ among the indices and careful interpretation is needed, several features were seen. All indices largely decreased in 1999 or 2000 year class. All indices are low level in 2000 and 2001 year classes. There are two types of indices, still remain in low level and increased slightly, to 2002 year class.

Reference

Basson, M., M. Bravington, P. Eveson and J. Farley. 2005. Preliminary results of aerial survey and commercial spotting data. RMWS/05/01.

Farley, J., S. Bestley, R. Campbell and K. Hartman. 2004. Aerial survey indices of abundance: comparison of estimates from line transect and “unit of spotting effort” survey approach. CCSBT-ESC/0409/19

Itoh, T. and S. Tsuji. 2004. Review of acoustic monitoring survey – analyses of data for eight years. RMWS/04/03.

Itoh, T. 2005. Acoustic index of age one southern bluefin tuna obtained from the 2004/05 survey. RMWS/05/04.

Itoh, T. and S. Tsuji. 2005. Other indices for age one southern bluefin tuna recruitment derived from data of the acoustic transect survey. RMWS/05/05.

Table 1. Indices for age one SBT recruitment in south Western Australia

Index	Unit of index	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Trolling catch index	N_school / 100 hour	21.7	29.9	20.8	41.9	5.2	0.7	0.7	21.4		11.7
Eye sighting index	N_school / 100 hour	10.0	12.7	8.0	8.0	5.5	0.7	0.0	1.5		3.1
Sonar number index	N_school / 100 hour	24.7	55.8	58.5	69.1	18.4	2.1	4.5	0.0		4.7
Sonar biomass index	Ton /(15 days in 9828km^2)	6605	8022	2193	3225	387	5	83	0		179

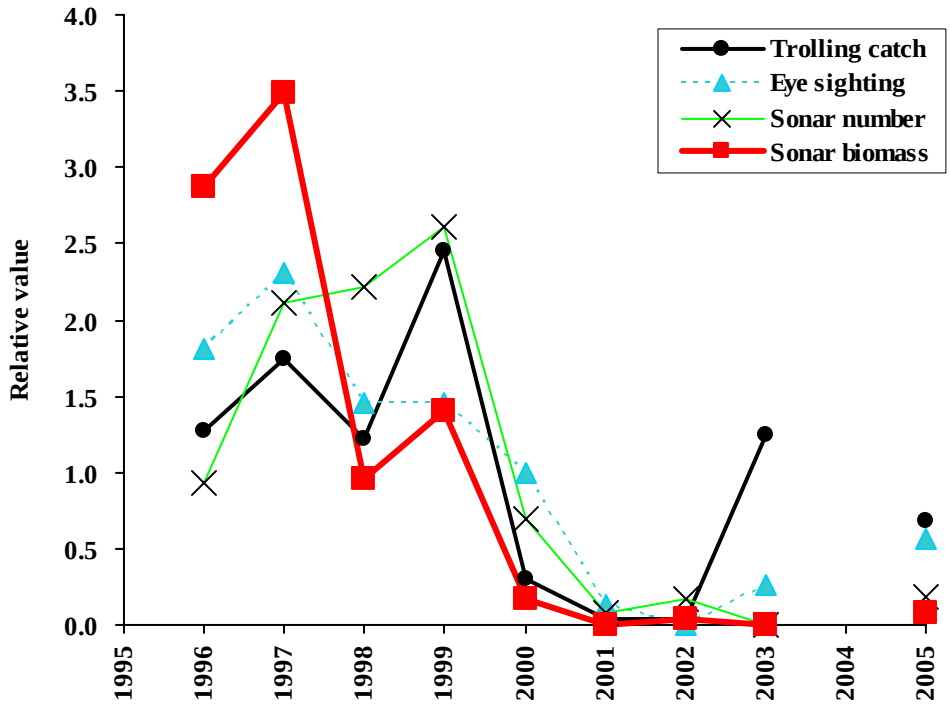

Fig. 1 Relative values of four indices for age one SBT recruitment in southern Western Australia

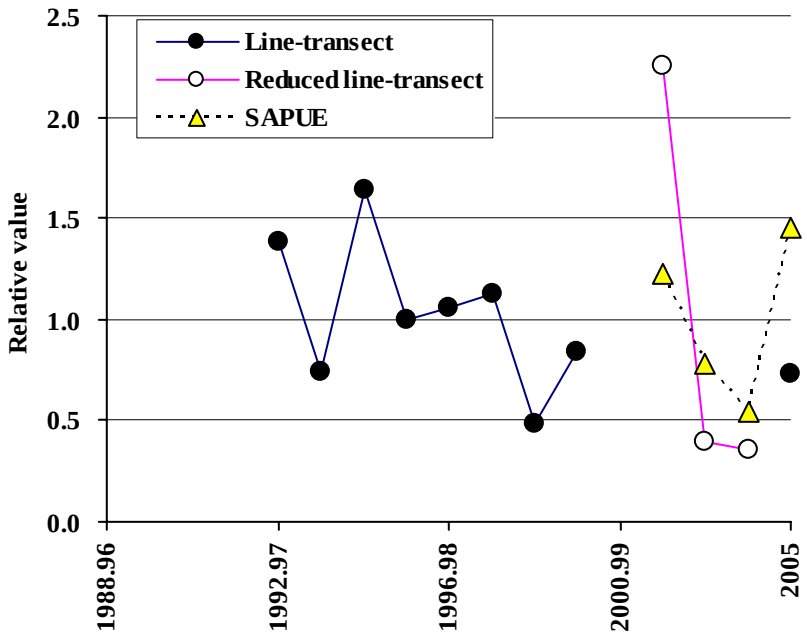

Fig. 2 Relative values of three indices for age two-four SBT recruitment in South Australia

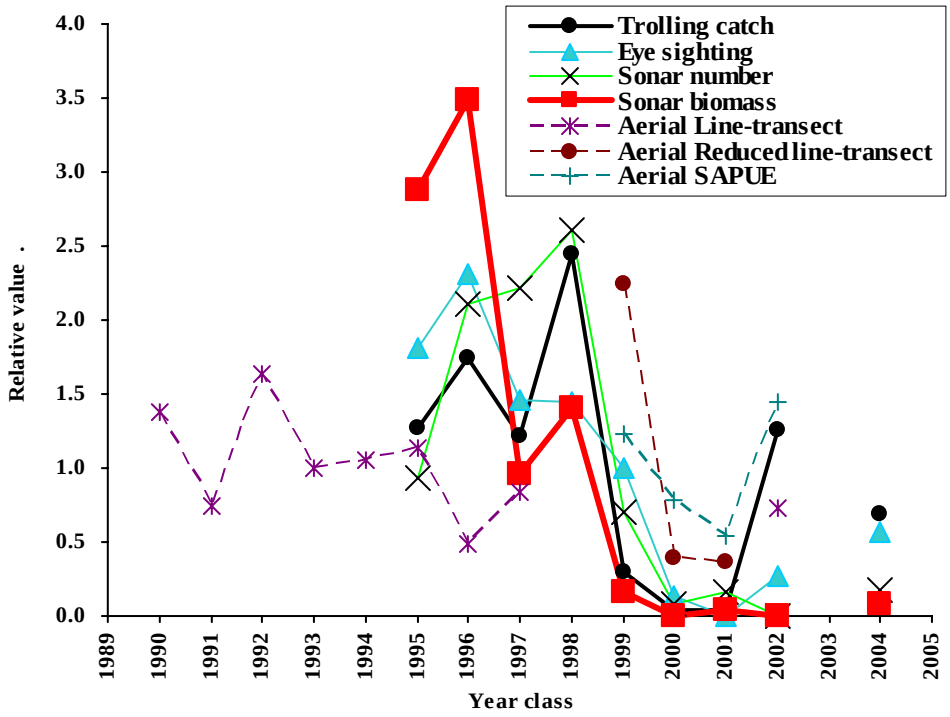

Fig. 3 Relative values of all indices for SBT recruitment in RMP adjusted to year class