

Preliminary analysis for gonad samples of southern bluefin tuna collected by Taiwanese scientific observer program

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ABSTRACT

A total of 152 gonad samples of southern bluefin tuna were collected during April to September in year of 2010-2013. The fork length of samples concentrated between 100 and 135 cm. Gonad weights of most female and male samples were less than the gonad weight of smallest mature fish observed by Chen et al. (2013), while the gonado-somatic indices of fewer female samples were less than the criterion of Chen et al. (2013). The sexual maturity for samples of this study will be further determined based on histological examination.

1. INTRODUCTION

Several studies have been conducted for the reproductive biology of southern bluefin tuna (SBT), *Thunnus maccoyii*. Thorogood (1986) investigated the development of SBT gonads collected from waters off the south eastern and southern coasts of Australia. The results provided information on age-at-first-maturity, gonad Index, ova size-frequency and fecundity of SBT. Farley and Davis (1998) investigated the spawning dynamics of SBT using ovaries obtained from fish caught on the spawning ground in the northeast Indian Ocean and the main feeding ground in the southern Ocean. Chen et al. (2013) investigated the sexual maturity of SBT based on the morphological and histological observations of the gonad samples collected by observers deployed on Taiwanese vessels in the southwestern Indian Ocean.

To collect scientific information on SBT, the scientific observers started being deployed on board and conducting the observation program of SBT in 2002. The biological samples, including otoliths, muscle tissues, stomach and gonads of SBT, were carried out by observers on board. In this paper, we presented the preliminary analysis for gonad samples of SBT collected by Taiwanese scientific observer program.

2. MATERIALS AND METHODS

Gonad samples of SBT were collected by scientific observers deployed on Taiwanese longline vessels operated in the Indian Ocean. The measurement of fork length and body weight, sex, and sampling date and location were recorded for each specimen.

Because the measurements of body weight were not recorded by observers, a length-based gonado-somatic index (Chen et al., 2013) was adopted in this paper:

$$GSI = \frac{GW}{L^3} \times 10^4$$

where GSI is the gonado-somatic index, GW is the weight of gonad and L is the fork length.

3. RESULTS AND DISCUSSION

A total of 152 gonad samples of SBT were collected during April to September (i.e. the first fishing season of Taiwanese SBT longline fishery) in year of 2010-2013. Female and male samples were 73 and 54 respectively. Sex information was not recorded for 25 fishes but the sexes of these fishes can be further identified based on the gonad samples.

Samples were collected in the waters of the southeast Indian Ocean (77°E-100°E, 29°S-37°S) (Fig. 1). To investigate the gonad samples of SBT caught by Taiwanese fishery, the sampling area of this paper can be complementary to that of Chen et al. (2013). The fork length of samples ranged from 90 to 170 cm and 84 to 182 cm for females and males respectively, with both concentrated between 100 and 135 cm (Fig. 2).

The gonad weights obviously increased with the growth of body lengths for both sexes (Fig. 3). However, gonad weights of most female and male samples (more than 60%) were less than the gonad weight of smallest mature fish observed by Chen et al. (2013) (92 and 53 g for females and males respectively). For females, the relationship between GSI and body length revealed similar trend, which the GSI obviously increased with body length. However, there was no apparent pattern in the relationship between GSI and body length for males (Fig. 4). Based on the GSI of smallest mature fish observed by Chen et al. (2013), the GSIs of fewer female samples (38%) were less than the criterion of 0.37.

Fig. 5 shows the monthly trends of GSI for females and males. For both sexes, GSIs increased from April to May and then revealed decreasing trends. However, GSIs substantially increased from August to September for males. Since the samples were collected only from April to September, monthly trend of GSI cannot be explored for entire year.

This paper conducted a preliminary analysis for gonad samples of SBT collected by Taiwanese scientific observer program. In addition, we made preliminary comparisons with the results of Chen et al. (2013), whose samples were also collected from Taiwanese observer program. The sexual maturity for samples of this study will be further determined based on histological examination.

REFERENCE

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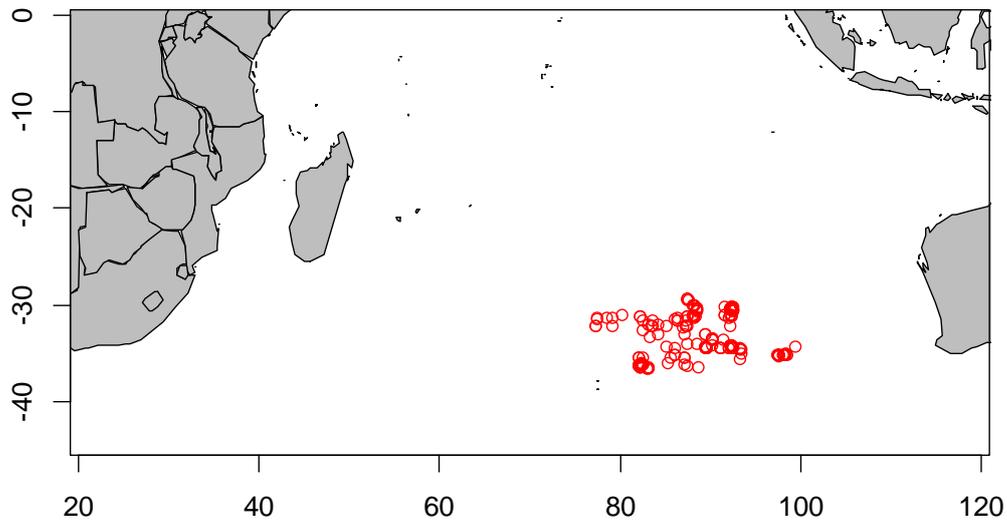


Fig. 1. Locations for gonad samples of SBT collected Taiwanese scientific observer program.

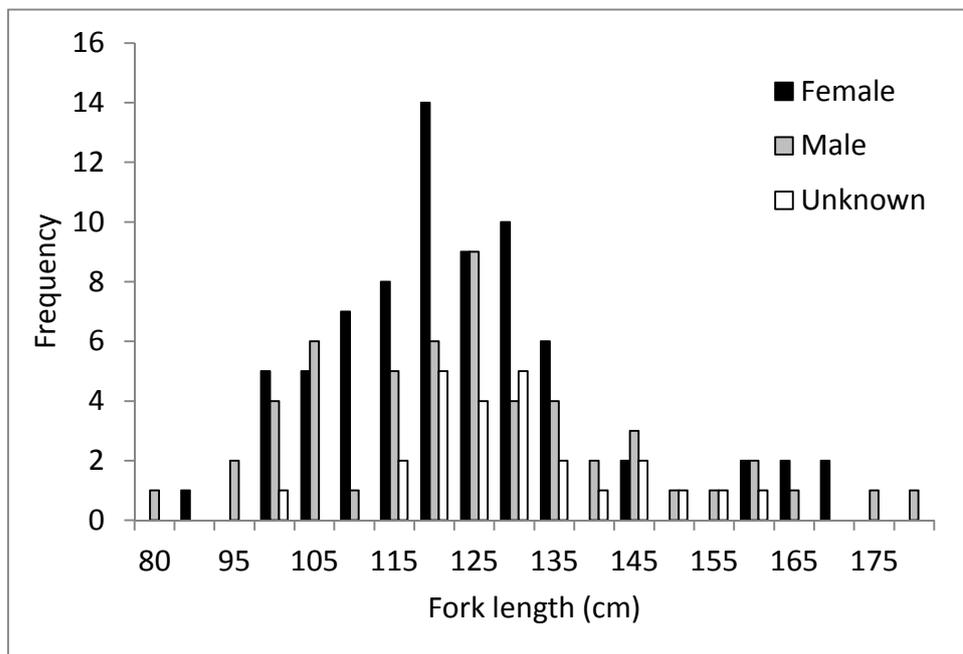


Fig. 2. Length frequency distributions (5 cm intervals) for gonad samples of SBT collected Taiwanese scientific observer program.

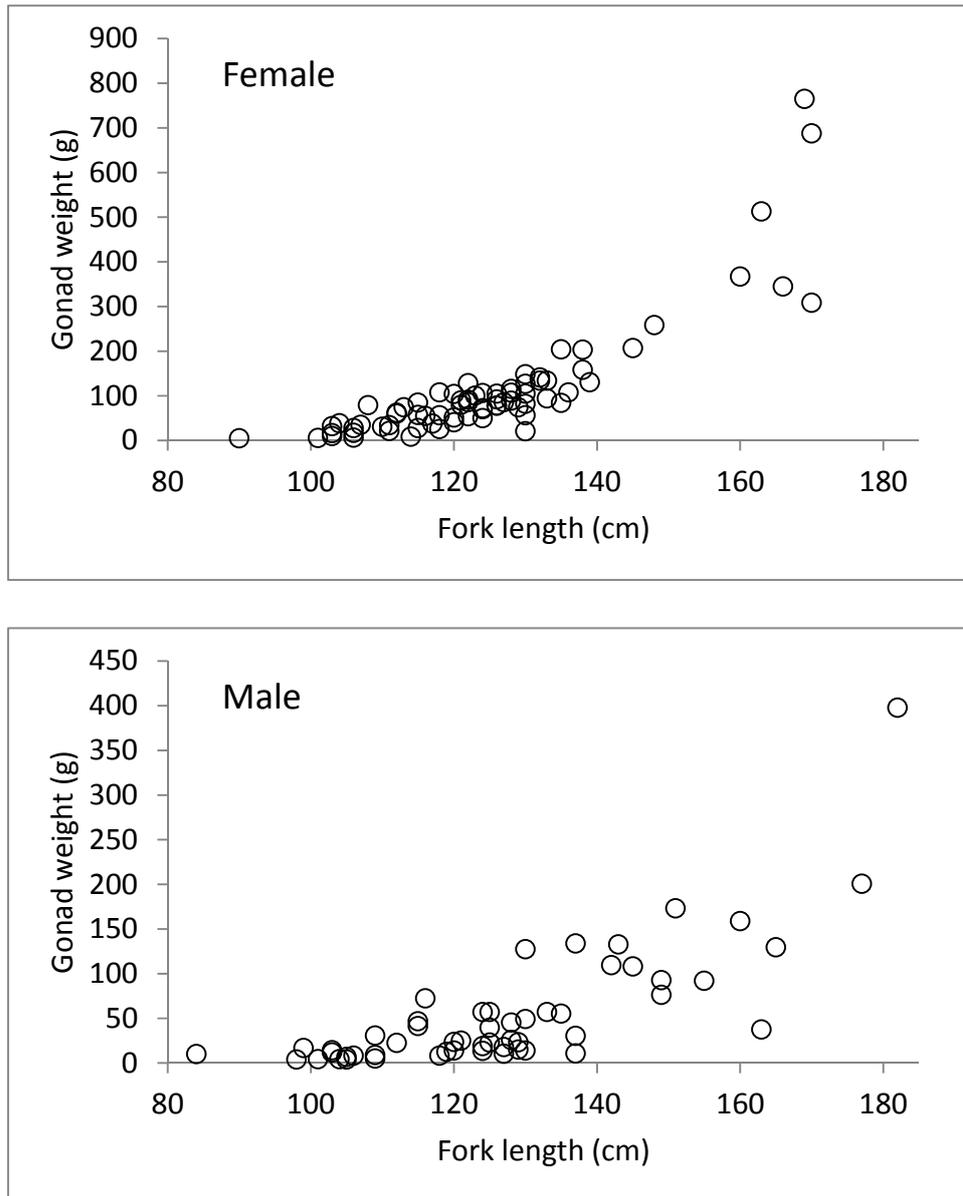


Fig. 3. Relationship between fork length and gonad weight for gonad samples of SBT collected Taiwanese scientific observer program.

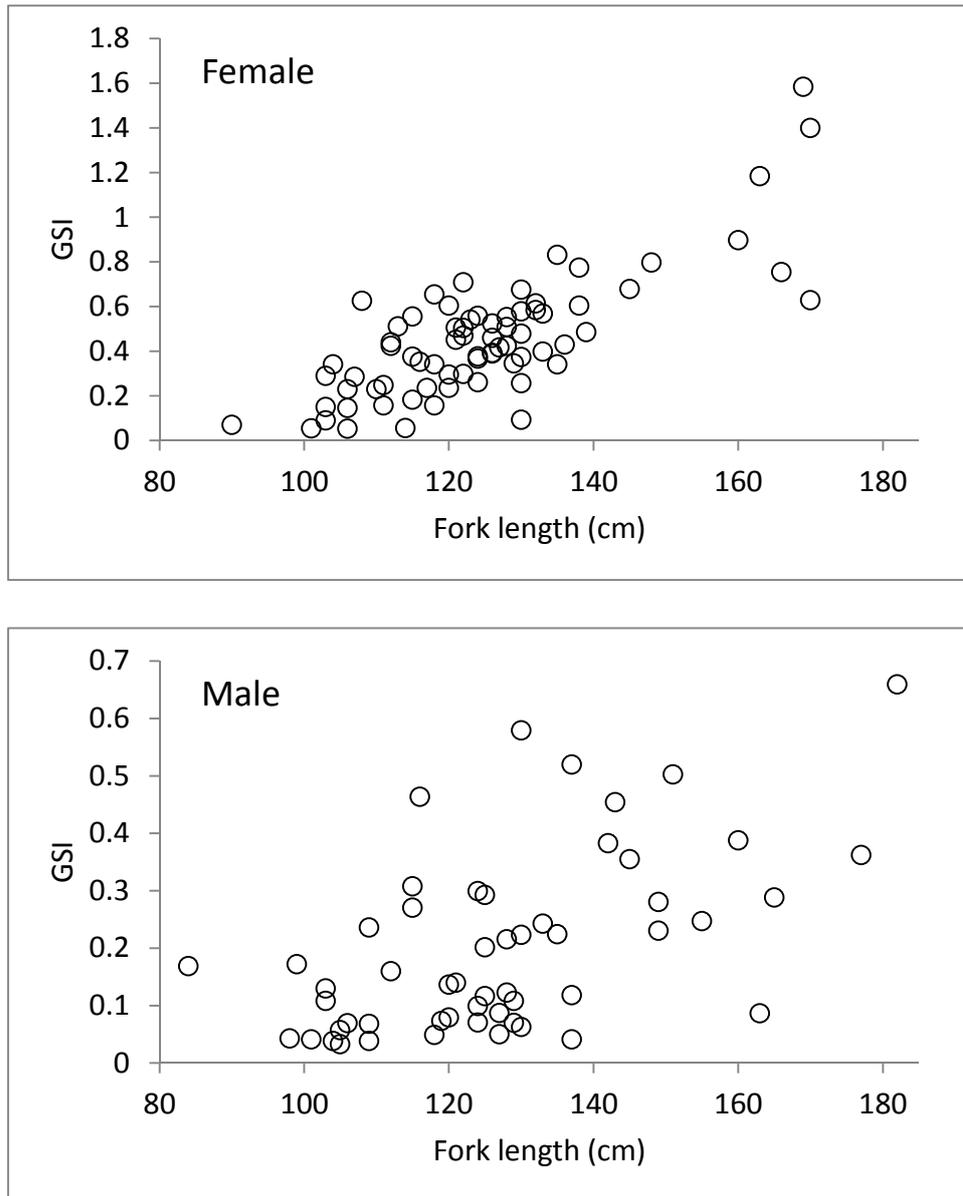


Fig. 4. Relationship between fork length and gonado-somatic index (GSI) for gonad samples of SBT collected Taiwanese scientific observer program.

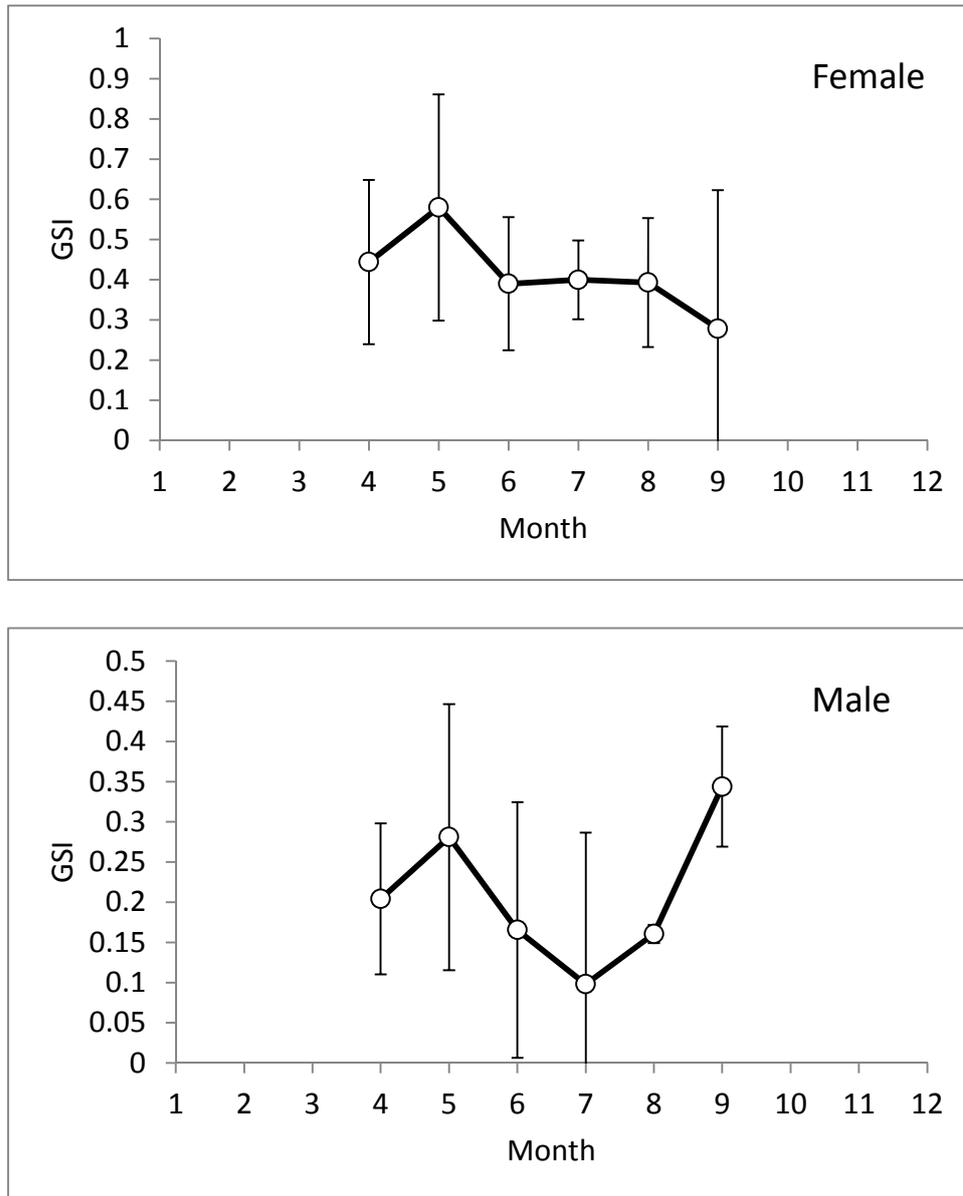


Fig. 5. Monthly trends of gonado-somatic index (GSI) for gonad samples of SBT collected Taiwanese scientific observer program.