Received: 13 September, 2012
IOTC–2012–WPEB08–26

Update of the standardized CPUE of oceanic whitetip shark (*Carcharhinus longimanus*) caught by Japanese longline fishery in the Indian Ocean

Kotaro Yokawa and Yasuko Semba
National Research Institute of Far Seas Fisheries

Abstract

The standardized CPUE of oceanic whitetip shark caught by Japanese longliners in the Indian Ocean was updated to 2011 with modified data filtering method. The trend of the updated standardized CPUE shows the fact that the level of CPUE does not change largely in the period between 2003 and 2011, and modified data filtering method produced rather similar and somewhat flatten trend in compare with the one by previous results. Smoother trend of the standardized CPUE in the period of 2003 and after than the one in the previous study suggests the fact that the newly developed data filtering method are increased the reliability of the estimated abundance index

Introduction

This document describes the update of the standardized CPUE of oceanic whitetip shark (*Carcharhinus longimanus*) caught by Japanese distant-water longliners operated in the Indian Ocean, from the previous study by Semba and Yokawa (2011).

Materials and methods

Basically, the same method as previous study by Semaba and Yokawa (2011) was used for the update. We assumed that catch and effort data of cruises with equal to and higher than 40 % reporting rate of sharks has reliable information of oceanic whitetip shark. The data of cruise reporting high catch ratio of oceanic whitetip shark in the high latitude area (south of 35S) in the southern hemisphere were omitted from the analysis as they misidentified species. Though the report of the catch of oceanic whitetip shark were mandated in the end of the 1990s, some species misidentifications of this shark were revealed to be occurred by the questionnaire to the fisher’s union (Japan Tuna Fisheries Corporation, person comm..) due to the complex local names of sharks which is rather different from their common name. Based on this information, catch and effort data of cruises in the period between 2000 - 2005 with unrealistically high catch of oceanic whitetip shark (more than 10 times higher catch ratio from those operated in the same area, year and season) were also omitted from the analysis as they believed to misidentify their shark catch.

For the GLM analysis, same area stratification as the previous study was used and the same main factors effects were introduced into the GLM model as follows;

- Year (10 years from 2000 to 2009)
- Quarter (4 categories; Q1: Jan.-Mar., Q2:Apr.-Jun., Q3: Jul.-Sep., Q4: Oct.-Dec.)
- Area (4 areas)
- Gear (3 categories based on hooks-per basket (hpb); G1: 5< hpb<15, G2: 15<= hpb<20, G3: hpb>=20)

In the previous study, effects of two way interactions between year and quarter, year and area and year and gear were introduced into the final model, and they are replaced into ones between year and quarter, and area and quarter due to the shortage of the coverage of data occurred by the newly developed data selection method. The calculation of GLM analysis was performed through GLM procedure of SAS/STAT package (version 9.2).

Results and Discussions

The trend of the updated standardized CPUE shows the fact that the level of CPUE does not change largely since previous study (Table 1, Fig. 2). The newly developed method of data filtering produced rather similar and somewhat flatten trend in the period of 2003 and after (Fig. 3). The trend of CPUE shows unrealistic up and down in the period before 2003, but this would not reflecting actual trend of the stock as those are the introduction phase of the new recording system.

All the factors included into the model had significant effects and effects of area and gear had largest impacts on the results (Table 2). Calculated residual pattern are not far from the normal (Fig. 4). Smoother trend of the standardized CPUE in the period of 2003 and after than the one in the previous study suggests the fact that the newly developed data filtering method are improved the reliability of the estimated abundance index as the abundance trend of this stock would only change slowly under the moderate fishing pressure due to its lower productivity.

Reference

Semba, Y. and K. Yokawa (2011) Trend of standardized CPUE of oceanic whitetip shark (*Carcharhinus longimanus*) caught by Japanese longline fishery in the Indian Ocean. IOTC-2011-WPEB07-35. 9p.

Received: 13 September, 2012
IOTC–2012–WPEB08–26

Table 1 The scaled standardized CPUE and its confidence interval. All values are scaled to the average of standardized CPUE which set at 1.0.

	cpue_p	cpue_l	cpue_u
2000	0.252985	0.083263	0.429897
2001	0.949025	0.745709	1.161192
2002	0.372907	0.204844	0.547813
2003	1.240989	0.908272	1.596617
2004	1.507619	1.255583	1.77192
2005	0.997783	0.7789	1.226857
2006	1.208635	0.99041	1.436556
2007	0.988038	0.792405	1.191788
2008	1.218808	1.092871	1.347905
2009	1.154058	1.028731	1.282556
2010	0.94177	0.804271	1.083268
2011	1.167384	0.952082	1.392195

Table 2 ANOVA table of the final model of GLM.

Source	DF	Sum of Square	Mean Square	F-value	Pr > F
Model	61	1975.29334	32.38186	28.78	<.0001
Error	50967	57339.362	1.12503		
Corrected Total	51028	59314.6553			
	R-Square	CV	Root MSE	Mean of log CPUE	
	0.033302	-16.39912	1.060674	-6.46787	
Facoter	DF	Type III SS	Mean Square	F-value	Pr > F
yr	11	180.285371	16.3895791	14.57	<.0001
area	3	326.631423	108.877141	96.78	<.0001
qt	3	42.9854798	14.3284933	12.74	<.0001
gear	2	179.796834	89.8984171	79.91	<.0001
yr*qt	33	343.649452	10.4136198	9.26	<.0001
area*qt	9	90.4051823	10.0450203	8.93	<.0001

Received: 13 September, 2012

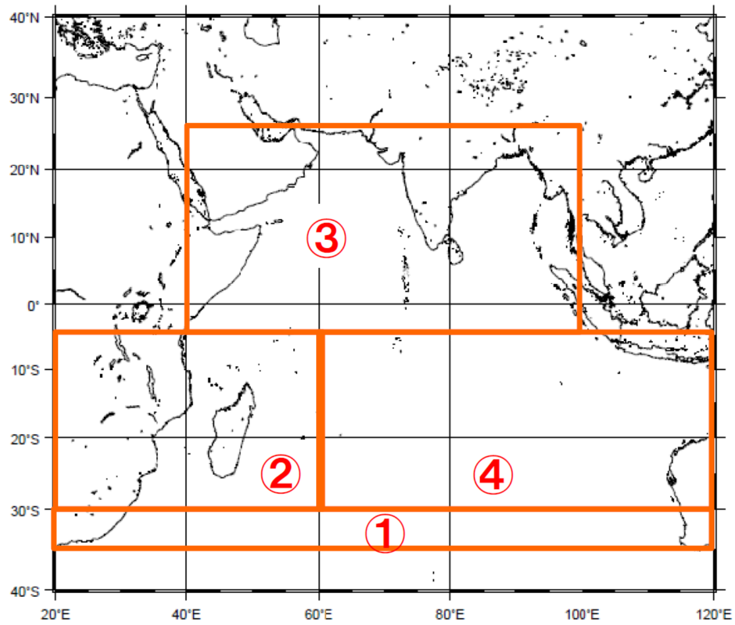

Fig. 1 Area stratification used in the analysis.

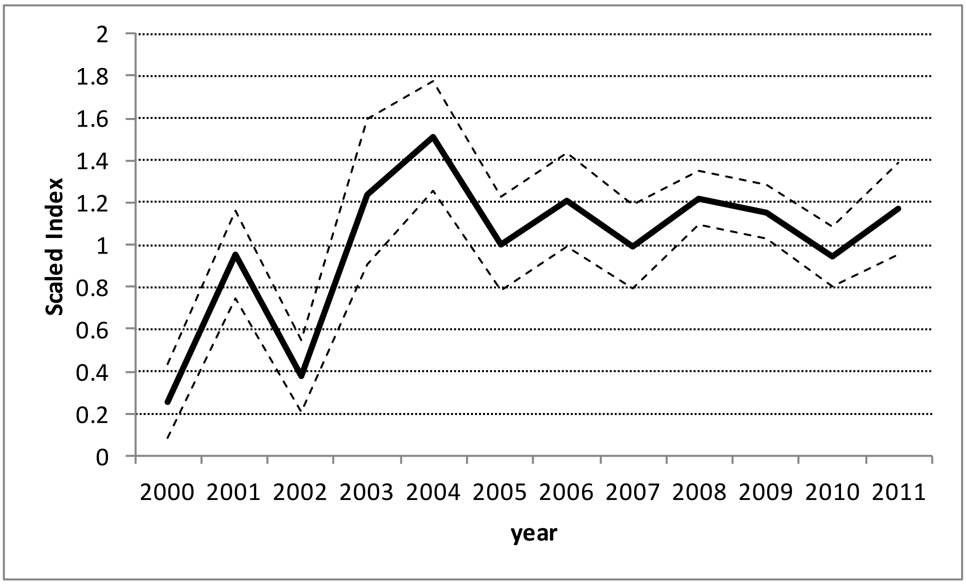

Fig. 2 Trends of standardized CPUE of oceanic whitetip shark in the Indian Ocean with confidence interval.

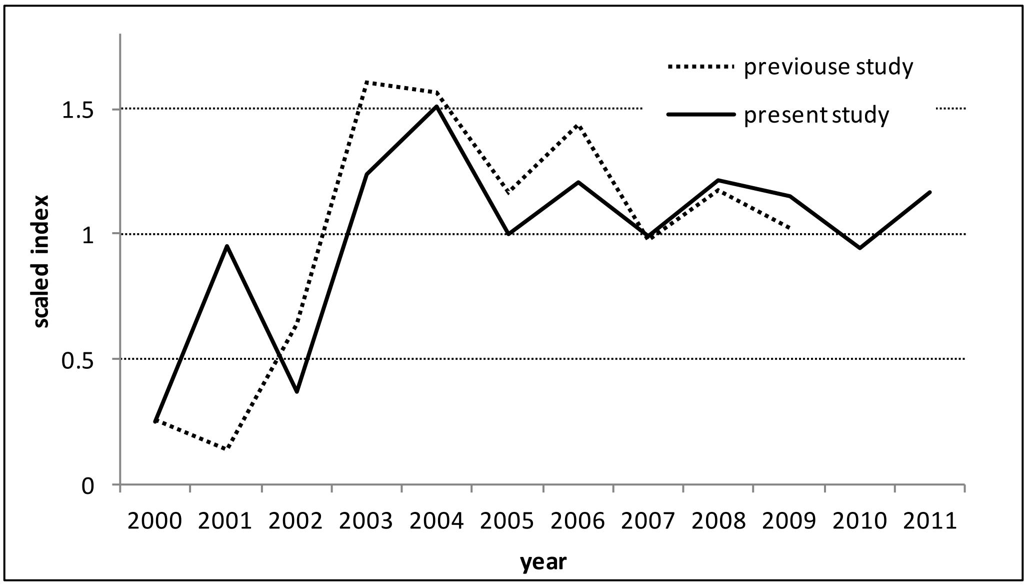

Fig. 3 Comparison of the trends of standardized CPUE between present study and previous study by Semba and Yoakwa (2011).

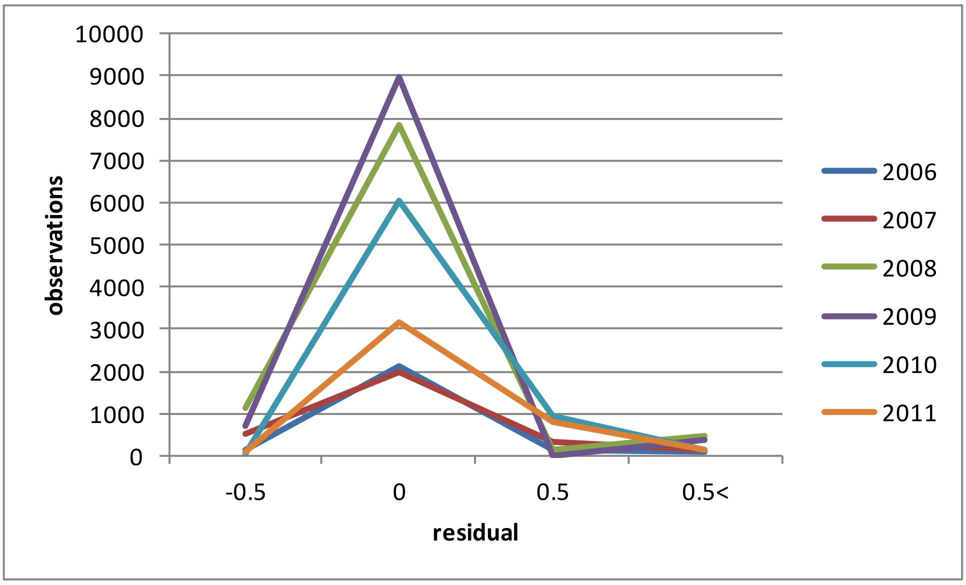

Fig. 4 Annual distribution pattern of standardized residual in the final model.