SCIENTIFIC COMMITTEE
SEVENTH REGULAR SESSION

9-17 August 2011
Pohnpei, Federated States of Micronesia

CPUE ANALYSES FOR SKIPJACK CAUGHT BY COASTAL TROLL FISHERY AROUND WAKAYAMA PREFECTURE IN JAPAN

WCPFC-SC7-2011/SA-IP-12 (Rev.1)

H. KIYOFUJI[1], H. ASHIDA[1], S. OKAMOTO[1], T. GOSHO[2] and Y. TAKEDA[2]

[1] National Research Institute of Far Seas Fisheries, Japan
[2] Wakayama Research Center of Agriculture, Forestry and Fisheries.

CPUE analyses for skipjack caught by coastal troll fishery around Wakayama prefecture in Japan.

Hidetada KIYOFUJI[1], Hiroshi ASHIDA[1], Suguru OKAMOTO[1], Toyoho GOSHO[2] and Yasuyuki TAKEDA[2].
1: National Research Institute of Far Seas Fisheries
2: Wakayama Research Center of Agriculture, Forestry and Fisheries.

ABSTRACT
CPUE analyses for skipjack caught by the coastal troll fishery around Wakayama prefecture in Japan were conducted from February to May between 2001 and 2009. All coastal troll fleets conduct fishing activity around coastal area with distance approximately 90 nautical miles from their homeport. Some fleets have been selected to submit daily catch report to investigate catch status around this area. For each data, nominal CPUE were calculated as catch (tonnes) / boat-day. CPUE were standardized by Year, Month and area considered as predictor variables. Area has been considered as variability of the Kuroshio axes that would affect formation of skipjack fishing ground. Kuroshio axes were defined as latitude of 15^{o}C in 200m depths around this area. As results, overall CPUE were smaller than nominal CPUE and it decreased largely especially after 2004.

INTRODUCTION
Skipjack tuna (*Katsuwonus pelamis*) appears wide area not only western central pacific ocean (WCPO) but also whole of Pacific Ocean. They are believed to migrate seasonally from tropical to subtropical oceans. Skipjack stock status is not both in an overfished nor overfishing state based on the stock assessment in 2010, it was indicated that there is concern, yet to be substantiated, that high catches in the equatorial region could result in range contractions of the stock, thus reducing skipjack availability to higher latitude (e.g. Japan, Australia, New Zealand) fisheries (Anonymous, 2010). Uosaki et al. (2010) also indicated that there were some signs of possibly of a decrease in the population in the vicinity of Japan especially caught by the Japanese middle-sized pole and line and offshore purse-seine fisheries.

In this study, we attempted to investigate any potential evidences of decreasing skipjack population not only offshore of Japan but coastal area. In particular, CPUE caught by the coastal troll fisheries around the Wakayama from winter to spring were examined. Coastal troll fisheries (<10GRT) in Wakayama are major and important fisheries as local industry. Coastal troll fisheries are characterized as deploying several fishing gears to the end of pole and run approximately 7 knots to attract skipjack. There are about more than hundreds troll fleet fish around this area in their high season. Coastal troll fishing ground were formed two part across the Kuroshio; one is south of the Kuroshio (January-March) and another formed north (March – May). Change of the Kuroshio path is an important proxy for the fishing ground formations (Sakamoto, 1990). Size of fish caught during this period is approximately 43cm fork length. This is almost same size as caught by the middle-sized pole and line fisheries in this season but in different areas.

DATA and METHODS
Two data sets were employed to analyses and standardize CPUE for skipjack caught by the coastal troll fishery around Wakayama as follows. The Wakayama Research Center of Agriculture, Forestry and Fisheries collected these data sets.

1. Skipjack landing and effort (fleet-day) data between February and May from 1993 to 2009.
2. Catch and effort data by selected coastal trolling fleet including fishing area and 0 catch data. Number of available data in each year was shown in table 1. We used data from 2002

and 2009.

Nominal CPUE were calculated both data set as catch per boat-day. Data set from selected fleet contains 0 catch data, small constant number were added to the catch when CPUE was standardized. In this analysis, the position of Kuroshio-axes was considered as one proxy of fishing ground formation. This reflected to the area definition in each year.

RESULTS and DISCUSSION

Catch trend and nominal CPUE based on skipjack landing and effort data

Figure 1(a) shows that catch anomaly from landing data to Wakayama. One significant result is that catch has been recorded below the average since 2004. Nominal CPUE also shows decreasing trend after 2001.

Fleet distribution and CPUE based on data from selected fleet

Coastal trolling fleet conducts fishing activity approximately 90 nautical miles from their homeport (Figure 2) and they usually return within one day. While fishing ground were mainly formed near coastal areas, southern concentration of fishing area likely varied annually. For example, fishing ground in 2002 were concentrated more in coastal area but they formed more broadly and scattered to southern area in 2005. This might be affected by the position of the Kuroshio-axes that broadly moved to south from middle of 2004 and early 2005 (Figure 3).

Overall standardized CPUE likely lower than nominal CPUE especially after 2004. One possible cause of this is because of migrating skipjack is affected by the Kuroshio meandering after 2004 (Figure 3). Other possibility is that somehow skipjack population itself was less after 2004.

In summary, there was evidence that skipjack CPUE caught by coastal troll fisheries declined after 2004 and kept lower to date. Although cause of low CPUE after 2004 has not been cleared yet, some research including both population dynamics and oceanographic conditions should be considered in near future. As for standardizing CPUE, zero catches rate and individual vessel effect should be included as predictors. The same methodology as Langley et al. (2010) could be potentially one candidate to apply.

Reference

Anonymous (2010) Summary Report of the Sixth Regular Session of the Scientific Committee. (http://www.wcpfc.int/node/2751)

Langley, A., Uosaki, K., Hoyle, S. and Shono, H. (2010) A standadized CPUE analysis of the Japanese distant-water skipjack pole and line fishery in the western and central Pacific Ocean (WCPO). SC6, Nukualofa, Tonga. SA-WP-08.

Uosaki, K., Kiyofuji, H., Hashimoto, K., Okamoto, S. and Ogura, M. (2010) Recent status of Japanese skipjack fishery in the vicinity of Japan. SC6, Nukualofa, Tonga. SA-WP-07.

Sakamoto, T. (1990) Fishing and Hydrographic Conditions of the coastal waters of Wakayama prefecture.

Table 1. Total number of data used in this analysis for each vessel from 2000 to 2009.

ID	month	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
A	2 ~ 6	-	-	75	67	83	43	60	47	59	65
B	1 ~ 6,11,12	-	7	46	90	63	62	62	76	48	32
C	2 ~ 6,11,12	18	47	65	53	64	45	52	43	44	-
D	2 ~ 5	-	-	39	51	60	34	43	47	52	40
E	2 ~ 5	-	-	67	70	75	53	66	64	71	74
F	1 ~ 6	-	-	50	42	36	30	49	49	36	-
G	2 ~ 6	-	-	47	37	51	35	37	43	31	-
H	2 ~ 6,11,12	16	49	48	47	55	41	48	43	41	-
I	1 ~ 6,11	-	37	54	83	65	57	75	81	50	80
	Total	34	140	491	540	552	400	492	493	432	291

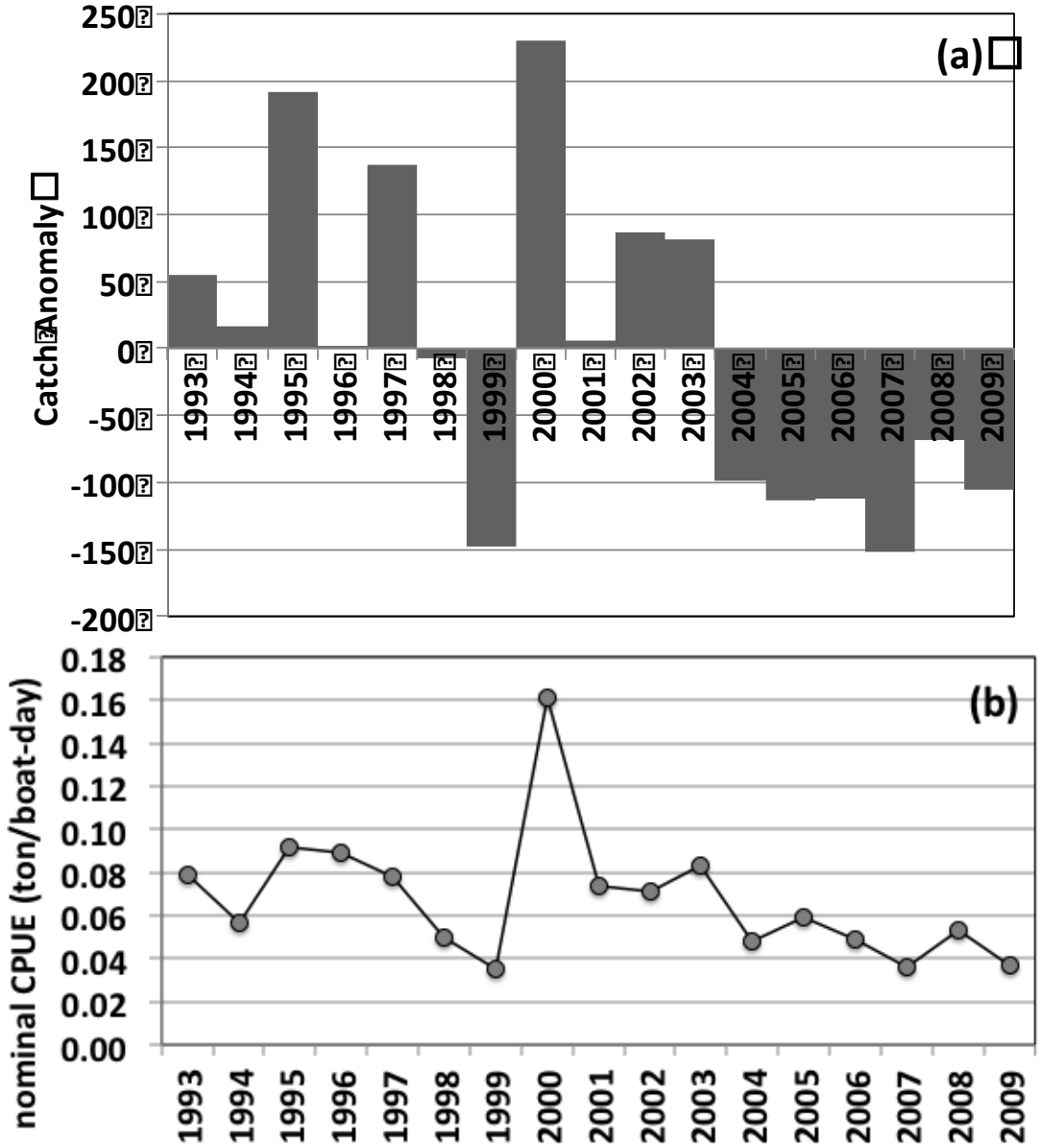

Figure 1 . (a) Catch anomaly between 1993 and 2009 from February and May in Wakayama. (b) nominal CPUE(tones/boat-day) .

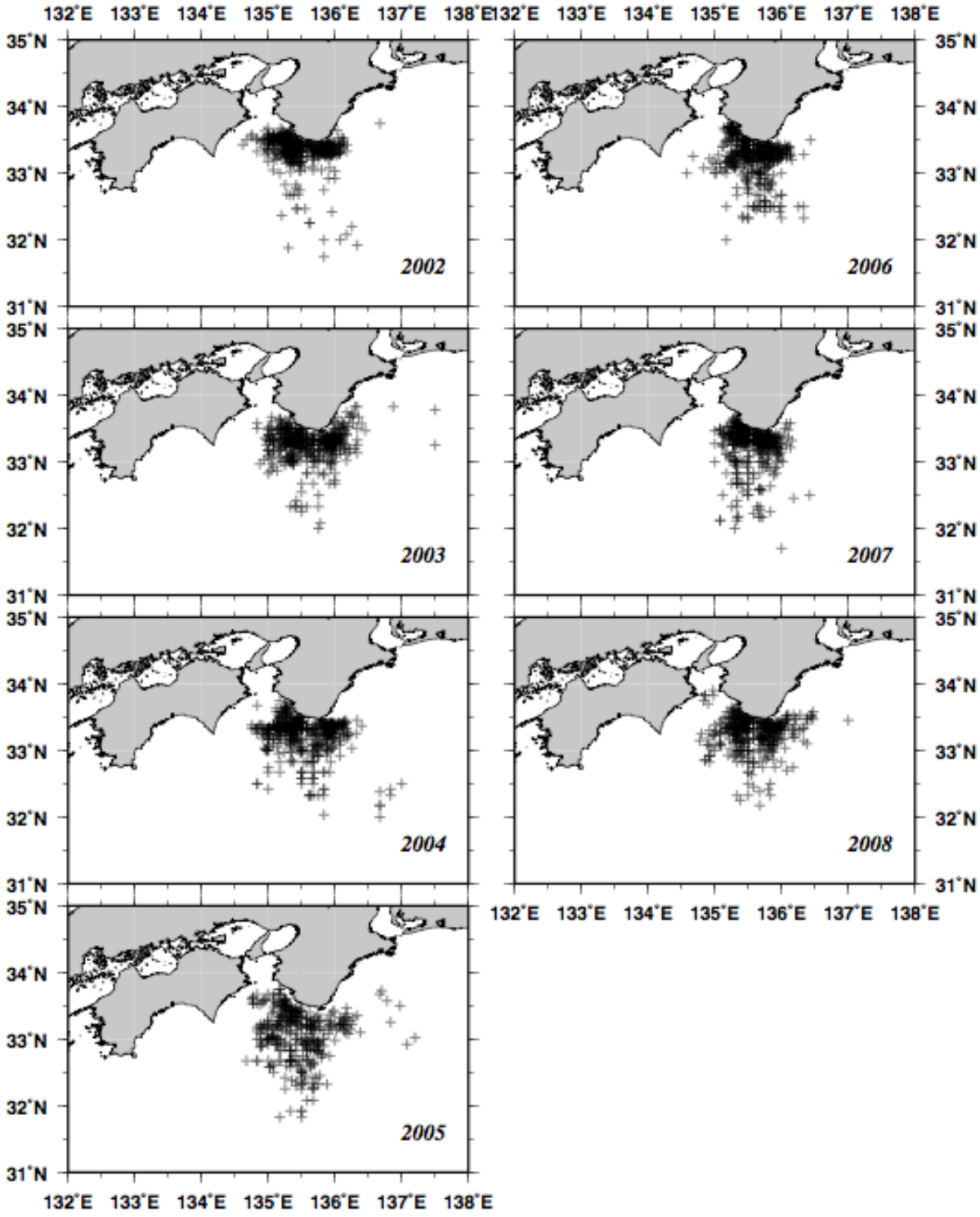

Figure 2. Spatial distribution of coastal troll fleet between February and May from 2002 to 2008.

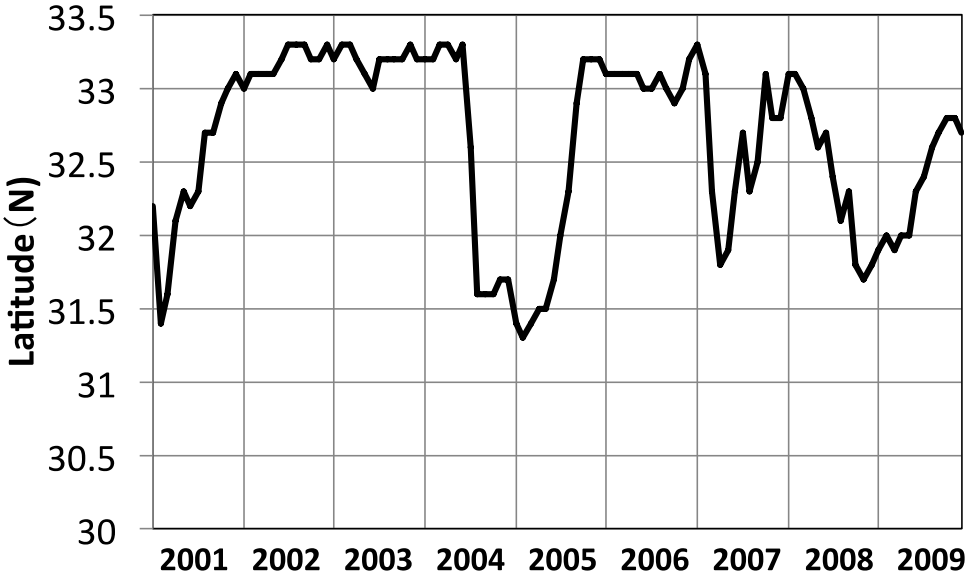

Figure 3. Seasonal latitudinal variations of the Kuroshio-axis. Kuroshio-axis were defined as latitude of 15℃ in depth 200m.

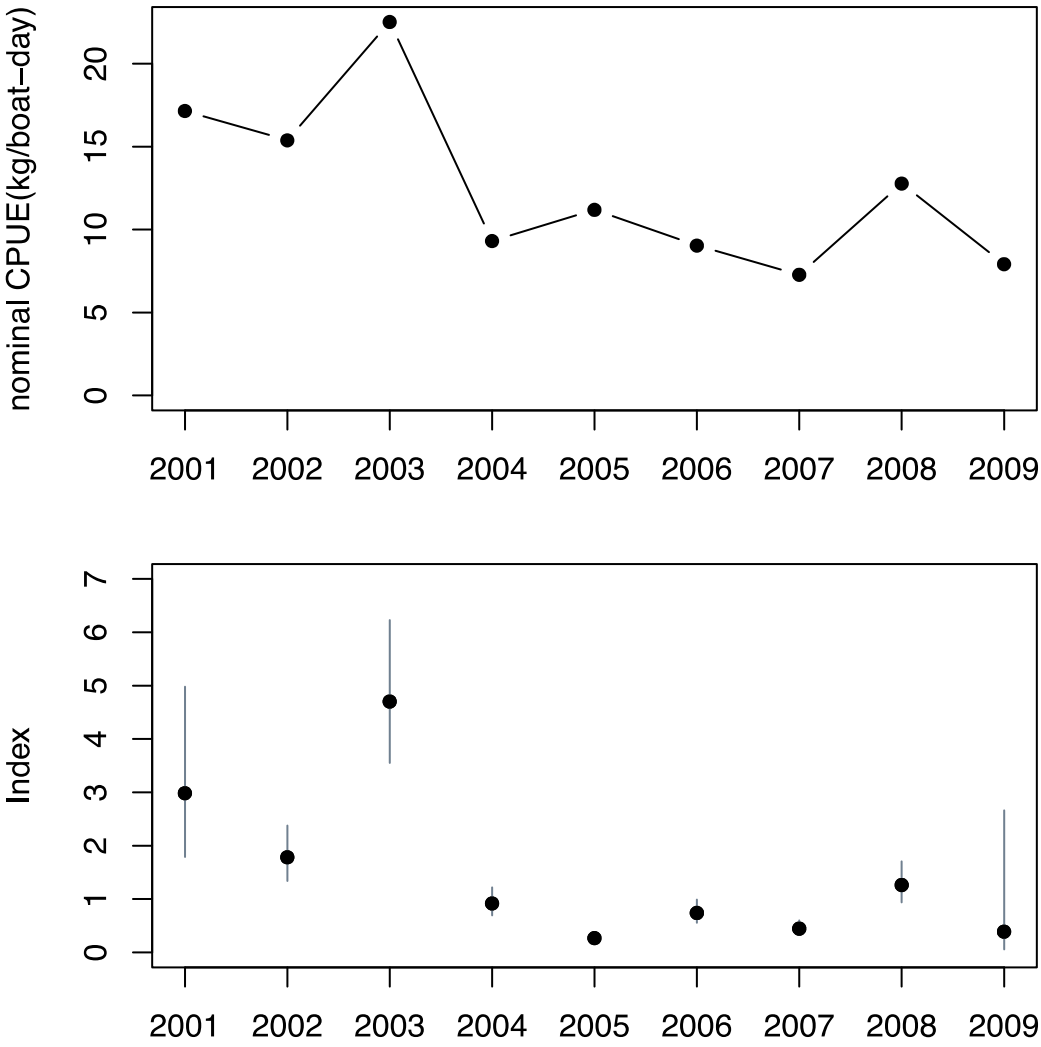

Figure 4. Nominal CPUE (above) and standardized CPUE (bottom).