Preliminary investigation of the high catch (2003) of yellowfin tuna (*Thunnus albacares*) in the tropical western Indian Ocean based on the Japanese longline data

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Abstract

In this document, we preliminary investigated the high catch of yellowfin tuna (*Thunnus albacares*) in the tropical western Indian Ocean based on the Japanese longline data by descriptive data analyses.

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1. Introduction

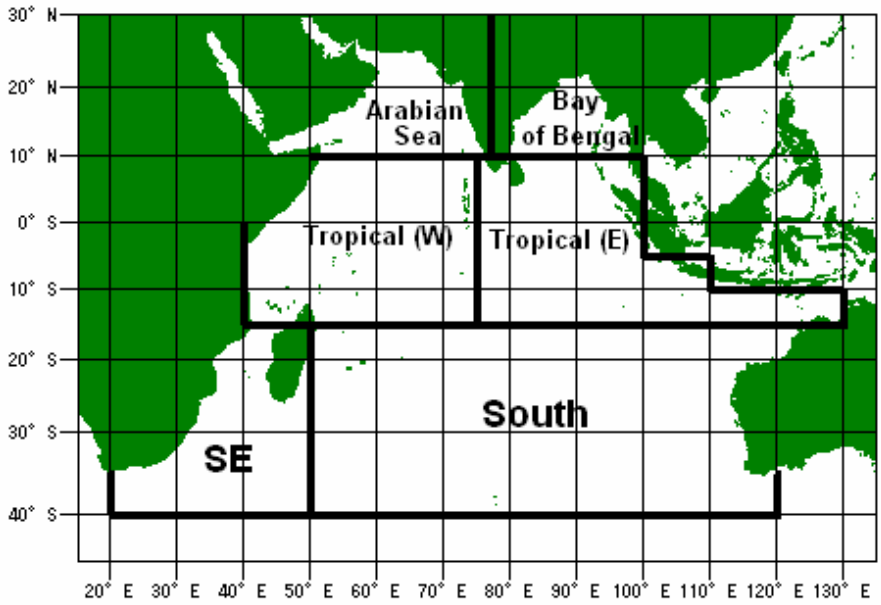
In 1993, there occurred the abnormal high catch of yellowfin tuna (*Thunnus albacares*) (YFT) by the Chinese (Taiwanese) longliners (LL) in the Arabian Sea. In 10 years later, in 2003, the high catch of YFT has been also recorded in both PS and LL in the western tropical waters in the Indian Ocean. Although the Japanese LL fisheries data for the latter case have not yet fully completed for the robust analyses, we preliminary and simply investigated the situation in 2003 in this paper. We plan to conduct more detail analyses considering effects of environments, strong cohort and etc. after the 2003 LL data are completed.

2. Data

We use the 5^{o}x5^{o} and moth based catch and effort data of the Japanese longline fisheries for 52 years from 1952-2003. The data 2003 is preliminary.

3. Methods and Results

We established six sub areas shown in Map 1, i.e., Arabian, Sea, Bay of Bengal, Tropical West, Tropical East, SW (southwestern) and S (Southern) Indian Ocean.



Map 1 Six sub areas

We investigate nominal catch (number of fish), effort (millions of hooks) and CPUE (fish/1000 hooks) by area in two periods (1952-2003 and 1980-2003) using graphical and mapping presentations. Results are summarized as below:

Fig. 1 Trend of nominal catch (1952-2003) by area
Fig. 2 Trend of nominal effort (millions of hooks) (1952-2003) by area
Fig. 3 Trend of nominal CPUE (1952-2003) by area

Fig. 4 Trend of nominal catch (1980-2003) by area
Fig. 5 Trend of nominal effort (millions of hooks) (1980-2003) by area
Fig. 6 Trend of nominal CPUE (1980-2003) by area

Map 2 Distribution of the annual average catch (1980-2003)(1000 fish)
Map 3 Distribution of catch in 2003 (1000 fish)
Map 4 Distribution of anomaly of the catch (2003) (1000 fish)

Map 5 Distribution of the annual average fishing effort (1980-2003) (millions of hooks)
Map 6 Distribution of fishing effort in 2003 (millions of hooks)
Map 7 Distribution of anomaly of the fishing effort (2003) (millions of hooks)

Map 8 Distribution of the annual average CPUE (1980-2003) (fish/1000 hooks)
Map 9 Distribution of CPUE in 2003 (fish/1000 hooks)
Map 10 Distribution of anomaly of CPUE (2003) (fish/1000 hooks)

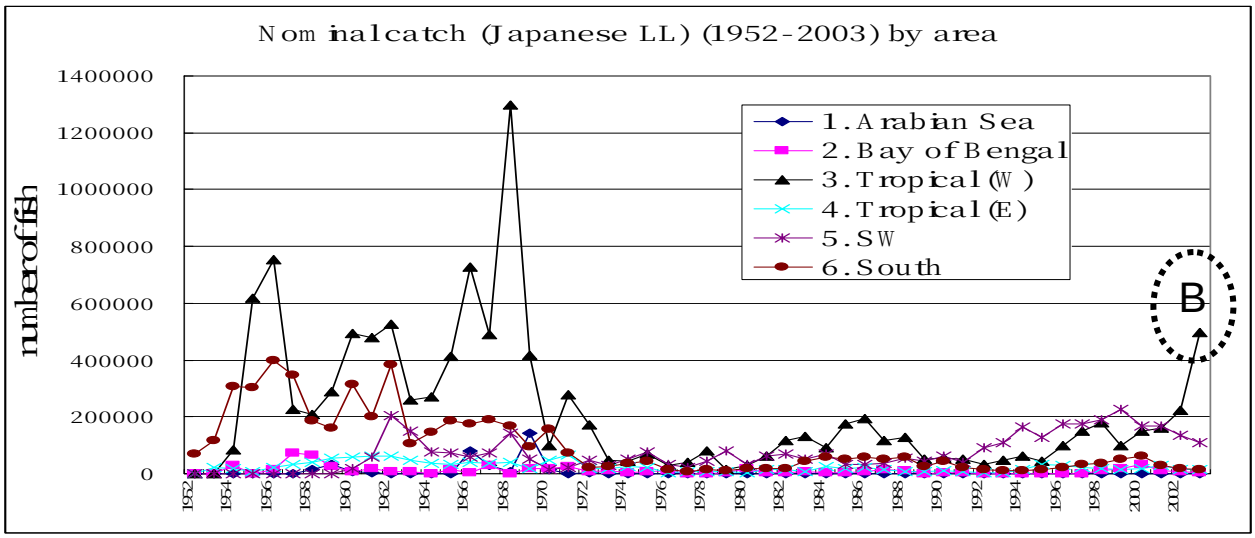


Fig. 1 Trend of nominal catch (1952-2003) by area

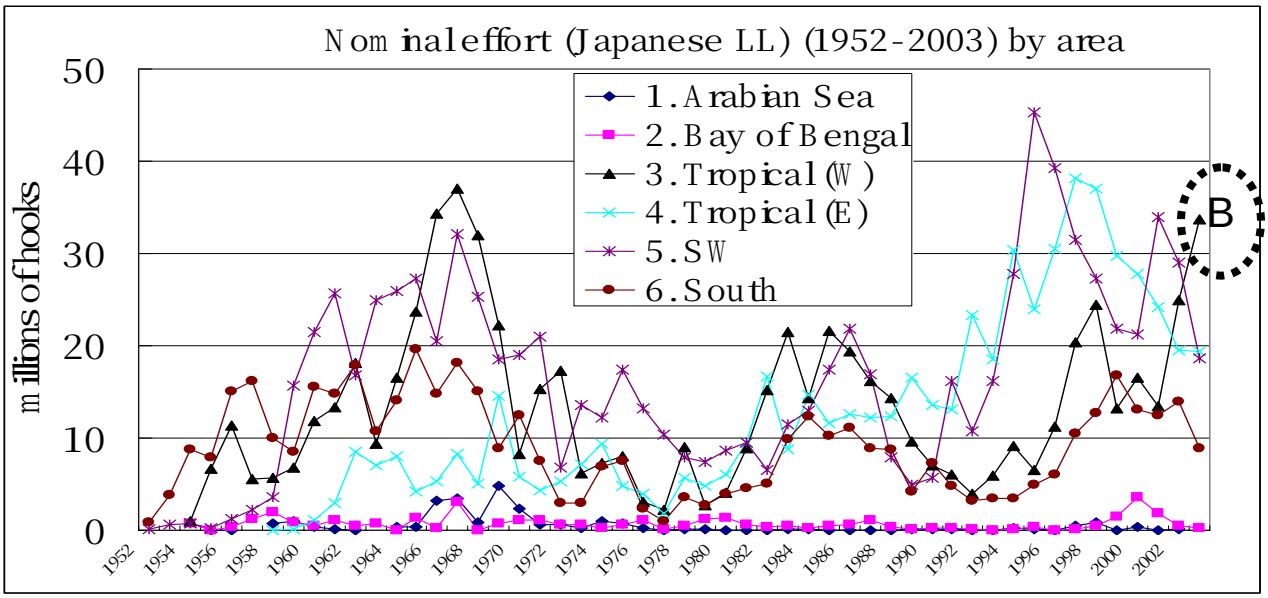


Fig. 2 Trend of nominal effort (1952-2003) by area

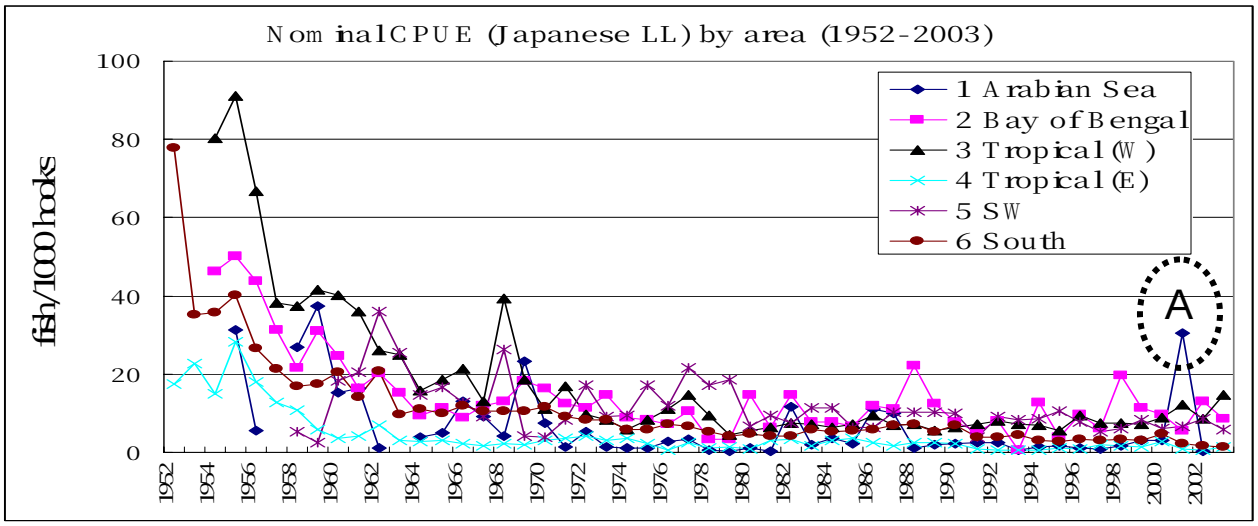


Fig. 3 Trend of nominal CPUE (1952-2003) by area

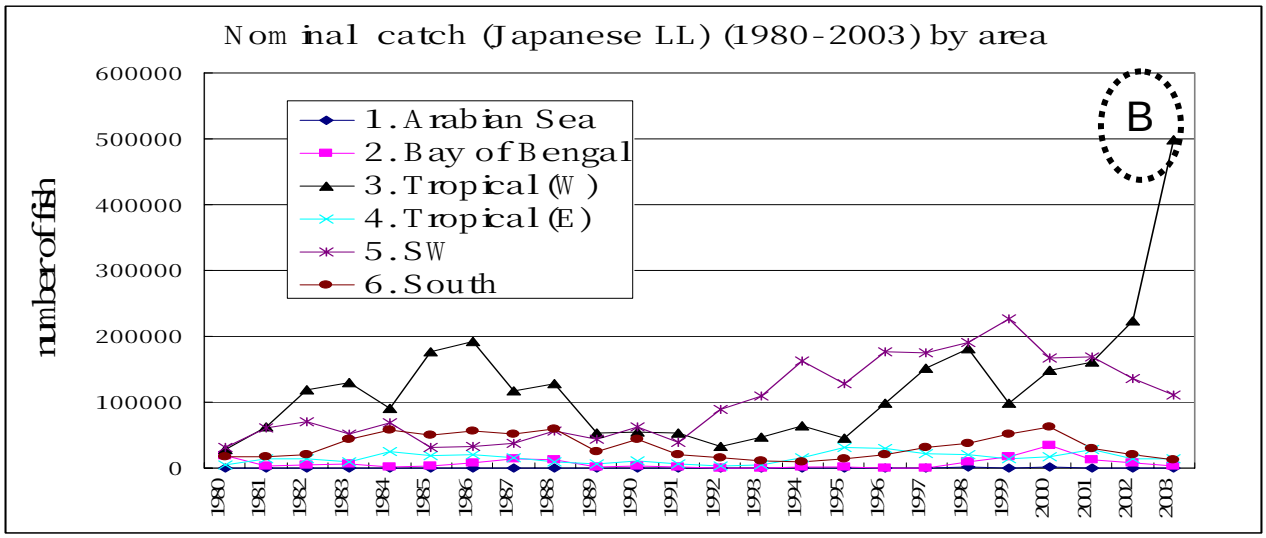


Fig. 4 Trend of nominal catch (1980-2003) by area

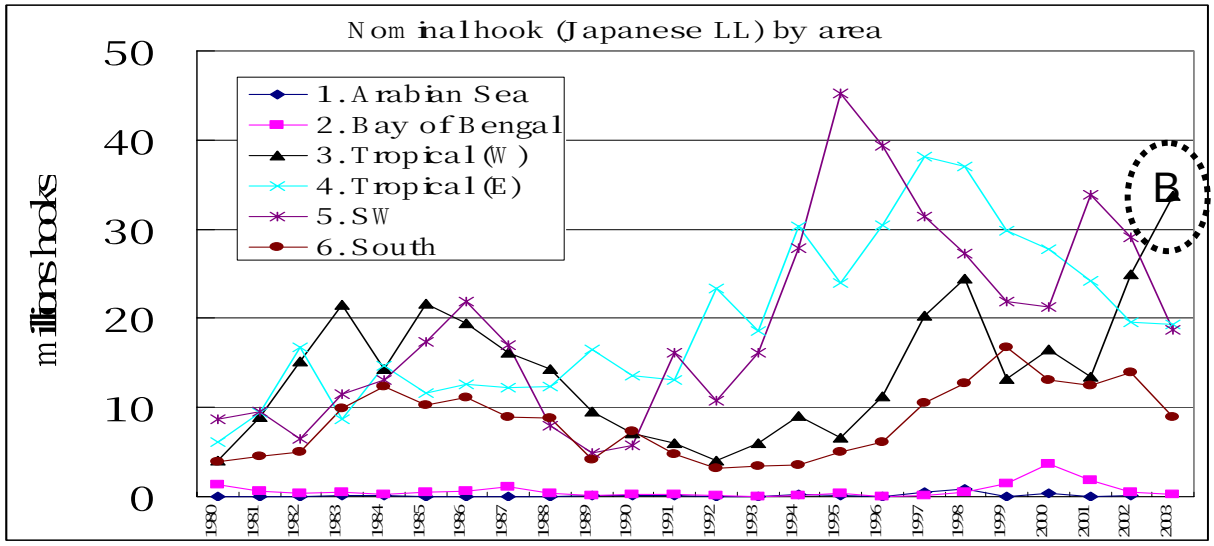


Fig. 5 Trend of nominal effort (millions of hooks) (1980-2003) by area

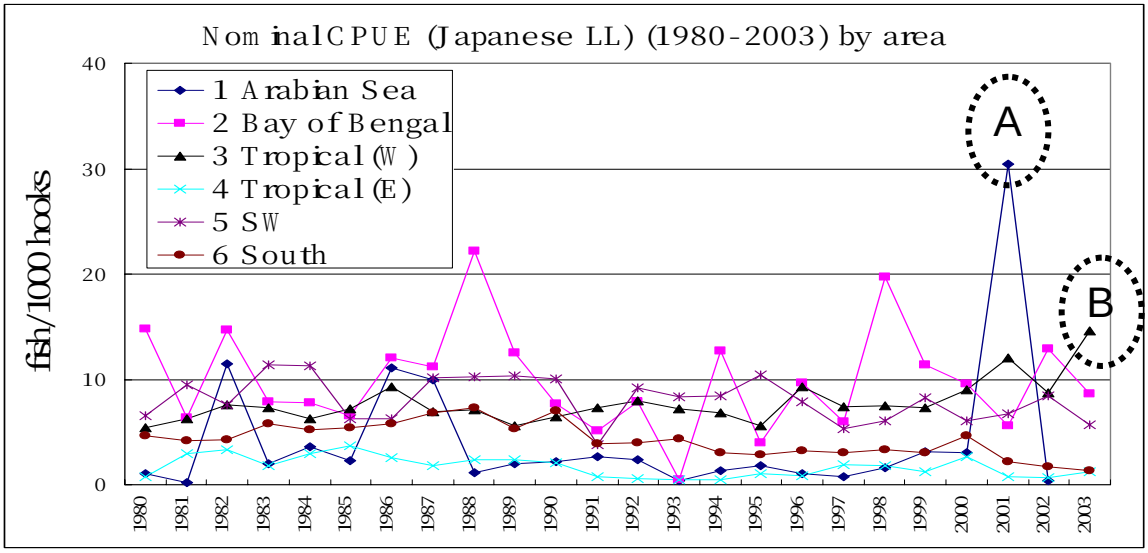
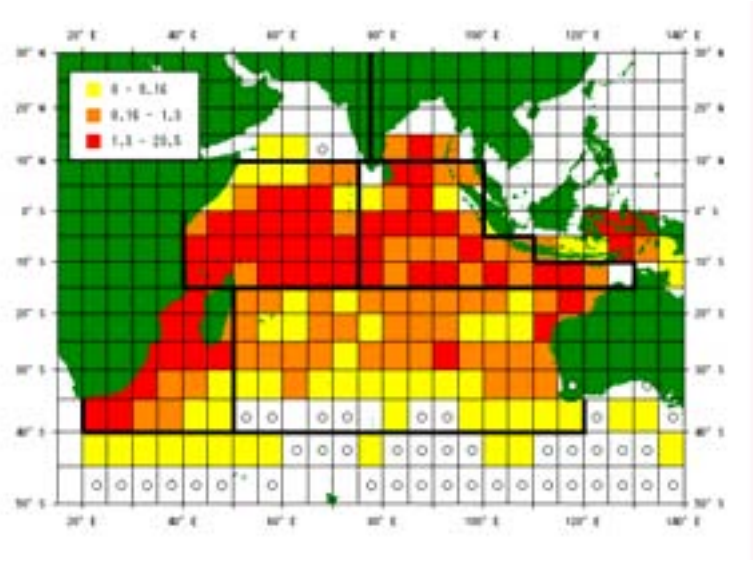
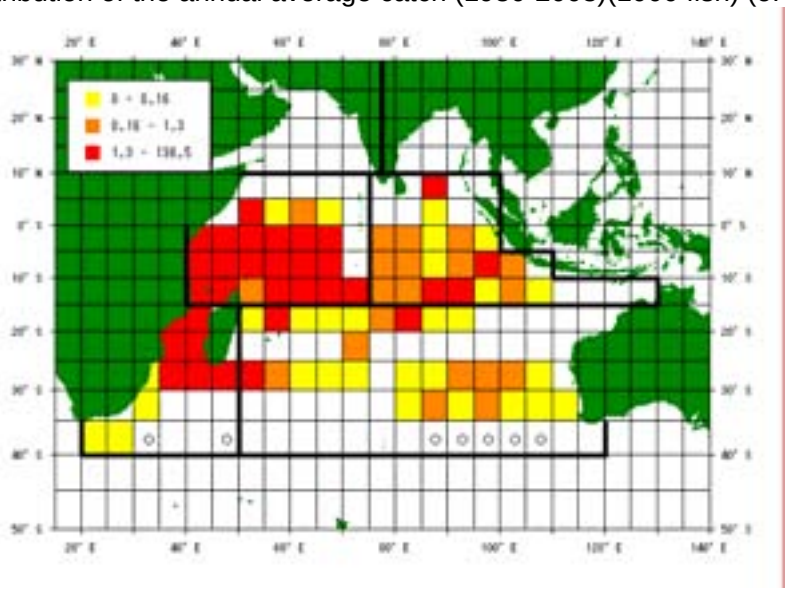


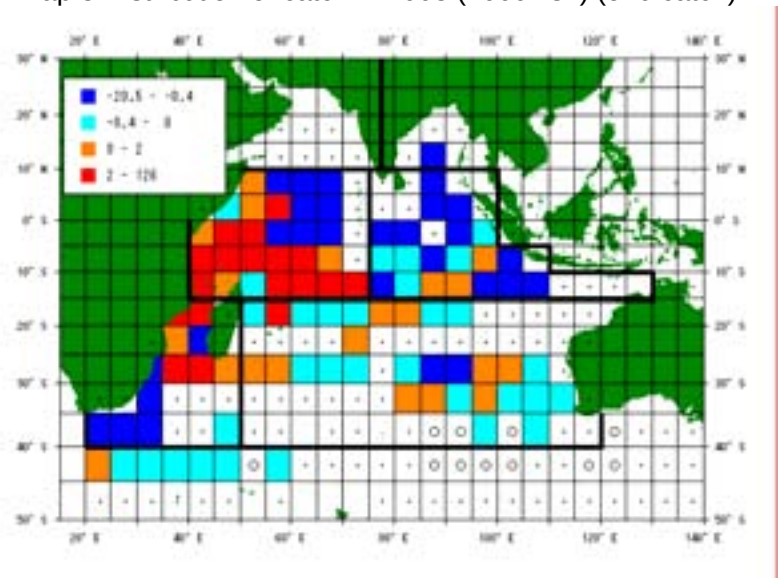
Fig. 6 Trend of nominal CPUE (1980-2003) by area



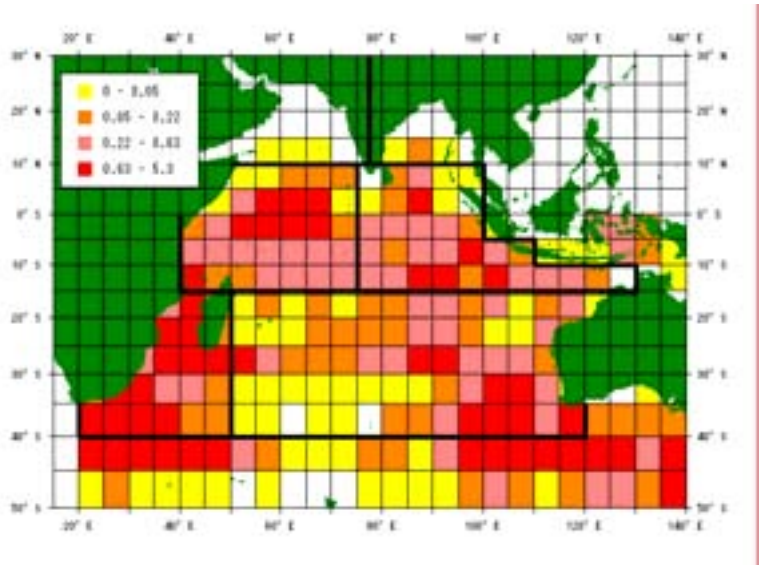
Map 2 Distribution of the annual average catch (1980-2003)(1000 fish) (o: 0 catch)



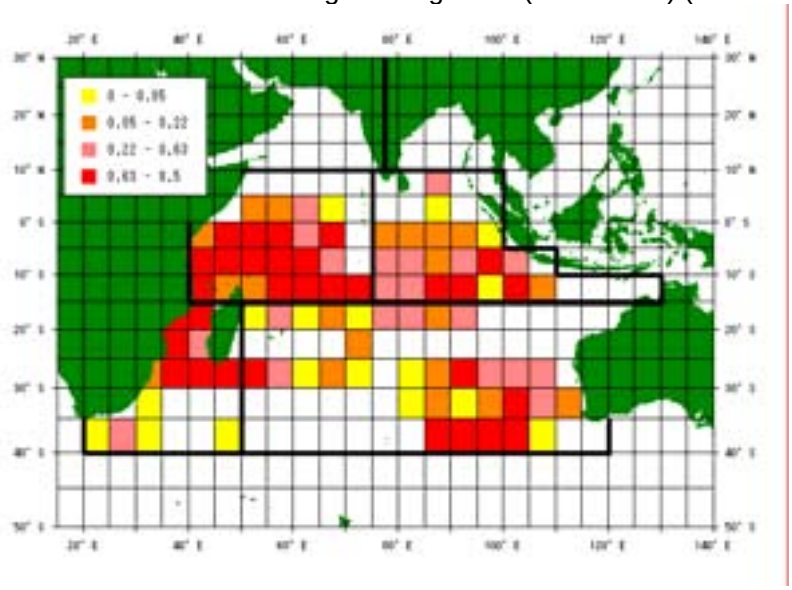
Map 3 Distribution of catch in 2003 (1000 fish) (o: 0 catch)



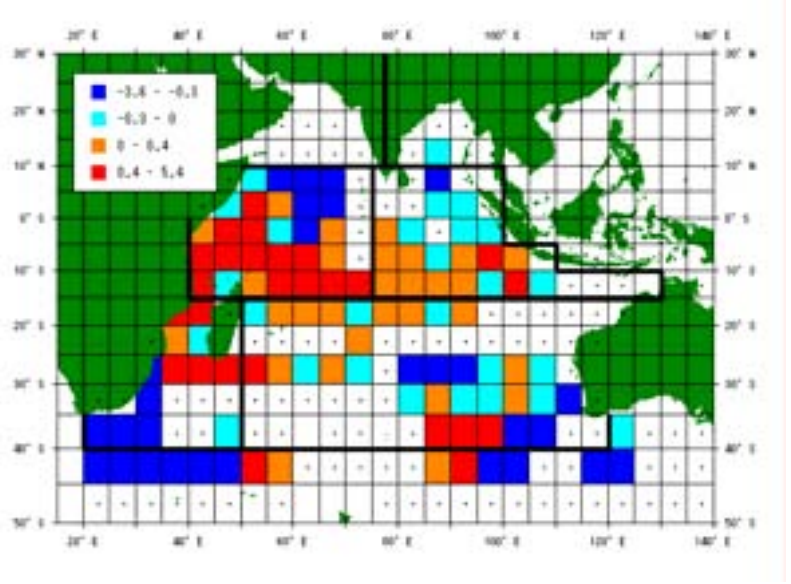
Map 4 Distribution of anomaly of the catch (2003) (1000 fish) (o: 0 catch; • not available in the 2003 data)



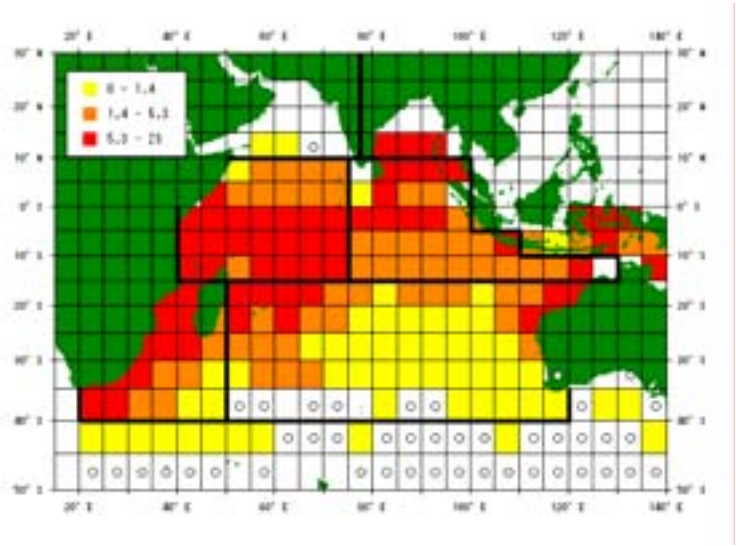
Map 5 Distribution of the annual average fishing effort (1980-2003) (millions of hooks)



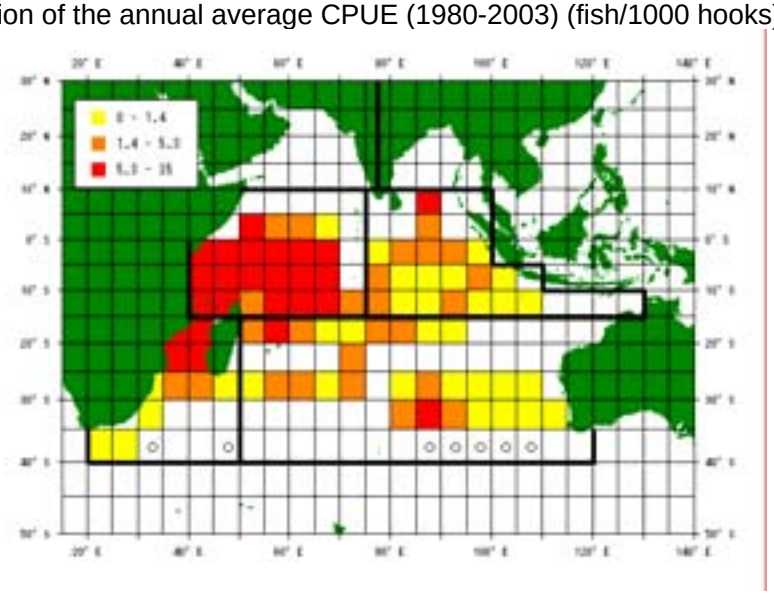
Map 6 Distribution of fishing effort in 2003 (millions of hooks)



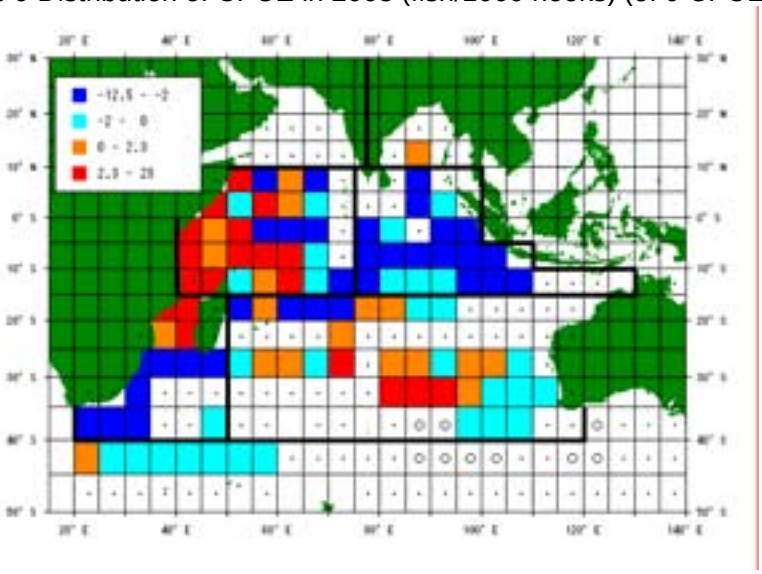
Map 7 Distribution of anomaly of the fishing effort (2003) (millions of hooks) (• not available in the 2003 data)



Map 8 Distribution of the annual average CPUE (1980-2003) (fish/1000 hooks) (o: 0 CPUE)



Map 9 Distribution of CPUE in 2003 (fish/1000 hooks) (o: 0 CPUE)



Map 10 Distribution of anomaly of CPUE (2003) (fish/1000 hooks) (o: 0 CPUE; • not available in the 2003 data)

4. Discussion

Based on our preliminary analyses by the preliminary 2003 Japanese LL data, we recognized the high YFT catch, high CPUE as well as high fishing effort in the western part of the tropical waters in 2003, which are marked by (B) in Figs 1-6. Although catch in 2003 was 2-5 times higher than in other years after 1980, CPUE was higher than by only around 2 times. This is probably because very high catch, effort and CPUE occur only in the limited areas (those in the red marks in the anomaly Maps 4 and 7 in the waters around Seychelles), CPUE in the whole of the western tropical waters was diluted and resulted to be much lower.

Based on these facts, at this stage we conclude that extraordinary high catch and CPUE was observed in the waters around Seychelles due to the extraordinary high fishing effort. Hence we can not conclude that real high catch and CPUE was actually occurred.

Note:

There is one high peaked CPUE in 2001 in the Arabian Sea, which was marked by (A) in Fig. 3 and 6. This was caused by only one operation in May, 2003 that recorded very high catch (CPUE) shown as below:

	Year	month	long	lat	N	hook	catch			CPUE
	2001	4	60	10	1	29524	160	1	0	5.4193
➔	2001	5	60	10	1	900	73	1	0	81.1111
	2001	7	65	10	1	3105	15	1	0	4.8309

Thus we don't consider that this is the general high CPUE (catch) event. However, as for the 2001 high catch, fishing effort and CPUE in the wenstern part of the tropical waters, there are many operational data, hence such events are considered to be real unlike the event of (A).