

PRELIMINARY RESULTS OF STANDARDIZED CPUE FOR PORBEAGLE CAUGHT BY JAPANESE LONGLINE FISHERY IN THE ATLANTIC OCEAN

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SUMMARY

The standardized CPUE for porbeagle caught by Japanese longline fishery in the Atlantic Ocean was given using the species specific logbook data filtered by 70% of reporting category from 1993 to 2000. No trends of decrease or increase were observed past 8 years in the North and South Atlantic.

RÉSUMÉ

La CPUE standardisée du requin-taube commun capturé par les palangriers japonais dans l'Atlantique a été obtenue d'après des extraits de livres de bord spécifiques de l'espèce filtrés par 70% de la catégorie de déclaration de 1993 à 2000. Aucune tendance croissance ou décroissante n'a été observée pendant les 8 dernières années dans l'Atlantique nord et sud.

RESUMEN

La CPUE estandarizada del marrajo sardinero capturado por la pesquería japonesa de palangre en el océano Atlántico se obtuvo utilizando los datos de los cuadernos de pesca especificados por especies filtrando el 70% de los datos de capturas de tiburones desde 1993 a 2000. No se han observado tendencias de incremento o descenso en los últimos ocho años en el Atlántico norte y sur.

KEYWORDS

High seas fisheries, Long line, Tuna fisheries, Time series analysis, Catch/effort, porbeagle

1. INTRODUCTION

Nakano and Honma (1996) reviewed CPUE of pelagic shark in the Atlantic Ocean using Japanese longline logbook data with filtering by shark reporting category (the ratio of operations shark reported to total operations in a cruise). Behavior of Japanese fishermen to report shark catch were various because some fishermen report all shark catch per cruise but some one only report important species, i.e. shortfin mako shark. Shiode and Nakano (2001) considered that reporting category of more and equal 70% contains the data reported all shark catch per cruise. Nakano (1998, 1999) introduced the standardized CPUE of total pelagic sharks caught by Japanese longline fishery in the Atlantic Ocean as abundance index of blue shark using the filtered logbook data. However it is important to examine

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the trend of standardized CPUE by species using species specific data as Nakano (2001) has done for blue shark. Therefore this paper estimated the standardized CPUE of porbeagle in the Atlantic Ocean using the logbook catch data by species of Japanese longline fishery from 1993 to 2000.

2. MATERIAL AND METHODS

The same filtering of Nakano and Honma (1996) was adapted and the data more and equal 70% of shark reporting category was used for the analysis. Time series of the data were 8 years from 1993 to 2000, although data for 2000 is provisional. Judging from the distribution of porbeagle, the hypothesis that there were two stocks in the Atlantic, one in North and another in South, was adopted.

Standardized CPUE (number of sharks caught per 1000 hooks) were calculated using Mixed procedure of SAS to eliminate some biased by change of fishing grounds and fishing seasons. A Mixed procedure is a generalization of the standard linear model that provides with flexibility of modeling not only the means of the data but their variances and co-variances (SAS Institute 1996). Although Mixed procedure can handle random-effect parameters, only fixed-effects parameter was used in this time. Therefore MLM model is same as GLM model for this analysis. It is useful for the model selection which the mixed procedure of SAS produces several information criteria values.

For standardization, CPUE was calculated shot by shot of operations. The area strata used for the analysis were shown in Figure 1. Numbers of branch line between floats were classified into three categories. CPUE of porbeagle were obtained for the three geographical units, *i.e.* the north, south and overall Atlantic Ocean. The north unit includes area 1 to 3; the south includes area 4 to 6. The equation for standardizing CPUE was as follows:

$$\ln(\text{CPUE}_{ijkl} + \text{const}) = \ln(\mu) + \ln(\text{YR}_i) + \ln(\text{QT}_j) + \ln(\text{AR}_k) + \ln(\text{brl}_l) + \varepsilon$$

where ln: natural logarithm, CPUE_{ijkl} : nominal CPUE (catch in number per 1000 hooks, in year i , quarter j , area k , branch line criteria l), const: 1/10 of overall mean, μ : overall mean, YR_i : effect of year i , QT_j : effect of quarter j , AR_k : effect of area k , brl_l : branch line criteria l , and ε : normal error term. Analysis was made through the mixed procedure of computer software, 'SAS System for windows Ver. 6.12'.

3. RESULTS AND DISCUSSION

Table 1 shows the number of observations in each year by North and South stock units. Type III analysis revealed that all main effects of selected model were significant (Table 2).

Figure 2 shows the standardized CPUE for the North and South units. The values of CPUE ranged around 0 to 0.001 in the North and -0.004 to 0.034 in the South. These were in the range of reported CPUE by observer on board for porbeagle caught by Japanese longline fishery (Matsushita and Matsunaga 2001). Though the levels and fluctuations of CPUE were different in North and South, no trend of decrease or increase were observed during this 8 years. But it was supposed that Japanese logbook data is not enough to estimate the abundance index of porbeagle, because the catch of porbeagle was low and fishing ground only covered the edge of its distribution.

Nakano (2001) showed the long-term trend of standard CPUEs for blue shark with using the logbook data, which were species combined ones, filtered by reporting category (more and equal 70% for blue shark) from 1971 to 2000. But we can not use the same method for porbeagle, because there is

no specific behavior of fisherman to treat porbeagle. Therefore, it is necessary to conduct further research activities on board, such as observer program, to examine the population dynamics for the species.

4. REFERENCE

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Table 1. Number of observations by geographical unit in each year.

Year	North	South
1993	525	250
1994	1021	322
1995	1059	429
1996	571	331
1997	622	36
1998	1477	328
1999	464	384
2000	224	143
Total	5963	2223

Table 2. Outputs of Type III analysis for the models selected in each unit.North Atlantic

Source	NDF	DDF	Tests of Fixed Effects					
			Type III ChiSq	Type III F	Pr>ChiSq	Ord CHiSq	Pr>F	Ord F
YR	7	5947	55,62	7,95	0,0001	0	0,0001	0
QT	3	5947	30,74	10,25	0,0001	0	0,0001	0
AREA	2	5947	6,20	3,10	0,0450	0,0731	0,0451	0,0451
BR	2	5947	52,82	26,41	0,0001	0	0,0001	0

South Atlantic

Source	NDF	DDF	Tests of Fixed Effects					
			Type III ChiSq	Type III F	Pr>ChiSq	Ord CHiSq	Pr>F	Ord F
YR	7	2208	210,43	30,06	0,0001	0	0,0001	0
QT	3	2208	21,47	7,16	0,0001	0	0,0001	0,0001
AREA	2	2208	73,62	36,81	0,0001	0	0,0001	0
BR	2	2208	14,20	7,10	0,0008	0	0,0008	0,0008

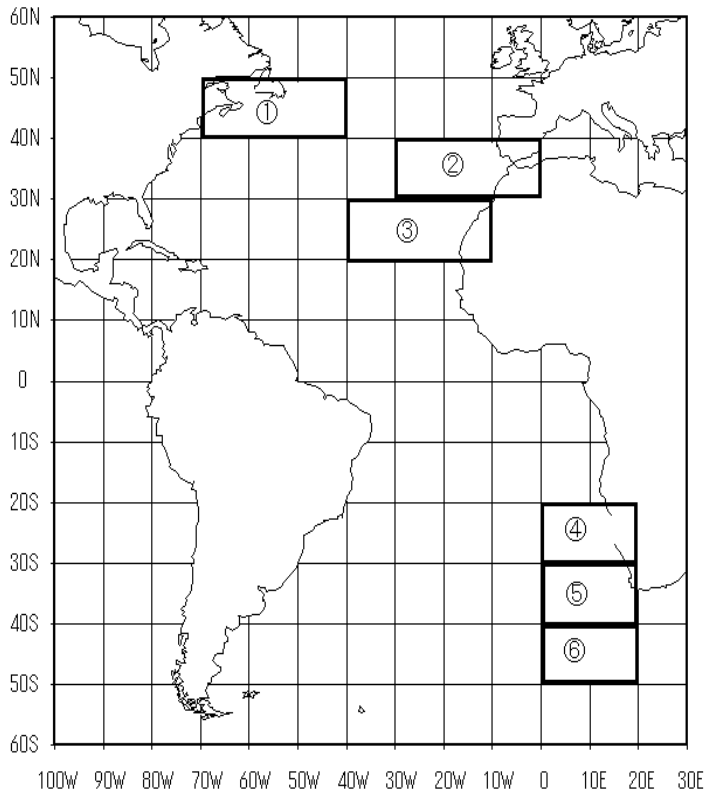


Fig. 1 Area classification used for the analysis.

Fig. 2 Standardized porbeagle CPUE and 95% confident intervals based on the species specific logbook data of Japanese longline fishery in the Atlantic Ocean.

