

## VALIDATION OF SHARK CATCH DATA OF THE LOGBOOK RECORDS IN THE JAPANESE LONGLINE FISHERY IN THE ATLANTIC OCEAN

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### SUMMARY

*Logbook data of Japanese longline fishery in the Atlantic Ocean during 1993-1997 were examined to validate the relationship between reporting rate and species composition of sharks indicated by Nakano and Honma (1996). Annual logbook data were classified by reporting rate of shark catches and by fishing area (north, tropical, and south), and species composition, occurrence and CPUE trends of sharks were compared. Those data with high reporting rate (>70%) showed marked dominance of blue sharks both in number and occurrence. Shortfin mako shark dominated in the data with low reporting rate (1-20%). CPUE of all sharks in the data with high reporting rate paralleled the catch of blue shark, while those with low reporting rate represented the CPUE trends of shortfin mako shark. No apparent trends were observed in the CPUE of sharks caught in the Japanese longline fishery in the Atlantic Ocean during 1993-1997.*

### RÉSUMÉ

*Les extraits de carnets de pêche des palangriers japonais qui ont pêché dans l'Atlantique de 1993 à 1997 ont été examinés pour valider le rapport entre le taux de transmission et la composition spécifique des requins signalés par Nakano et Honma (1996). Les données annuelles des carnets de pêche ont été classées selon le taux de transmission des captures de requins et par zone de pêche (nord, tropicale et sud), puis la composition spécifique, la fréquence d'apparition et la tendance de la CPUE des requins ont été comparées. Les données qui avaient un taux élevé de transmission (>70 %) montraient une prédominance marquée de requins peau bleue, en nombre et en fréquence d'apparition. Le requin-taupe bleu prédominait dans les données à faible taux de transmission (1-20 %). La CPUE de tous les requins dans les données à fort taux de transmission était parallèle à la prise de requin peau bleue, alors que dans celles à faible taux de transmission elle suivait la tendance de la CPUE du requin-taupe bleu. Aucune tendance apparente n'a été détectée dans la CPUE des requins capturés par la pêche palangrière japonaise dans l'Atlantique en 1993-1997.*

### RESUMEN

*Se examinaron los datos de cuadernos de pesca de la pesquería japonesa de palangre en el Atlántico en el período 1993-1997, con el objetivo de validar la relación entre la tasa de información y la composición por especies señalada por Nakano y Honma (1996). Los datos anuales de cuadernos de pesca se clasificaron por tasa de información de capturas de tiburones y por zona de pesca (norte, tropical y sur) y se compararon la composición por especies, la presencia y las tendencias de la CPUE de tiburones. Los datos con una alta tasa de información (>70%) presentaban un claro predominio de las tintoreras, tanto en número como en presencia. El tiburón maco*

*predominaba en los datos con baja tasa de información (1-20%). La CPUE de todos los tiburones en los datos con una alta tasa de información eran paralelos a la captura de tintorera, mientras que los datos con tasa de información baja representaban las tendencias de la CPUE del tiburón maco. No se observaron tendencias en la CPUE de tiburones capturados en la pesquería de palangre japonesa en el Atlántico en el periodo 1993-1997.*

## **Introduction**

Logbook records of commercial fishing vessels provide valuable source of statistic data of the high sea longline fishery. However, the fidelity of logbook data is quite variable among vessels. Nakano and Honma (1996) examined the shark catches of the 1993 logbook records collected in the new format containing four shark categories, and found out the relation between reporting rate and species composition of sharks. Namely, data from fishing vessels with high reporting rate of sharks contained every kind of sharks and were dominated by blue shark. Whilst data from vessels with low rate of shark records were represented by shortfin mako shark which has high market value. In the present report, the new format logbook data for 1993-1997 were analyzed to validate the above relationship and to examine the CPUE trends of shark species in recent years.

## **Materials and Methods**

The Japanese longline fishery data collected by the new format during 1993-1997 were used for the present analysis. The new format (New Shark File) discriminates the catches of sharks into the four species categories, *i.e.*, blue shark (*Prionace glauca*), porbeagle (*Lamna nasus*), shortfin mako (*Isurus oxyrinchus*), and other sharks.

Reporting rate of shark catches (percentage of operations with shark records to total operations per one cruise) were calculated for each cruise. Catch data of every fishing operation were classified by the reporting rate. Occurrence and species composition of sharks were calculated for each class of reporting rates. Data from vessels without shark catches were excluded from the catch analysis. CPUE of sharks were calculated for three fishing area (North: north of 20°N, Tropical: between 20°N and 20°S, South: south of 20°S) and three classes of reporting rate (high:71-100%, mid: 21-70%, low:1-20%) to compare the CPUE trends of total catch to that of each shark species.

## **Results and Discussion**

Table 1 shows the number of sets, hooks and sharks by year and area of the data used for the present analysis. The data represents 25,882-48,311 sets and 34,505-89,024 shark catches per year. Fig. 1 shows the frequency distribution of reporting rate of sharks. The histogram had two modes at the highest and the lowest reporting rate. The pattern was quite similar between the years investigated. This result suggests that some fishing vessels records sharks for almost every operating day and others record sharks for only a limited portion of operations. Figs. 2 and 3 compare the occurrence and composition of shark species between different classes of reporting rates. The importance of blue shark, which is the most common shark species in the high sea longline fishery, increased both in occurrence and composition as the reporting rate became higher. On the contrary, the composition of shortfin mako shark, which is less common than blue shark but has higher market value, increased as the reporting rate decreased. The percentage occurrence of shortfin mako shark was rather stable among different reporting rates. These results indicate that the commercial fishing vessels adopt two distinct strategies for handling shark catches, *i.e.*, to collect all kinds of sharks or to collect only those sharks with high market value, as was suggested by Nakano and Honma (1996).

Fig. 3 strongly suggests that shark catch data with higher reporting rate (>70%) reflect catches of blue shark and that those with lower reporting rate (<21%) reflects catches of shortfin mako shark.

The suggestion was examined by comparing the CPUE of total shark catch to the catch of each species for different levels of reporting rate in three fishing areas (Fig. 4). Based on the data with higher reporting rate, as seen in the left panels of the Fig. 4, CPUE of all sharks quite resembled that of blue shark. On the other hand, CPUE trends of low reporting rate data paralleled the CPUE of shortfin mako shark. No clear pattern was observed for the data with intermediate reporting condition; Total CPUE of North and Tropical areas paralleled the catch of blue shark but in the Southern area the pattern of total CPUE was a mixture of blue, shortfin mako and other sharks. These results support the use of total shark CPUE as indicators of blue shark and shortfin mako shark with the data classification by reporting conditions.

Fig. 4. also show the CPUE trends of shark species in recent years. Data with higher reporting rate provide CPUE trends of each shark category, especially of blue shark. Data with lower reporting rate also gives index of CPUE of shortfin mako shark. The CPUE is quite variable between area and year but no apparent trends of increase or decrease were observed. Standardization of CPUE will be necessary to eliminate the noise effect of fishing area and season. Education and enlightenment of fishermen would also be necessary to increase the accuracy of the logbook data.

## **Reference**

Nakano, H. and M. Honma. 1996. Historical CPUE of pelagic sharks caught by Japanese longline fishery in the Atlantic Ocean. ICCAT BYC/96/05. pp.10.

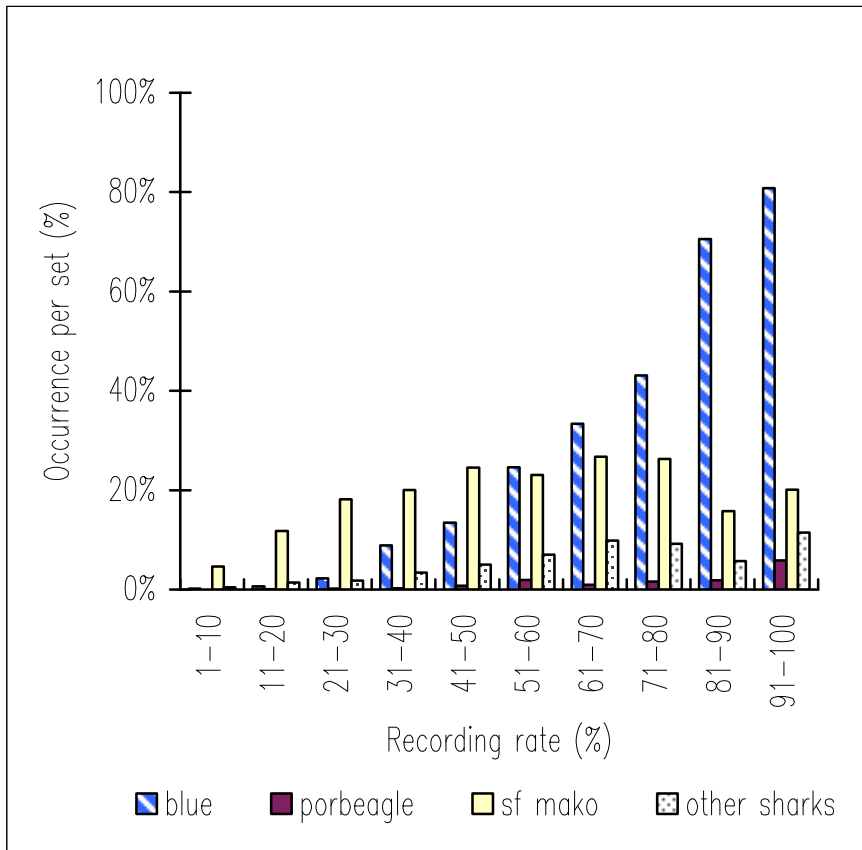
Table 1. Summary of Japanese logbook data analyzed in this report showing number of sets and hooks and catch of sharks in the Atlantic Ocean during 1993-1997.

Data	Area	Year				
		1993	1994	1995	1996	1997
Sets	North	4.519	6.288	8.688	12.225	11.340
	Tropical	13.441	23.858	22.746	26.581	19.768
	South	7.922	9.215	9.830	9.505	4.635
	Total	25.882	39.361	41.264	48.311	35.743
Hooks	North	12.258.566	16.745.170	22.979.524	32.515.402	30.451.367
	Tropical	36.281.039	62.431.407	58.642.105	67.716.728	51.206.688
	South	22.022.238	24.439.088	26.591.925	25.567.292	11.701.986
	Total	70.561.843	103.615.665	108.213.554	125.799.422	93.360.041
Blue shark	North	9.623	18.992	18.846	11.308	9.893
	Tropical	25.882	35.974	24.900	23.741	15.960
	South	3.130	16.330	2.101	1.230	1.774
	Total	38.635	71.296	45.847	36.279	27.627
Shortfin mako	North	4.789	3.298	3.864	2.175	1.216
	Tropical	4.472	6.403	4.267	2.718	2.340
	South	3.562	3.135	2.773	1.839	1.635
	Total	12.823	12.836	10.904	6.732	5.191
Porbeagle	North	42	64	115	97	22
	Tropical	567	651	348	129	267
	South	146	478	654	128	43
	Total	755	1.193	1.117	354	332
Other shark	North	359	710	1.572	1.684	69
	Tropical	2.136	1.818	1.104	765	796
	South	1.196	1.171	2.823	707	490
	Total	3.691	3.699	5.499	3.156	1.355
All shark	North	14.813	23.064	24.397	15.264	11.200
	Tropical	33.057	44.846	30.619	27.353	19.363
	South	8.034	21.114	8.351	3.904	3.942
	Total	55.904	89.024	63.367	46.521	34.505

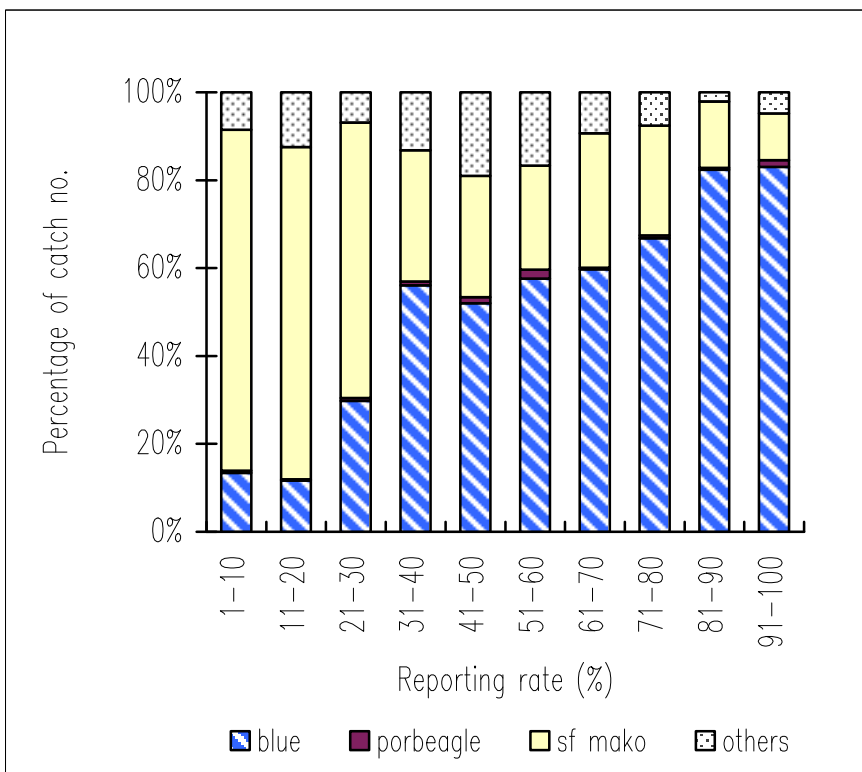
Table 2. Number and coverage of sets, hooks and shark catches in the 1993-1997 logbook data classified by the reporting rate. Coverage was calculated against all data including cruises without shark records.

		1993		1994		1995		1996		1997	
	reporting rate	number	coverage	number	coverage	number	coverage	number	coverage	number	coverage
sets	71+	4.194	16,2%	7.464	19,0%	6.458	15,7%	5.286	10,9%	4.188	21,1%
	21-70	6.023	23,3%	6.641	16,9%	4.758	11,5%	6.184	12,8%	5.544	28,0%
	1-20	8.394	32,4%	12.419	31,6%	14.143	34,3%	15.486	32,1%	10.072	50,9%
	all (incl. 0)	25.882		39.361		41.264		48.311		19.804	
hooks	71+	11.106.277	15,7%	19.313.383	18,6%	16.394.906	15,2%	13.295.248	10,6%	10.528.777	20,7%
	21-70	16.252.180	23,0%	17.305.624	16,7%	12.465.791	11,5%	16.056.823	12,8%	14.214.958	28,0%
	1-20	22.945.667	32,5%	32.730.234	31,6%	37.086.487	34,3%	40.039.445	31,8%	25.998.555	51,2%
	all (incl. 0)	70.561.843		103.615.665		108.213.554		125.799.422		50.742.290	
blue shark	71+	32.987	85,4%	66.952	93,9%	39.344	85,8%	30.827	85,0%	24.262	87,8%
	21-70	5.466	14,1%	4.153	5,8%	6.094	13,3%	5.174	14,3%	3.202	11,6%
	1-20	172	0,4%	191	0,3%	409	0,9%	278	0,8%	163	0,6%
	all (incl. 0)	38.635		71.296		45.847		36.279		27.627	
shortfin mako	71+	6.751	52,6%	8.003	62,3%	8.033	73,7%	2.807	41,7%	1.311	25,3%
	21-70	4.877	38,0%	3.443	26,8%	1.475	13,5%	2.345	34,8%	2.878	55,4%
	1-20	1.195	9,3%	1.389	10,8%	1.394	12,8%	1.580	23,5%	1.002	19,3%
	all (incl. 0)	12.823		12.836		10.904		6.732		5.191	
porbeagle	71+	577	76,4%	1.123	94,1%	959	85,9%	285	80,5%	283	85,2%
	21-70	172	22,8%	65	5,4%	146	13,1%	64	18,1%	46	13,9%
	1-20	6	0,8%	5	0,4%	12	1,1%	5	1,4%	3	0,9%
	all (incl. 0)	755		1.193		1.117		354		332	
other shark	71+	2.615	70,8%	2.659	71,9%	2.794	50,8%	1.554	49,2%	1.019	75,2%
	21-70	887	24,0%	867	23,4%	2.611	47,5%	1.204	38,1%	282	20,8%
	1-20	189	5,1%	173	4,7%	93	1,7%	398	12,6%	54	4,0%
	all (incl. 0)	3.691		3.699		5.499		3.156		1.355	
all shark	71+	42.930	76,8%	78.737	88,4%	51.130	80,7%	35.473	76,3%	26.875	77,9%
	21-70	11.402	20,4%	8.528	9,6%	10.326	16,3%	8.787	18,9%	6.408	18,6%
	1-20	1.562	2,8%	1.758	2,0%	1.908	3,0%	2.261	4,9%	1.222	3,5%
	all (incl. 0)	55.904		89.024		63.367		46.521		34.505	

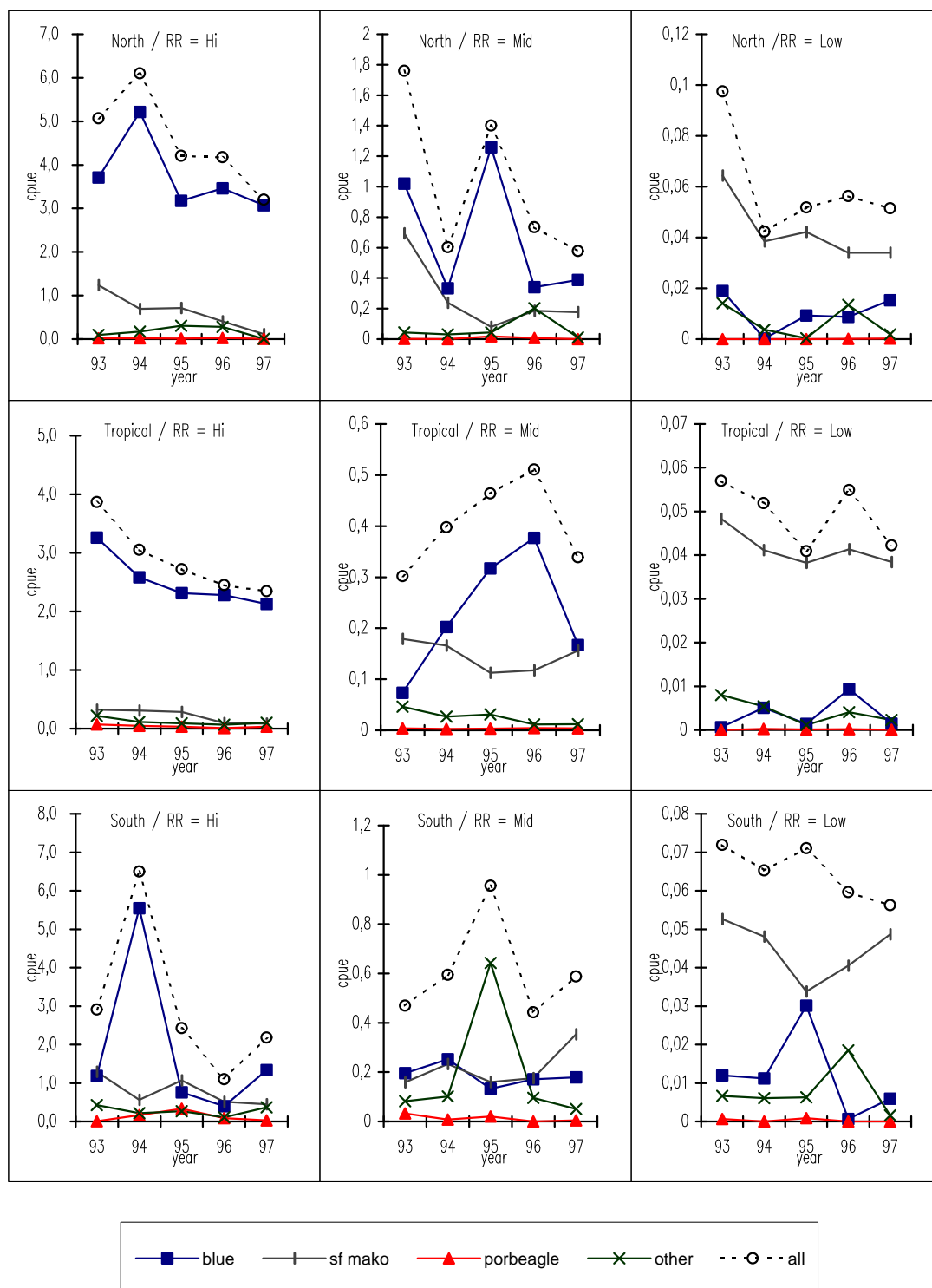




**Fig. 2. Percent occurrence of shark species by the recording rate per cruise in the 1993-1997 logbook data.**



**Fig. 3. Percent composition of shark species by the recording rate per cruise in the 1993-1997 logbook data.**



**Fig. 4.** Cpue trends of shark species in Japanese tuna longline fishery in the Atlantic Ocean during 1993-1997. Cpue was classified by fishing area (North: north of 20°N, Tropical: between 20°N and 20°S, South: south of 20°S) and reporting rate of shark catches per cruise (RR=Hi : >70%, RR=Mid : 21-70%, RR=Low : 1-20%).