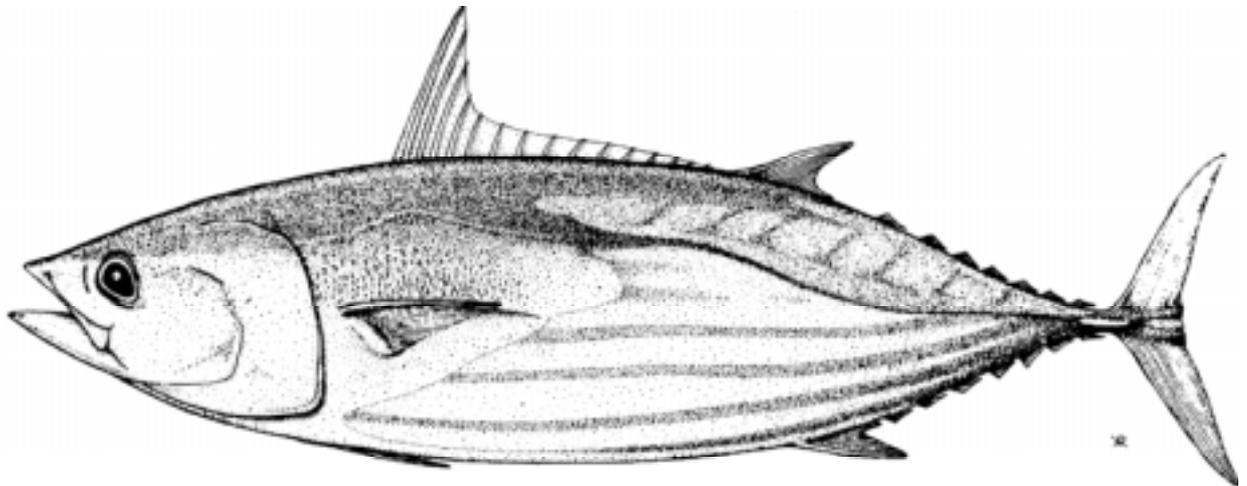




SCTB14 Working Paper

SWG-6

PREDATION OF TUNA BY WHALES AND SHARKS IN THE WESTERN AND CENTRAL PACIFIC OCEAN



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INTRODUCTION

At the thirteenth meeting of the Standing Committee on Tuna and Billfish (SCTB13), a directive was made to the Statistics Working Group to compile information concerning predation of longline-caught fish by whales (Anon. 2000). The following tables present statistics on the predation by whales and, for comparison, by sharks, in the western and central tropical Pacific Ocean, determined from observer data held by SPC in October 2000.

The observer data were collected by SPC observers, and by the observers of several SPC Pacific island member countries, in the tropical western and central Pacific Ocean during 1995–2000. Observer data covering 1991–1994 were excluded because whale- and shark-damaged fish were not regularly reported during this period. Observer data collected by Australia and New Zealand have not been included in the analysis. Figures 1 and 2 show the observed distribution of whale- and shark-damaged tuna respectively.

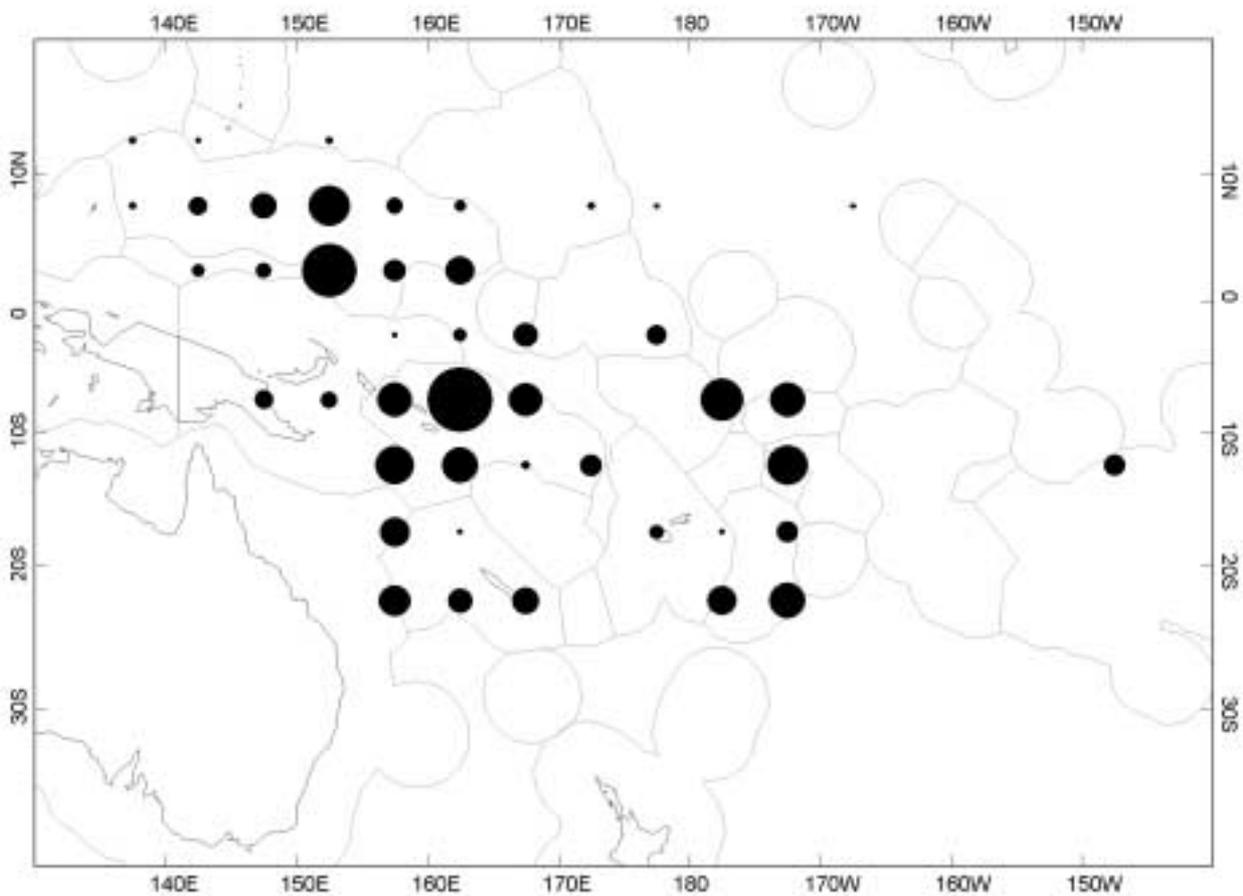


Figure 1. Distribution of whale-damaged tuna observed during 1995–2000

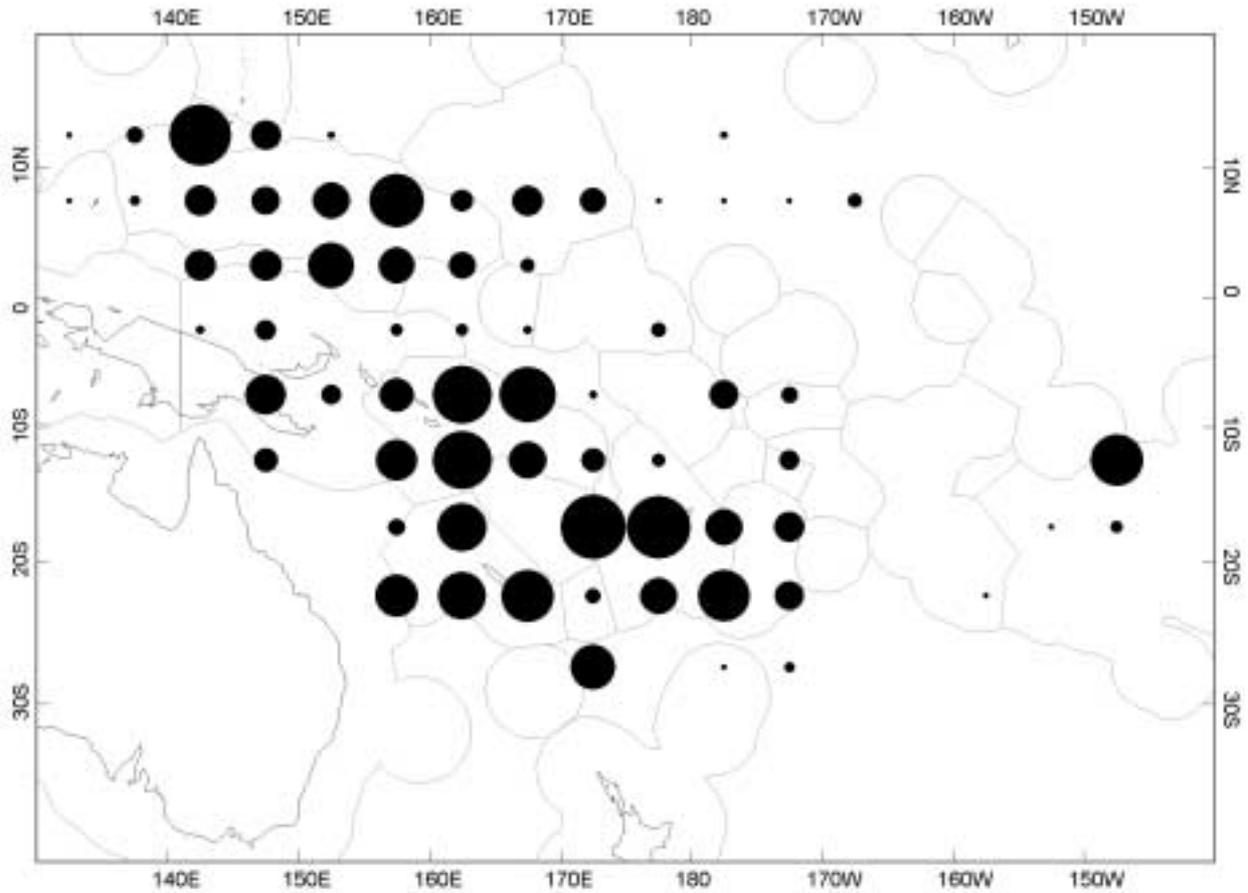


Figure 2. Distribution of shark-damaged tuna observed during 1995–2000

Table 1 presents the percentages of whale and shark predation of longline-caught fish, by species groups. The overall level of whale damage is relatively low, 0.8 percent, and is greatest for tuna and billfish. Shark predation is greater than whale predation, 2.1 percent overall, and is also significant for tuna-like species and other fish.

Table 1. Total number of individuals observed and discards due to shark and whale damage, by species group

SPECIES GROUP	TOTAL OBSERVED	SHARK DAMAGE		WHALE DAMAGE	
		N	%	N	%
TUNA	35,323	919	2.6	440	1.2
TUNA-LIKE SPP	1,117	65	5.8	3	0.3
BILLFISH	3,502	127	3.6	19	0.5
OTHER FISH	5,913	95	1.6	6	0.1
SHARKS AND RAYS	12,696	25	0.2	2	0.0
MARINE REPTILES	36	0	0.0	0	0.0
BIRDS	1	0	0.0	0	0.0
MARINE MAMMALS	4	0	0.0	0	0.0
UNSPECIFIED	499	5	1.0	0	0.0
TOTAL	59,091	1,236	2.1	470	0.8

The level of shark predation reported in Table 1 is lower than that observed in the early 1970s aboard Japanese longliners. Hirayama (1975) reported that 10.45 percent of longline-caught tuna observed in the western tropical Pacific Ocean and 10.16 percent in the central tropical Pacific were damaged by sharks, compared to 2.6 percent reported in Table 1. He also reported that the percentage of shark-damaged tuna was observed to be 14.45 percent in the eastern tropical Pacific, 6.1 percent in the South China Sea, 5.39 percent in waters adjacent to Japan and 4.77 percent in the Coral Sea.

The level of both whale and shark predation varies by area fished and by year. Table 2 presents the percentage of whale- and shark-damaged tuna by year and by EEZ. Figures 3 and 4 present the annual percentage of whale- and shark-damaged tuna, respectively, in three countries for which sufficient data are available. The percentage of whale-damaged tuna in Solomon Islands and shark-damaged tuna in the Federated States of Micronesia has varied considerably. It is possible that this variability, and the low percentages of whale-damaged tuna in Fiji, may be due to improper reporting by national observers.

Table 2. Total number of tuna observed and discards due to shark and whale damage, by year and EEZ

YEAR	EEZ	TOTAL OBSERVED	SHARK DAMAGE		WHALE DAMAGE	
			N	%	N	%
1995	CK	15	1	6.7	0	0.0
1995	FJ	1,303	24	1.8	0	0.0
1995	FM	2,421	213	8.8	50	2.1
1995	MH	300	18	6.0	0	0.0
1995	NC	1,026	22	2.1	41	4.0
1995	SB	1	0	0.0	0	0.0
1995	TO	696	24	3.4	17	2.4
1996	CK	1	0	0.0	0	0.0
1996	FJ	429	4	0.9	0	0.0
1996	FM	502	25	5.0	14	2.8
1996	NC	2,782	104	3.7	18	0.6
1996	PG	421	32	7.6	8	1.9
1996	PW	99	2	2.0	0	0.0
1996	SB	325	6	1.8	32	9.8
1996	TO	56	2	3.6	0	0.0
1997	FJ	658	11	1.7	0	0.0
1997	FM	1,718	19	1.1	35	2.0
1997	MH	334	14	4.2	1	0.3
1997	PF	4,544	75	1.7	13	0.3
1997	SB	2,090	59	2.8	69	3.3
1998	AS	7	0	0.0	0	0.0
1998	FM	490	13	2.7	2	0.4
1998	GU	575	19	3.3	6	1.0
1998	KI	355	8	2.3	1	0.3
1998	NC	328	5	1.5	8	2.4
1998	SB	6,465	125	1.9	84	1.3
1998	TO	211	6	2.8	0	0.0
1998	WS	40	0	0.0	0	0.0
1999	FJ	165	7	4.2	1	0.6
1999	FM	504	5	1.0	1	0.2
1999	NC	370	0	0.0	1	0.3
1999	PG	27	2	7.4	0	0.0
1999	PW	23	0	0.0	0	0.0
1999	SB	1,577	26	1.6	13	0.8
1999	TO	410	1	0.2	1	0.2
2000	PG	717	22	3.1	10	1.4
2000	TO	628	25	4.0	14	2.2

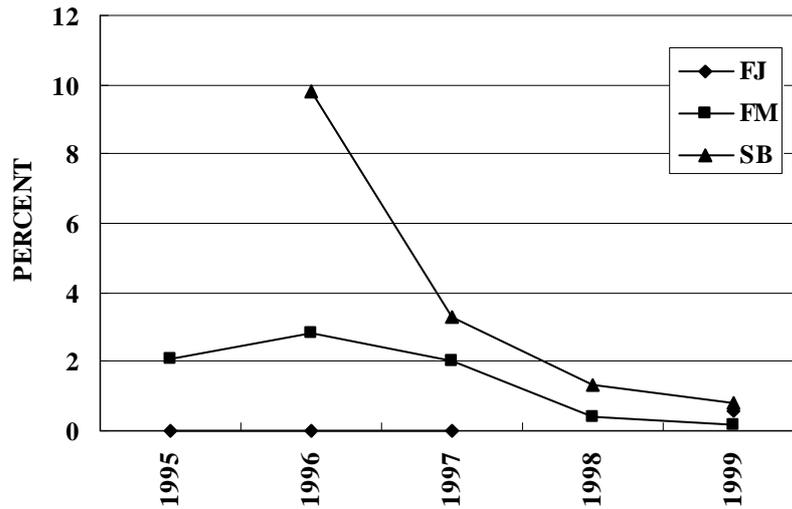


Figure 3. Percentage of whale-damaged tuna observed in the EEZs of the Federated States of Micronesia (FM), Fiji (FJ) and Solomon Islands (SB)

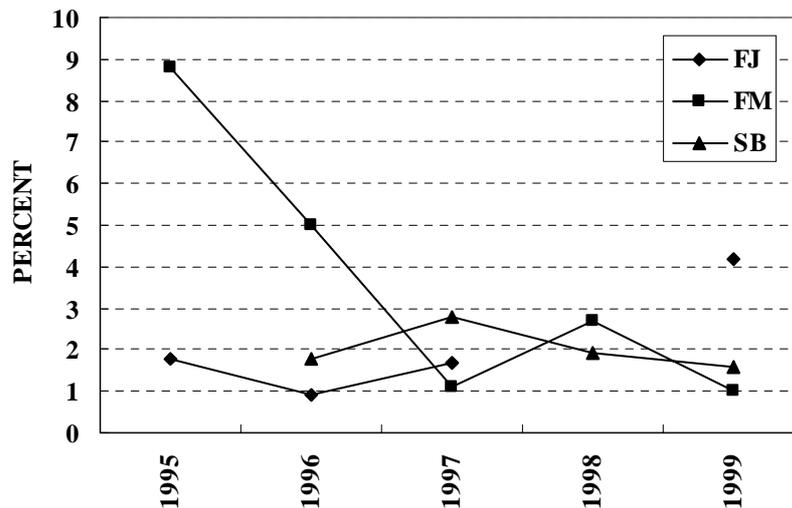


Figure 4. Percentage of shark-damaged tuna observed in the EEZs of the Federated States of Micronesia (FM), Fiji (FJ) and Solomon Islands (SB)

Table 3 presents the percentages of whale and shark predation of longline-caught tuna, tuna-like species and billfish, by individual species. It would appear that whales prefer yellowfin and bigeye, whereas sharks prefer wahoo, yellowfin, blue marlin, spearfish, striped marlin, skipjack and swordfish.

Table 3. Total number of individuals observed and discards due to shark and whale damage, by species

SPECIES	TOTAL OBSERVED	SHARK DAMAGE		WHALE DAMAGE	
		N	%	N	%
TUNA	35,323	919	2.6	440	1.2
ALBACORE	17,397	243	1.4	100	0.6
BIGEYE	5,767	86	1.5	52	0.9
NORTHERN BLUEFIN	1	0	0.0	0	0.0
SKIPJACK	807	28	3.5	0	0.0
SOUTHERN BLUEFIN	9	0	0.0	0	0.0
TUNA (UNIDENTIFIED)	155	61	39.4	81	52.3
YELLOWFIN	11,187	501	4.5	207	1.9
TUNA-LIKE SPP	1,117	65	5.8	3	0.3
BUTTERFLY TUNA / KINGFISH	0	0	0.0	0	0.0
NARROW-BARRED SPANISH MACKEREL	0	0	0.0	0	0.0
DOGTOOTH TUNA	27	0	0.0	0	0.0
KAWAKAWA	2	0	0.0	0	0.0
LONGTAIL TUNA	0	0	0.0	0	0.0
MACKEREL (UNIDENTIFIED)	0	0	0.0	0	0.0
SLENDER TUNA	0	0	0.0	0	0.0
WAHOO	1,088	65	6.0	3	0.3
BILLFISH	3,502	127	3.6	19	0.5
MARLINS, SAILFISHES, SPEARFISH	45	4	8.9	4	8.9
BLACK MARLIN	241	4	1.7	2	0.8
BLUE MARLIN	887	40	4.5	7	0.8
STRIPED MARLIN	500	19	3.8	1	0.2
INDO-PACIFIC SAILFISH	429	12	2.8	0	0.0
SHORT-BILLED SPEARFISH	486	20	4.1	1	0.2
SWORDFISH	914	28	3.1	4	0.4

At SCTB13, information was presented on whale predation in the Indian Ocean suggesting that when whale predation occurs, whales may take a large proportion of the fish in a set. Table 4 presents the frequency of six levels of whale and shark predation, for sets in which five or more tuna were caught. For whales, 95.1 percent of sets exhibited no predation. When whale predation occurred, less than 20 percent of the tuna were usually damaged, but on four occasions whales took all the tuna in the set. For sharks, 83.5 percent of sets exhibited no predation. As for whales, when shark predation occurred, less than 20 percent of the tuna were usually damaged, but sharks were never observed to have taken all tuna in the set. The statistics in Table 4 are for all fleets combined. Similar results were obtained for individual fleets.

Table 4. Frequency of levels of whale and shark predation for sets in which five or more tuna were caught

PERCENT TUNA PREDATED	SHARK DAMAGE		WHALE DAMAGE	
	SETS	%	SETS	%
0	1,874	83.5	2,134	95.1
0 - 20	341	15.2	92	4.1
20 - 40	21	0.9	7	0.3
40 - 60	7	0.3	5	0.2
60 - 80	0	0.0	1	0.0
80 - 100	0	0.0	4	0.2

REFERENCES

- Anonymous. 2000. Report of the Thirteenth Meeting of the Standing Committee on Tuna and Billfish, 5–12 July 2000, Noumea, New Caledonia. Secretariat of the Pacific Community, Noumea, New Caledonia.
- Hirayama, N. 1976. Study on predation damages to hooked tuna by shark in longline fishery. *Journal of the Tokyo University of Fisheries* 62(2): 125–136.