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Species composition of fish assemblage based on observer data in the southwestern Indian Ocean

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Introduction

In this study, species composition of pelagic fishes was analyzed based on the data collected in a Chinese longline observer trip in the southwestern Indian Ocean during July-September, 2010. The trip was supposed to capture bigeye tuna, however, target species was changed to oilfish (*Ruvettus pretiosus*) and escoler (*Lepidocybium flavobrunneum*). This study can improve our understanding of species composition in the pelagic fish assemblage involving in longline fishery in the Indian Ocean.

Material and methods

All the data analyzed were collected by a single scientific observer onboard a commercial longline fishing vessel in the southwestern Indian Ocean (S33°35′-S36°07′，E30°05′-E34°05′) during July 25 and September 28, 2010. The trip was conducted by longliner "Tianxiang No.16" (overall length of 47.3 m and 573 GT) targeting oilfish and escoler. A total of 42 sets were operated and effectively observed during the observation period. The observed stations were shown in Figure 1. The ''station'' in this study refers to an individual longline set. Information about each station was summarized in Table 1.

For each basket of the longline gear, length of floating line is 30 m, and length of branch line is 23 m. The distance between the two consecutive branch lines is 30 m. The number of hooks between two consecutive floats is 15. The Japan tuna hook was used. The bait fish was sardine (21~24 cm fork length). Generally, each set of deployment started in the afternoon (14:00-16:00) and hauling started at night (20:00-23:00). Speed of main line release was about 5.3 m/s. Vessel speed during the deployment was 6.7-7.0 knot. Gear configuration did not change during the observation period.

The observer was not able to observe all the hauling process. Proportion of baskets observed for some sets was low (less than 50%) because of uncontrolled conditions (e.g. bad weather). Most sets had more than 50 percent baskets observed. For baskets observed, all individuals of all species captured were identified and biological information, including size, weight, and sex, was recorded when possible.

Dominant species for each station was determined by catch rates (Tracey et al., 2004). Catch rate was defined as number of fish captured per 1000 hooks (Zhu et al., 2011). Only the sets

in which more than 50% baskets observed were used for calculating species specific catch rate. Length frequencies were calculated for some commonly captured species, for which the sample sizes of size measurement were relatively larger.

Results

Fourteen species were observed during this observer trip, including 3 tuna species, 2 billfish species, 2 shark species, and 7 other species (Table 2). No sea birds were captured during the trip, although they were sometimes around the vessel when hauling. The observer was not able to indentify the species of these sea birds. No sea turtles and other mammals were captured.

Dominant species determined by catch rate at each station, excluding oilfish and escoler, were listed in Table 1. Of the 42 observed stations, 12 stations were excluded for calculating species specific catch rate as the proportions of baskets observed were less than 50%. As oilfish and escoler were target species during this trip, the catch rates of these two species were much higher than others (averagely, 24 individuals/1000 hooks or 178.2 kg/1000 hooks for oilfish, and 60 individuals/1000 hooks or 224.7 kg/1000 hooks for escoler). Excluding oilfish and escoler, albacore dominated 11 stations and ray's bream dominated 18 stations. Blue shark dominated 6 stations. Some stations were dominated by more than one species since catch rates of these species were equal. Average catch rate among sets for each species, excluding target species, was shown in Figure 2. Length frequencies for six pelagic species were shown in Figure 3.

References

Tracey, D. M., Bull, B., Clark, M. R., Mackay, K. A. 2004. Fish species composition on seamounts and adjacent slope in New Zealand waters. New Zealand Journal of Marine and Freshwater Research, 38: 163-182.

Zhu, J., Dai, X., Chen, Y. 2011.Species composition and diversity of pelagic fishes based on a longline fishery catch in the North Pacific Ocean. Chinese Journal of Oceanology and Limnology, 29：261-269

Table 1 Information for each longline set observed by the Chinese longline observer onboard "Xianxiang No. 16" in the southwestern Indian Ocean during July-September 2010

Set No.	Date of set start	Hooks	SST of set start	Latitude of set center	Longitude of set center	Dominant species (excluding target species)	Catch rate of dominant species
1	2010-7-25	3600	22.2	-34.13	32.75	Albacore	1.00
2	2010-7-26	3600	21.9	-34.08	32.68	Albacore, Ray's bream	0.70
3	2010-7-27	3600	22.1	-34.05	32.67	Blue shark	0.67
4	2010-7-28	3600	22.1	-34.90	32.68	—	—
5	2010-7-29	2400	22.0	-33.92	32.68	—	—
6	2010-7-30	3900	22.0	-33.90	32.80	Ray's bream	1.33
7	2010-7-31	3000	22.1	-33.97	32.88	—	—
8	2010-8-1	3900	21.8	-33.87	32.42	Ray's bream	1.00
9	2010-8-3	3600	21.5	-35.07	30.05	Blue shark	1.00
10	2010-8-4	3600	20.5	-36.25	29.02	Ray's bream	2.22
11	2010-8-5	3900	20.1	-35.98	30.25	Blue shark	1.27
12	2010-8-6	3900	20.1	-35.00	30.37	Bigeye tuna, Albacore, Ray's bream, Opah	0.63
13	2010-8-7	3000	19.8	-36.27	30.40	—	—
14	2010-8-8	2400	19.5	-36.45	30.40	—	—
15	2010-8-9	3000	20.3	-36.15	30.45	Albacore, Ray's bream	0.83
16	2010-8-14	3600	19.4	-36.15	30.42	Bigeye tuna, Albacore, Opah, Longnose lancetfish	0.33
17	2010-8-15	3600	19.7	-36.02	30.53	Ray's bream	1.00
18	2010-8-16	3600	19.3	-36.53	30.63	Albacore, Blue shark, Ray's bream, Opah	0.67
19	2010-8-17	3600	19.2	-36.53	31.43	Albacore	1.00
20	2010-8-18	3600	19.1	-36.52	31.40	—	—
21	2010-8-20	3900	19.6	-33.55	33.85	Bigeye tuna, Ray's bream,	0.83
22	2010-8-24	3900	19.0	-36.65	30.35	Ray's bream, Opah	0.67
23	2010-8-25	3600	19.0	-36.58	30.35	—	—
24	2010-8-27	3900	19.6	-36.72	30.25	Ray's bream	0.95
25	2010-8-28	3900	19.6	-36.53	30.50	Ray's bream,	0.63

						Dolphinfish	
26	2010-8-29	4200	19.2	-36.42	30.43	Blue shark	1.21
27	2010-8-31	4200	19.7	-36.48	30.65	Albacore	1.00
28	2010-9-1	3000	20.6	-35.93	32.10	—	—
29	2010-9-2	3600	20.2	-36.05	33.00	Albacore	1.00
30	2010-9-3	3000	20.2	-35.70	32.75	—	—
31	2010-9-4	4200	20.2	-35.72	32.72	Ray's bream	1.19
32	2010-9-8	3000	21.0	-31.78	34.53	—	—
33	2010-9-17	3900	19.1	-35.90	34.12	Ray's bream	1.33
34	2010-9-18	4200	16.5	-35.92	34.10	Albacore	1.11
35	2010-9-19	4200	19.6	-35.80	34.30	Bigeye tuna, Ray's bream	1.00
36	2010-9-20	3600	19.1	-36.02	34.08	Ray's bream	1.33
37	2010-9-21	3600	19.4	-35.95	33.72	Albacore	2.00
38	2010-9-23	4200	19.3	-36.00	33.85	Blue shark	1.25
39	2010-9-24	4200	19.4	-35.97	33.57	Bigeye tuna, Ray's bream	1.11
40	2010-9-25	4200	19.7	-36.07	33.60	—	—
41	2010-9-26	3600	19.5	-36.02	34.13	Ray's bream	0.67
42	2010-9-28	3900	17.2	-36.13	39.78	—	—

Note: Dominant species is defined as species with the highest catch rate (number per 1000 hooks) at that station. "—" Indicates no calculation due to less than 50% baskets observed for that set.

Table 2 List of species observed in the Chinese longline observer trip in the southwestern Indian Ocean during July-September 2010

Category	Scientific name	Common name	Species code
Tunas	*Thunnus alalunga*	Albacore	ALB
	Thunnus albacares	Yellowfin tuna	YFT
	Thunnus obesus	Bigeye tuna	BET
Billfish	*Xiphias gladius*	Swordfish	SWO
	Tetrapturus audax	Striped marlin	MLS
Sharks	*Isurus oxyrinchus*	Shortfin mako	SMA
	Prionace glauca	Blue shark	BSH
Others	*Pteroplatytrygon violacea*	Pelagic stingray	PLS
	Lampris guttatus	Opah	LAG
	Alepisaurus ferox	Longnose lancetfish	ALX
	Brama brama	Ray's bream	POA
	Coryphaena hippurus	Dolphinfish	DOL
Target species	*Ruvettus pretiosus*	Oilfish	OIL
Target species	*Lepidocybium flavobrunneum*	Escoler	LEC

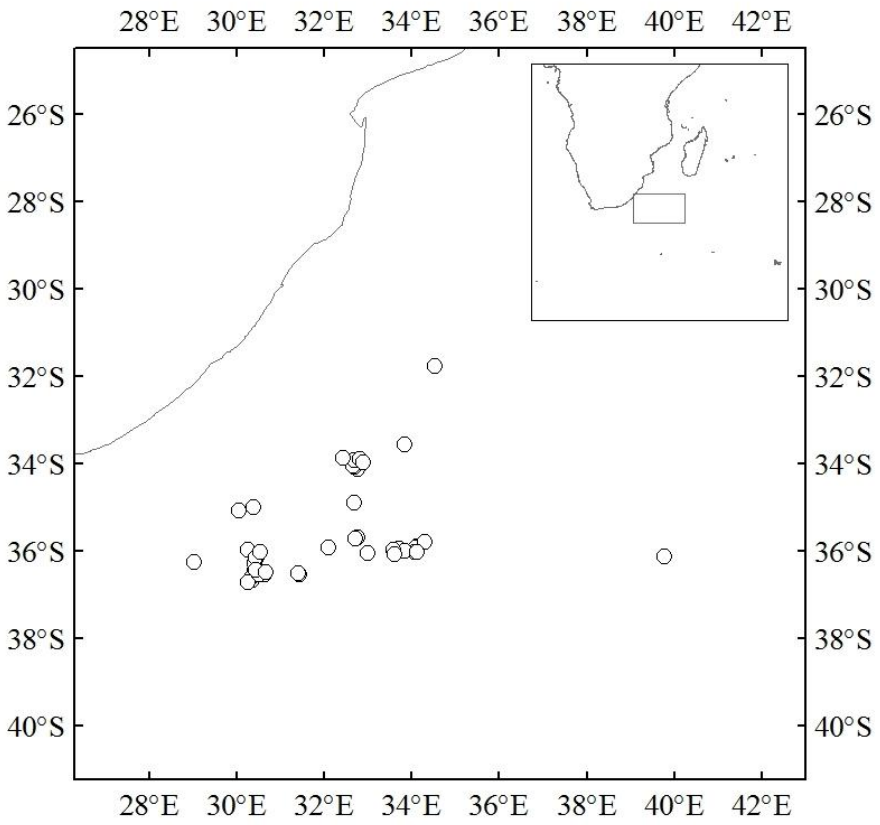

Figure 1 Longline set position (round dots) observed during the Chinese longline observer trip conducted onboard "Xianxiang No. 16" in the southwestern Indian Ocean during July-September 2010. See Table 1 for detailed information of each set.

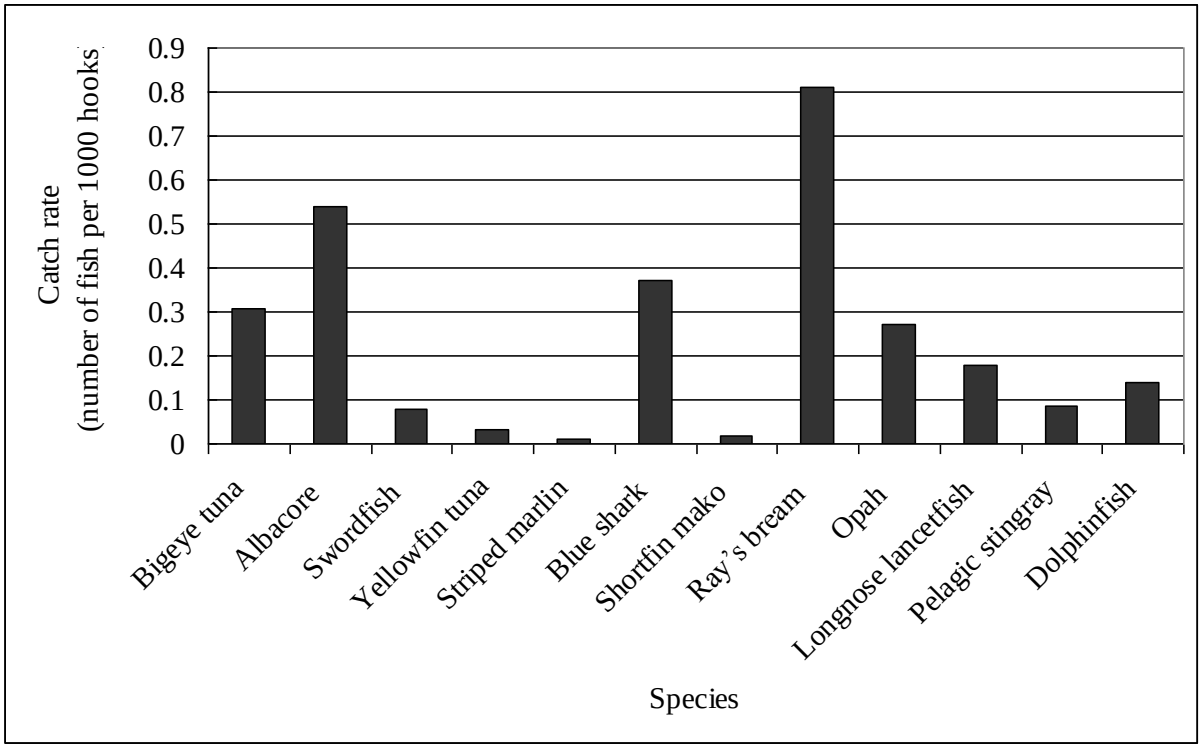

Figure 2 Average catch rates among sets for species observed in the Chinese longline observer trip in the southwestern Indian Ocean during July-September 2010

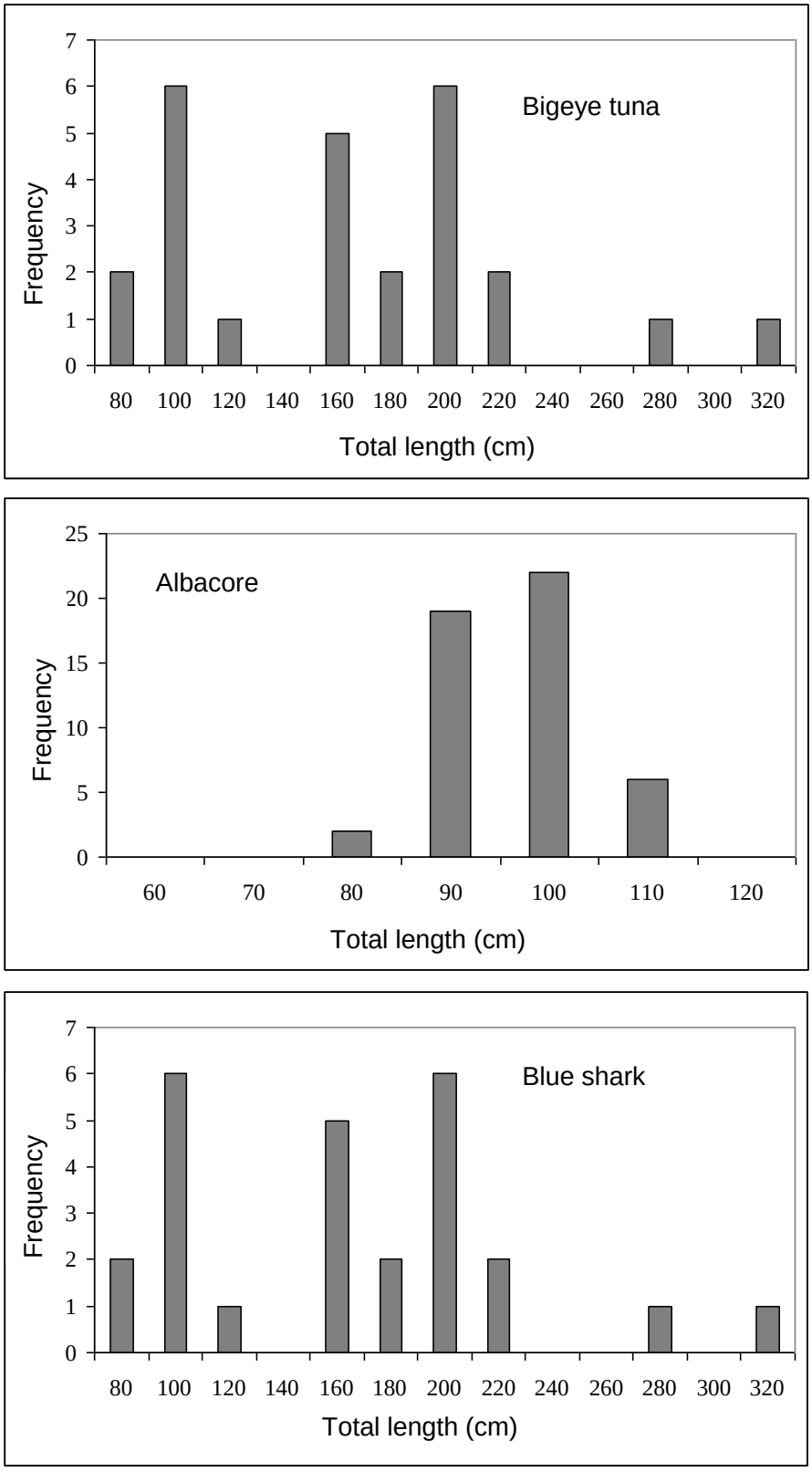

Figure 3 Length frequencies (in number of fish) for some common pelagic species in the Chinese longline observer trip in the southwestern Indian Ocean during July-September 2010

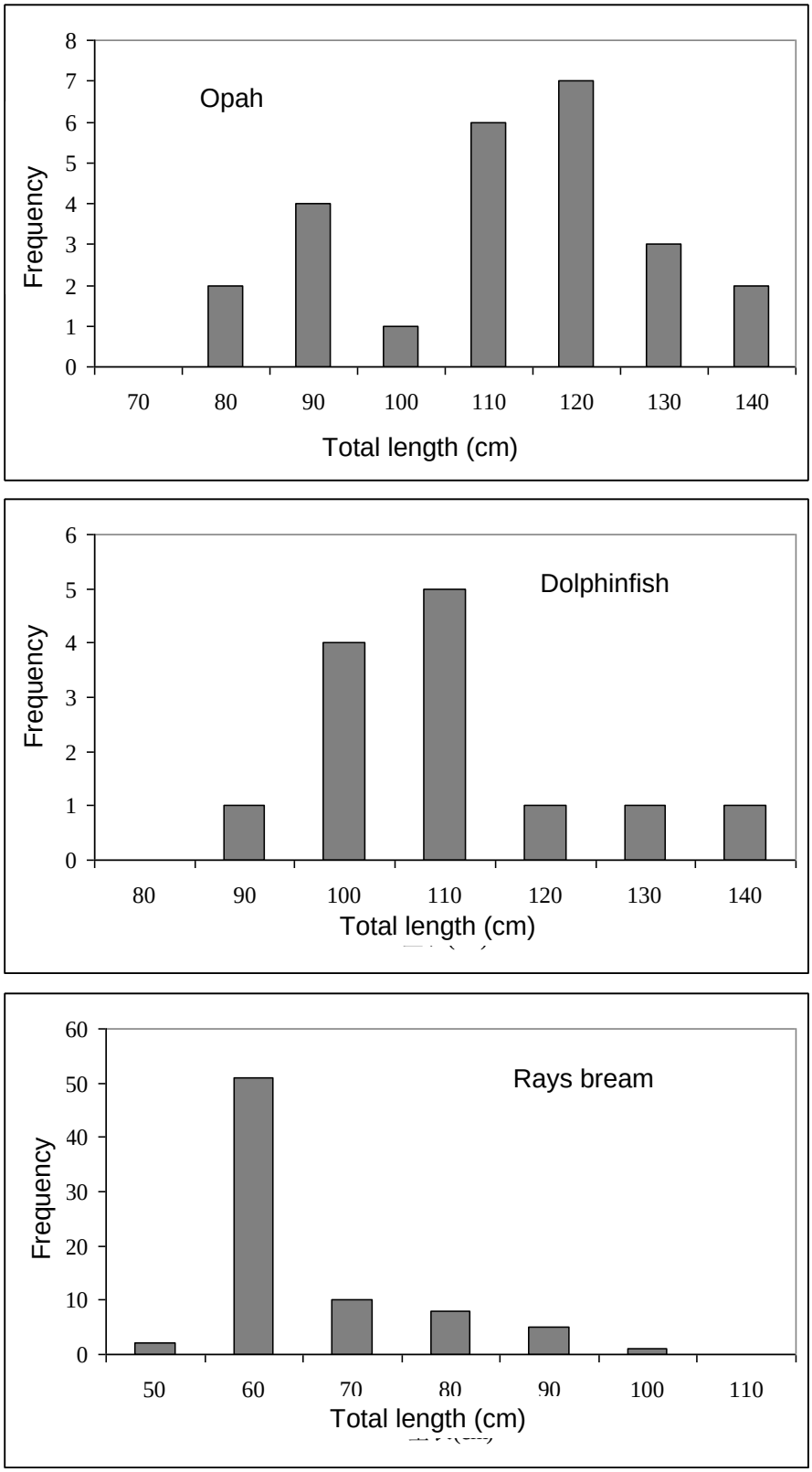

Figure 3 continued.