PRELIMINARY ANALYSIS OF THE NOMINAL CPUE AND FISHING EFFORT IN THE CHINA LONGLINE FISHERY IN THE INDIAN OCEAN

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SUMMARY

This paper provides information on China longline fishery catch, fishing effort and nominal CPUE during recent years. Nominal CPUE for China tuna fishery in 1999, 2000 and 2001 in the Indian Ocean was 418.9 kg per thousand hooks, 303.12 kg per thousand hooks and 308.39 kg per thousand hooks respectively. Nominal CPUE of bigeye, yellowfin and swordfish was 4.39 per thousand hooks, 2.83 per thousand hooks and 0.439 per thousand hooks respectively in 2001. Japanese longline data in 2000 were also compiled for the comparison between Chinese longline fishery and Japanese longline fishery. Nominal CPUE of bigeye and yellowfin in 2000 by Japanese longline fleet in the whole Indian Ocean were obtained. Nominal CPUE of bigeye and yellowfin for different areas(tropical and temperate) by Japanese longline fleet in 2000 was computed. The nominal CPUE of bigeye and yellowfin in the tropical was higher than in the temperate.

INTRODUCTION

Since 1995, China began to conduct tuna fishery in the Indian Ocean with only 12 longliners. In 2001 there were about 100 longliners. Catch in weight and fishing effort are submitted to IOTC secretariat since 1999. In additionr, catch in numbers was also obtained from some fishing companies in 2001, by which nominal CPUE can be calculated. The primary purpose of the analysis is to provide some information on nominal CPUE of China longline fleet

MATERIALS AND METHODS

Logbook data were used and obtained from sampled longline fleet (China's Zhejiang longline fleet) which had good quality of tuna fishery data submission. The fishing fleet belong to large scale longliners mostly operated in the western Indian Ocean. Fishing effort per set (Hooks per day) deployed by large scale longliner are 2800 – 3000 hooks. The number of hooks per basket is 18. Branch lines are made of nylon monofilament. Small scale longline fleet operated only in the eastern Indian Ocean. Figure 1 shows longline fishing grounds.

Japanese longline fishery data in 2000 were obtained from IOTC Secretariat. Data of BET and YFT and fishing effort were selected for analysis

Results and discussion

1. Catch, fishing effort and nominal CPUE

Table 1 shows catch by species by China longliners during 1995-1999.

Table 1 Catch of tuna and tuna-like species during 1995-2001 by China longliners in the Indian Ocean

Species	1995	1996	1997	1998	1999	2000	2001*
YFT	137.89	493.77	750.14	402.1	2335	2361.5	2300
BET	139.52	466.3	1651.68	2164.48	2182	2698.6	2900
SWO	71.34	237.8	255.2	117.16	270	372.2	452
ALB	0	0	0	0	189	2.8	15
SHX	0	0	0	0	187	98.4	260
BIL	0	0	0	0	287	485.9	300
OTH	95.7	299.42	306.77	396.43	712	487.6	600
Total	444.45	1497.29	2963.79	3080.17	6162	6507	6827

* preliminary data

Since 1999, tuna data collection system has been established. Table 2 shows fishing effort by areas and CPUE during 1999-2001. CPUE in 2000 declined compared with 1999 and slightly increased in 2001(Table 2). Table 3 shows fishing effort and CPUE by month in 2000 and also that of sampled longline fleet in 2001. Fishing effort of sampled longline fleet accounted for 10.7% of total fishing effort in 2001(Table 3). In addition, sampled longline fleet reported their catch in weight and in number for targeted tuna species consequently monthly nominal CPUE of BET, YFT and SWO was obtained in Table 4. Average nominal CPUE of BET, YFT and SWO in 2001 was 4.39, 2.83 and 0.43 respectively.

Table 2 Fishing effort deployed by Chinese longline fleet and Nominal CPUE in the Indian Ocean   Unit of CPUE: kg/1000 Hooks

Year	Area	Total hooks	Total	CPUE
1999	East IO	14393	14710	418.90
	West IO	317		
2000	East IO	17627.7	21466.28	303.12
	West IO	3838.58		
2001*	East IO	17509.68	22137.1	308.39
	West IO	4627.42		

* preliminary data

2. Fishing effort and nominal CPUE of Japanese longline fleet in 2000

Tuna data from Japanese longliner fleet in 2000 were compiled. Table 5 shows the total fishing effort deployed by Japanese longline fleet in 2000 in Indian Ocean. A line of latitude 15S was arbitrarily set to divide Indian Ocean into two parts(tropical and temperate). Because China longline fleet operated in the tropical areas the division can make the CPUE comparison between China longline fleet and Japanese longline fleet in the same areas. Table 5 indicates that 70% total hooks by Japanese longline fleet are located in the temperate areas, which mean that this fleet largely target temperate tunas.

Table 3 Fishing effort and Nominal CPUE by month in 2000(whole China longline fleet) and 2001(sampled Chinese longline fleet) in the Indian Ocean   fishing effort: 1000 Hooks   CPUE: kg/1000 Hooks

Month	2000		2001	
	Fishing effort	CPUE	Fishing effort	CPUE
JAN	1924.5	312.1	62.7	307.1
FEB	2003.9	288.9	58.5	317.8
MAR	2254.3	266.5	62.7	509.7
APR	2355.1	300.0	90.0	237.4
MAY	2244.6	271.9	93.0	428.6
JUN	1879.5	293.8	259.5	274.2
JUL	1005.3	338.0	171.0	125.6
AUG	993.4	351.0	179.8	209.3
SEP	957.4	327.8	261.0	287.7
OCT	1458.4	346.3	268.2	311.2
NOV	2086.5	314.1	429.0	221.4
DEC	2285.4	304.2	429.0	470.5
Total/Average	21466.3	309.6	2364.4	308.3

Table 4 Nominal CPUE of BET, YFT and SWO by month from sampled Chinese longline fleet in the Indian Ocean in 2001   Unit of CPUE: number of fish/1000 hooks

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Year
BET	4.30	3.98	4.83	1.48	5.68	4.00	2.47	5.61	6.57	5.28	2.48	6.02	4.39
YFT	1.66	2.62	8.00	1.27	0.83	1.86	1.04	1.28	1.96	6.73	2.02	4.67	2.83
SWO	0.43	0.21	0.72	0.48	0.41	0.76	0.12	0.42	0.25	0.64	0.31	0.38	0.43

Note: Chinese longliners operated mostly in the tropical Indian Ocean fishing grounds are located in the areas of 00S-10S, 45E-55E; 05S-06S, 75E-77E,

Table 6 shows that total 336 million BET individuals were caught by Japanese longline fleet in whole Indian Ocean and tropical areas accounted for 42%, temperate areas 58%. Table 7 shows YFT situation.

Table 8 shows the nominal CPUE of BET (3.25) and YFT (4.27) by Japanese longline fleet in the whole Indian Ocean in 2000. However, when tropical and temperate areas was set, the nominal CPUE of BET and YFT in the tropical (4.72 and 7.28 respectively in 2000, Table 9) is higher than that of temperate (2.44 and 3.56 respectively in 2000, Table 10).

The nominal CPUE of BET by Japanese longline fleet in tropical areas is slightly higher than that of China(4.39, Table 4) and the nominal CPUE of YFT by considerably higher than that of China. The reason may attribute to fishing technology. China developed its tuna fishery recently and captains were not familiar with the fishing grounds of targeted species.

Table 11 shows nominal CPUE in time series. Nominal CPUE of BET is obtained from the document of last Working party on Methods. The nominal CPUE of BET by month in 2000 declined greatly compared with previous years

Table 5 Fishing effort(million hooks) of Japanese longline fileet in the whole Indian Ocean in 2000 by tropical and temperate(divided by latitude 15 S)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
TRO	4.5	3.1	3.2	3.3	3.2	2.1	1.8	1.3	1.2	1.5	2.1	2.9	30.2
	58%	66%	53%	38%	46%	36%	19%	13%	12%	14%	20%	29%	30%
TEM	3.2	1.7	2.8	5.3	3.7	3.8	7.5	8.5	9.0	9.3	8.6	7.1	70.5
	42%	34%	47%	62%	54%	64%	81%	87%	88%	86%	80%	71%	70%
Total	7.7	4.8	6.0	8.6	6.9	5.9	9.3	9.8	10.2	10.8	10.7	10.0	100.7

TRO stands for tropical areas (north of latitude 15 S)

TEM stands for temperate areas (south of latitude 15 S)

Percentage accounted for the total fishing effort

Table 6 Number (×1000) of BET by Japanese longline fleet in the whole Indian Ocean in 2000 by tropical and temperate (divided by latitude 15 S)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
TRO	26	14	11	11	15	12	9	6	5	8	9	16	142
	93%	38%	48%	42%	63%	52%	25%	11%	18%	33%	64%	80%	42%
TEM	2	23	12	15	9	11	27	47	23	16	5	4	194
	7%	62%	52%	58%	36%	48%	75	89%	82%	67%	36%	20%	58%
Total	28	37	23	26	24	23	36	53	28	24	14	20	336

Table 7 Number (×1000) of YFT by Japanese longline fleet in the whole Indian Ocean in 2000 by tropical and temperate

(divided by latitude 15 S)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
TRO	36	19	18	21	20	15	18	11	11	8	12	26	215
	46%	54%	72%	72%	80%	58%	53%	41%	48%	42%	46%	52%	54%
TEM	43	16	7	8	5	11	16	16	12	11	14	24	183
	54%	46%	28%	28%	20%	42%	47%	59%	52%	58%	54%	48%	46%
Total	**79**	**35**	**25**	**29**	**25**	**26**	**34**	**27**	**23**	**19**	**26**	**50**	**398**

Table 8 Nominal CPUE (in number of fish/1000 hooks) of BET and YFT from Japanese longline fleet in the whole Indian Ocean in 2000

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Year
BET	3.65	3.46	3.88	2.91	3.54	3.87	3.86	5.41	2.72	2.28	1.38	2.02	3.25
YFT	10.33	7.41	4.22	3.37	3.74	4.34	3.68	2.71	2.21	1.75	2.46	4.97	4.27

Table 9 Nominal CPUE(in number of fish/1000 hooks) of BET and YFT from Japanese longline fishery in the tropical Indian Ocean in 2000(North of 15 S)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Year
BET	5.66	4.59	3.51	3.21	4.71	5.52	4.98	4.66	4.38	5.55	4.41	5.48	4.72
YFT	8.07	6.32	5.77	6.28	6.34	7.01	10.36	8.30	8.56	5.37	6.00	8.99	7.28

Table 10 Nominal CPUE (in number of fish/1000 hooks) of BET and YFT from Japanese longline fishery in the temperate Indian Ocean in 2000(South of 15 S)

|	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Year
BET	0.77	1.38	4.29	2.72	2.54	2.94	3.60	5.52	2.49	1.75	0.64	0.61	2.44
YFT	13.57	9.39	2.50	1.55	1.50	2.79	2.09	1.87	1.35	1.16	1.60	3.32	3.56

Table 11 Nominal CPUE of BET (in number of fish/1000 hooks) of Japanese longline fleet (2000) and sampled Chinese fleet (2001)

	Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
JPN	97	5.16	3.87	4.90	7.56	11.84	8.67	7.77	4.27	4.07	3.52	4.88	6.11
JPN	98	5.05	4.82	5.22	6.11	6.68	3.84	7.13	5.65	4.24	4.22	3.27	8.08
JPN	**00**	**3.65**	**3.46**	**3.88**	**2.91**	**3.54**	**3.87**	**3.86**	**5.41**	**2.72**	**2.28**	**1.38**	**2.02**
CHN	**01**	**4.30**	**3.98**	**4.83**	**1.48**	**5.68**	**4.00**	**2.47**	**5.61**	**6.57**	**5.28**	**2.48**	**6.02**

REFERENCES

IOTC 2001, Report of the *ad hoc* IOTC Working Party on Methods

IOTC 2001, Report of IOTC Working Party on Tropical Tunas
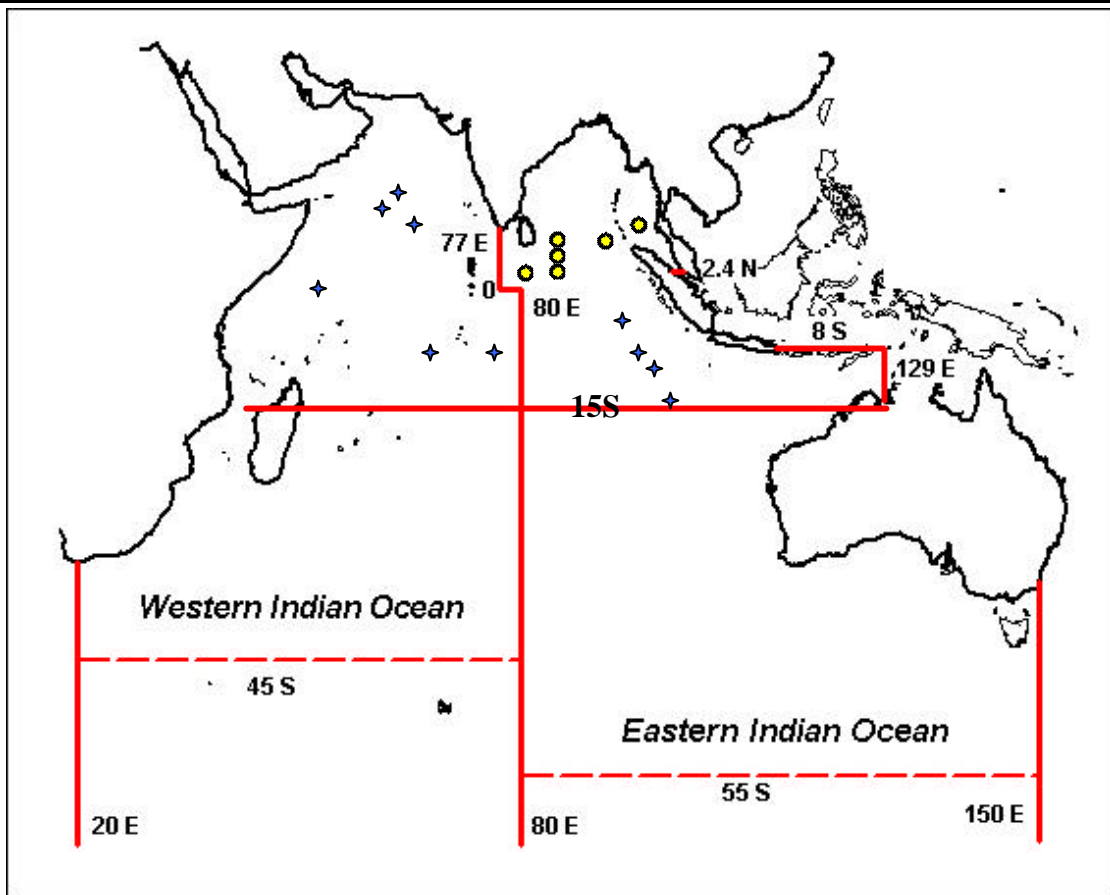
Figure 1 Fishing grounds of Chinese longline fleet

✦ **Area for Chinese large scale longliner**

◉ **Area for Chinese small scale longliner**