

Chinese tuna longline fishery in the Indian Ocean in 2006

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1. INTRODUCTION

Since mainland China began to develop tuna longline fishery in the Indian Ocean in 1995, longlining fishing has been the only fishing methods applied by the fishing fleets in the IOTC waters. At the peak time in 1998, the recorded number of fishing boats were 120, most of them were small non-professional fishing boats reconstructed from trawlers or gill-netters which used to operate along Chinese coastal waters before the transfer. After 1998 number of fishing boats reduced due to the poor management, low economic performance and some of them shifted to the Pacific Ocean. Total number of tuna fishing boats registered with IOTC Secretariat was 63 in 2002, 67 in both 2005 and 2006. The number of the larger scale deep frozen longliners increased from 16 in 2003 to 41 in 2006(see table 1). Fishing area in 2006 was 40-85°E, 25°N-25°S. Fishing efforts and catch (bigeye and yellowfin) distribution in 2005 and 2006 are indicated in Fig.1 and Fig.2. Some of deep frozen longliners seasonally accessed to fish in the EEZs of some coast nations, such as Pakistan and Tanzania waters in 2005 and Pakistan,Tanzania, Seychelles waters in both 2006 and 2007 by holding the fishing license under the agreement.

2. CATCH STATISTICS

The total catch of tuna and tuna-like species in the IOTC waters in 2006 is 14858 MT in round weight, 3.8 % increase compared with that in 2005 (14,307MT, see table 2). The catch of BET was 8702 MT, slightly decreased compared with 8867MT in 2005. The catch of yellowfin tuna (YFT) was 3857 MT, 9 percent less than that of the previous yeas (4259MT in 2005). Catch of swordfish was 775 MT, slightly increased compared with that in 2005. Catch of other species including billfish and albacore (ALB) was 1511 MT.

Most majority of the tuna catch (about 96%) are from the west part of the Indian Ocean. As shown in table 3, a 95.0% of the bigeye tuna catch came from the above waters.

The CPUE (kg per 1000 hooks, combined species) in IOTC waters by month from 2001 to 2006 is indicated in Fig.3 and table 4. The peak CPUE occurred in 2004, followed by in 2003 and 2005. Fishing Efforts (x 1000 hooks) in IOTC waters by month from 2001 to 2006 is indicated in Fig. 4 and table 4. Fishing Efforts increased from 21,545 thousand of hooks deployed in 2004 to 30,696 thousand of hooks in

2005 and further to 35,285 thousand of hooks in 2006 (see table 3).

3. FISHERIES MANAGEMENT AND RESEARCH

Shanghai Fisheries University (SFU) has been responsible for the programs of the training and data collection and compilation of the Indian Ocean tuna fishery statistics with the cooperation of the Branch of Distant Water Fisheries of China Fisheries Association.

SFU also runs training courses on the data formulation and collection, conducts relevant works on fisheries management measure, which adopted or recommended by RIFMOs, including IOTC. SFU also runs training courses of fishing technology related to conservation, such as comparative experiments in the field on the effect of various configurations of longline on reducing the incidental catch of sea turtles and sharks.

A tuna working group in SFU is also in charge of the national tuna observer program in the Pacific Ocean, Atlantic Ocean and Indian Ocean which is authorized by the Bureau of Fisheries, Ministry of Agriculture. The scientific observer program has been carried out smoothly under the fully cooperation of the Branch of Distant Water Fisheries of China Fisheries Association and supported by Shanghai Fisheries University. So far, graduate and post graduate students majoring in marine fisheries science & technology, marine fisheries resources from Shanghai Fisheries University have been chosen as the candidates for tuna scientific observers.

Two observers were dispatched on board the fresh tuna longliner in the Indian Ocean in September of 2006 and worked for three months, covering the area of $04^{\circ}07'N \sim 03^{\circ}07'S$, $62^{\circ}12'E \sim 71^{\circ}15'E$. Besides the basic biological data collection, the two observers also did the environmental measurements including water temperature, salinity, chlorophyll a concentration, dissolved oxygen concentration at different water layers predetermined by Submersible Data Logger. The actual hook depth were also measured by TDRs. SFU tuna working group will submit the secretariat the report of size frequency data of Bigeye and Yellowfin tuna collected from the observer program. A comparison of the effect of the circle hooks and ring hooks on the catch rate of main targeting tuna species was also conducted by observers during their mission. Length-frequency distribution of bigeye and yellowfin tuna is shown in Fig.5 and Fig.6.

SFU tuna working group have conducted the research projects, which funded by the Ministry of Agriculture of China, on the tropical tuna species (mainly BET and YFT) of the Indian Ocean since 2005. In 2007, two working papers were submitted to the WPTT-2007 (IOTC-2007-WPTT-13 and IOTC-2007-WPTT-14). Field tests continues on the mitigation measures to reduce the incidental catch of seabirds, sharks and sea turtles by using the "tori line", circle hooks, etc..

As a responsible fisheries nation, Chinese Fisheries Authority will continue to strengthen the management of her tuna fisheries. Main measures which have been taken in last years include:

1) Continuing the implementation of fishing license system. Chinese government will strictly issue “ High Seas Fishing Permit” to all legal fishing boats operating in high seas, the “fishing permit “ explicitly specifies fishing area, main targeting species and quota, fishing time of the boat holding the permit. so that the harbor nations can easily have a check if the boat enters their harbor .

2) All fishing companies have to report their catch data every month to the Branch of Distant Water Fisheries of China Fisheries Association and then collected by the SFU Tuna Working Group..

3) Continuing to implement the national tuna observer program in the Oceans. As mentioned above,in 2007, two observers were dispatched on board the larger scale tuna longliner in the Indian Ocean. The area covered will be 1°00'S ~ 6 °00'S, 44°E ~ 53°E. The observers will spend at least four months on the fishing boat and do both biological and environmental measurements, conduct scientific research works, including application of incidental catch mitigation measures by using the circle hook, tori line to test the effect of preventing or reducing the incidental catch of sea turtle, sharks and sea birds instructed by the Branch of Distant Water Fisheries of China Fisheries Association.

4) Installing the VMS equipments on all the large scale tuna longliners from 1st Oct. 2006.

The following measure and activities will be taken in coming year by China:

1) Strengthening the consultation with nations who are willing to accept Chinese tuna boats about fishing access, assuring their legal access and normal fishing operation.

2) Encouraging scientists to conduct research on the incidental catch of sea turtles and sea birds, request fishing companies to report situation about the incidental catch of sea turtles and sea birds.

3) Put logbook system as normal management work. Pilot logbook data submission system was tried last year in order to obtain more detailed information about catch and fishing effort. Fisheries Bureau, Ministry of Agriculture this year requests that all fishing boats have to fill logbook as required format and will take implementation of logbook system as one of the main considerations for renewing the fishing permission and licenses.

4) Through improving the data report system, submitting fisheries statistics to regional tuna fisheries management organizations as required.

In addition, our government will strictly implement the measures recommended in the GOA meeting, such as limiting the number of fishing vessel and capacity.

Reference

1. XU Liuxiong and DAI Xiaojie, National report of China in IOTC waters in 2004. IOTC-2005-SC-INF13.
2. DAI Xiaojie and XU Liuxiong, National report of China in IOTC waters in 2005. IOTC-2006-SC-INF13.

Table 1. Number of Chinese Tuna Fishing Fleet in 1995-2006 in the Indian Ocean

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Ice fresh	12	52	89	120	96	98			47		27	26
Deep freezing									16		40	41
Total	12	52	89	120	96	98	93	63	63	63	67	67

**Table 2. Catch of tuna and tuna-like species during 1995-2006
(round weight in MT)**

Species	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
YET	138	494	750	402	2335	2362	1771	1325	2279	3781.2	4,259	3857
BET	140	466	1652	2164	2182	2699	2994	2792	4569	8321.2	8,867	8702
SWO	71	238	255	117	270	372	263	397	753	687.6	625	775
ALB	-	-	-	-	189	3	21	41	31	62	51	56
SBF	-	-	-	-	-	-	-	-	14	0	-	-
SHX	-	-	-	-	187	98	-	-	-	0	-	-
BIL	--	-	-	-	287	486	380	255	148	218	271	266
OTH	96	299	306	396	712	487	293	112	79	254.4	234	1189
Total	444	1497	2964	3080	6162	6507	5722	4922	7873	13324.3	14307	14858

Table 3 Total Catch in Metric tons from Chinese Longline Fleet by Species and Fishing Areas between 2000 and 2006

Year	Area	Total hooks (x1000)	BET	YFT	ALB	SWO	BIL	SHK	OTH	TOTAL
2000	E	17,627.7	1,822.1	2,055.2	0	293.6	343.8	94.8	308.5	4,918
	W	3,838.6	876.5	306.3	2.8	78.6	142.1	3.6	179.1	1,589
	SUM	21,466.3	2,698.6	2,361.5	2.8	372.2	485.9	98.4	487.6	6,507
2001	E	15,303.6	2,105.0	1,287.8	19.6	169.9	258.3	0	167.6	4,008.2
	W	4,690.8	889.3	483.5	1.6	92.7	121.3	0	125.2	1,713.6
	SUM	19,994.4	2,994.3	1,771.3	21.2	262.6	379.6	0	292.8	5,721.8
2002	E	4614.6	875.4	446.9	20.8	70.2	36.8	0	23.5	1473.6
	W	8728.5	1917	878	19.8	326.6	218.1	0	88.9	3448.4
	SUM	13343.1	2792.4	1324.9	40.6	333.8	252.9	0	112.4	4922
2003	E	1159	310.7	96.8	5.6	47.9	19.3	14.1(SBF)	12.0	506.4
	W	14315	4258.1	2182.3	25.1	705.2	129.2	0(SBF)	67.2	7367.1
	SUM	15474	4568.8	2279.1	30.7	753.1	148.5	14.1	79.2	7873.5
2004	E	3046	1084.2	208.4	5.7	73.7	34.1	0	28.4	1434.5
	W	18500	7237.1	3572.9	56.2	613.9	183.8	0	226.0	11889.9
	SUM	21546	8321.3	3781.3	61.9	687.6	217.9	0	254.4	13324.4
2005	E	2807	797	94	2	36	16	0	9	953
	W	27890	8070	4165	50	589	255	0	225	13355
	SUM	30697	8867	4259	52	625	271	0	234	14307
2006	E	1,488	413	51	3	34	4	-	4	509
	W	33,797.5	8289	3806	53	741	262	-	1185	14336
	SUM	35,285.5	8702	3858	56	775	266	-	1189	14845

**Table 4 CPUE (kg per 1000 hooks/month) and fishing Effort (x 1000 hooks)
in IOTC waters by month, 2000-2006**

Year		Jan.	Feb.	March	Apr.	May	June
2000	Effort	1,924.5	2,003.9	2,254.3	2,355.1	2,244.6	1,897.5
	CPUE	311.7	288.9	266.5	299.9	271.9	291.0
2001	Effort	1733.7	1723.4	1752.3	1736.6	1713.1	1667.6
	CPUE	277	302.5	293	272.3	307.2	258.4
2002	Effort	1100.1	891.9	1033.1	875.1	1291.7	941.9
	CPUE	392.6	344	358.7	372.8	286.8	265.5
2003	Effort	1263	1196	1341	1269	1258	1117
	CPUE	514	516	417	526	719	568
2004	Effort	1588	1426	1638	3004	1497	1355
	CPUE	758	780	687	508	738	585
2005	Effort	1952	2042	2463	2880	2944	2627
	CPUE	490	505	447	676	536	499
2006	Effort	2114.5	2925.3	2991.3	3404.9	3438.6	3368.3
	CPUE	555.6	443.2	388.4	433.3	544.4	378.4
Year		July	Aug.	Sep.	Oct.	Nov.	Dec.
2000	Effort	1,005.3	993.4	957.4	1,458.4	2,086.5	2,285.4
	CPUE	338.0	351.0	327.8	346.3	314.1	304.2
2001	Effort	1263.1	1118.8	1927.7	1630.7	1794.6	1932.8
	CPUE	231.9	294.7	248	255.7	268.3	402.2
2002	Effort	1204.6	1074.8	1019.2	1317.4	1312.4	1280.9
	CPUE	329.5	343.5	352.1	211.7	457.3	509
2003	Effort	1253	1275	1381	1305	1361	1456
	CPUE	440	319	442	461	579	608
2004	Effort	1605	1556	1577	1652	2256	2391
	CPUE	500	636	486	466	580	76
2005	Effort	2316	2872	2370	3001	2586	2643
	CPUE	356	314	386	384	490	501
2006	Effort	2422.4	2350.9	2508.3	3189.2	3316.1	3255.6
	CPUE	355.7	301.6	383.6	372.4	396.2	478.0

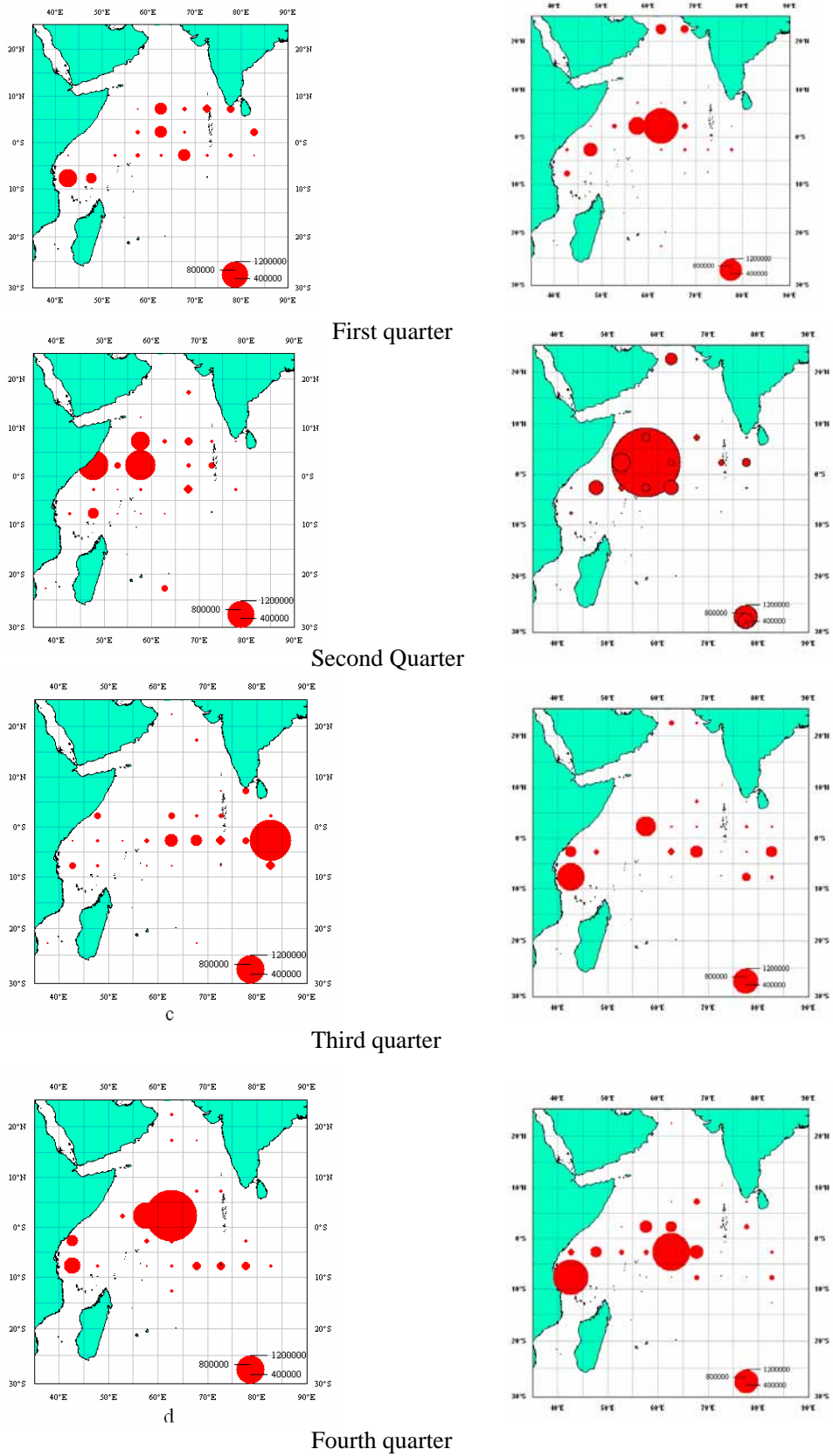
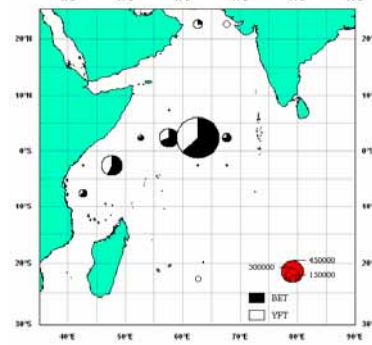
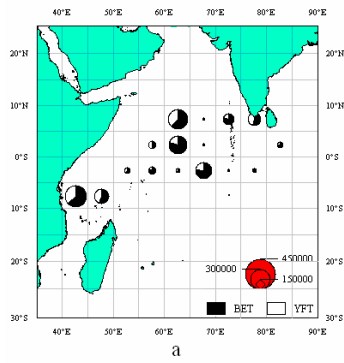
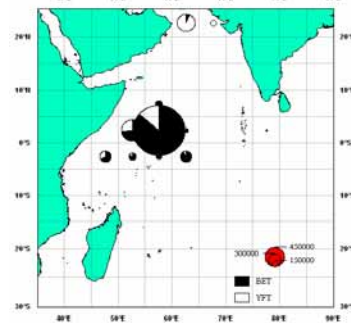
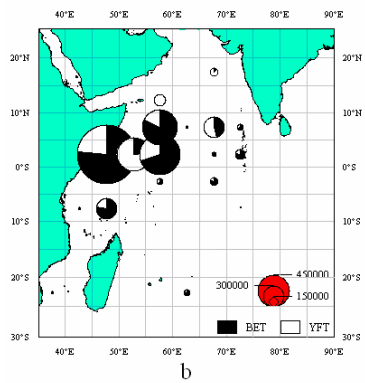


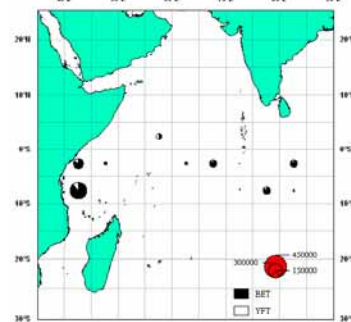
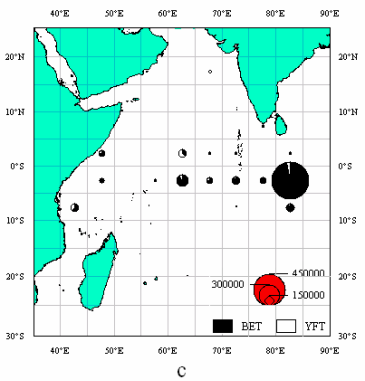
Fig. 1 Distribution (area: 5°x5°) of fishing effort by quarter in the Indian Ocean In 2005 (left) and 2006(right)



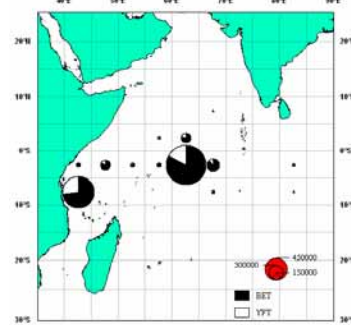
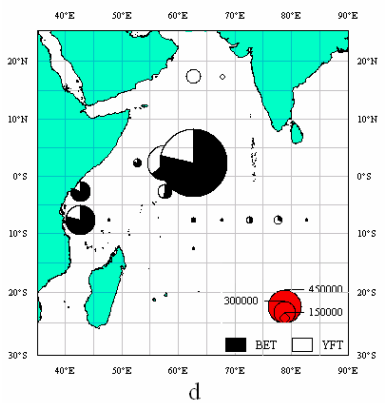
First quarter



Second Quarter

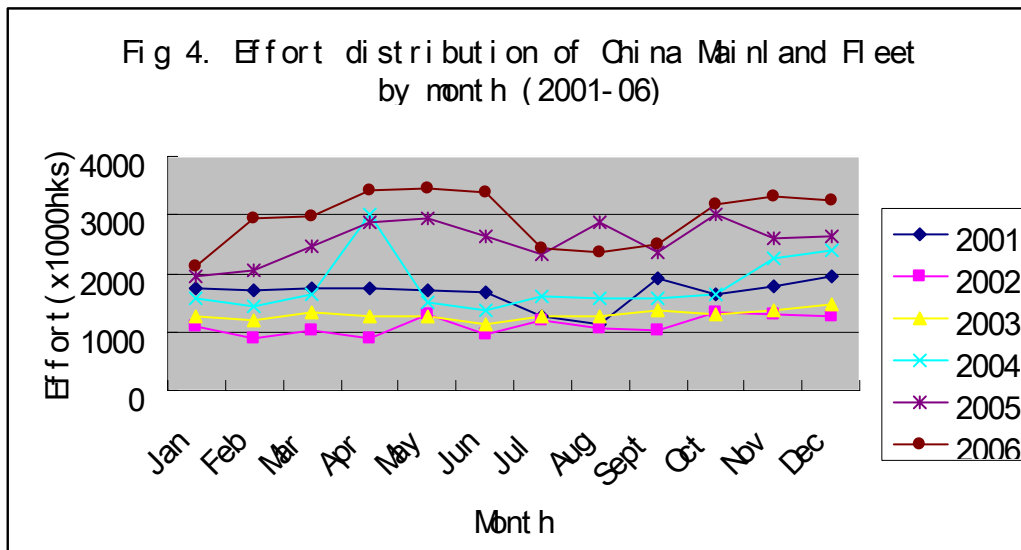
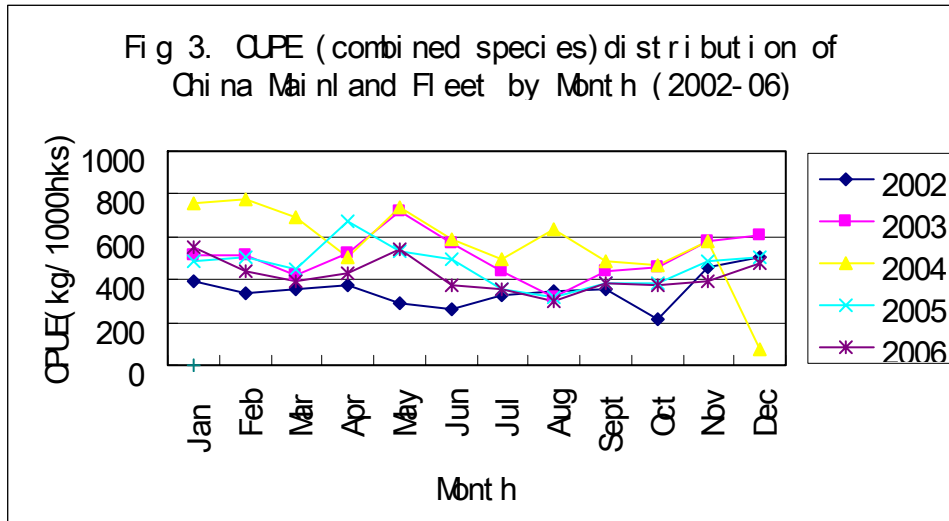


Third quarter



Fourth quarter

Fig. 2 Distribution (area: 5°×5°) of catch by species (BET, YFT) by quarter in the Indian Ocean in 2005(left) and 2006(right)



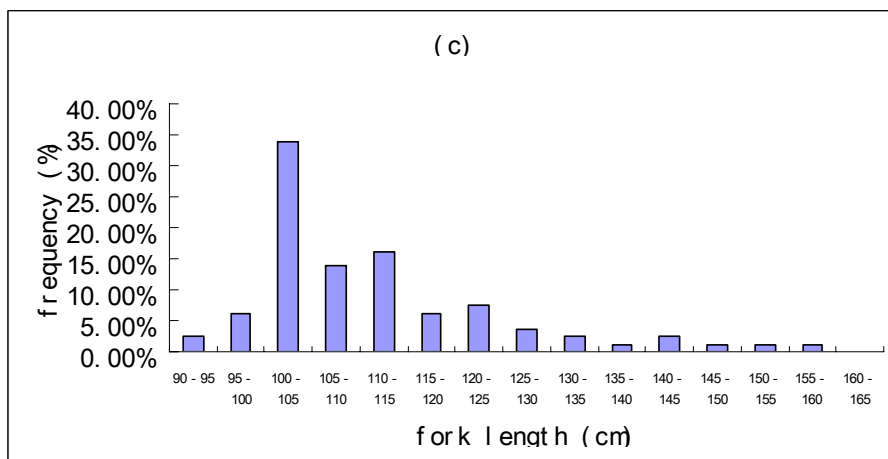
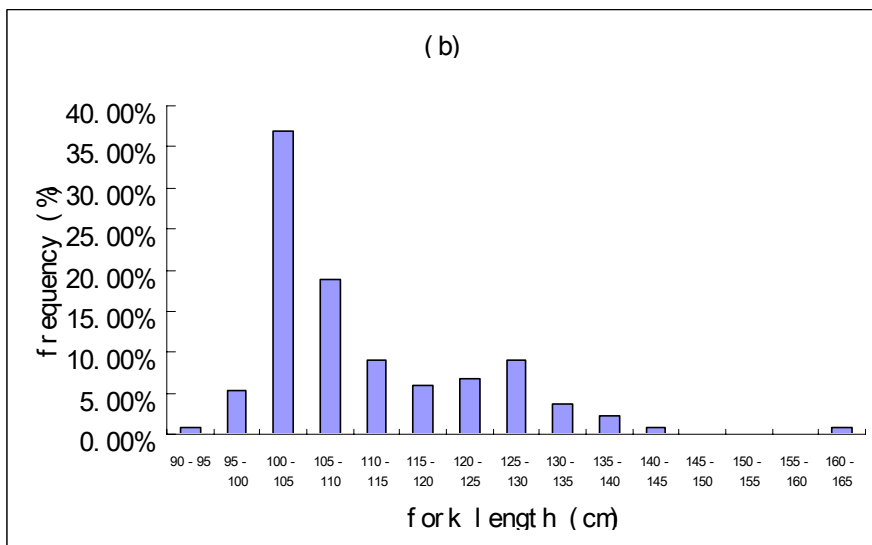
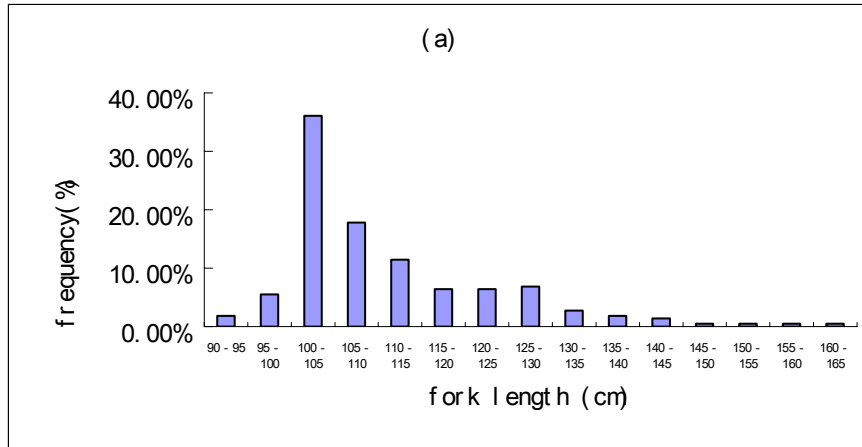


Fig.5 Length-frequency distribution of bigeye tuna (in5cm interval) from observer data (Spt-Dce,2006), (a) mix; (b) female ; (c) male

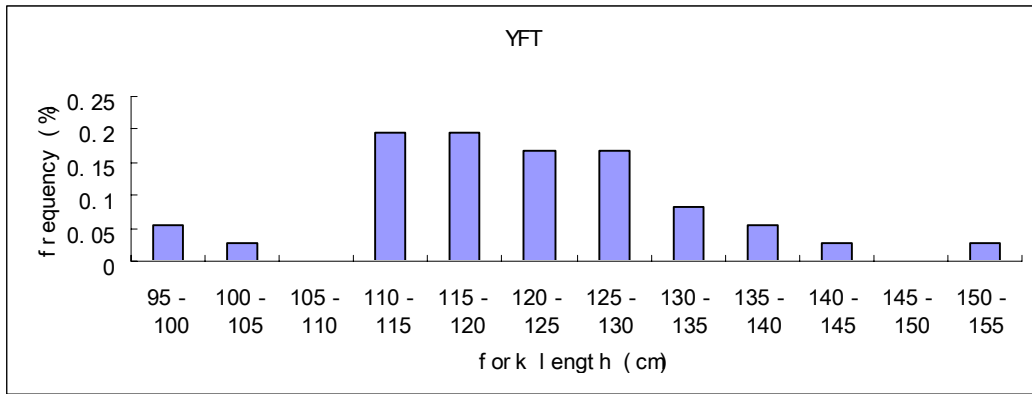


Fig. 6 Length-frequency distribution of Yellowfin tuna (in 5cm interval) from observer data (Spt-Dce,2006)