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Taiwanese Tuna and Tuna-like Fisheries in the North Pacific Ocean

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ABSTRACT

Large-scale tuna longline (LTLL, previous named DWLL, ≧100GT) and small-scale tuna longline (STLL, previous named OSLL, ＜100GT) vessels are two major Taiwan tuna fleets operating in the North Pacific Ocean. The number of active LTLL vessels operating in the Pacific Ocean in 2006 was 104, but the number of active vessels in 2007 was 90 and 2008 reduced to 84 respectively. The albacore catches of LTLL in the North Pacific was 3,848 tons in 2006, 2,465 tons in 2007, and 2,490 tons in 2008. The annual catches of swordfish were once more than 1,000 tons in 2001 to 2003 for the development of tropical tuna fishing fleet, but after then the annual catches declined to the level of 350-400 tons in 2006 to 2008 for the decrease of fishing efforts. For STLL fishery, the catches of albacore were 350-450 tons during 2006-2008. The catches of bluefin tuna fluctuated at the level of 950-1400 tons during 2006-2008. The swordfish catches were at the level of 3,400-4,000 t during 2006-2008, including the catches for STLL that based and landed in foreign ports. Size data for LTLL was obtained from logbooks, but for STLL, the data was collected through port sampling program. The average sizes of albacore were 85cm and 99cm for LTLL and STLL in 2006-2008, respectively, and for swordfish, average sizes were 163 cm and 142 cm for LTLL and STLL, respectively. Observer program was continuously conducted with increased number of observers from 2 in 2005 to 7 in 2006 and to 8 in 2007 (including Albacore and Bigeye Tuna observation trips). In 2008, there were 2 observation trips for vessels targeting albacore. To improve logbook coverage rate and data quality of STLL, the STLL data improvement program was launched since mid-2007. Long-term contracted staffs have been dispatched to 5 domestic fishing ports for the program.

1. FISHERIES AND CATCHES

1.1. General overview

There are two Taiwan tuna fleets operating in the North Pacific Ocean: the large-scale tuna longline (LTLL) and the small-scale tuna longline (STLL) vessels. Since the distant water purse seine fleets operate mainly in the equatorial areas, the following report focuses on LTLL and STLL fleets operating in the north of equator, the catches of species concerned by ISC, and data collection system for these two fleets.

1.2. Large-scale tuna longline fishery

The LTLL vessels refer to those vessels larger than or equal to 100 gross tons (GT). Those vessels mostly operate in the high sea areas or in the EEZs of coastal countries under fisheries cooperation agreements. The number of active LTLL vessels operating in the Pacific Ocean in 2006 was 104, but the number of active vessels in 2007 and 2008 reduced to 90 and 84

respectively.

Before 1995, the catch of albacore in the North Pacific was very low for Taiwanese fleet. Since the opportunities of access agreements to South Pacific were constrained, the Taiwanese fishing efforts and catch in the North Pacific increased thereafter. The albacore catch in 2006 was estimated as 3,848 mt, but the catch reduced to 2,465 mt in 2007. The catch in 2008 was preliminarily estimated as 2,490 mt.

For LTLL fisheries, the catch of bluefin tuna in the North Pacific has been very minimal and the catches were less than 1 mt in recent years. Before 2000, the catch of swordfish in the North Pacific was low and less than 100 mt. Thereafter, the catch increased substantially to more than 1,000 mt from 2001 to 2003 for the increase of fishing efforts on Bigeye tuna, but declined less than 1,000 mt from 2004 to 2008.

The fishing efforts distribution of Taiwanese LTLL vessels operating in the North Pacific region during 2006-2008 is shown in Figure 1. These vessels fish for northern albacore seasonally from September to March of the following year, and shift to the South Pacific for southern albacore from April to August.

1.3. Small-scale tuna longline fishery

The small-scale tuna longline (STLL) vessels generally refer to those vessels smaller than 100 GT (mostly 50-70 GT). Table 1 shows the STLL fishery's catches by species from 1997 to 2008. From Table 1, the catch of albacore fluctuated between 200 and 900 mt in recent ten years. A preliminary estimated catch of albacore in 2008 was 579 mt. The catch of swordfish in 2007 was estimated as 2,907 mt and a preliminary estimate for 2008 was 2,471 mt. The catch of bluefin tuna in 2007 was estimated at 1,401mt. The preliminary estimated catch in 2008 was 979 mt.

The distribution of fishing efforts for STLL vessels based at domestic ports from 2006 to 2008 is shown in Figure 2. The fishing area mainly distributed around south of 45^0 N and west of 165^0 W.

1.4. Size samples from the longline fisheries

The length frequency by species caught by LTLL and STLL vessels in the North Pacific are shown in Figure 3.

For LTLL fleet, the catch size data is from logbook. The amount of size measurements for albacore and swordfish were 161,582 and 6,383 respectively from 2006-2008. The length frequency for albacore caught by LTLL for 2006-2008 ranged from 40 to 148 cm with a clear peak in the range of 80-90 cm. The length measurement for swordfish is measured from low jaw to fork length shows one mode from the range of 155-165 cm.

For STLL fleet, the amount of size measurements for albacore and swordfish measured from

domestic fishing ports were 1,049 and 799 respectively from 2006-2008. The catch size of albacore has one mode from 92 to 106 cm. Since the low jaw of swordfish was generally cut on board, the eye fork length was measured instead. The eye fork length frequency for swordfish is mainly from 125 to 145 cm. The fork length distribution of bluefin tuna mainly ranges from 215 to 230 cm.

2. DATA COLLECTION

2.1 Large-scale tuna longline

Two types of fisheries statistical data are routinely collected for LTLL fleet: the commercial data (for estimation of total catch), and the logbook data (for stock assessment purposes). Several sources of commercial information were available including traders, Taiwan Tuna Association, Japanese market, and so on. After cross-checking and compilation, the commercial information was used to estimate total catches of the Category I data.

The logbook data includes each set of catch in number and weight by species, effort deployed, fishing location, as well as the length measurement of the first 30 fish caught each day. Categories II and III data were all compiled from this data set.

2.2 Small-scale tuna longline fishery

Two categories of STLL are defined: STLL that base in Taiwan and unload their catches at domestic fishing ports (domestic-based STLL), and that base and unload catches at foreign ports (foreign-based STLL). For domestic-based STLL, the commercial landing records from local fishing markets provide the best information for estimating the ISC Category I data. Since, there was not much information to estimate total catches for foreign-based STLL, preliminary estimations were basically made from fishing vessels activities and import statistics of the Japanese markets. In addition, some STLL vessels fishing in the South Pacific or Eastern Indian Ocean, their catch of billfish were transshipped back to Taiwan by containers, reefers or fishing vessels in frozen form, and unloaded/auctioned in the domestic markets. These catches in frozen form were excluded from the estimation of table 1.

Logbooks of STLL fishery have been collected since 1997, though at current stage, the recovery rate of about 2% to 5% is too low to be compiled for Category II data, and insufficient for the purposes of stock assessment. To improve the coverage rate of logbook, Fisheries Agency has launched a data improving program by dispatching staffs to collect logbooks, to interview with fishermen to obtain fisheries information, and to conduct size sampling program on domestic-based STLL vessels since April 2007.

2.3 Port sampling

For domestic-based STLL, port sampling at domestic fish markets has been strengthened by collecting size data of the major tuna species (mainly bigeye and yellowfin tunas) since 1997. In 2004, we carried out a pilot port sampling in Davao, the Philippines in the North Pacific.

Through the data improvement program, port sampling on both the trip information (location, catches and effort) and size of major tuna species in Tong-Kang, Suao and Sin-Kang , the main ports of domestic-based STLL vessels, has been conducted independently. These data were compiled and made available for the scientific uses.

2.4 Observer program

The scientific observer program for three Oceans has been implemented since 2001. The trips of observer on board were 7 trips in 2006, 8 trips in 2007, but decreased to 2 trips in 2008 for some vessels ceased to operate due to high fuel price. For North Pacific, the duty of observer on board is to collect fisheries data, including size measurements, otoliths and gonads sampling of albacore.

2.5 VMS monitoring

Vessel monitoring system (VMS) has been installed voluntarily on some longliners prior to 2005. Since 2005, all of our large-scale tuna vessels were required to install VMS. In addition to monitoring, those data were used to verify the logbook data for improving data quality.

3. RESEARCH

For the purpose of improving stock assessment of species in the North Pacific, government of Taiwan has commissioned scientists to conduct a series of researches as follows：

1. Research on the catch at size/age and CPUE standardization of North Pacific Albacore.
2. Research on the age and growth and stock assessment of Pacific Bluefin Tuna.
3. Studies on population dynamics and stock assessment for Swordfish, Sailfish, and Blue Marlin.
4. Studies on the age/growth, and reproductive biology of Black Marlin, and Striped Marlin.
5. A Billfish tagging program.

Table 1. Catch estimates of North Pacific albacore, bluefin tuna, bigeye tuna, yellowfin tuna, swordfish and marlins by Taiwanese longline fisheries during 1997-2008. LTLL stands for catches by the Large-scale tuna longline, STLL for the small-scale tuna longline fishery.

Unit: mt

Year	albacore			Bluefin tuna			Bigeye tuna			Yellowfin tuna		
	LTLL	STLL		LTLL	STLL		LTLL	STLL		LTLL	STLL	
		domestic-based	foreign-based		domestic-based	foreign-based		domestic-based	foreign-based		domestic-based	foreign-based
1997	9,119	337	-	-	1,814	-	112	3,506	-	41	9,419	-
1998	8,617	193	-	-	1,910	-	156	3,520	-	39	8,955	-
1999	8,186	207	-	-	3,089	-	360	2,578	-	122	8,961	-
2000	7,898	802	-	-	2,780	-	1,450	2,041	-	584	7,848	-
2001	7,852	747	-	-	1,839	-	4,569	1,898	-	1,882	8,166	-
2002	7,055	910	-	-	1,523	-	7,257	2,150	-	2,689	9,145	-
2003	6,454	712	-	-	1,863	-	2,936	2,299	3,837	1,105	10,567	5,122
2004	4,061	927	-	-	1,714	-	4,939	1,340	2,727	1,230	7,756	4,861
2005	3,990	477	5	-	1,368	-	3,963	1,425	3,889	1,552	8,219	3,962
2006	3,848	453	16	1	1,148	-	2,756	887	5,317	1,035	7,027	6,089
2007	2,465	321	130	-	1,401	-	2,965	1,188	3,887	657	6,792	5,093
*2008	2,490	353	226	0.16	979	-	2,840	722	5,333	484	7,886	4,681

Year	Swordfish			Srtiped marlin			Blue marlin			Black marlin			Sailfish		
	LTLL	STLL		LTLL	STLL		LTLL	STLL		LTLL	STLL		LTLL	STLL	
		domestic-based	foreign-based		domestic-based	foreign-based		domestic-based	foreign-based		domestic-based	foreign-based		domestic-based	foreign-based
1997	15	1,358	-	59	290	-	20	3,625	-	1	611	-	13	527	-
1998	20	1,178	-	90	205	-	21	3,603	-	5	469	-	34	868	-
1999	70	1,385	-	66	128	-	53	3,362	-	8	563	-	5	402	-
2000	325	1,531	-	153	161	-	75	4,056	-	19	453	-	49	499	-
2001	1,039	1,691	-	121	129	-	209	4,524	-	4	428	-	4	640	-
2002	1,633	1,557	-	251	226	-	138	4,310	-	5	173	-	1	504	-
2003	1,084	2,196	1,491	241	91	590	218	4,289	3,178	4	305	805	7	380	1699
2004	884	1,828	1,536	261	95	166	372	3,354	2,946	2	620	886	11	514	1567
2005	392	1,813	1,759	199	76	508	376	3,949	3,305	15	636	508	63	709	624
2006	438	2,587	1,357	204	87	450	363	3,842	1,524	5	275	686	11	425	63
2007	345	2,907	847	102	133	66	275	3,230	1,612	1	215	44	2	527	532
*2008	338	2,471	936	78	144	48	255	3,347	1875	1	202	47	20	348	570

* Data of 2008 is still preliminary

** The catch of domestic-based STLL fishery does not include the landing in frozen form

*** The catch of foreign-based STLL is preliminary estimations

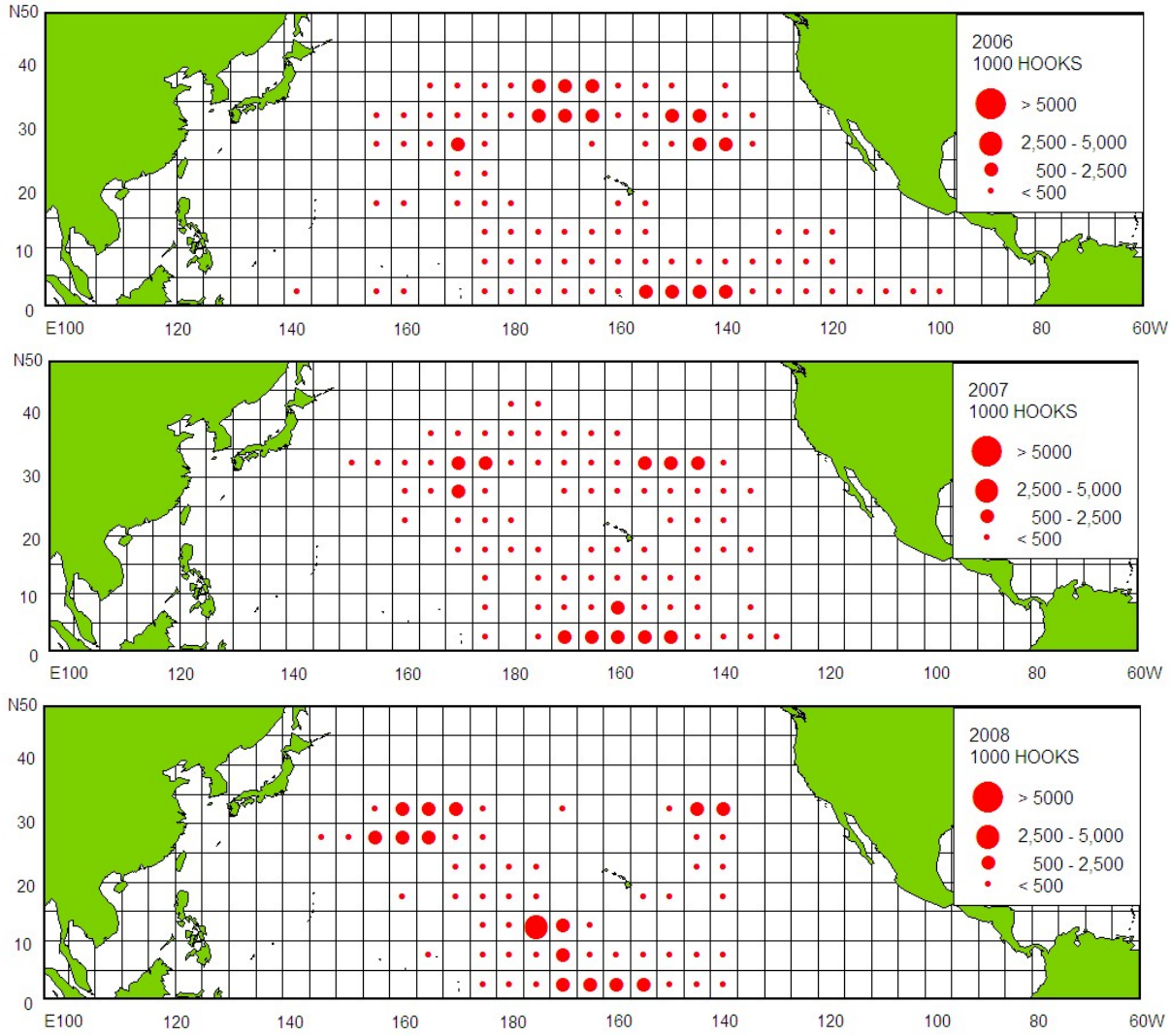

Figure 1. The effort distribution of the LTLL operated in the North Pacific region during 2006-2008.(Note: Map of 2007 and 2008 is still preliminary and will be revised shortly.)

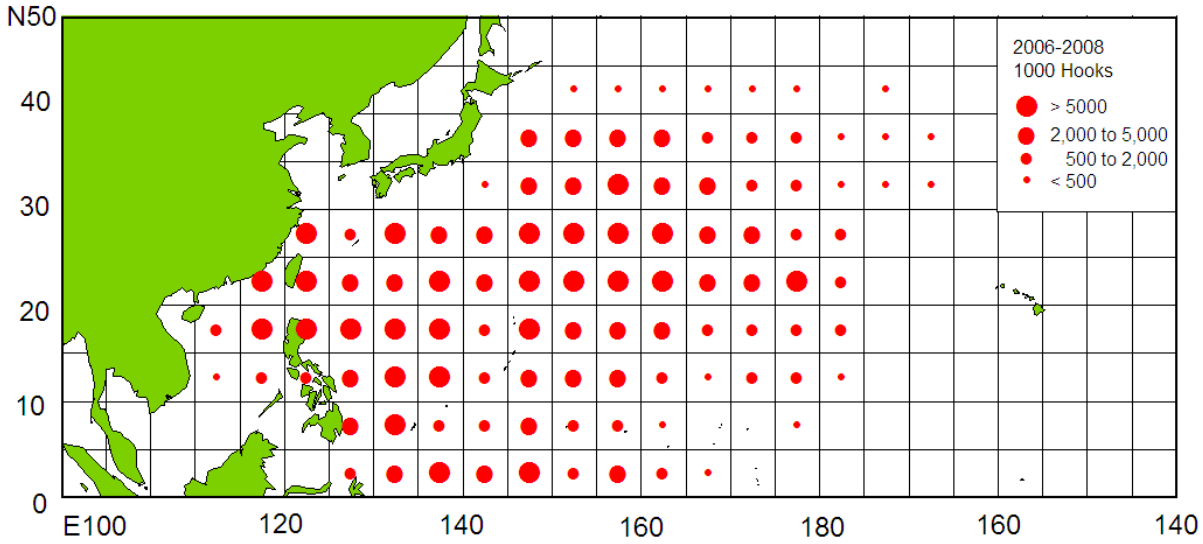

Figure 2. The distribution of fishing effort for Taiwanese STLL fishery based at domestic port from 2006 to 2008.

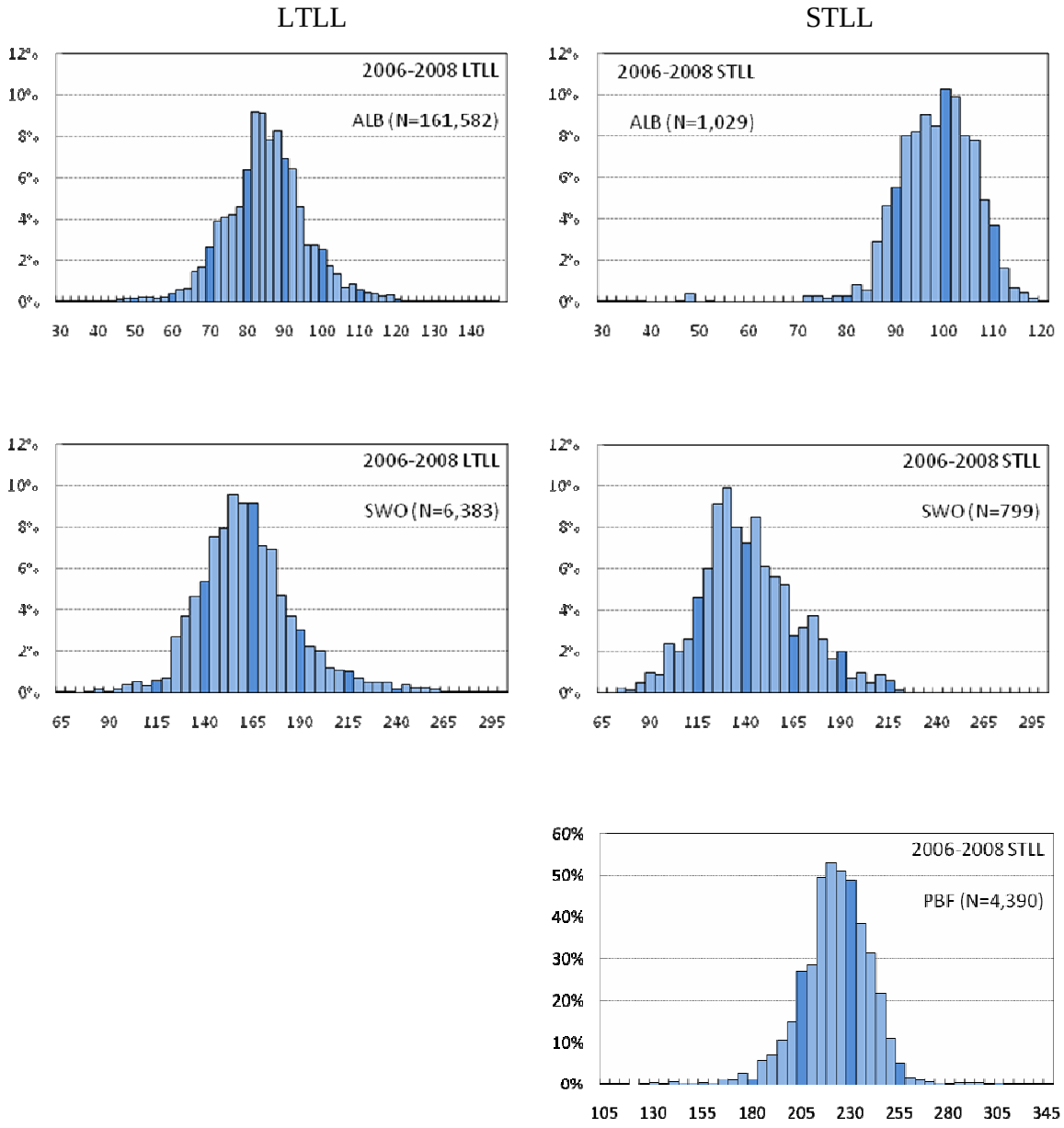

Figure 3. Length frequencies of albacore, swordfish and bluefin tuna by the LTLL and STLL fisheries in the North Pacific Ocean during 2006-2008. The length scales vary for different species.