Brief description of Taiwan fisheries with incidental catch of swordfish and striped marlin in the North Pacific Ocean[1]

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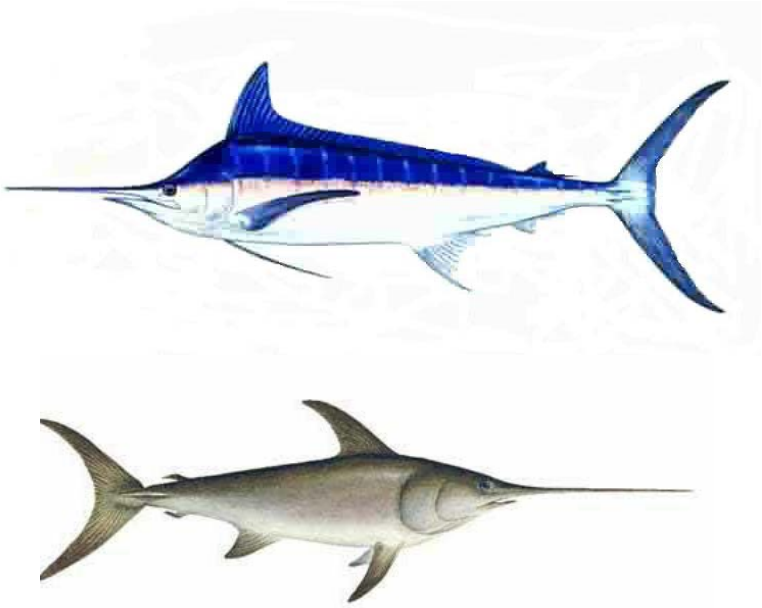

[1]Working document submitted to the ISC Billfish Working Group Workshop, 19-27 March 2007, Chinese Taipei. Document not to be cited without author's written permission.

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A. The introduction of fisheries with incidental catch of billfishes

In Taiwan, there's no fishery targeting on billfish, except seasonal coastal harpoon fishery operating in the waters of the eastern part of Taiwan. Incidental catches of swordfish and striped marlin in the North Pacific Ocean in tuna longline fisheries, including both small-scale tuna longline (STLL) and large-scale tuna longline (DWLL) fleets. According to the fishing grounds and gears, these fisheries can be classified as followed:

1. Coastal fisheries

Coastal fisheries refer to the fishing activities are made in the waters within the 12 nautical mile territorial waters of the country. Due to the proximity of the fishing activities, these fishing vessels spend about one day at sea and keep their catches in fresh form. These fisheries include harpoon fishery, set net fishery, pole and line fishery, and others.

Table 1 shows the catches of swordfish and striped marlin from coastal fisheries between 1996 and 2005. Total catch of the two species in ranged from 1 to 103 mt. Monsoon might be the major reason for the fluctuation. Total catch of other fisheries ranged from 14 to 37 metric tons in the same period.

2. Offshore fisheries

Offshore fisheries refer to the fishing activities made in the EEZ of Taiwan. Most of the fishing vessels are less than 100 GRT. They spend at most 2 to 3 weeks at sea and preserve their catches in ice. The fisheries with billfish bycatches include STLL fishery, gill net fishery, and other fisheries.

The annual swordfish and striped catches combined of STLL fishery from 1996 to 2005 ranged from 863 to 2,287 metric tons. (Table 1.) Total catch of the two species from gillnet and other fisheries is relatively small, accounted for less than 2% only. Their annual combined catch was between 2 to 33 mt. (Table 1.)

Figure 1a shows the effort distribution of STLL fishery from 2000 to 2004. Some small-scale tuna longline vessels based in Suao, locates in the northeast coast of Taiwan, operating in the waters outside the EEZ of Taiwan. Figures 1b and c show the CPUE distributions of swordfish and striped marlin for STLL fishery from 2000 to 2004 respectively.

3. Distant-water tuna longline fisheries

There are two types of DWLL fisheries (larger than 100 GRT) operating in the North Pacific, one in tropical waters for bigeye and yellowfin tuna, and the other in temperate waters for albacore. Some of the albacore tuna longliners will shift their fishing ground seasonally from the South Pacific Ocean to the North Pacific Ocean between September and March of the following year.

Table 1 shows the catch estimate of swordfish and striped marlin caught by DWLL fishery from 1996 to 2005 in the North Pacific Ocean. The catches of these 2 species increased significantly from 2000, due to the development of northern albacore DWLL fishery starting developing

from 1996 resulting significant increase in the number of fishing vessels in 2000. The catch ratio of these 2 species against THE major tuna species (albacore, bigeye and yellowfin tuna) was estimated to be 11%.

Figure 2a shows the effort distribution of DWLL fisheries from 2000 to 2004. Two different fishing activities can be observed from figure 3a, one in the tropical area, south of latitude 15°N, targeting for bigeye and yellowfin tuna; the other one in temperate waters, in areas north of latitude 15°N, targeting for albacore. From figures 2b and 2c, high swordfish catch rate was noted mainly in the tropical waters, and high catch rate of striped marlin was major in the temperate area.

B. Data collection system

1. Offshore and coastal fisheries

Almost the billfish catch of coastal and offshore fisheries has been unloaded at auction markets for better price, and these records are the best information sources for estimating ISC category 1 data for Taiwan coastal and offshore fisheries. For 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 ISC category 1.

Logbooks of STLL fishery have been collected since 1997, though at this stage, the recovery rate of about 2 to 5 per cent is too low to be compiled to Category II data, and insufficient for the purposes of stock assessment.

Sampling programs have been conducted in local fishing ports to collect length data of tunas including billfish. The size numbers of swordfish and striped marlin sampled in local ports were 2,280 and 453 respectively from 2002 and 2005. Figure 2a and b show the low jaw fork length frequency distributions of the two fish species. From figure 3a, a peak of SWO length distribution, between 135 to 165 cm, has been observed. But from figure 2b, there is a gap on the peak of MLS length distribution, from 155 to 200 cm. After checking the MLS length distribution by year, we discover there were no obvious centralized trends of length between 2004 and 2005. Probably due to the MLS catch from domestic fisheries, it is too small to get enough sample size.

To improve the coverage of logbook, Fisheries Agency has launched a data improvement program on domestic STLL fishery. By the program, additional manpower- the statisticians, will be deployed to local ports to collect logbooks, interview with fishermen, and conduct port-sampling program. Logbook coverage rate will be improved significantly in the near future in consequence.

2. Distant-water tuna longline fisheries

For DWLL fishery, 2 types of fishery statistical data are routinely collected: the commercial data (for estimation of total catch), and the logbook data (for stock assessment purposes). Several sources of commercial information are available from traders, Taiwan Tuna Association, Japanese market, and others. After cross-checking and compilation, the commercial information is used to estimate total catches of the Category I data.

The logbook data include each set of catch in number and weight by

species, effort deployed, fishing location, as well as the size measurement of the first 30 fish caught each day. Categories II and III data are all compiled from this data set. Figure 4a and b show geographic distributions of length data collected form the DWLL fishing vessels. Figure 5a and b show the length frequency distributions of swordfish and striped marlin sampled by DWLL fisheries.

Pilot observer program for the three Oceans was launched in 2001, with 2 observers in the beginning, and increased to 31 in 2006. In 2007, the number of observers will be further increased to 56 for the three Oceans. In 2005 and 2006, 2 trips in the North Pacific region were observed, to collect both fishery data and size measurements.

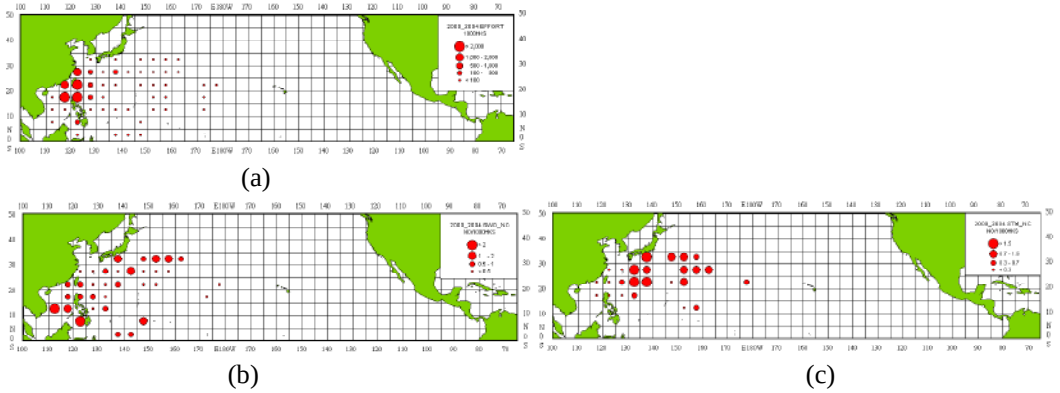
Installation of Vessel Monitoring System (VMS) is required to be set up on all DWLL vessels. Besides better monitoring of the fishing activities, VMS data are used to verify the logbook data to improve data quality.

Table 1. The SWO and MLS catch statistics by Taiwanese fishery from 1996 to 2005.

	SWO				MLS			
	DWFS	OFS			DWFS	OFS		
Year	DWLL	STLL	OTH	CFS	DWLL	STLL	OTH	CFS
1996	9	701	2	29	26	162	14	33
1997	15	1,358	2	59	59	290	9	38
1998	20	1,178	8	33	90	205	15	35
1999	70	1,385	4	57	66	128	7	35
2000	325	1,531	5	81	153	161	18	37
2001	1039	1,691	17	74	121	129	16	35
2002	1633	1,557	8	19	251	226	14	15
2003	1084	2,196	3	8	241	91	26	17
2004	884	1,828	5	11	261	95	9	15
2005	437	1,813	1	25	176	76	1	31

DWFS: distant-water fisheries; OFS: offshore fisheries; CFS: coastal fisheries

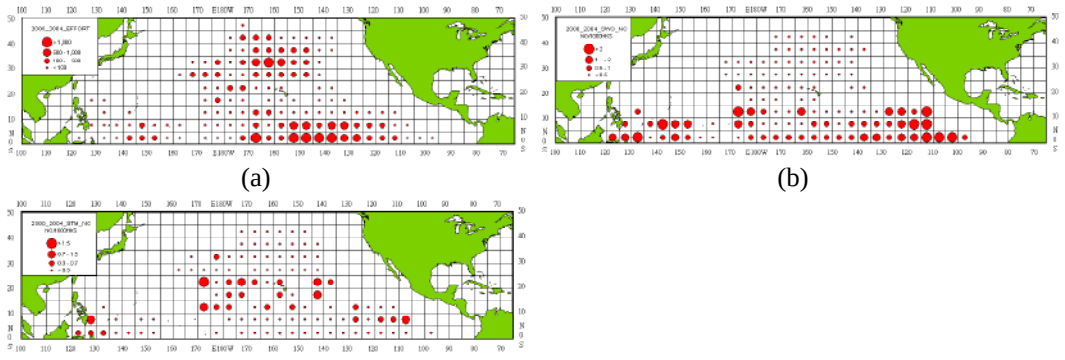
DWLL: distant-water tuna longline fisheries; STLL: small tuna longline fishery;



(a)

(b) (c)

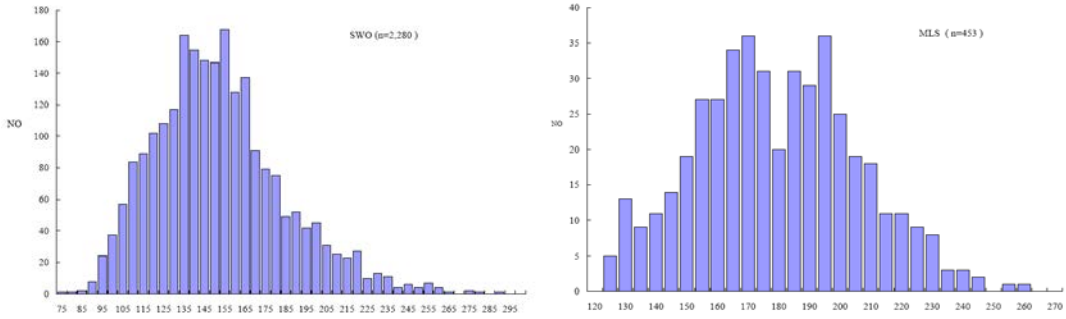
Figure 1. The effort and CPUE distribution of STLL fishery from 2000 to 2004 based on very limit logbook coverage. (a) effort; (b) swordfish CPUE; (c) striped marlin CPUE.



(a) (b)

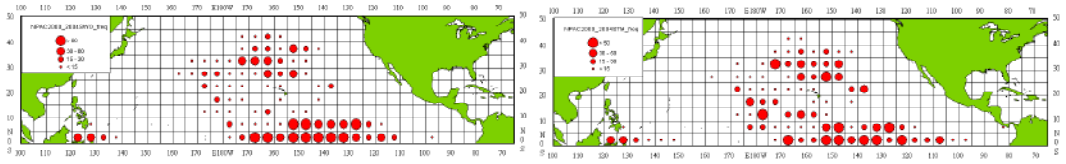
(c)

Figure 2. The effort and CPUE distribution of DWLL fisheries from 2000 to 2004



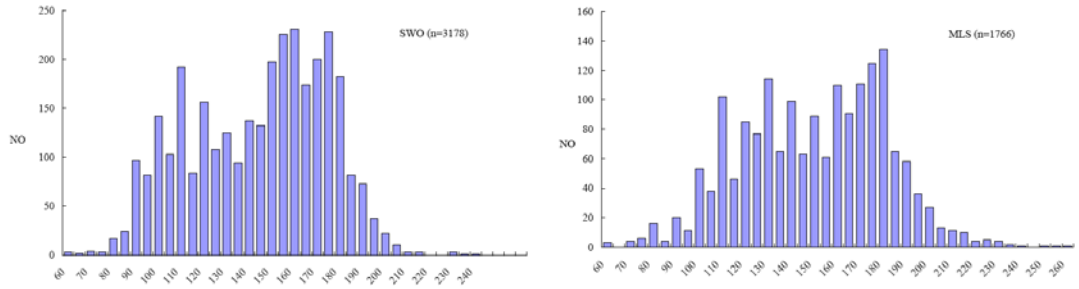
(a)SWO (b)MLS

Figure 3. The low jaw fork length frequency distribution of SWO and MLS of STLL fishery from 2002 to 2005



(a) (b)

Figure 4. The geographic distribution of SWO and MLS length data collected by DWLL fisheiesS from 2000 to 2004



(a)SWO (b)MLS

Figure 5. The low jaw fork length frequency distribution of SWO and MLS of DWLL fisheries from 2000 to 2004