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

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Introduction

Taiwanese tuna fisheries are comprised of two major fisheries, longline, and purse seine fisheries, and other small scale fisheries, such as harpoon, set net, gill net in the North Pacific Ocean (North of equator). Longline and purse seine fisheries occupy around 99% of the total tuna catch of Taiwanese fisheries. For longline fishery, it consists of large-scale tuna longline fleet (LTLL, previous named DWLL, ≥ 100 GRT) and small-scale tuna longline fleet (STLL, previous named OSLL, < 100 GRT). The total catch of tunas and billfish (including swordfish, striped marlin, blue marlin, black marlin, and sailfish) for longline fishery (including the catch of LTLL and STLL) in the North Pacific Ocean was 29,598 mt (metric ton) in 2013. The active vessels of LTLL operating in the Pacific Ocean in 2013 were 82 and STLL were 1,296. For purse seine fishery, the total catch was 212,480 mt caught by 34 vessels in the Pacific Ocean in 2013. This paper described the recent trend of Taiwanese tuna fishery in the North Pacific Ocean, and purse seine fishery in the Pacific Ocean.

1. Fisheries Monitoring

1.1. Tuna Longline fishery

1.1.1 Large-scale tuna longline fleet

Large-scale tuna longline (LTLL) vessels refer to those vessels larger than or equal to 100 gross register ton (GRT). Those vessels mostly operate in the high sea areas or in the EEZs of coastal countries under fisheries cooperation agreements. Table 1 shows the number of Taiwanese vessels actually engaged in fishing in the Pacific Ocean from 2005 to 2013. For the purpose of sustainable use of fishery resources, Taiwan imposed a fleet size reduction program on its large-scale tuna longline vessels from 2005 to 2007. Through this program, 32 large-scale tuna longline vessels were reduced in the Pacific Ocean during 2005 - 2007. The number of active vessels reached low level in 2008 and 2009 due to high fuel price with some fishing vessels ceasing operation temporarily, and the vessel number returned to 90 in 2010 and slightly increased to 95 for some shifting from Indian Ocean for pirate issue in 2011. The vessels have been reduced to 82 for 2013 with some vessels shifting back to the Indian Ocean.

Table 2 shows catch and effort of Taiwanese LTLL vessels operated in North Pacific Ocean during 1997-2013. Before the mid 1990s, the catch and effort of albacore in the North Pacific was very low. Thereafter, as fishing condition got better, the fishing effort in the North Pacific increased from 1997 and peaked in 2004. However, since 2005, the fishing efforts gradually decreased due to the above mentioned fleet reduction program. Additionally affected by the high fuel price in 2008 and 2009, the number of active vessels targeting albacore in the North Pacific Ocean decreased from 24 in 2006 to 13 in 2009. Thereafter, the number gradually recovered to 22 in

2013.

From 1997 to 2000, albacore is the main catch of Taiwanese LTLL in the North Pacific Ocean, occupied more than 70% of total catch, but since 2001, the catch of bigeye tuna, yellowfin tuna and swordfish increased significantly. The catch of albacore have gradually declined to 1,866 mt in 2009, which was the lowest catch of pass ten years, but it showed slight increasing trend during the recent three years. The albacore catch in 2011 and 2012 was estimated as 2,972 mt and 2,055 mt respectively. The catch in 2013 was preliminarily estimated as 3,836 mt. For LTLL, Pacific bluefin tuna was caught incidentally, and the amount was very small. 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 to less than 500 mt from 2005 to 2009 due to reducing efforts. The catch of swordfish increased to more than 500 mt from 2010 to 2011, but it declined to 291 mt in 2013. Table 3 shows sharks catch by species for Taiwanese LTLL operated in the North Pacific Ocean during 2009-2013. The annual shark catch was preliminary estimated as 749 mt in 2013. The distribution of fishing efforts of Taiwanese LTLL vessels operating in the Pacific Ocean during 2011-2013 is shown in Figure 1.

The length frequency of albacore, swordfish caught by LTLL in the North Pacific are shown in Figures 2 and 3 which were obtained from commercial logbooks. The predominant size range for albacore caught by LTLL from 2011-2013 were 86-94cm, 86-102cm and 92-104cm in fork length, respectively. The dominant size range for swordfish caught by LTLL from 2011-2013 was 155-185cm, 165-180cm and 145-185cm in low jaw fork length, respectively.

1.1.2 ll-scale tuna longline fleet

The small-scale tuna longline (STLL) vessels generally refer to those vessels smaller than 100 GRT (mostly 50-70 GRT). Table 4 shows catch of domestic-based and foreign-based STLL vessels operated in the North Pacific by species from 1997 to 2013. STLL vessels were mainly is targeted on yellowfin with some bycatch of albacore. Estimated albacore catch in the region fluctuated between 450 and 930 mt during 2002 to 2012. A preliminary albacore catch was estimated as 591 mt in 2013. The catch of swordfish fluctuated between 1,200 mt to 4,000 mt from 1997 to 2012. The catch of swordfish in 2013 was preliminary estimated as 2,555 mt. As for Pacific bluefin tuna, in 2007, the catch was 1,401 mt, but it gradually decreased to 210 mt in 2012. The preliminary estimated catch in 2013 was 331 mt, slightly increased from 2012. Table 5 shows sharks catch by species for Taiwanese STLL operated in the North Pacific Ocean during 2009-2013. The annual shark total catch was preliminary estimated as 10,118 mt in 2013. The distribution of fishing efforts for STLL vessels from 2011 to 2013 is shown in Figure 4.

The length frequency of albacore, swordfish, and Pacific bluefin tuna caught by STLL vessels in the North Pacific are shown in Figure 2, Figure 3, and Figure 5 separately. For STLL, the size measurements for albacore, swordfish and Pacific bluefin tuna were sampled from domestic fishing ports. The amount of size measurements for albacore from 2011-2013 were 851, 1,421 and 424. The dominant size range for albacore caught by STLL from 2011-2013 was 86-100cm, 86-98cm and 94-104cm. Since the low jaw of swordfish was generally cut on board, eye-fork length was then measured instead. The amount of length measurement for swordfish from 2011-2013 was 995, 1,106 and 713. The dominant size range for swordfish caught by STLL from

2011-2013 was 95-145cm, 95-150cm and 100-145cm, separately. The amount of size measurements for Pacific bluefin tuna from 2011-2013 were 952, 684 and 1,090. The dominant size range for Pacific bluefin tuna caught by STLL from 2011-2013 was 230-245cm, 230-250cm and 235-250cm.

1.2. Distant water purse seine fishery

Tuna purse seine fishery was introduced into Taiwan in 1982. At the outset second-hand Japanese group purse seiners were imported and Japanese fishing masters were employed. Through years of research, the first single boat purse seiner was launched in October 1984, as the cornerstone for rapid development of this fishery in the following 10 years. In 1992 the number of purse seiners reached to the highest level of 45 boats. Due to the adjustment of business strategy of some companies, the number of fishing vessels was then reduced to 42. The fleet further reduced to 34 vessels in 2003, after 8 vessels were exported. Since then, it maintained around 34.

Fishing operations of the fleet moved along the equator under a seasonal pattern, mainly concentrating in the exclusive economic zones of Papua New Guinea, Federated States of Micronesia, Kiribati, Nauru, Marshall Islands and Solomon Islands, as well as the neighboring high seas. In the years where El Niño phenomena occur the fish tends to move eastwards and the fishing activities will follow the pattern of this movement. In contrary, in years of La Niña, fish schools tend to concentrate more in the western part of the Pacific, and likewise do the fishing activities.

In 2013, the number of active distant water purse seine vessels was 34. The fishing effort distribution in recent three years was shown in Figure 6. The fishing effort is more concentrated in the western Pacific Ocean. The total catch by purse seine fishery in 2013 was increased to 212,480 mt from 200,653 mt in 2012 (Table 6). Fishing effort and catch by species for Taiwanese DWPS operated in the North Pacific Ocean is shown as table 7.

1.3 Other fisheries

Some other small scale fisheries, such as harpoon, set net and gill net may also catch tunas and tuna-like species in the Taiwanese coastal and offshore waters. Table 8 shows the annual catch of 2013 for Taiwanese small scale coastal and offshore fisheries in the North Pacific Ocean. The total catch of these fisheries was estimated about 3,053 mt in 2013.

2. DATA COLLECTION

2.1 Tuna longline fishery

2.1.1 Large-scale tuna longline fleet

Two types of fisheries statistical data are routinely collected for LTLL: the commercial data (for estimation of total catches), and the logbook data (for stock assessment purposes). Several sources of commercial information were available including traders, Taiwan Tuna Association, certified weight reports provided by the Organization for the Promotion of Responsible Tuna Fisheries

(OPRT) 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 deployment, fishing location, as well as the length measurement of the first 30 fishes caught each day. Categories II and III data were all compiled based on this data set.

2.1.2 Small-scale tuna longline fleet

Two categories of STLL are defined: one is that station and unload their catches at domestic fishing ports (domestic-based STLL), and the other is that station and unload catches at foreign ports (foreign-based STLL). For domestic-based STLL, the landing records from local fishing markets provide the best information for estimating the ISC Category I data. For foreign-based STLL, preliminary estimations of Category I data were based on fishing vessels activities, import statistics of Japanese markets and monthly catch report.

Since 1997, logbooks of STLL have been collected, and port sampling at domestic fish markets has also been strengthened by collecting size data of major tuna species (mainly bigeye tuna and yellowfin tuna). However, at the beginning, the recovery rate of logbook was about 2% - 5% which was too low to be compiled for Category II data, and insufficient for stock assessment. To improve the recovery rate of logbook, Fisheries Agency have launched a data improving program by dispatching its staffs to collect logbooks, to interview with fishermen so as to obtain fisheries information, and to conduct size sampling program at main domestic fishing ports of Tungkan, Nanfangao and Singang since April 2007. Through the program, the recovery rate of logbook was improved to 15% in 2013.

For the purpose of conservation and management of Pacific bluefin tuna resource and well collection of catch data, Fisheries Agency has imposed a Catch Documentation Scheme (CDS) since March 2010. According to the regulation, all vessels fishing for Pacific bluefin tuna shall be authorized by Fisheries Agency every year and satellite based vessel monitoring system (VMS) is required to be installed on board. Once Pacific bluefin tuna was caught, fisher shall attach a tag issued by Fisheries Agency to each Pacific bluefin tuna, record the number and individual weight of Pacific bluefin tuna. The record shall be reported to Fisheries Agency on a daily basis. When the catch of Pacific bluefin tuna is landing, Fisheries Agency would dispatch its staffs to fishing ports to measure individual weight and length. In addition, Catch Documentation shall be validated by local authorities before the first sale whether the catch is for domestic consumption or for export. Through the program, the data collection of individual weight and length of Pacific bluefin tuna has reached 100% from 2010 to 2013.

2.2 Distant water purse seine fishery

The logbook recovery rate for distant water purse seine fishery has always been satisfactory, reaching 100% since the development of the fishery.

2.3 Other fisheries

The annual catch data of small scale coastal and offshore fisheries was collected from yearbook directly. For collecting information and developing estimation system of these coastal and offshore fisheries, a new program is under construction.

2.4 Observer program

For the purposes of better understanding the fishing activities of the longline fishery, including target and non-target fish species and to be in line with the international requirement for conserving marine resources, Fisheries Agency has launched a pilot observer program since 2001 in the Indian Ocean. Table 9 shows the number of observational trips in each year during 2002-2013. The observer program has been carried out in Pacific Ocean since 2002. In accordance with the government's policy in establishing an observers program and availability of budgets to support the increase of observers, the observational trips gradually increased year by year. In addition, Fisheries Agency began to dispatch observers to STLL from 2012. The number of observation trips in 2013 for LTLL and STLL was 15 and 15 respectively.

The duty of observer on board is to collect catch and effort data, and biological data, such as otoliths, gonads and muscles.

2.5 VMS monitoring

Vessel monitoring system (VMS) has been installed on some longliners (over 100 tons) prior to 2005. Since 2005, Taiwanese tuna vessels over 20 tons fishing for highly migratory fish stocks in the area beyond national jurisdiction were required to install VMS. In addition to monitoring fishing activities, those data were also used to verify 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 in 2013 as follows :

1. Stock Assessment of Pacific bluefin tuna.
2. Age and growth of Pacific bluefin tuna revealed by otolith microstructure.
3. Impact of climate change on Pacific albacore stock and fishing ground.
4. Studies on the assessment of south Pacific albacore stock.
5. Age and growth study of south Pacific albacore.
6. Study on the north Pacific albacore resource.
7. Environmental effects on billfish CPUE in the Pacific.
8. A study on CPUE standardization and stock status for Pacific blue marlin and North Pacific swordfish.
9. The billfish and tuna tagging project in waters off eastern Taiwan.
10. Research on Ecological Related Species bycatch of distant water tuna longline fisheries.
11. Comparisons of effects from different CPUE standardization models on WCPO yellowfin tuna for Taiwanese longline fishery.
12. Estimation of historical catches and standardization of CPUEs for dominant sharks in three oceans.

And the scientific papers presented at recent ISC meetings during 2013 to 2014 were as follows:

1. Catch and standardized CPUE of the blue shark by Taiwanese large-scale longline fishery in the North Pacific Ocean. (ISC/13/SHARKWG-1/07)
2. Catch and abundance index of the blue shark by Taiwanese small-scale longline fishery in the North Pacific Ocean. (ISC/13/SHARKWG-1/08)
3. Estimate of the intrinsic rate population increase for the blue shark in the North Pacific. (ISC/13/SHARKWG-2/04)
4. Updated historical catches and standardized CPUE series of blue shark by Taiwanese tuna longline fisheries in the North Pacific Ocean. (ISC/13/SHARKWG-2/05)
5. Updated estimation of catch and CPUE of the blue shark in Taiwanese large-scale longline fishery.(ISC/13/SHARKWG-2/06)
6. Estimate of intrinsic population increase rate for the blue shark in the North Pacific. (ISC/13/SHARKWG-2/07)
7. Development of Taiwanese albacore-targeting longline fisheries in the North Pacific Ocean, 1995-2010.(ISC/13/ALBWG-01/16)
8. Taiwanese albacore-targeting longline fisheries in the North Pacific Ocean, 1995-2011(ISC/13/ALBWG-3/01)
9. Standardizing catch and effort data of the Taiwanese distant-water tuna longline fishery for blue marlin (*Makaira nigricans*) in the Pacific Ocean, 1967-2011. (ISC/13/BILLWG-1/09)
10. Sex-specific growth parameters and natural mortality rates of blue marlin (*Makaira nigricans*) in the northwest Pacific Ocean. (ISC/13/BILLWG-1/10)
11. Vertical and horizontal movements of blue marlin in the northwestern Pacific Ocean determined using pop-up satellite tags. (ISC/13/BILLWG-2/03)
12. Stock assessment of blue marlin (*Makaira nigricans*) in the Pacific Ocean using an age-structured model.(ISC/13/BILLWG-2/07)
13. Model selection uncertainty and multi-model inference in the generalized fishery production modeling: simulation study of the Pacific blue marlin stock. (ISC/13/BILLWG-2/10)
14. Updated and revised historical catch and standardized CPUE series of the blue shark by

Taiwanese large-scale tuna longline fisheries in the North Pacific Ocean.(ISC/14/SHARKWG-1/07)

15. A comparison study of North Pacific albacore (*Thunnus alalunga*) age and growth among various sources (ISC/14/ALBWG/04)
16. Albacore catch statistics of Taiwanese longline fisheries operated in the North Pacific Ocean, 1995-2011, and preliminary estimates for the year of 2012.(ISC/14/ALBWG/05)
17. Standardized CPUE of swordfish (*Xiphias gladius*) for the Taiwanese distant-water tuna longline fishery, based on a two-stock scenario in the North Pacific. (ISC/14/BILLWG-1/07)
18. Catch estimates of swordfish (*Xiphias gladius*) for the WCNPO and EPO stocks from the Taiwanese fisheries. (ISC/14/BILLWG-1/09)
19. Standardized Catch Per Unit Effort of Pacific Bluefin Tuna (*Thunnus orientalis*) by General Linear Model for Taiwanese Small-Scale Longline Fishery in the Southwestern North Pacific Ocean. (ISC/14/PBFWG-1/01)
20. Updates of Input Data for Stock Assessment Model, Stock Synthesis 3, on Pacific Bluefin Tuna. (ISC/14/PBFWG-1/05)

Table 1. Number of Taiwanese tuna fishing vessels operated in the Pacific Ocean

Year	Fishery	Longline Fishery		Purse Seine Fishery
		LTLL	STLL	
2005		133	1,420	34
2006		104	1,490	34
2007		90	1,750	34
2008		84	1,260	34
2009		75	1,220	34
2010		90	1,236	34
2011		95	1,376	34
2012		87	1,326	34
*2013		82	1,296	34

LTLL: large scale tuna longline vessel, STLL: small scale tuna longline vessel

* Data of 2013 is still preliminary

Table 2. Fishing effort and catch by species for Taiwanese LTLL operated in the North Pacific Ocean

Unit: MT

Year	Hooks	ALB	PBF	BET	YFT	SWO	MLS	BUM	BLM	SFA	SKJ	TOTAL
1997	5,254,704	9,119	-	112	41	15	59	20	1	13	72	9,452
1998	9,752,453	8,617	-	156	39	20	90	21	5	34	444	9,426
1999	15,129,625	8,186	-	360	122	70	66	53	8	5	114	8,984
2000	24,950,519	7,898	-	1,450	584	325	153	75	19	49	195	10,748
2001	22,232,830	7,852	-	4,569	1,882	1,039	121	209	4	4	243	15,923
2002	32,474,088	7,055	-	7,257	2,689	1,633	251	138	5	1	16	19,045
2003	20,676,890	6,454	-	2,936	1,105	1,084	241	218	4	7	40	12,089
2004	34,997,887	4,061	-	4,939	1,230	884	261	372	2	11	191	11,951
2005	29,897,156	3,990	-	3,963	1,552	392	199	376	15	63	175	10,725
2006	22,532,898	3,848	1	2,756	1,035	438	204	363	5	11	8	8,669
2007	20,775,642	2,465	-	2,965	657	345	102	275	1	2	3	6,815
2008	17,301,213	2,490	+	2,840	484	338	78	255	1	20	129	6,635
2009	11,789,456	1,866	-	2,302	303	373	37	225	0	8	175	5,289
2010	16,044,584	2,281	-	3,139	467	531	53	409	32	4	44	6,960
2011	18,559,170	2,972	-	3,318	448	502	74	675	16	40	85	8,130
*2012	14,337,644	2,055	-	2,653	285	350	91	287	5	29	82	5,837
*2013	13,008,684	3,836	-	1,814	281	291	87	253	+	23	102	6,687

Species -- Albacore (ALB), Pacific bluefin tuna (PBF), bigeye tuna (BET), yellowfin tuna (YFT), swordfish (SWO), striped marlin (MLS), blue marlin (BUM), black marlin (BLM), sailfish (SFA), skipjack tuna (SKJ)

* Data of 2012 and 2013 is still preliminary

Table 3. Shark catch by species for Taiwanese LTLL operated in the North Pacific Ocean

Unit: MT

Year	BSH	FAL	SMA	OCS	THR	SPN	POR	SKX	TOTAL
2009	417	155	78	32	10	-	0	29	721
2010	238	109	54	21	9	3	0	11	445
2011	670	289	208	53	43	9	0	29	1,301
2012	401	197	74	11	6	+	0	3	692
*2013	453	173	107	0	3	+	0	13	749

Species -- blue shark (BSH), silky shark (FAL), shortfin mako sharks (SMA), oceanic whitetip (OCS), thresher sharks (THR), hammerhead sharks (SPN), porbeagle shark (POR), other sharks & rays (SKX).

* Data of 2013 is still preliminary

Table 4. Tuna and billfish catch by species for Taiwanese STLL operated in the North Pacific Ocean

Unit: MT

Year	PBF		ALB		BET		YFT		SKJ	
	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based
1997	1,814	-	337	-	3,506	-	9,419	-	59	-
1998	1,910	-	193	-	3,520	-	8,955	-	32	-
1999	3,089	-	207	-	2,578	-	8,961	-	27	-
2000	2,780	-	944	-	2,041	-	7,848	-	31	-
2001	1,839	-	832	-	1,898	-	8,166	-	26	-
2002	1,523	-	910	-	2,150	-	9,145	-	67	-
2003	1,863	0	712	0	2,299	3,837	10,567	5,122	14	-
2004	1,714	0	927	0	1,340	2,727	7,756	4,861	32	-
2005	1,368	0	477	5	1,425	3,889	8,219	3,962	33	-
2006	1,148	0	453	16	887	5,317	7,027	6,089	24	-
2007	1,401	0	321	130	1,188	3,887	6,792	5,093	17	-
2008	979	0	353	226	722	5,333	7,886	4,681	15	-
2009	877	0	320	192	859	2,948	9,048	4,074	66	-
2010	373	0	401	136	427	1,540	9,950	3,742	169	-
2011	292	0	358	104	602	2,167	8,090	3,292	235	-
2012	210	0	390	198	1,376	2,864	8,923	2,314	147	43
*2013	331	0	192	399	420	3,073	5,728	4,200	219	46

Year	SWO		MLS		BUM		BLM		SFA	
	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based
1997	1,358	-	290	-	3,625	-	611	-	527	-
1998	1,178	-	205	-	3,603	-	469	-	868	-
1999	1,385	-	128	-	3,362	-	563	-	402	-
2000	1,531	1,859	161	-	4,056	-	453	-	499	-
2001	1,691	2,122	129	-	4,524	-	428	-	640	-
2002	1,557	2,209	226	-	4,310	-	173	-	504	-
2003	2,196	1,491	91	590	4,289	3,178	305	805	380	1,699
2004	1,828	1,536	95	166	3,354	2,946	620	886	514	1,567
2005	1,813	1,759	76	508	3,949	3,305	636	508	709	624
2006	2,587	1,357	87	450	3,842	1,524	275	686	425	63
2007	2,907	847	133	66	3,230	1,612	215	44	527	532
2008	2,471	936	144	48	3,347	1,875	202	47	348	570
2009	2,323	854	170	55	3,210	1,203	259	39	330	42
2010	1,917	396	173	27	3,553	997	333	50	814	146
2011	2,501	574	236	33	3,257	693	311	24	798	78
2012	2,644	752	314	38	3,152	651	233	7	716	24
*2013	1,703	852	164	121	3,255	1,099	406	38	515	150

Species -- Pacific bluefin tuna (PBF), albacore (ALB), bigeye tuna (BET), yellowfin tuna (YFT), skipjack tuna (SKJ), swordfish (SWO), striped marlin (MLS), blue marlin (BUM), black marlin (BLM), sailfish (SFA).

* Data of 2013 is still preliminary

Table 5. Shark catch by species for Taiwanese STLL operated in the North Pacific Ocean

Unit: MT

Year	BSH		FAL		MAK		OCS		THR	
	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based
2009	9,680	1,444	178	212	405	72	8	7	549	79
2010	6,720	712	132	14	562	58	6	1	452	46
2011	11,377	1,070	160	56	890	86	2	+	720	68
2012	9,494	711	87	7	643	43	2	+	543	36
*2013	4,091	1,777	39	16	383	135	0	0	532	185

Year	SPN		PO		SKX	
	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based
2009	483	69	0	0	2,815	402
2010	289	31	0	0	1,731	194
2011	354	34	0	0	2,807	280
2012	327	22	0	0	2,803	248
*2013	234	82	0	0	1,969	675

Species -- blue shark (BSH), silky shark (FAL), mako sharks (MAK), oceanic whitetip (OCS), thresher sharks (THR), hammerhead sharks (SPN), porbeagle shark (POR), other sharks & rays (SKX).

* Data of 2013 is still preliminary

Table 6. Fishing effort and catch for Taiwanese DWPS operated in the Pacific Ocean

Unit: MT

Year	Fishing days	SKJ	YFT	BET	Total
2005	4,823	165,289	27,572	2,178	195,039
2006	4,493	189,392	19,793	978	210,163
2007	4,873	209,002	21,147	2,386	232,535
2008	4,783	165,007	35,770	3,196	203,973
2009	4,363	173,725	16,237	2,113	192,075
2010	5,129	166,211	29,203	3,437	198,851
2011	5,359	155,641	18,143	2,151	175,935
2012	5,097	172,664	25,750	2,239	200,653
*2013	5,520	186,330	22,659	3,491	212,480

DWPS: distant water purse seiner

Species -- skipjack tuna (SKJ), yellowfin tuna (YFT), bigeye tuna (BET).

* Data of 2013 is still preliminary

Table 7. Fishing effort and catch by species for Taiwanese DWPS operated in the North Pacific Ocean

Unit: MT

Year	Fishing days	ALB	PBF	BET	YFT	SWO	MLS	BUM	BLM	SFA	SKJ	TOTAL
2005	-	-	-	1,167	11,166	-	-	-	-	-	69,500	81,833
2006	1,873	-	-	182	7,717	-	-	-	-	-	75,442	83,341
2007	2,082	-	-	564	8,037	-	-	-	-	-	87,232	95,833
2008	1,370	-	-	1,243	9,994	-	-	-	-	-	50,587	61,824
2009	1,859	-	-	568	6,319	-	-	-	-	-	69,026	75,913
2010	1,370	-	-	121	1,215	-	-	-	-	-	42,397	43,733
2011	1,463	-	-	724	4,037	+	-	2	3	+	42,796	47,562
2012	2,072	-	-	764	7,517	-	+	12	2	+	71,482	79,777
*2013	1,842	-	-	1,749	8,714	-	+	9	3	+	66,694	77,170

DWPS: distant water purse seiner

Species -- Albacore (ALB), Pacific bluefin tuna (PBF), bigeye tuna (BET), yellowfin tuna (YFT), swordfish (SWO), striped marlin (MLS), blue marlin (BUM), black marlin (BLM), sailfish (SFA), skipjack tuna (SKJ).

* Data of 2013 is still preliminary

Table 8. The annual catch of 2013 for Taiwanese small scale coastal and offshore fisheries in the North Pacific Ocean

Unit: MT

Fisheries	PBF	ALB	BET	YFT	SKJ	SWO	MLS	BUM	BLM	SFA	SSP	SKX	TOTAL
Offshore Gillnet	0	0	0	+	10	+	+	0	0	+	-	74	84
Offshore Others	0	0	6	118	760	1	+	+	0	1	-	576	1462
Coastal Gillnet	1	+	+	14	66	8	24	6	71	106	-	181	477
Coastal Setnet	2	1	+	25	220	2	+	+	4	17	-	10	281
Coastal Harpoon	0	0	0	0	0	0	197	16	166	139	-	0	518
Costal Longline	0	0	0	5	133	0	0	0	0	7	-	12	157
Coastal Others	0	0	0	14	54	0	0	0	0	0	-	6	74

Species -- Pacific bluefin tuna (PBF), albacore (ALB), bigeye tuna (BET), yellowfin tuna (YFT), skipjack tuna (SKJ), swordfish (SWO), striped marlin (MLS), blue marlin (BUM), black marlin (BLM), sailfish (SFA), shortbill spearfish (SSP), other sharks & rays (SKX).

Data of 2013 is still preliminary

Table 9. Observational trips of observer program in Pacific Ocean during 2002-2013

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	*2013
Observational trips	1	3	4	5	10	15	14	22	17	15	32	30

* Data of 2013 is still preliminary

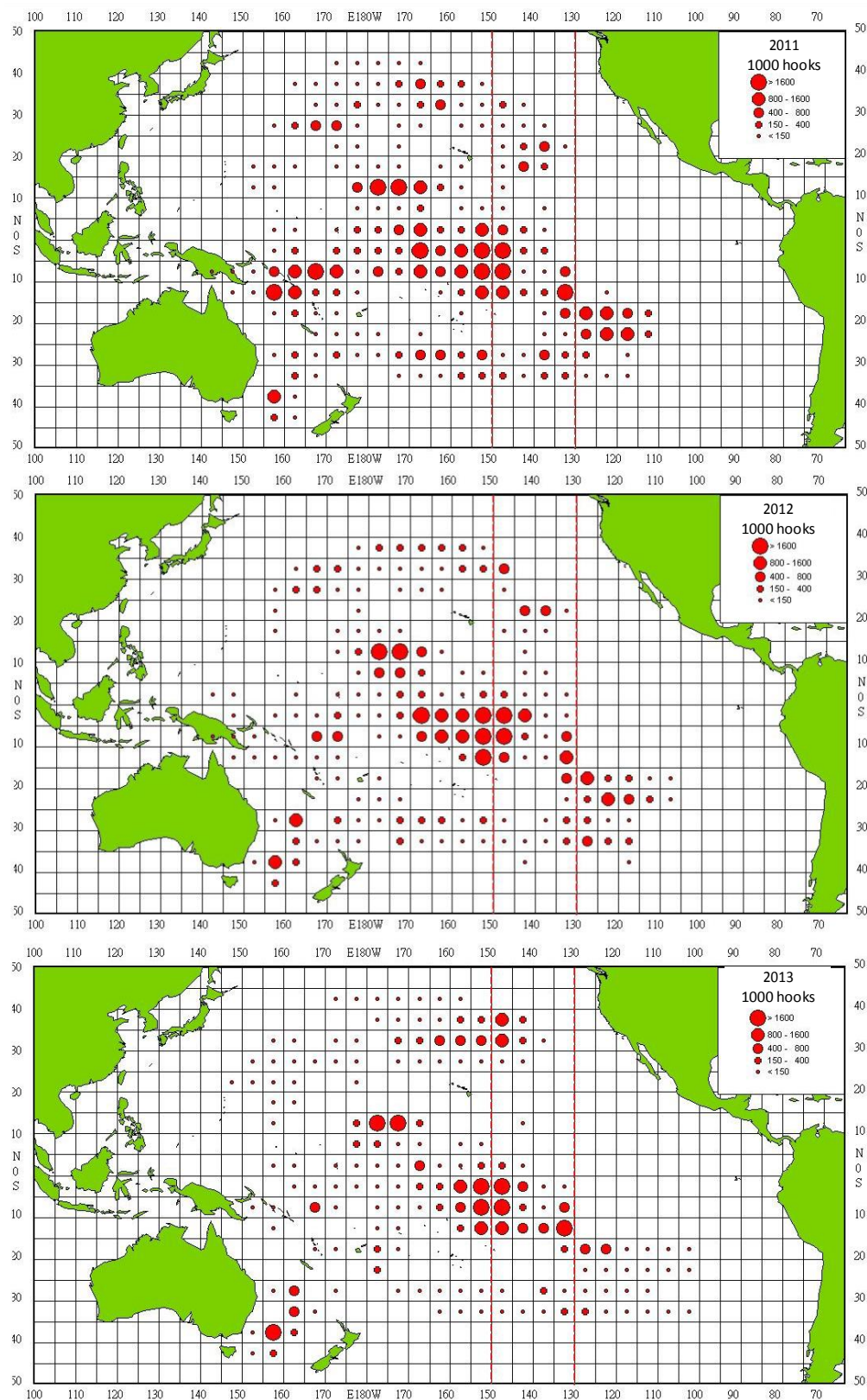


Figure 1. Distribution of fishing effort for Taiwanese LTLL vessels operated in the Pacific Ocean during 2011-2013
(Note: Map of 2012 and 2013 is still preliminary and will be revised shortly.)

LTLL

STLL

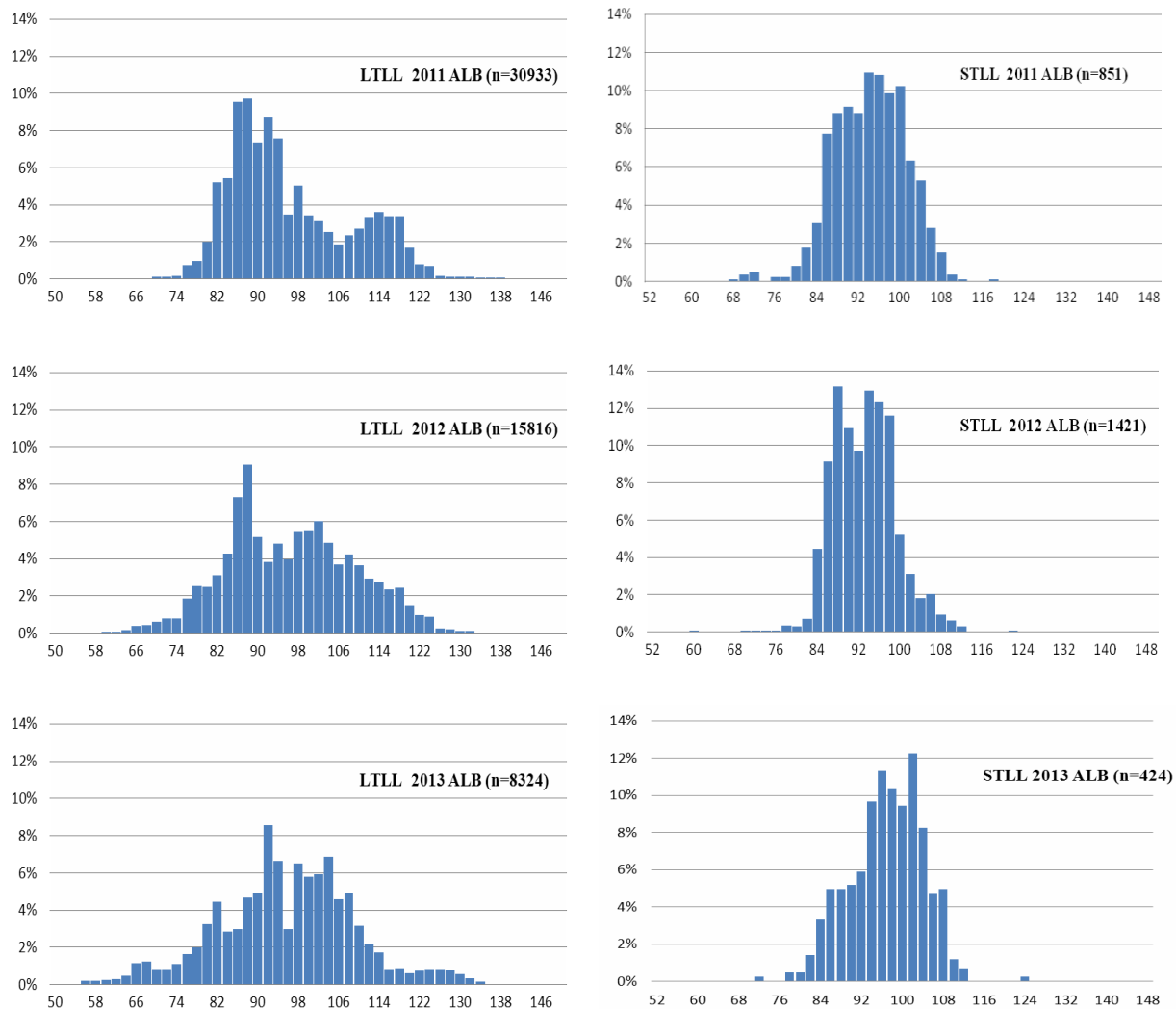


Figure 2. Length frequency distribution of albacore caught by Taiwanese LTLL and STLL vessels in the North Pacific Ocean during 2011-2013.

LTLL

STLL

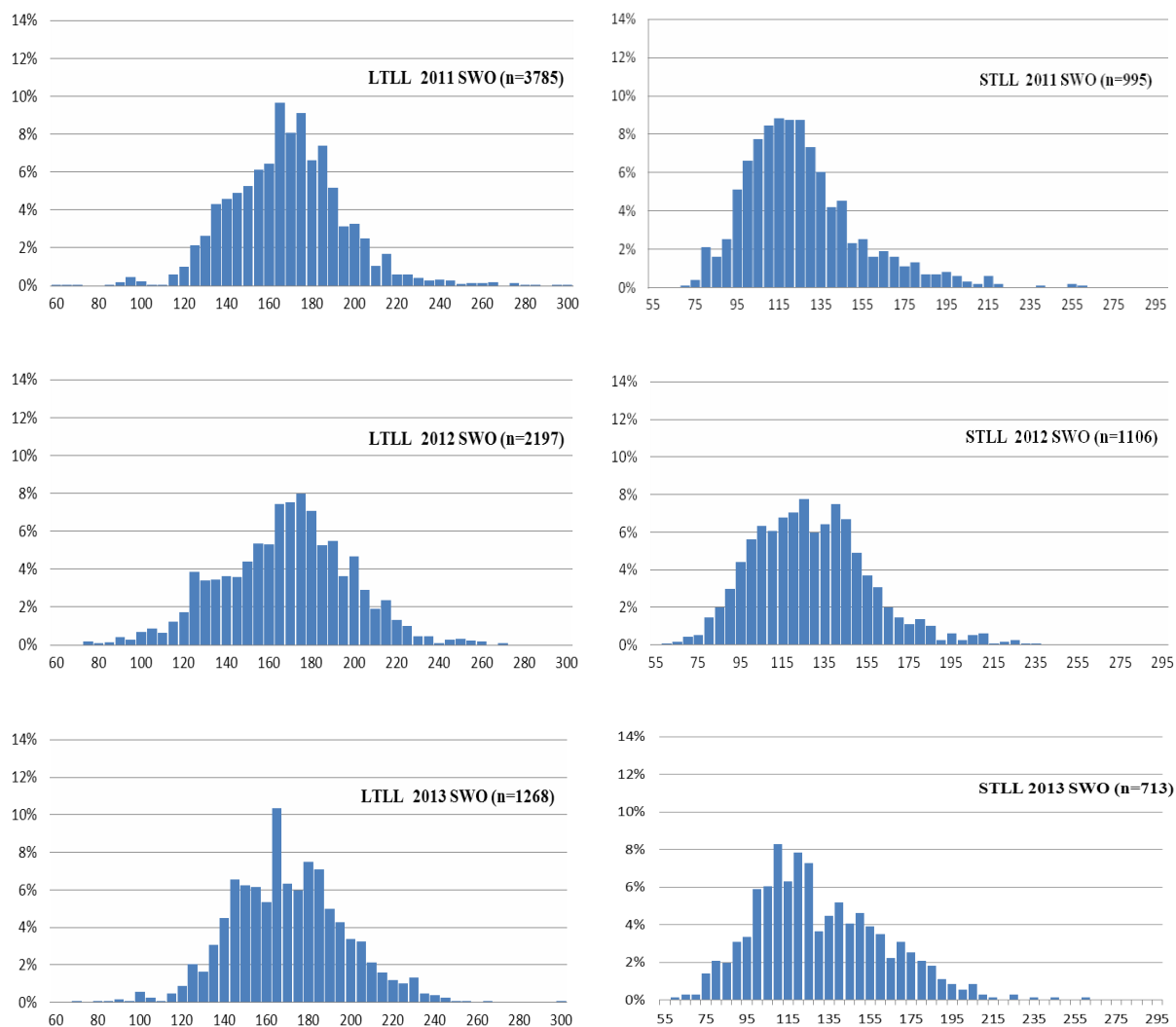


Figure 3. Length frequency distribution of swordfish caught by Taiwanese LTLL and STLL vessels in the North Pacific Ocean during 2011-2013 (measurement: low jaw-fork length for LTLL, eye-fork length for STLL).

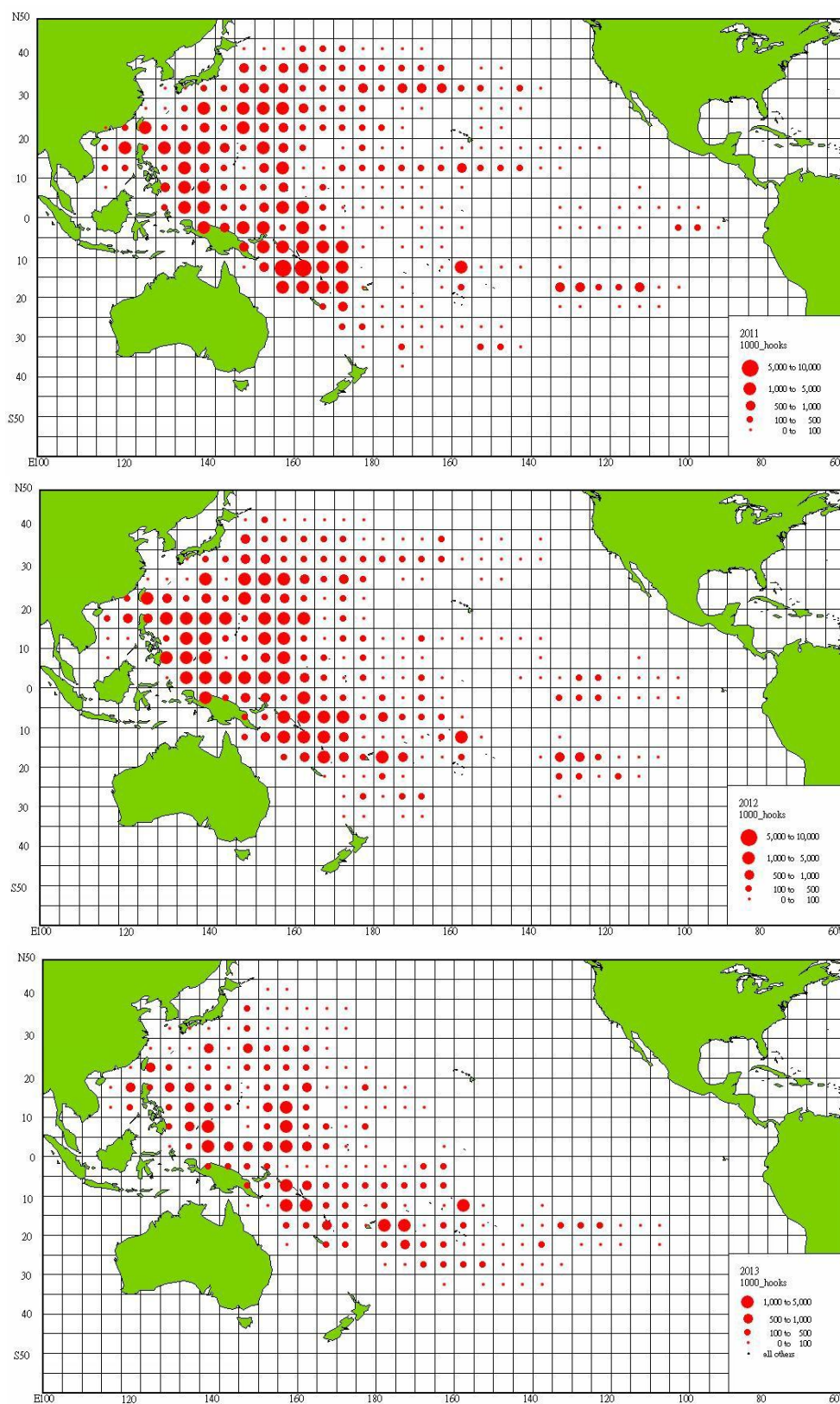


Figure 4. Distribution of fishing effort for Taiwanese STLL vessels operated in the Pacific Ocean during 2011-2013.
(Note: Map of 2012 and 2013 is still preliminary and will be revised shortly.)

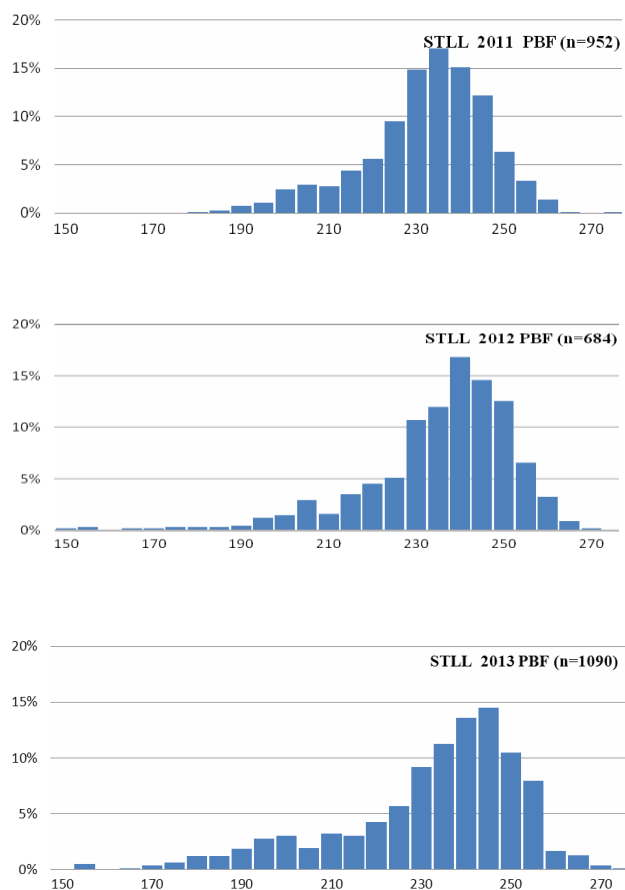


Figure 5. Length frequency distribution of Pacific bluefin tuna caught by Taiwanese STLL vessels in the North Pacific Ocean during 2011-2013.

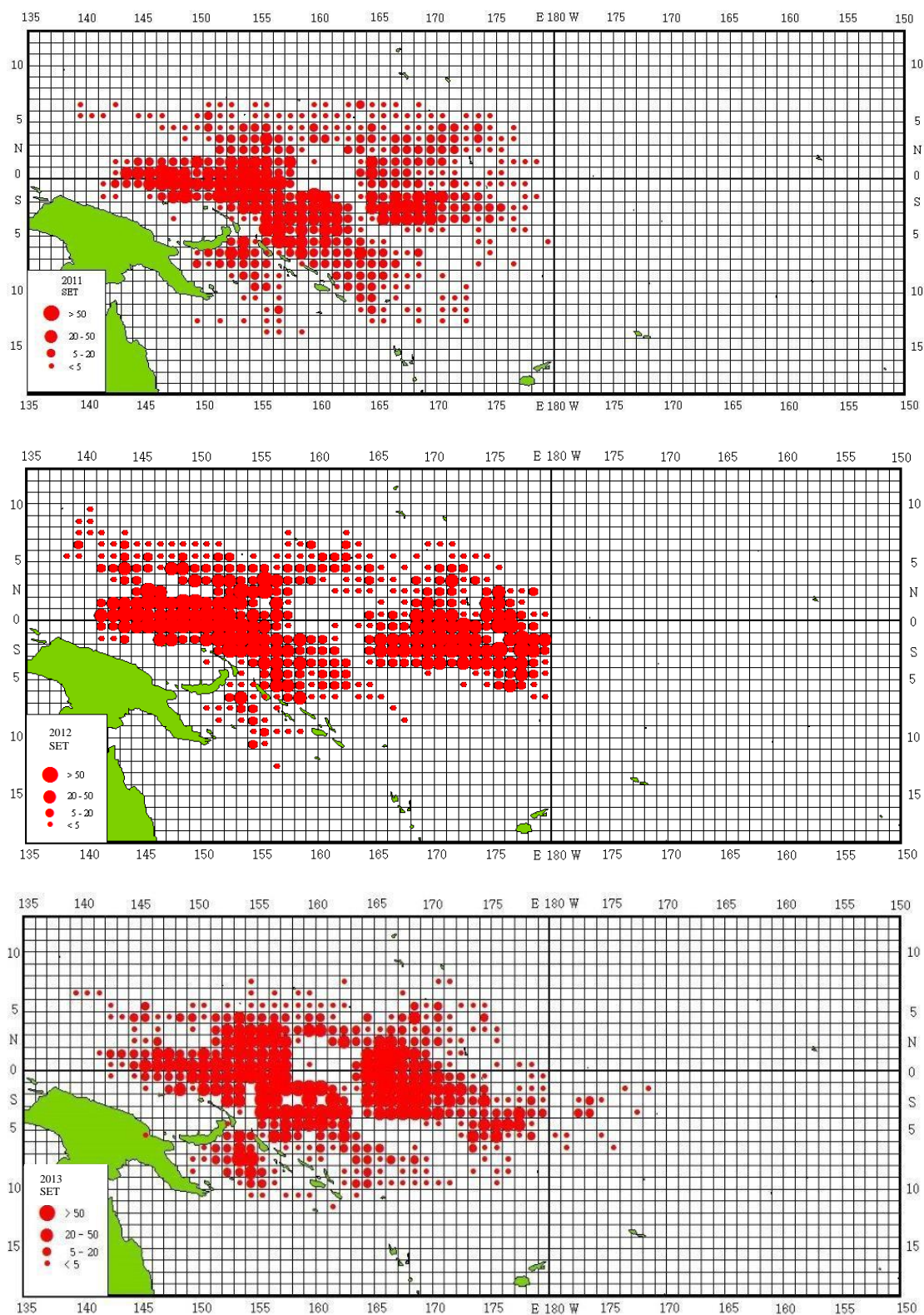


Figure 6. Distribution of fishing effort for Taiwanese distant water purse seine vessels operated in Pacific Ocean during 2011-2013.