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NATIONAL REPORT ON CHINESE TAIPEI (TAIWANESE TUNA AND TUNA-LIKE FISHERIES IN THE NORTH PACIFIC OCEAN IN 2021)

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INTRODUCTION

Taiwanese tuna fisheries in the North Pacific Ocean mainly comprise tuna longline fishery and purse seine fishery, and with some small scale fisheries operating off waters of Taiwan, such as harpoon, set net and gill net. Ninety percent of tuna and tuna-like species catch of Taiwanese fisheries in the North Pacific Ocean are from tuna longline and purse seine fisheries. The tuna longline fleet 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 catch of tuna and tuna-like species of tuna longline fishery in the North Pacific Ocean was 22,935 mt in 2021. For purse seine fishery, the total catch was 215,354 mt in the whole Pacific Ocean in 2021.

1. FISHERIES MONITORING

1.1. Tuna Longline fishery

1.1.1. Large-scale tuna longline fleet

Large-scale tuna longline (LTLL) fishing vessels refer to those whose GRT are larger than or equal to 100 GRT, which mostly operate in the high seas or in the EEZs of Pacific Island countries under access agreements. There was a fleet size reduction program conducted between 2005 and 2007, 32 LTLL vessels previously operated in the Pacific Ocean had been scrapped. The number of active LTLL vessels reached a low level in 2009 for high fuel price with some temporarily ceasing operation, and the vessel number returned to 90 in 2010 and slightly increased to 95 for some shifting from the Indian Ocean owing to piracy in 2011. After then, the number of fishing vessels reduced to 87 in 2012 and 82 in 2013 with some shifting back to the Indian Ocean. Although the number of vessels in 2014 decreased further to 73, it gradually increased to 82 in 2017. In 2018 and 2019, the number of fishing vessels reduced to 75 which excluded 7 and 11 longlines chartered by the Pacific Islands countries, respectively. And slightly increased to 82 and 85 in 2020 and 2021 (Table 1).

Table 2 shows catch estimates of Taiwanese LTLL fishing vessels operating in North Pacific Ocean during 1997-2018. From 1997 to 2000, albacore was the dominant species of the catch of Taiwanese LTLL in the North Pacific Ocean, accounting for more than 70% of the total catch. However, the catch of bigeye tuna, yellowfin tuna and swordfish increased significantly after 2001. The catch of albacore had gradually declined to 1,866 mt in 2009, and then rebounding to 3,836 mt in 2013. Since then, the albacore catch showed a decreasing trend and the catch declined to 1,565 mt in 2020, which reached the historical lowest level. The annual albacore catch was preliminary estimated at 2,266 mt in 2021.

Prior to 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 the reduction of fishing efforts. The catch of swordfish increased to more than 500 mt from 2010 to 2011, gradually decreased to 225 mt in 2014, and more than 500 mt from 2015 to 2019. The preliminary estimated catch in 2021 was at 328 mt, which reached the lowest level since 2015. Table 3 shows catch of shark species of Taiwanese LTLL fishery in the North Pacific Ocean during 2009-2021. The annual shark catch was preliminary estimated at 1,504 mt in 2021.

The distribution of fishing efforts (in 1,000 hooks) of Taiwanese LTLL fishing vessels in the Pacific Ocean during 2019-2021 is shown in Figure 1. The weight frequency of albacore and

swordfish caught by LTLL in the North Pacific, compiling from e-logbook data, are shown in Figures 2 and 3. The predominant weight ranges for albacore catch of LTLL between 2019 and 2021 are 12 to 16 kg, 6 to 14 kg, and 8 to 14 kg, in whole weight, respectively. The dominant weight ranges for swordfish catch of LTLL between 2019 and 2021 are 20 to 50 kg, 20 to 60 kg, and 20 to 75 kg in dressed weight, respectively.

1.1.2 Small-scale tuna longline fleet

The small-scale tuna longline (STLL) vessels generally refer to those smaller than 100 GRT (mostly 50-70 GRT). Table 4 shows the catch of Taiwanese STLL vessels operating in the North Pacific by species from 1997 to 2021. STLL vessels are mainly targeting tropical tuna with some bycatch of albacore, and some of them are seasonally targeting sharks. Prior to 2015, the catch estimation of albacore in the North Pacific Ocean was less than 1000 mt, and then has increased since 2016. A preliminary albacore catch was estimated at 3,687 mt in 2021. The catch of swordfish fluctuated between 1,200 mt to 4,000 mt from 1997 to 2020 and the catch in 2021 was preliminary estimated at 739 mt. As for Pacific bluefin tuna, since 2008, the catch fell below 1,000 mt and gradually decreased to 210 mt in 2012, reaching the lowest in the latest decade. The preliminary estimated catch of Pacific bluefin tuna in 2021 was 1,478 mt which reaches a high level in recent 10 years. Table 5 shows the shark catch by species for Taiwanese STLL operating in the North Pacific Ocean during 2009-2021. The shark catch was preliminarily estimated at 9,212 mt in 2021, which reached the historical lowest level. The distribution of fishing efforts for STLL vessels from 2019 to 2021 is shown in Figure 4.

The weight 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 weight measurements for albacore, swordfish and Pacific bluefin tuna are sampled at domestic fishing ports. The dominant weight ranges for albacore caught by STLL from 2019-2021 are 16-20 kg, 14-18 kg, and 16-20 kg in whole weight (Figure 2). For swordfish, the dominant weight ranges from 2019-2021 are 10-25 kg, 15-35 kg, and 10-35 kg in dressed weight, separately (Figure 3). For Pacific bluefin tuna, the dominant weight ranges from 2019 to 2021 are 160-215 kg, 160-215 kg, and 155-215 kg in gutted weight, respectively (Figure 5).

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 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 2004, the number of authorized purse vessels has maintained around 34. In 2021, the number of active fishing vessels was 29.

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 when 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 the fishing activities move likewise. The distribution of fishing effort in recent three years is shown in Figure 6. The total

catches of SKJ, YFT and BET by the purse seine fishery in 2021 increased to 215,354 mt from 150,372 mt in 2020 (Table 6). Catch by species for Taiwanese purse seiners operating 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 have reported some catches of tunas and tuna-like species in Taiwanese coastal and offshore waters. Table 8 shows the catch of 2021 for Taiwanese small scale coastal and offshore fisheries in the North Pacific Ocean.

2 DATA COLLECTION

2.1 Tuna longline fishery

2.1.1 Large-scale tuna longline fleet

In the past, several types of fisheries data, including commercial data, weekly report, and logbook data were collected to estimate the LTLL catches. The commercial data are collected from traders, Taiwan Tuna Association, certified weight reports provided by the Organization for the Promotion of Responsible Tuna Fisheries (OPRT) and so on. 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 set. In addition, the weekly reports were used to enhance the timeliness of logbook data. After cross-checking and compilation, the commercial information was used to estimate total catches of the Category I data, and the logbook data was used to compile the catch and effort data for Categories II and III.

In 2014, Taiwan introduced the electronic logbook system and enforced it on LTLL in the first period. Under this system, fishing vessels are all required to report their fishery data daily to the data center of Fisheries Agency through satellite transmission. The system improves the recovery rate of fishery data in a real-time manner and both logbook and weekly report are gradually replaced. In addition, two new measures have been implemented to collect the unloading data. All fishermen shall submit landing declaration after offloading their catches. Also, port inspection conducted by the Fisheries Agency is another source for landing data. Both are used to verifying e-logbook data. In recent year, these data are the main sources for the data preparation of Categories I, II and III.

2.1.2 Small-scale tuna longline fleet

Similar to LTLL, the approaches of data collection for STLL also have been improved during the last several years. In the past, we divided STLL into two categories, namely the domestic-based STLL and the foreign-based STLL, based on the ports that the vessels station and unload their catch. For domestic-based STLL, the landing records from local fishing markets were the main source of Category I data, on the other hand, the landing reports collected from foreign-based agents and monthly catch report from individual vessel were used to estimate the Category I data for foreign-based STLL. As for Categories II and III, the logbook data of STLL had been collected since 1997, and the size data of major tuna species (mainly bigeye tuna and yellowfin tuna) have been sourced from port sampling conducted at domestic fish markets. At the beginning, the low recovery rate of logbook resulted in difficulty in compiling Category II data stock assessment. To improve the recovery rate of logbook, Fisheries Agency has launched a data improving program by dispatching its staffs to collect logbook, interviewing with fishermen so as to obtain fisheries information, and conducting size sampling program at main domestic fishing ports including Donggang, Nanfangao and Hsinkang since April 2007. Through this program, the recovery rate of logbook has been gradually improved.

In 2015, the implementation scope of e-logbook system was broadened. The Fisheries Agency required STLL vessels operating outside the EEZ of Taiwan to report their catches through the satellite transmission daily since 2016. Due to the great improvement on the recovery rate of the e-logbook of STLL, those e-logbook data are gradually used as the main source. Like LTLL, data from landing declaration and port inspection are also used to verify the e-logbook data reported by fishermen.

Recognizing the importance of Pacific Bluefin tuna to our fishery, Fisheries Agency has implemented the Catch Documentation Scheme (CDS) for the purpose of conservation and management since March 2010. According to the regulation, all longline vessels fishing for Pacific bluefin tuna shall get prior authorization by Fisheries Agency every year and carry an automatic location communicator (ALC) on board. Fishermen have to attach a tag issued by Fisheries Agency to every Pacific bluefin tuna landed on board and report the location, the tag serial number, and the estimate weight to the Fisheries Agency. As mentioned above, all PBF catch landed at the domestic fishing ports would be weighted and measured the length. For PBF catch which is not attached with a tag nor reported by fisherman, the CDS will not be issued for it. It takes a positive effect on the data collection of the Pacific Bluefin tuna.

To develop the Pacific Bluefin Close-Kin Mark Recapture project, ISC members decided to collect tissue samples for genetics analysis. In 2020, Taiwan has already collected 800 tissue samples of Pacific bluefin tuna. These Pacific bluefin tuna were caught by STLL and sampled from domestic fishing ports of Donggang and Nanfangao. The length distribution of sampled fish was between 175 cm and 268 cm in fork length. There was no more sample collected during 2021.

2.2 Distant water purse seine fishery

The logbook recovery rate for distant water purse seine fishery has always been satisfactory and reaching 100%, and all purse seiners have been required to report their operation data via iFIMS (integrated Fisheries Information Management System) in a real-time manner since 2015. Length data has been collected from fishing vessels since 2013.

2.3 Other fisheries

The annual catch data of small scale coastal and offshore fisheries are collected and compiled by local governments.

2.4 Observer program

To better understand the fishing activities of the longline fishery, including target and non-target species and to be in line with the international requirements for conserving marine resources, Fisheries Agency has launched a pilot observer program since 2001 in the Indian Ocean. Further, the observer program has been carried out in the Pacific Ocean since 2002. Table 9 shows the number of observers deployed on board annually during 2012-2021. In accordance with the government's policy of establishing an observer program and availability of budgets to support the increase of observers, the number of observers gradually increased annually, besides, it has been extended to the STLL fleets since 2012. The number of observers deployed on longline vessels in 2021 was 54 in total, including 19 observers for LTLL vessels and 35 observers for STLL vessels, respectively. Three of them both deployed on LTLL and STLL vessels in 2021. The observer coverage rate for both LTLL and STLL has met the RFMOs' requirement of 5%.

2.5 VMS monitoring

Since 2005, Taiwanese tuna fishing vessels with GRT over 20 tons fishing for highly migratory fish stocks are required to install ALC and transmit one vessel position every 4 hours. In 2018, the measure further required the vessels operating in the area beyond national jurisdiction to transmit their positions every 1 hour. Afterwards, vessels with GRT over 20 tons fishing for highly migratory fish stocks operating in national jurisdiction shall also install ALC and transmit one vessel position every 4 hours since 2020 February. Through the above-mentioned measures, more information was provided regarding the distribution of the fishing operation.

Furthermore, considering the importance to monitor the fishing activities on the Pacific bluefin tuna, since 2018, the requirement of installation of ALC and transmitting vessel position is extended from vessels over 20 GRT to all sized longline vessels that intend to fish for the Pacific bluefin tuna. The data will be used to monitor fishing activities as well as to verify the fishing location that recorded in logbooks.

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 2021 as follows：

1 Study on abundance index and HS/MS elements for WCPO tropical tunas.
2 A study on the elements of the harvest strategy/management strategy developments of the south Pacific albacore tuna and the biology and stock assessment of Pacific blue marlin.
3 Stock status and NDF assessment of sharks in the Pacific Ocean.
4 The impacts of mitigation measures on the bycatch species in Taiwanese distant water vessels.

Besides, the scientific papers presented at recent ISC meetings during 2021 to 2022 were as follows:

1 Updated standardized CPUE and historical catch estimate of the shortfin mako shark caught by Taiwanese large-scale tuna longline fishery in the North Pacific Ocean. (ISC/21/SHARKWG-1/01)
2 Updated size composition of shortfin mako shark caught by the Taiwanese tuna longline fishery in the North Pacific Ocean. (ISC/21/SHARKWG-1/02)
3 Movement ecology of swordfish (Xiphias gladius) in the northwestern Pacific Ocean using electronic tags and stable isotope analysis. (ISC/21/BILLWG-01/06 rev1)
4 Size pattern and relative CPUE of Taiwanese PBF fisheries using delta-generalized linear mixed models (GLMM) and vector-auto-regressive spatiotemporal model (VAST). (ISC/21/PBFWG-1/03)
5 Preliminary base-case models in stock synthesis 3.30 for consideration in the 2021 Pacific blue marlin (Makaira nigricans) stock assessment. (ISC/21/BILLWG-02/01)
6 Catch, size and distribution pattern of the blue shark caught by the Taiwanese small-scale longline fishery in the North Pacific. (ISC/21/SHARKWG-02/12)
7 Size and spatial distribution of the blue shark, Prionace glauca, caught by the Taiwanese large-scale longline fishery in the North Pacific Ocean. (ISC/21/SHARKWG-02/13)
8 Updated standardized CPUE and catch estimation of the blue shark caught by the Taiwanese large scale tuna longline fishery in the North Pacific Ocean. (ISC/21/SHARKWG-02/14)
9 Catch and size data of striped marlin (Kajikia audax) by the Taiwanese fisheries in the Western and Central North Pacific Ocean during 1958-2020. (ISC/21/BILLWG-02/XX)

10 A Preliminary Stock Synthesis Model Conducted for the WCNPO Striped Marlin based on the growth parameters of SWPO striped marlin. (ISC/22/BILLWG-01/Presentations/01)

Regarding international cooperation in research, NRIFSF of Japan, sponsored by Ajinomoto Group Corporate, had conducted skipjack tagging project in the waters off Japan since 2009 to study the migration route of skipjack. As it is believed that some tagged skipjack off Yonaguni were harvested by Taiwanese fishermen, NRIFSF proposed to work with Taiwanese scientists to recover tags on skipjack. In 2016, Taiwan began to assist the cooperation program on tag recovery. There were 5 tags recovered and returned to NRIFSF as by the end of 2019, but no tag recovered during 2020 and 2021.

Table 1. Number of active Taiwanese tuna fishing vessels in the Pacific Ocean by fishery

Fishery Year	Longline Fishery		Purse Seine Fishery
	LTLL	STLL	
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
2014	73	1,275	34
2015	76	1,306	34
2016	79	1,303	34
2017	82	1,079	28
2018	75	843	27
2019	75	723	30
2020	82	710	28
2021*	85	787	29

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

* Data of 2021 are still preliminary. The numbers of chartered LL vessels are excluded.

Table 2. Catch by species of the Taiwanese LTLL fishing vessels operating in the North Pacific Ocean

Unit: mt

Year	ALB	PBF	BET	YFT	SWO	MLS	BUM	BLM	SFA	SKJ	TOTAL
1997	9,119	0	112	41	15	59	20	1	13	72	9,452
1998	8,617	0	156	39	20	90	21	5	34	444	9,426
1999	8,186	0	360	122	70	66	53	8	5	114	8,984
2000	7,898	0	1,450	584	325	153	75	19	49	195	10,748
2001	7,852	0	4,569	1,882	1,039	121	209	4	4	243	15,923
2002	7,055	0	7,257	2,689	1,633	251	138	5	1	16	19,045
2003	6,454	0	2,936	1,105	1,084	241	218	4	7	40	12,089
2004	4,061	0	4,939	1,230	884	261	372	2	11	191	11,951
2005	3,990	0	3,963	1,552	392	199	376	15	63	175	10,725
2006	3,848	1	2,756	1,035	438	204	363	5	11	8	8,669
2007	2,465	0	2,965	657	345	102	275	1	2	3	6,815
2008	2,490	+	2,840	484	338	78	255	1	20	129	6,635
2009	1,866	0	2,302	303	373	37	225	0	8	175	5,289
2010	2,281	0	3,139	467	531	53	409	32	4	44	6,960
2011	2,972	0	3,318	448	502	74	675	16	40	85	8,130
2012	2,055	0	2,653	285	350	91	287	5	29	82	5,837
2013	3,836	0	1,814	281	291	87	253	+	23	102	6,687
2014	2,302	0	1,349	221	225	25	146	1	0	47	4,316
2015	2,629	0	2,745	730	724	47	468	1	40	90	7,474
2016	2,395	0	2,681	1,043	692	79	600	1	20	74	7,585
2017	1,986	+	2,224	1,649	632	98	498	8	21	133	7,249
2018	1,863	0	2,095	1,314	636	71	325	1	18	47	6,370
2019	1,694	0	2,868	1,460	525	59	280	1	28	74	6,989
2020	1,565	0	1,867	946	495	46	163	1	6	26	5,115
2021*	2,266	0	1,529	923	328	55	159	1	7	128	5,396

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 2021 are still preliminary.

+:bellow 499kg catch.

Table 3. Shark catch by species for the Taiwanese LTLL fishing vessels operating 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
2014	481	68	119	0	2	0	0	5	675
2015	943	13	322	0	50	6	0	49	1,383
2016	783	7	220	0	59	5	0	30	1,104
2017	1,642	0	187	0	23	6	0	7	1,865
2018	2,255	0	265	0	58	15	0	12	2,605
2019	2,985	2	273	0	12	4	0	5	3,281
2020	2,118	2	247	0	15	3	0	6	2,391
2021*	1,295	1	196	0	7	2	0	3	1,504

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). +:bellow 499kg catch. -: there is no clear information of the catch.

* Data of 2021 are still preliminary

** Catch after 2015 was from NEPO

Table 4. Catch by species for the Taiwanese STLL fishing vessels operating in the North Pacific Ocean

Unit: mt

Year	ALB	PBF	BET	YFT	SKJ	SWO	MLS	BUM	BLM	SFA	TOTAL
1997	337	1,814	3,506	9,419	59	1,358	290	3,625	611	527	21,546
1998	193	1,910	3,520	8,955	32	1,178	205	3,603	469	868	20,933
1999	207	3,089	2,578	8,961	27	1,385	128	3,362	563	402	20,702
2000	944	2,780	2,041	7,848	31	3,390	161	4,056	453	499	22,203
2001	832	1,839	1,898	8,166	26	3,813	129	4,524	428	640	22,295
2002	910	1,523	2,150	9,145	67	3,766	226	4,310	173	504	22,774
2003	712	1,863	6,136	15,689	14	3,687	681	7,467	1,110	2,079	39,438
2004	927	1,714	4,067	12,617	32	3,364	261	6,300	1,506	2,081	32,869
2005	482	1,368	5,314	12,181	33	3,572	584	7,254	1,144	1,333	33,265
2006	469	1,148	6,204	13,116	24	3,944	537	5,366	961	488	32,257
2007	451	1,401	5,075	11,885	17	3,754	199	4,842	259	1,059	28,942
2008	579	979	6,055	12,567	15	3,407	192	5,222	249	918	30,183
2009	512	877	3,807	13,122	66	3,177	225	4,413	298	372	26,869
2010	537	373	1,967	13,692	169	2,313	200	4,550	383	960	25,144
2011	462	292	2,769	11,382	235	3,075	269	3,950	335	876	23,645
2012	588	210	4,240	11,237	190	3,396	352	3,803	240	740	24,996
2013	591	331	3,493	9,928	265	2,555	285	4,354	444	665	22,911
2014	315	483	2,687	6,964	122	2,592	115	4,715	441	443	18,877
2015	391	552	2,504	6,679	70	2,475	181	3,838	386	472	17,548
2016	1,011	454	2,650	6,920	126	1,362	135	2,798	177	553	16,186
2017	2,347	415	3,140	12,004	194	1,562	291	3,479	196	367	23,998
2018	2,651	381	3,316	10,498	251	1,488	259	3,176	239	364	22,623
2019	3,760	486	2,567	10,155	580	1,588	314	3,079	250	551	23,330
2020	2,244	1,149	1,996	5,479	380	1,373	307	1,792	233	144	15,096
2021*	3,687	1,478	2,528	6,243	368	739	215	1,939	183	159	17,539

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 2021 are still preliminary

Table 5. Shark catch by species for the Taiwanese STLL fishing vessels operating in the North Pacific Ocean

Unit: mt

Year	BSH	FAL**	MAK	OCS	THR	SPN	POR	SKX	TOTAL
2009	11,124	390	477	15	628	552	0	3,217	16,403
2010	7,432	146	620	7	498	320	0	1,925	10,948
2011	12,447	216	976	2	788	388	0	3,087	17,904
2012	10,205	94	686	2	579	349	0	3,051	14,966
2013	5,868	55	518	0	717	316	0	2,644	10,118
2014	7,670	35	391	0	531	218	0	1,403	10,248
2015	7,608	19	571	0	459	245	0	1,298	10,200
2016	7,780	26	470	0	430	172	0	1,321	10,199
2017	9,479	6	568	0	530	237	0	2,639	13,459
2018	9,506	1	585	0	533	290	0	2,785	13,700
2019	15,180	0	1,084	0	579	326	0	2,744	19,913
2020	13,443	0	1,087	0	449	348	5	598	15,930
2021*	7,527	0	368	0	539	279	+	497	9,212

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 2021 are still preliminary

** Catch after 2015 was from NEPO

Table 6. Catch by species for the Taiwanese DWPS fishing vessels operating in the Pacific Ocean

Unit: mt

Year	SKJ	YFT	BET	Total
2007	209,002	21,147	2,386	232,535
2008	165,007	35,770	3,196	203,973
2009	173,725	16,237	2,113	192,075
2010	166,211	29,203	3,437	198,851
2011	155,641	18,143	2,151	175,935
2012	172,664	25,750	2,239	200,653
2013	186,330	22,659	3,491	212,480
2014	213,154	20,548	3,418	237,120
2015	160,597	28,593	5,059	194,249
2016	146,204	34,494	4,994	185,692
2017	126,960	35,345	4,934	167,239
2018	160,599	28,427	4,656	193,682
2019	201,731	33,761	3,584	239,076
2020	123,154	23,533	3,684	150,371
2021*	179,187	25,110	11,057	215,354

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

* Data of 2021 are still preliminary

Table 7. Catch by species for the Taiwanese purse seine vessels operating in the North Pacific Ocean

Unit: mt

Year	ALB	PBF	BET	YFT	SWO	MLS	BUM	BLM	SFA	SKJ	TOTAL
2007	-	-	564	8,037	-	-	-	-	-	87,232	95,833
2008	-	-	1,243	9,994	-	-	-	-	-	50,587	61,824
2009	-	-	568	6,319	-	-	-	-	-	69,026	75,913
2010	-	-	121	1,215	-	-	-	-	-	42,397	43,733
2011	-	-	724	4,037	+	-	2	3	+	42,796	47,562
2012	-	-	764	7,517	-	+	12	2	+	71,482	79,777
2013	-	-	1,749	8,714	-	+	9	3	+	66,694	77,170
2014	-	-	1,248	8,700	+	1	7	4	+	95,091	105,051
2015	-	-	2,082	17,873	-	-	3	2	+	59,274	79,234
2016	-	-	2,196	12,586	-	1	4	2	+	57,384	72,443
2017	-	-	1,095	12,231	+	-	6	5	+	41,945	55,282
2018	-	-	1,141	9,437	-	+	10	5	+	82,292	92,886
2019	1	-	659	12,040	-	+	4	1	-	56,110	68,810
2020	-	-	1,357	8,304	-	-	-	+	-	32,274	41,935
2021*	-	-	2,881	10,020	-	-	1	1	-	43,696	56,599

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 2021 are still preliminary. +:bellow 499kg catch.

Table 8. The annual catch of Taiwanese coastal and offshore fisheries in the North Pacific Ocean for 2021 (preliminary)

Unit: mt

Fisheries	PBF	ALB	BET	YFT	SKJ	SWO	MLS	BUM	BLM	SFA	SSP	SKX	TOTAL
Offshore Gillnet	0	0	0	1	270	+	2	10	13	12	-	94	402
Offshore Others	0	0	5	168	1,572	+	0	+	+	37	-	167	1,949
Coastal Gillnet	0	0	0	2	64	0	7	20	26	69	-	205	392
Coastal Setnet	1	1	9	80	1,137	3	+	2	13	78	-	10	1,334
Coastal Harpoon	0	0	0	0	0	0	25	115	116	96	-	1	353
Costal Longline	0	0	0	3	8	+	0	0	+	1	-	4	15
Coastal Others	0	0	0	+	1	0	0	0	0	+	-	5	6

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).
+:bellow 499kg catch. -: there is no clear information of the catch.

Table 9. The number of observers deployed on tuna longline vessels in the Pacific Ocean during 2012-2021

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Number of observers	32	24	24	32	28	66	76	46	56	54

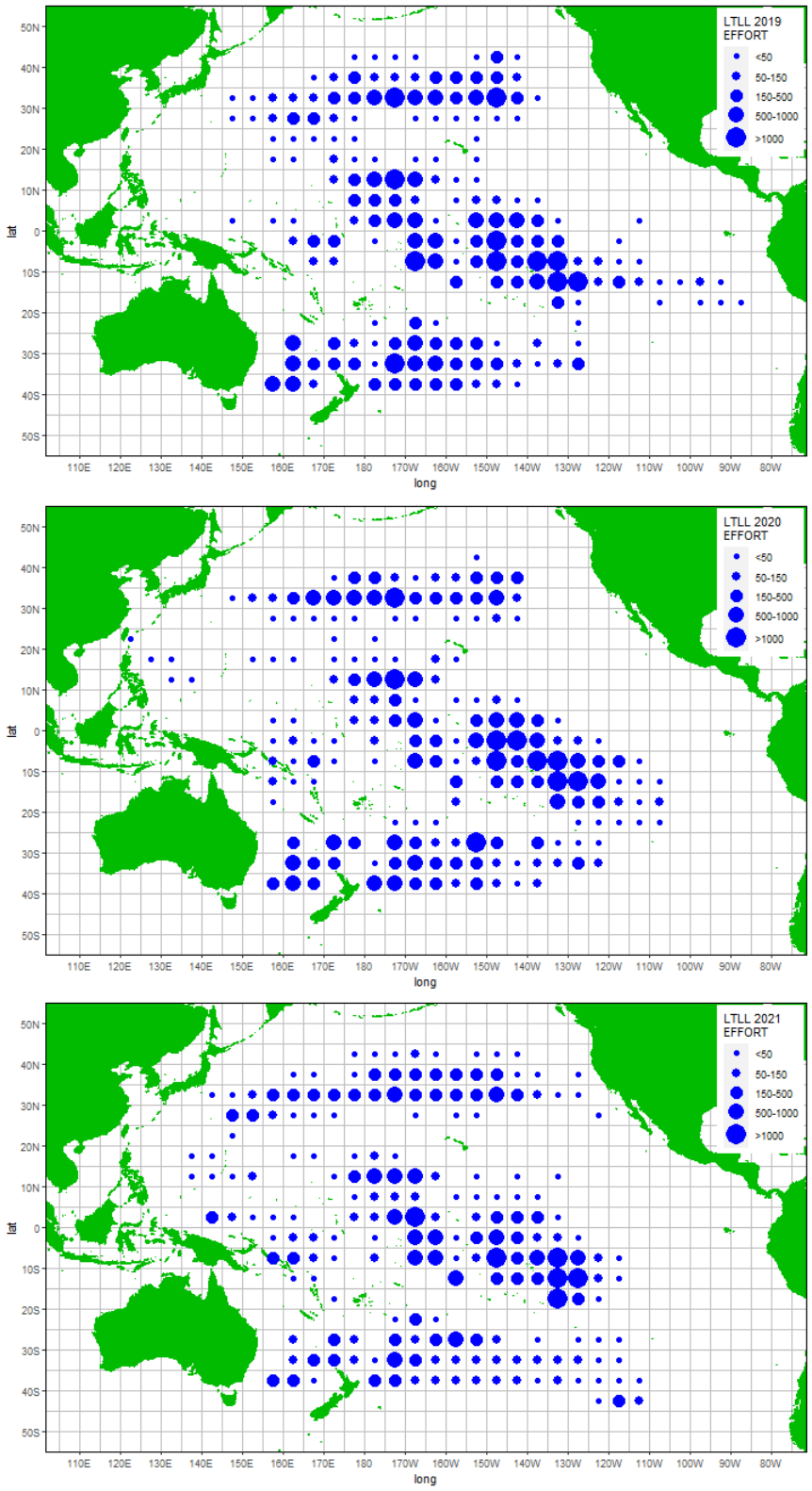

Figure 1. Distributions of fishing effort for the Taiwanese LTLL vessels operating in the Pacific Ocean during 2019-2021. (Note: Distributions of 2021 are still preliminary.)

LTLL STLL

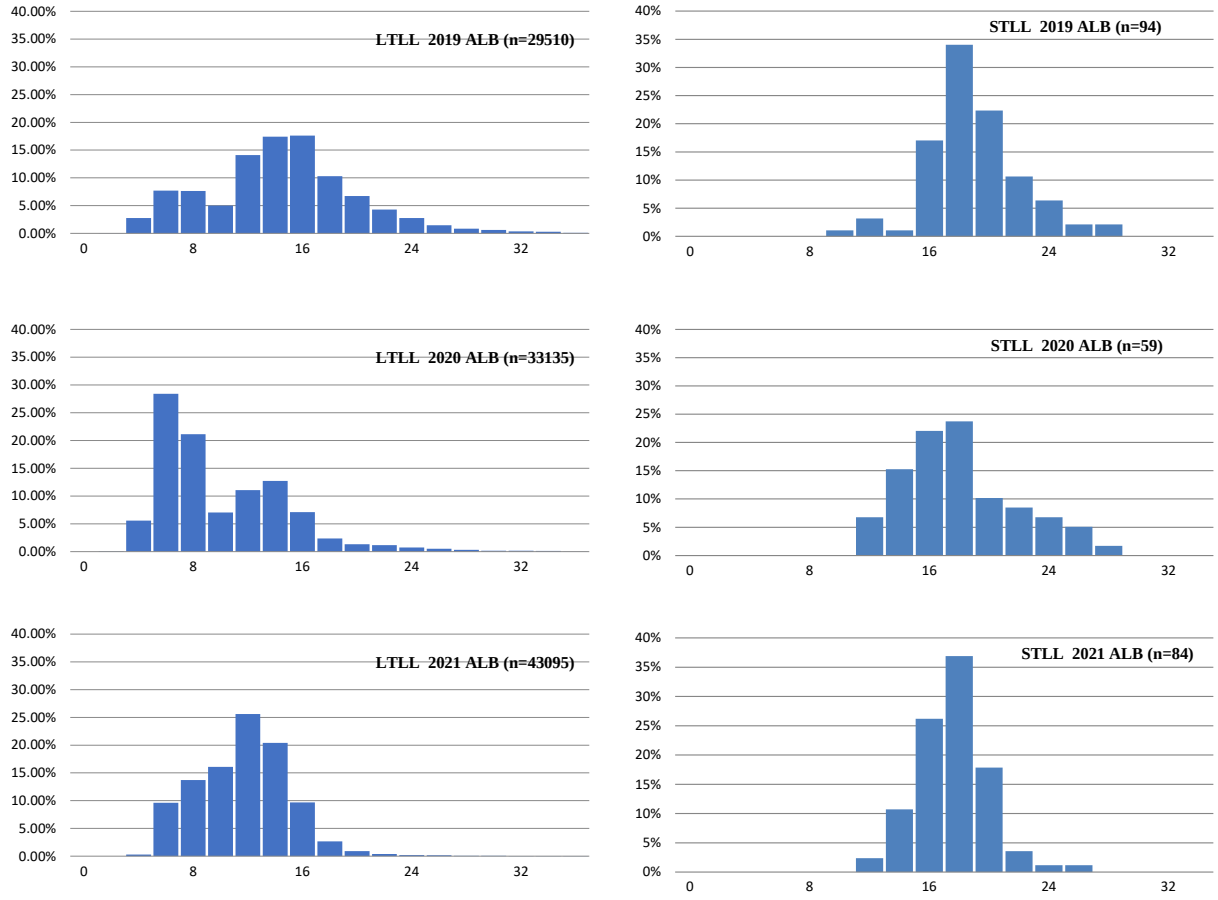

Figure 2. Weight frequency distributions of albacore caught by the Taiwanese LTLL and STLL vessels in the North Pacific Ocean during 2019-2021.

* The size data of STLL have been sourced from port sampling conducted at main domestic fish markets.

LTLL STLL

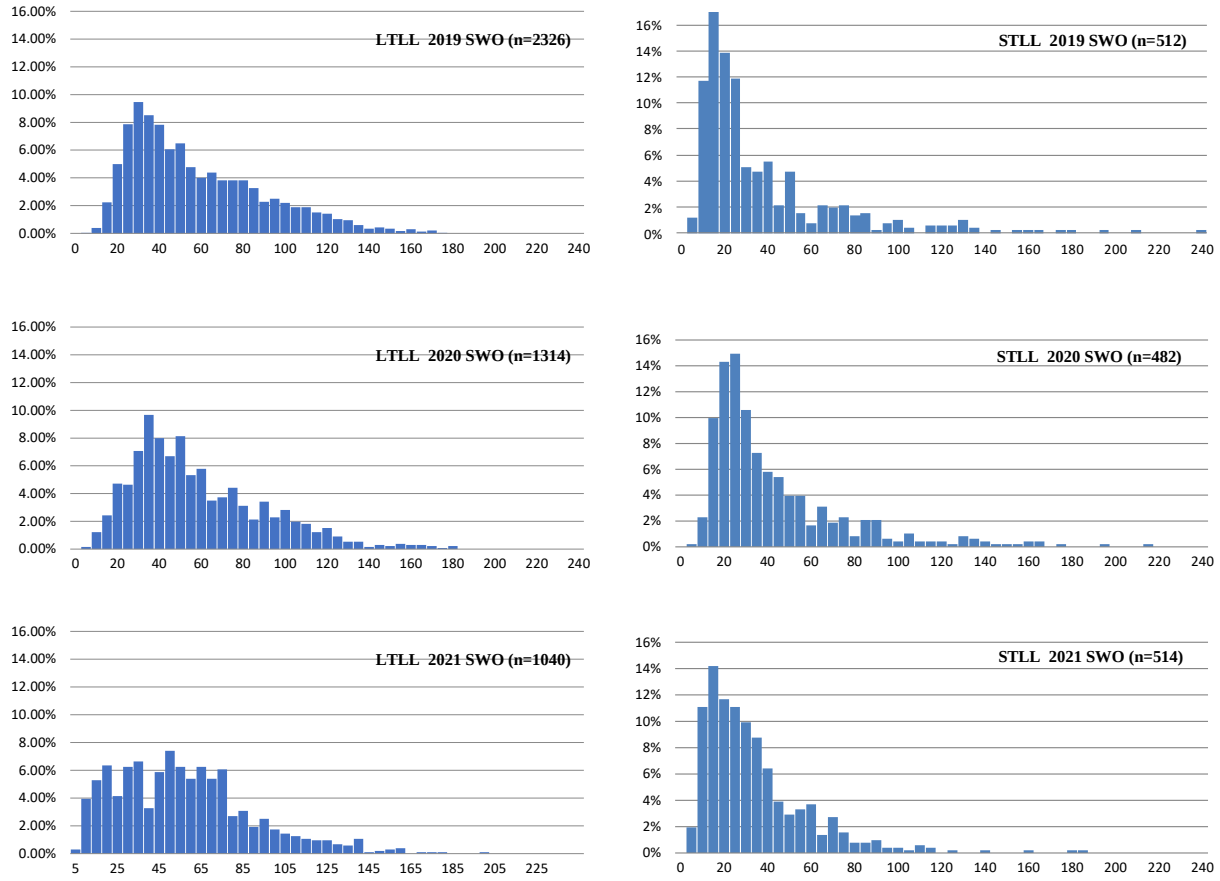

Figure 3. Weight frequency distributions of swordfish caught by the Taiwanese LTLL and STLL vessels in the North Pacific Ocean during 2019-2021.

* The size data of STLL have been sourced from port sampling conducted at main domestic fish markets.

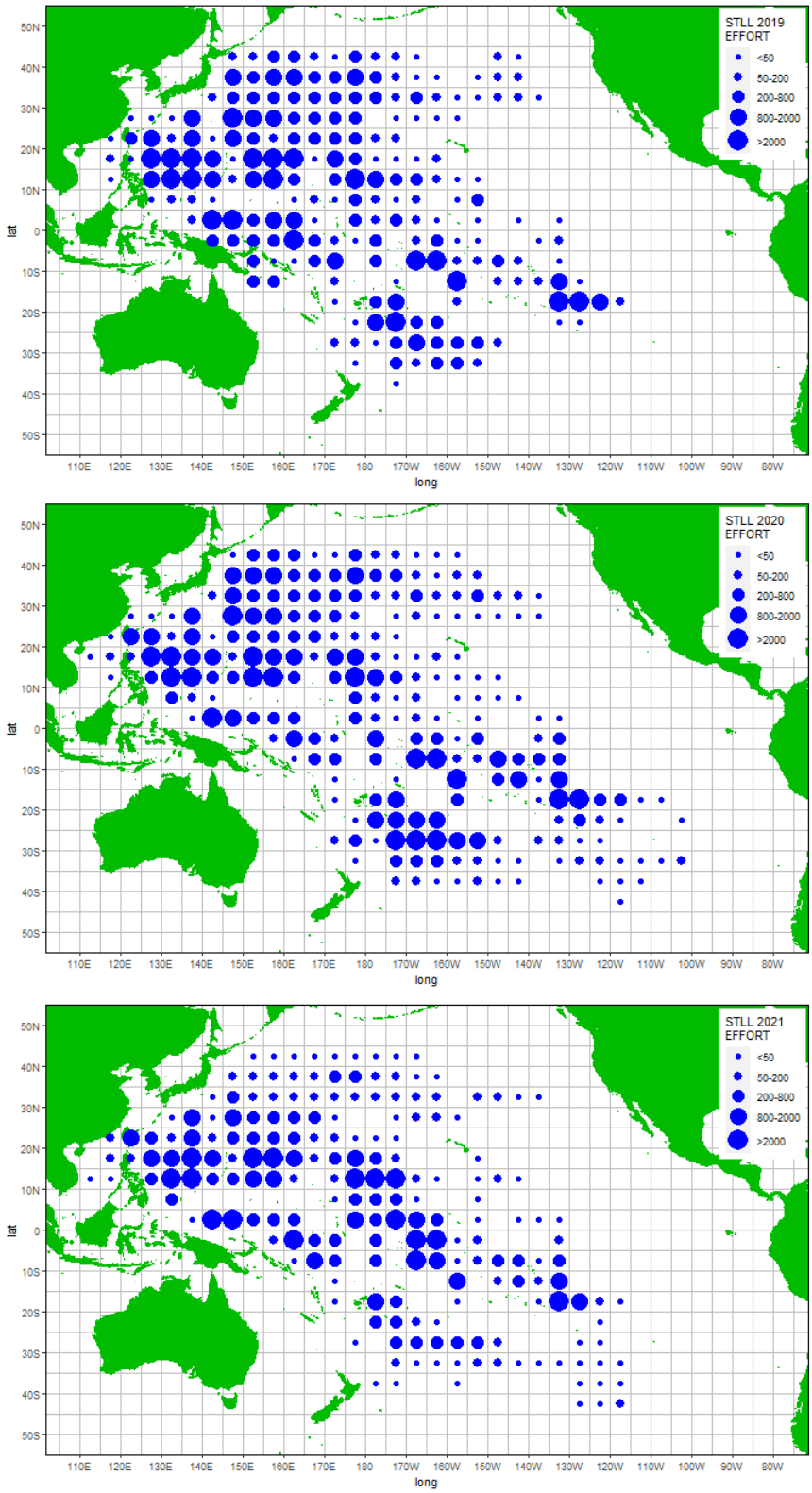

Figure 4. Distributions of fishing effort for the Taiwanese STLL vessels operating in the Pacific Ocean during 2019-2021. (Note: Distributions of 2021 are still preliminary.)

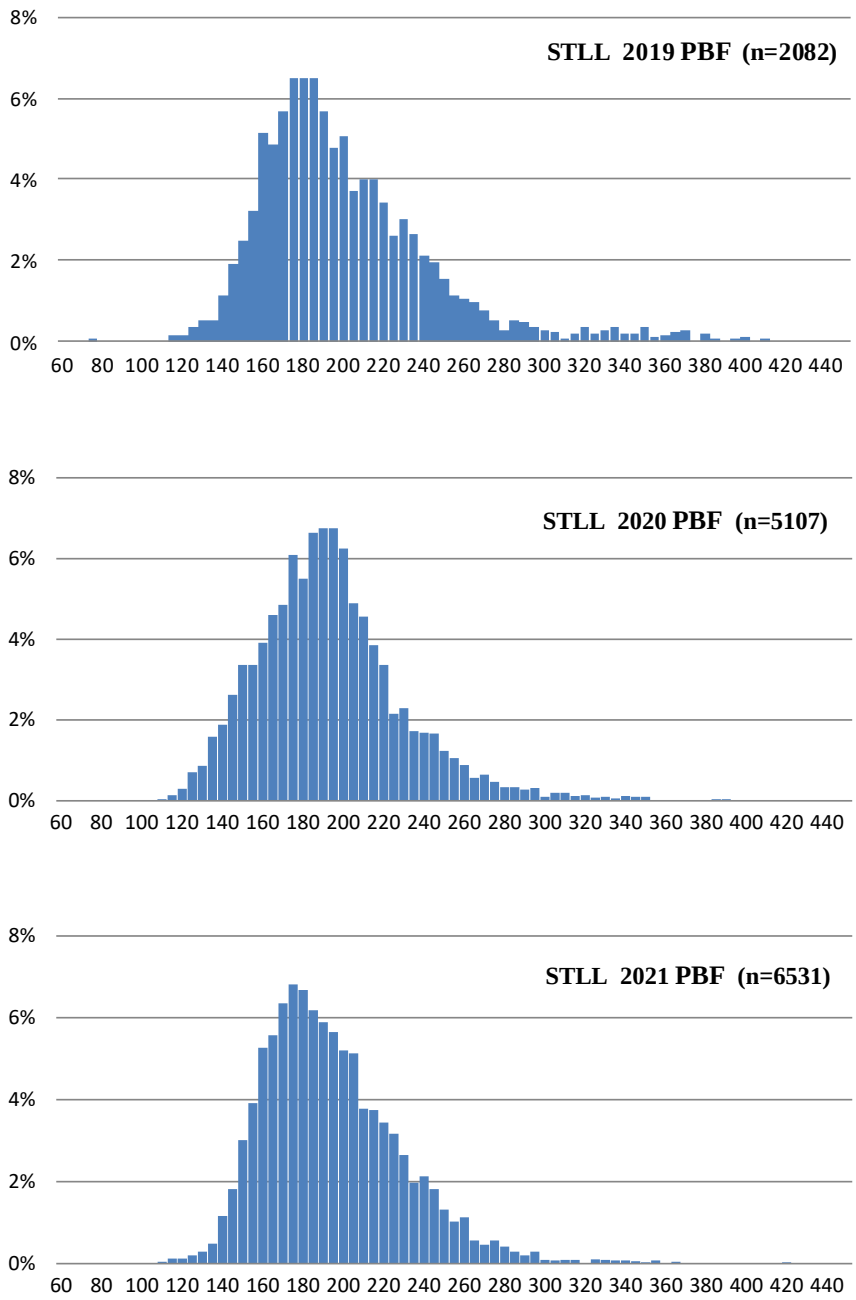

Figure 5. Weight frequency distributions of Pacific bluefin tuna caught by the Taiwanese STLL vessels in the North Pacific Ocean during 2019-2021.

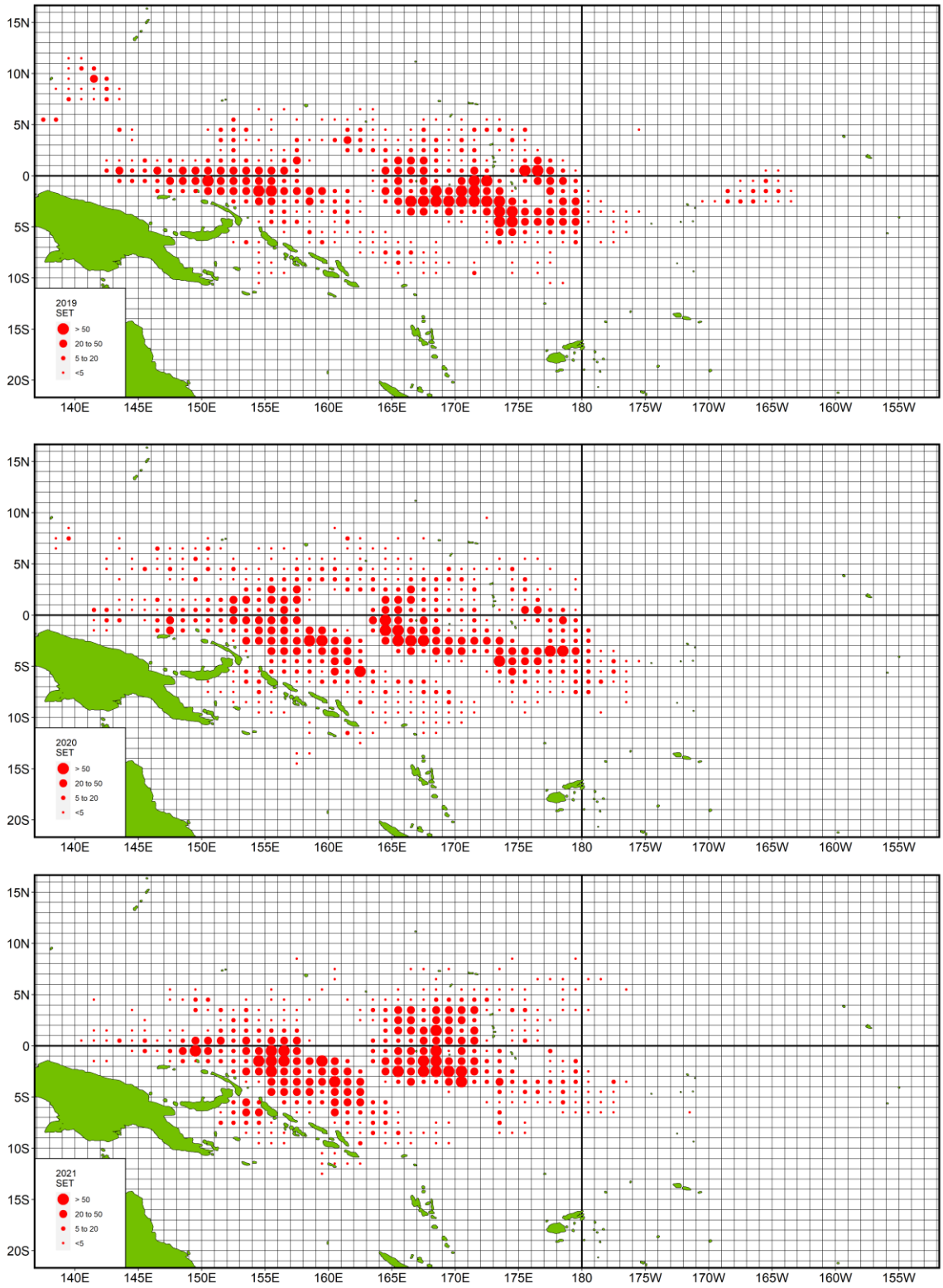

Figure 6. Distributions of fishing efforts (number of sets) for the Taiwanese purse seine vessels operating in the Pacific Ocean during 2019-2021. (Note: Distributions of 2021 are still preliminary.)