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NATIONAL REPORT ON CHINESE TAIPEI (TAIWANESE TUNA AND TUNA-LIKE FISHERIES IN THE NORTH PACIFIC OCEAN IN 2022)

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INTRODUCTION

Tuna longline, including large-scale (LTLL) and small-scale (STLL), and distant water tuna purse seine (DWPS) are the tuna and tuna-like species targeting fisheries of Chinese Taipei operating in the Pacific Ocean, and the catch of these 2 fisheries accounts for the most major tuna and tuna-like catch of Chinese Taipei in the North Pacific Ocean. The catch of tuna and tuna-like species of tuna longline fishery and distant water tuna purse seine fishery in the North Pacific Ocean were 23,631 mt and 70,041 in 2022, respectively. There is around 3,000 tons of tuna and tuna-like species, mainly skipjack, are taken by offshore and coastal fisheries, namely gillnet, harpoon, setnet, longline fisheries and others. The number of active fishing vessels of LTLL, STLL and DWPS were 108, 608 and 26 in 2022.

1. FISHERIES MONITORING

1.1. Tuna Longline fishery

1.1.1. Large-scale tuna longline fleet

The mean of active LTLL fishing vessels in 2018 to 2022 is around 85, and the number of fishing vessels increased to 108 in 2022 (Table 1).

Table 2 shows the catch of the LTLL fishery in the North Pacific Ocean during 1997-2022. The mean of LTLL fishery catch in 2018 to 2022 is around 6,220 tons, and it is noted that the lower catches of 2020 and 2021 were mainly affected by the COVID. Bigeye tuna is the most dominant species of the catch which accounts for more than 34% of the mean catch, followed by albacore, 33.5%, and yellowfin tuna, 18.7%.

Table 3 shows the shark catch by species of the LTLL fishery in the North Pacific Ocean during 2009-2022. The mean catch of shark in 2018 to 2022 is around 2,350 tons, blue shark is the most dominant species of the catch which accounts for more than 88.1% of the mean catch, followed by shortfin mako, 10.1%.

The effort distributions of LTLL fishing vessels in the Pacific Ocean during 2020-2022 is shown in Figure 1. The weight frequency distributions of albacore and swordfish are shown in Figure 2 and 3 separately.

1.1.2. Small-scale tuna longline fleet

The mean of STLL fishing vessels in 2018 to 2022 is around 734, and the number of fishing vessels decreased to 608 in 2022 (Table 1).

Table 4 shows the catch of the STLL fishery in the North Pacific Ocean during 1997-2022. The mean of STLL fishery catch in 2018 to 2022 is around 19,000 tons, and it is noted that the lower catches of 2020 and 2021 were mainly affected by the COVID. Yellowfin tuna is the most dominant species of the catch which accounts for more than 41% of the mean catch, followed by albacore, 14.9%, and bigeye tuna, 13.6%.

Table 5 shows the shark catch by species of the STLL fishery in the North Pacific Ocean during 2009-2022. The mean catch of shark in 2018 to 2022 is around 14,400 tons, blue shark is the most dominant species of the catch which accounts for more than 78.9% of the mean catch, followed by other shark species, 9.9%.

The effort distributions of STLL fishing vessels in the Pacific Ocean during 2020-2022 is shown in Figure 4. The weight frequency distributions of Pacific bluefin tuna is shown in Figure 5.

1.2. Distant water tuna purse seine (DWPS) fishery

The mean of active DWPS fishing vessels in 2018 to 2022 is 28, and 26 were active in 2022 (Table 1). The catch in Pacific Ocean is shown in Table 6, and Table 7 shows the catch in the North Pacific Ocean.

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. The effort distributions of this fishery in recent three years is shown in Figure 6.

1.3. Other fisheries

There is around 3,000 tons of tuna and tuna-like species, mainly skipjack, are taken by offshore and coastal fisheries, namely gillnet, harpoon, setnet, longline fisheries and others. Table 8 shows the catch of coastal and offshore fisheries of Taiwan in 2022.

2. DATA COLLECTION

2.1. Tuna fisheries

All tuna longliners operating outside the EEZ of Taiwan are reporting their fishery data through e-logbook, and the catch and effort data is compiled from e-logbook data. The size data, length and weight of individual catch, of all species is also compiled from the first 30 fish caught for each setting recorded on e-logbook. A port-sampling program conducted in domestic ports aims at collecting the size data of tuna and tuna-like species.

The iFIMS e-logbook data is compiled into catch and effort data of DWPS fleet. The sizing data of Thai canneries has been collected for estimating the catch composition of skipjack, bigeye tuna and yellowfin tuna. Length data was collected from fishing vessels' reporting.

The operator or the captain of any fishing vessel intending to land or transship has been mandatory to fill in the Landing/Transshipment Notice and submit it to the competent authority for approval. Moreover, after the completion of landing or transshipment, the operator or the captain are mandatory to submit the Landing/Transshipment Declaration to the competent authority so that the competent authority could verify the catches with e-logbook data and other relevant data, so as to ensure the catches are legal and traceable.

2.2. Other fisheries

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

2.3. 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 showed the number of observers deployed on board annually during 2013-2022. 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 2022 was 39 in total, including 4 on LTLL vessels and 35 on STLL vessels, respectively. The observer coverage rates of LTLL and STLL both are above 5%.

2.4. VMS monitoring

Since 2005, Taiwanese tuna fishing vessels with GRT over 20 tonnages 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 requirements of installing ALCs and transmitting vessel positions are extended from longline vessels over 20 GRT to vessels of all sizes that intend to fish for the Pacific bluefin tuna. The data is used to monitor fishing activities as well as to verify the fishing location that recorded in logbooks.

3. RESEARCH

To improve the understanding of tuna and tuna-like stock status in the North Pacific Ocean, the government of Taiwan has commissioned scientists to conduct a series of researches in 2022 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) CPUE standardization of stripe marlin caught by Taiwanese distant-water longline fishery in the Western and Central North Pacific Ocean during 1995-2020. (ISC/21/BILLWG-03/02)
- (7) 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)
- (8) 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)
- (9) 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)
- (10) 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-03/05)

- (11) 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)
- (12) Catch, length composition, and standardized CPUE of the North Pacific albacore caught by the Taiwanese distant-water longline fisheries in North Pacific Ocean from 1995-2020. (ISC/22/ALBWG-01/03)

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 in 2019, while there was no tag recovered in 2020 to 2022.

TABLES

Table 1. The number of active tuna fishing vessels in the Pacific Ocean by fishery and by fleet

Year	Fishery	Longline Fishery		DWPS
		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
2022*		108	608	26

LTLL: large-scale tuna longline vessel, STLL: small-scale tuna longline vessel, DWPS: distant water tuna purse seine fishery

* The figures of 2022 are still preliminary

Table 2. The catch by species of LTLL fishery 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
2022*	3,033	0	2,294	1,188	358	59	239	1	13	46	7,231

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)

* The figures of 2022 are still preliminary.

+:below 499kg.

Table 3. The catch by shark species of LTLL fishery 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
2022*	1,705	+	206	0	47	6	0	12	1,976

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)..

* The figures of 2022 are still preliminary

** The catch during 2016-2022 were made in EPO

+ : below 499kg

- : no clear information

Table 4. The catch by species of STLL fishery 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
2022*	1,823	1,496	2,274	7,120	250	751	239	2,008	199	240	16,400

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).

* The figures of 2022 are still preliminary

Table 5. The catch by shark species of STLL fishery 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	+	1,084	0	579	326	0	2,744	19,913
2020	13,448	4	1,090	0	449	350	5	602	15,948
2021	7,540	2	370	0	539	284	0	688	9,423
2022*	11,154	0	534	0	642	310	0	550	13,190

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).

* The figures of 2022 are still preliminary

** The catch during 2016-2022 were made in EPO

+:bellow 499kg

Table 6. The catch by species of DWPS fishery 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
2022*	176,368	26,703	7,807	210,878

DWPS: distant water purse seine

* The figures of 2022 are still preliminary

Table 7. The catch by species of DWPS fishery 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
2022*	-	-	2,277	10,532	-	+	+	2	-	57,229	70,041

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).

* The figures of 2022 are still preliminary

+:below 499kg

-: no clear information

Table 8. The catch by species of Taiwanese coastal and offshore fisheries in the North Pacific Ocean, 2022 (preliminary)

Unit: mt

Fisheries	PBF	ALB	BET	YFT	SKJ	SWO	MLS	BUM	BLM	SFA	SSP	SKX	TOTAL
Offshore Gillnet	+	0	0	0	57	0	1	2	14	1	-	76	151
Offshore Others	0	+	1	116	907	0	+	1	+	7	-	139	1171
Coastal Gillnet	0	+	0	12	32	0	8	28	89	28	-	210	408
Coastal Setnet	+	0	+	41	1255	1	+	2	9	36	-	7	1352
Coastal Harpoon	0	0	0	0	0	0	23	107	121	49	-	1	301
Costal Longline	0	0	0	1	5	0	0	0	+	3	-	13	23
Coastal Others	0	0	0	+	+	0	0	0	0	0	-	10	10

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).

+:below 499kg

-: no clear information

Table 9. The number of observers deployed on tuna longliners in the Pacific Ocean during 2013-2022

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Number of observers	24	24	32	28	66	76	46	55	53	39

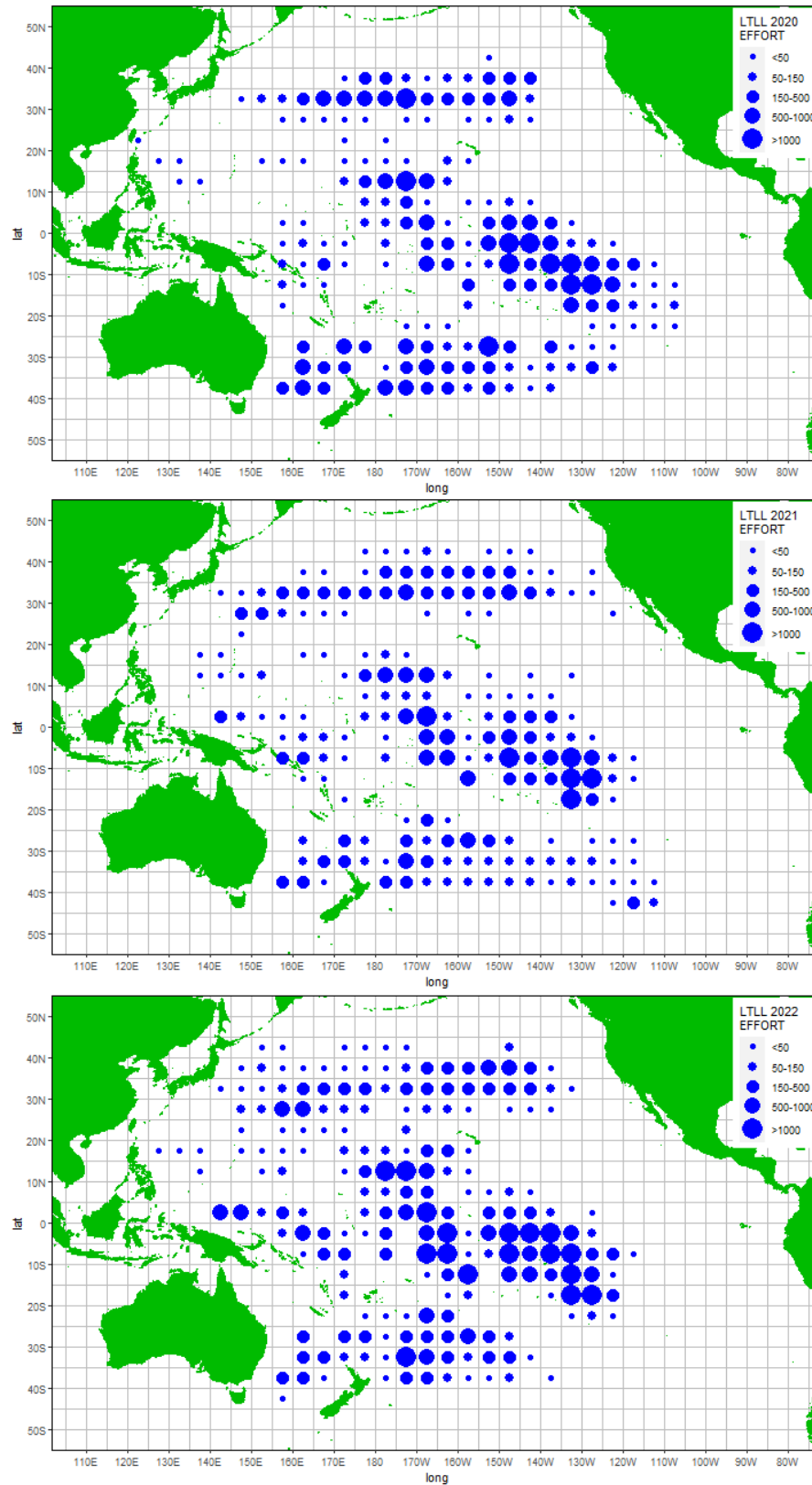


Figure 1. Effort distributions of Taiwanese LTLL fleet in the Pacific Ocean during 2020-2022. (Note: The fishery data of 2022 is still preliminary.)

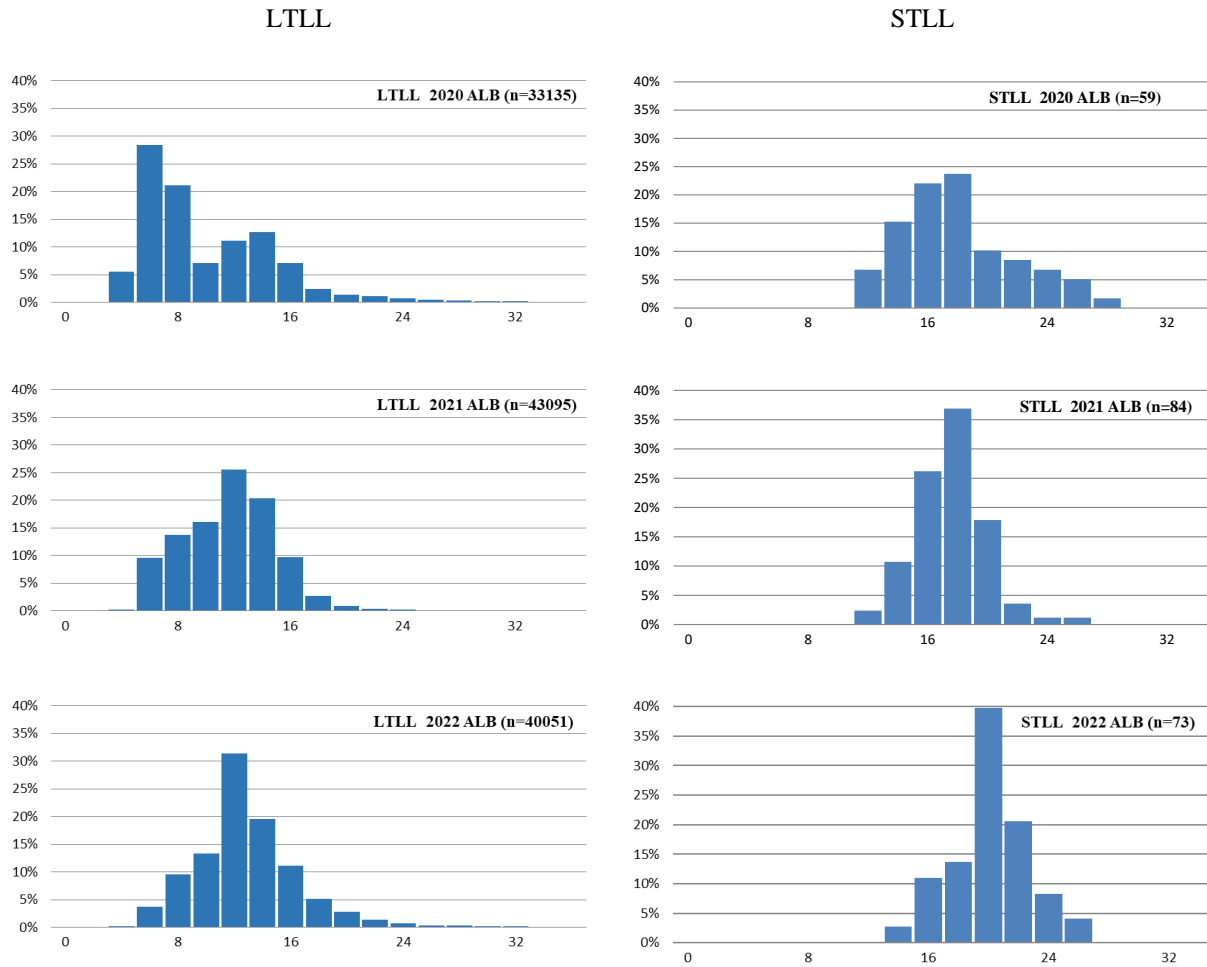


Figure 2. Albacore weight frequency distributions by fleet during 2020-2022.

* The size data of STLL fishery is collected through port samplings.

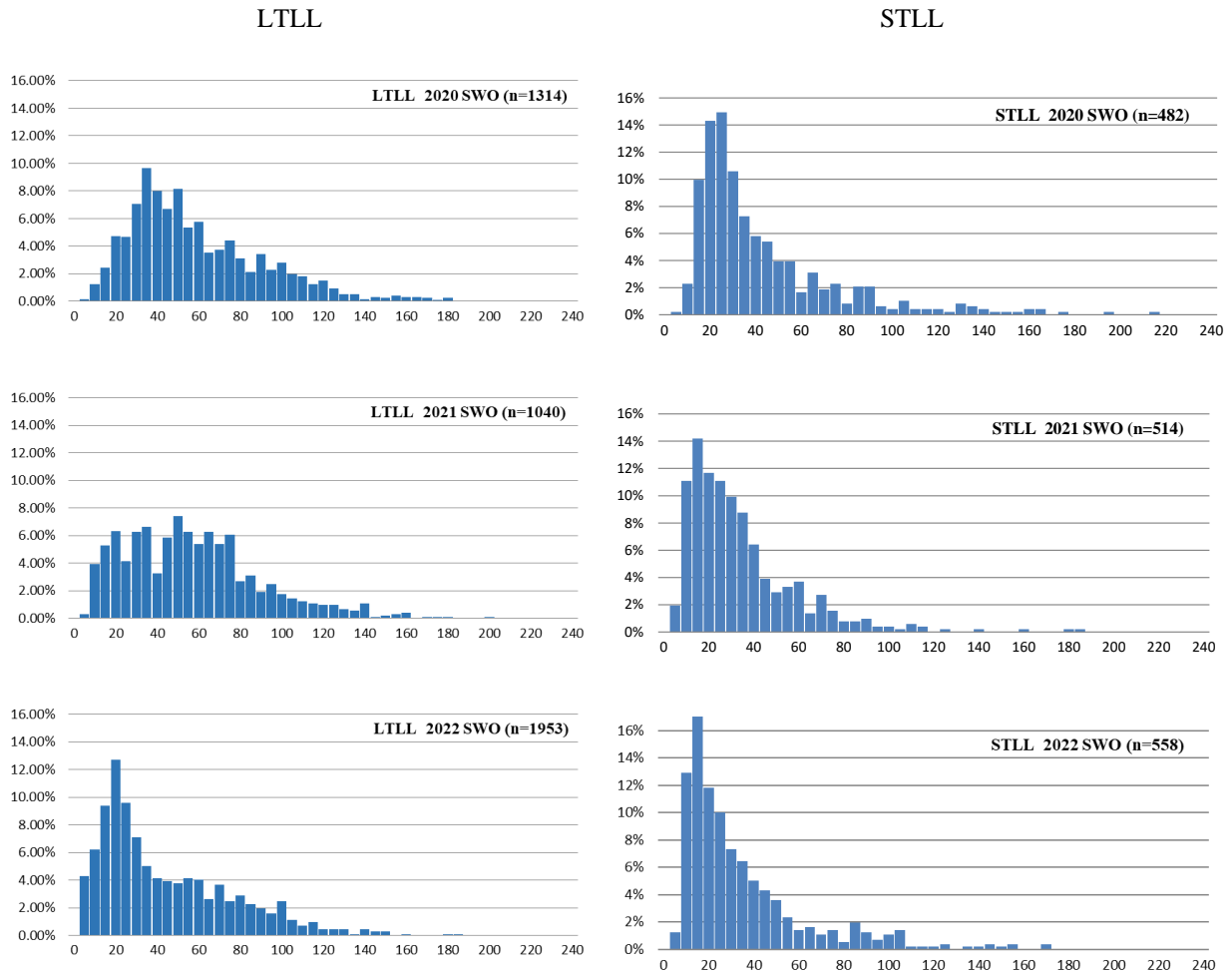


Figure 3. Swordfish weight frequency distributions by fleet during 2020-2022.

* The size data of STLL fishery is collected through port samplings .

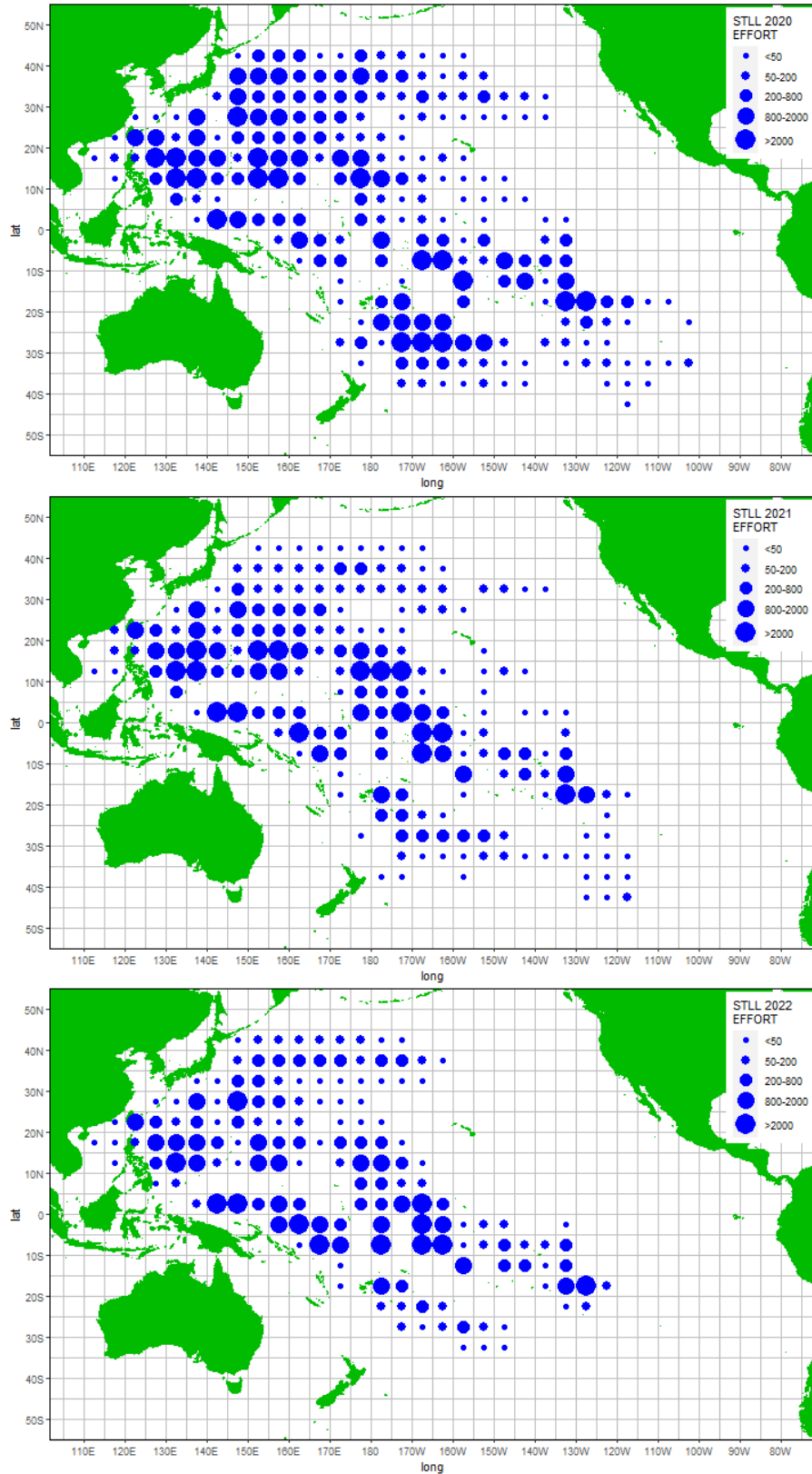


Figure 4. Effort distributions of Taiwanese STLL fleet in the Pacific Ocean during 2020-2022. (Note: The fishery data of 2022 is still preliminary.)

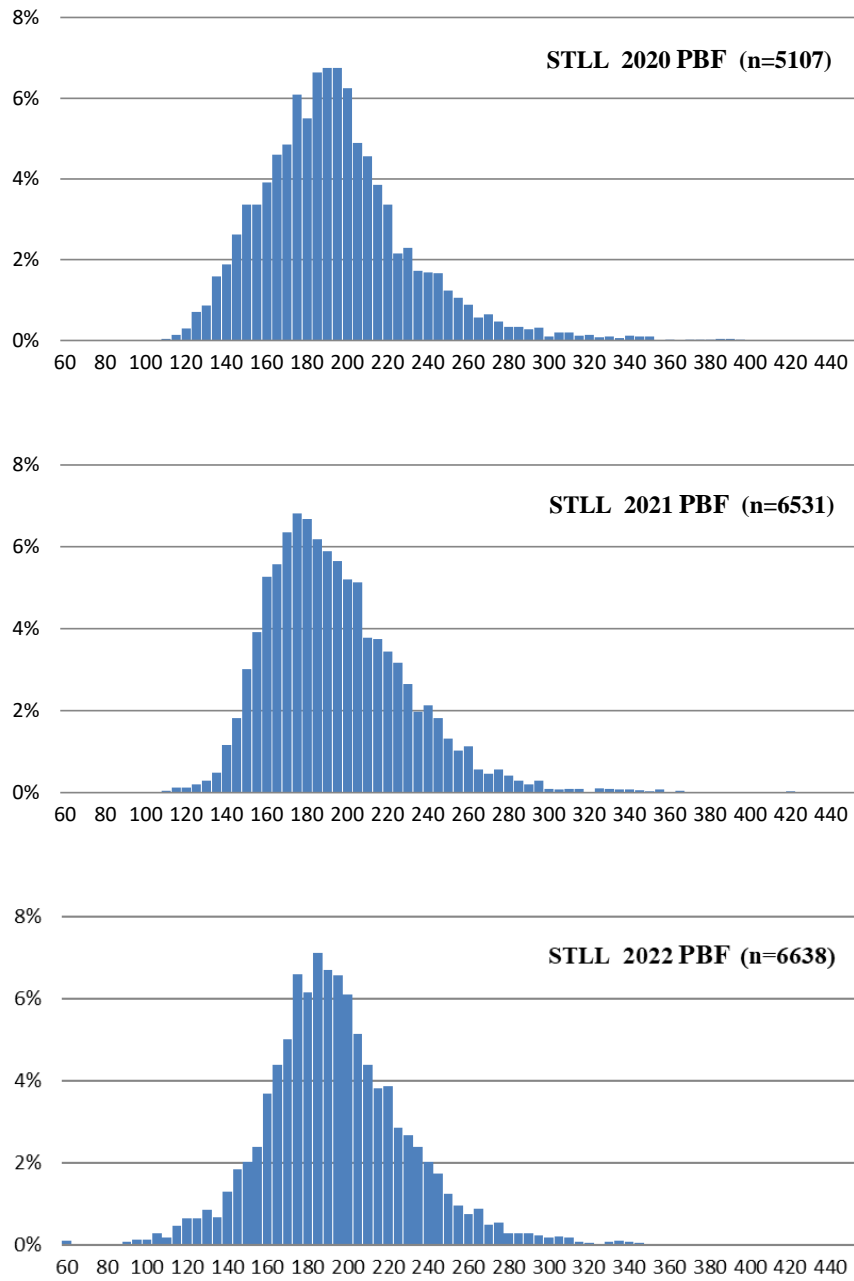


Figure 5. Pacific bluefin tuna weight frequency distributions during 2020-2022.

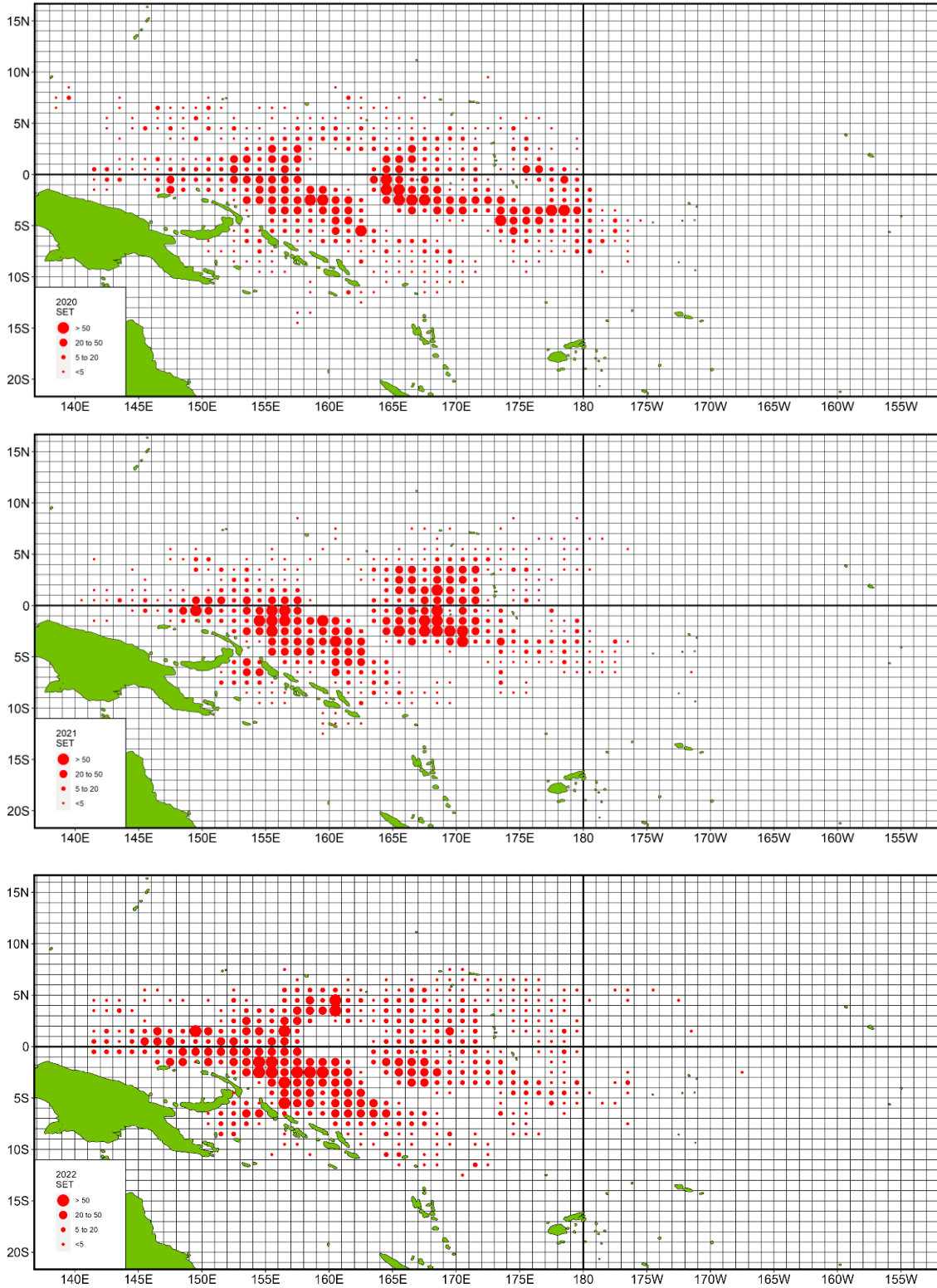


Figure 6. Effort distributions of Taiwanese DWPS fleet in the Pacific Ocean during 2020-2022. (Note: The fishery data of 2022 is still preliminary.)