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TRENDS IN THE SOUTH PACIFIC ALBACORE LONGLINE AND TROLL FISHERY (SC17-2021-SA-IP04)

WCPFC18-2021-IP05[1]
24 July 2021

SPC-OFP

[1] This was posted to TCC17 meeting as **WCPFC-TCC17-2021-IP03**

TECHNICAL AND COMPLIANCE COMMITTEE
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WCPFC-TCC17-2021-IP03[1]
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Trends in the South Pacific albacore longline and troll fisheries

WCPFC-SC17-2021/SA-IP-04

24 July 2021

Sam McKechnie, Graham Pilling, Peter Williams[1]

[1]Oceanic Fisheries Programme, Pacific Community (SPC), Nouméa, New Caledonia

Contents

Executive Summary

This paper presents a compendium of fishery indicators for South Pacific albacore tuna, as requested at previous Western and Central Pacific Fisheries Commission (WCPFC)-related meetings. These indicators include: total catch; catch by gear; and longline effort and nominal troll and longline CPUE trends, along with their spatial patterns. Commentary provided includes comparisons of 2020 values to 2019 and to the average over 2015-2019. Information provided includes data loaded into databases as of 19 July 2021. Note that catch levels and their distribution amongst areas may change as more data become available. This paper complements the information provided by Hare et al. (2021) that summarises the latest trends for the main target species for the fisheries occurring in the WCPFC convention area (WCPFC-CA). Note that no stock projections are included herein as the full stock assessment of South Pacific albacore tuna was carried out this year, making the inclusion of projections from the previous assessment redundant. Updated stock projections using the 2021 assessment will be conducted following SC17.

Transshipment data are available over the period from the inception of transshipment reporting (July 2010) to May 2021. Data presented represent high seas transshipments only; they do not include in-port or in-zone transshipments. Monthly reported transshipment levels fluctuate notably, and may reflect logistical/operational factors in addition to fishing activity. The annual peak appears to typically occur during the mid-late part of the year. It should be noted that transshipment levels are unlikely to be fully reported for the most recent 18 months.

1 Introduction

At the 7^{th} Technical and Compliance Committee, some members requested the preparation of a paper on South Pacific albacore. That request indicated the paper should contain all available data on catches and transshipments, and should highlight trends. The paper was first prepared by the scientific services provider and the WCPFC Secretariat for WCPFC8 in March 2012. It has since been updated frequently, taking into consideration further requests from members.

This paper presents trends in catch, effort and catch per unit effort (CPUE), both spatially and temporally for the South Pacific albacore (SPA) fishery. Depending on the context, summaries are computed for the South Pacific (all waters south of the equator), for the albacore target longline fishery region (Pacific waters south of 10°S), and also for Exclusive Economic Zones (EEZs) and High Seas regions (HS) within the WCPFC-Convention Area (WCPFC-CA). In addition, information on transshipment patterns is presented, consistent with WCPFC (2013).

The analyses presented are based on data available to SPC as of 19 July 2021. The overall catch, and its distribution amongst spatial areas, may change as more data becomes available. Please note that the figures may include or exclude specific fleets that are included in summaries made for other purposes (e.g. CMM tables) and therefore the reported values (catch, effort, CPUE, etc.) may not be identical to those presented in other documents. Usually, the current status of the albacore stock is estimated and reported in this paper using status quo projections from the last available stock assessment. However, a full stock assessment has been carried out this year which provides much more detailed information on the status of the stock, and so we refer readers to the assessment document (Castillo-Jordan et al., 2021) rather than repeat that information herein.

2 Patterns of longline and troll fishing

The longline and troll fleets are the two main groups of commercial vessels exploiting South Pacific albacore. In this section we examine trends in their catch, effort and CPUE. Catch and effort information come primarily from logsheet returns or, particularly for the high seas, from the provision of aggregate data from distant water fishing nations.

2.1 Catch

Annual catch estimates for albacore in the South Pacific (south of the equator) as a whole peaked at 93,835 mt (all gears) in 2017 (Figure 1). Catch by longliners represented 93% of the catch weight in 2020 at 64,963 mt. The 2020 longline catch was a 21% decrease from 2019. Provisional troll catch (4,760 mt) was a 72% increase from 2019. Very small amounts of catch by 'other' gears also occurred. Over the past 10 years, the annual contribution of the EPO catch south of the equator ranged from 12–23% of the total catch. The provisional estimate for the 2019 EPO share is 14% of the total catch, but it is likely the EPO data are still incomplete.

By comparison, the 2020 total albacore catch within the southern part of the WCPFC-CA [2] (Table 1) was 61,778 mt and the longline catch was 57,006 mt. High seas longline catch estimates represent 49% of the 2020 total, and have ranged from 29–52% of the total since 2010. By flag (or attributed nationality based on charter agreements), China and Chinese Taipei had the highest catch estimates of South Pacific albacore in 2020 (20,591 mt and 10,631 mt respectively),

[2]Note that these annual catch estimate-based tables approximate the southern area of the WCPFC-CA as far as possible, given that some EEZs and high seas areas span the equator.

representing 55% of the total catch (Table A1-1), with much of their catch taken on the high seas (Table A1-2).

Four flag states reported troll catch within the WCP-CA during the period 2000 to 2020, namely Canada, the Cook Islands, USA and New Zealand (Table A1-3) with catch totaling 4,772 mt in 2020. Troll activity in 2020 was exclusively in the New Zealand EEZ and on the high seas (Table 2). Catch estimates for 2020 were 1,913 mt for the high seas and 2,859 mt for the New Zealand EEZ. The total troll catch within the WCPFC-CA in 2020 was a 72% increase from the 2019 catch.

The spatial pattern of South Pacific albacore catch over the long-term (1950–2014), the last 5 years excluding the most recent (2015–2019), and 2020 alone, are shown in Figure 2. In recent years, catch has been concentrated in the 10-20°S latitudinal band and several high seas areas. Note that, while 2020 estimates remain provisional, the geographic distribution of catch is generally consistent with that observed in recent years.

2.2 Effort

It is challenging to identify the specific species being targeted by longline vessels, particularly within the aggregate data received from particular fleets fishing on the high seas. To more directly relate the patterns seen in effort to the declared South Pacific albacore catch, we have considered fishing effort south of 10°S to approximate South Pacific albacore targeting (noting that this will include longline effort targeting swordfish) and to attempt to exclude tropical longline fishery effort.

Raised effort data for the southern WCPFC-CA south of 10°S were available up to 2020 (Figure 3). The longline effort in this region was estimated at 304 million hooks in 2020, although we note there is considerable uncertainty in effort estimates for this most recent year. The number of deployed hooks in 2020 within the WCPFC-CA south of 10°S was a 3% decrease from in 2019, and a 9% decrease from the peak of 334 million hooks fished in 2010.

Effort data from VMS provides more 'up to date' information than raised logsheet data, given that logsheet effort for recent years may be incomplete, and the uncertainty in raised annual logsheet effort estimates for 2020 is high. The VMS data reported here are for the WCPFC-CA waters south of 10°S, as for the raised hooks data above. The VMS data represents fishing days which is estimated using an algorithm that accounts for speed and changes in bearing of the vessel. It must be noted that a new algorithm has been adopted since the 2019 report and this has been applied to all available VMS data which means that estimates are comparable among years but not with previous reports. As for the aggregate longline data, it does not allow information on the species targeted by vessels during fishing to be assessed. In addition, some trends over time may be influenced by increased coverage of VMS across longline vessels in the South Pacific, while data for certain EEZs may be incomplete or not available. A list of notes on the VMS data and a table of effort by high seas area are provided in Appendix 2. To overcome the absence of VMS data for some EEZs, data were augmented with logsheet information in these locations[3].

Effort south of 10°S (VMS fishing days, augmented by logsheet days) both within EEZs and on the high seas generally increased through to 2013, then declined to a lower average level before rebounding in 2019 and 2020. Around 31% of the VMS days occurred within the high seas in 2020

[3]This addition of logsheets, and the use of only select fleets in the summaries of Williams and Ruaia (2021), mean that values cannot be directly compared with that report.

(Table 3). Overall effort has increased in the EEZs and had been decreasing on the high seas until a sharp upturn in 2019 (Table 3). Of the VMS days in 2020 within the international waters the most important high seas areas were Region I5 which is east of the Line Islands and French Polynesia, and Region I7 which is the region north and northeast of New Zealand (Table A2-2; Figure A2-1).

2.3 Catch per unit effort

Figure 5 presents nominal longline South Pacific albacore CPUE series by key fleets south of 10° south. Note, the values presented in Hare et al. (2021) are south of the equator and will therefore differ from those presented here. Some key changes in CPUE in the recent periods were:

- Japanese longline CPUE in 2020 (17.3 kg per 100 hooks) was a 57% increase on 2019, the 2015-2019 average was 12.6 kg per 100 hooks;
- Fiji longline CPUE in 2020 (15.1 kg per 100 hooks) was a 6% decrease on 2019, the 2015-2019 average was 17.8 kg per 100 hooks;
- Chinese longline CPUE in 2020 (16.5kg per 100 hooks) was a 11% decrease on 2019, the 2015-2019 average was 24.9 kg per 100 hooks;
- Chinese Taipei longline CPUE in 2020 (22.3 kg per 100 hooks) was a 3% decrease on 2019, the 2015-2019 average was 25.9 kg per 100 hooks.

Examining longer-term trends, the average nominal CPUE for the Fiji fleet was 23.7 kg per 100 hooks between 1991 and 2000, while that for the Chinese Taipei fleet was 34.9 kg per 100 hooks. In contrast, the Japanese fleet averaged 18 kg per 100 hooks over that time.

The relative spatial pattern of CPUE is presented in Figure 6 for two time periods. Over the period 2000–2017, catch rates were relatively high across much of the southern WCPFC-CA, in particular within high seas areas. Catch rates in the most recent three year period (2018–2020) are generally lower across the region. It is notable that increases in effort within particular 5°×5° squares are generally matched by declines in CPUE. The CPUE in the high seas east of New Zealand was high in the most recent years.

Figure 7 presents nominal South Pacific albacore CPUE series for two troll fleets. The CPUE of the US fleet was highly variable with a general decline over the period 1987 to 2006, with catch rates in the most recent years of activity being comparable to that in the mid-2000s, with the exception of the most recent two years where CPUE was very high. By comparison, the nominal CPUE of the New Zealand fleet has generally been lower, but relatively stable.

3 Transshipment information

High seas transshipment data are available from July 2010 to March 2020, but no in-port or in-zone transshipment data are presented. Fluctuations in reported transshipments may reflect logistical/operational factors rather than fishing activity. It is noted that South Pacific albacore would have historically been offloaded directly to canneries (e.g. Pago Pago, American Samoa, or Levuka, Fiji) rather than being transshipped on the high seas. There is a notable peak in transshipment activity around September of each year (Figure 8). Vanuatu has had the highest transhipment volumes in the past, as averaged over the entire period. The highest peak in the time series was in October 2017 (∼ 4,000 mt) (Figure 8), of which about 2,500 mt was by China and 1,000 mt by Vanuatu (Table A3-8). Further transshipment information by flag and month is

presented in Appendix 3. It should be noted that transshipment levels are unlikely to be fully reported for the most recent 18 months. Transshipment data for 2020 to 2021 should, therefore, be considered preliminary and subject to change.

Acknowledgments

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Table 1: Annual southern WCPFC-CA albacore longline catch estimates (excluding archipelagic waters) by EEZ and High Seas, since 2010. Note: Available operational and aggregate logsheet data raised to annual catch estimates. EEZ are approximate 200-mile boundaries; High seas is the high seas in the WCPFC Convention Area, south of the equator. Allocation of flag catch to EEZ is approximate due to the lack of operational logsheet data in some cases.

EEZ	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
American Samoa	2,838	1,784	2,416	1,769	1,377	1,760	1,511	1,511	1,552	1,062	513
Australia	745	652	702	757	728	945	910	830	751	796	1,158
Cook Islands	4,911	5,559	10,627	5,985	4,483	4,556	4,757	3,310	4,715	5,302	2,441
Fiji	5,771	4,165	4,287	3,642	3,916	5,643	4,784	5,871	5,466	5,140	3,826
High seas	40,349	22,910	29,764	29,698	19,984	23,045	16,818	35,799	27,400	31,355	28,199
Jarvis (USA)	0	0	0	0	0	0	0	0	0	0	0
Kiribati	1,290	550	1,218	828	1,258	2,578	4,752	426	72	1,127	2,837
Matthew and Hunter	15	6	9	0	0	2	1	2	1	2	2
New Caledonia	1,932	1,734	1,711	1,713	1,628	1,578	1,745	1,719	1,742	2,009	1,896
Niue	196	0	0	362	208	196	88	14	364	386	165
New Zealand	460	418	266	302	311	223	233	181	239	845	171
French Polynesia	3,482	3,224	3,591	3,495	3,744	3,418	3,276	2,148	3,058	3,439	2,812
PNG	795	294	801	237	310	459	1,185	1,613	1,451	756	753
Solomon Islands	6,021	6,424	8,172	9,074	13,111	6,887	3,748	5,548	7,022	4,498	3,793
Tokelau	0	108	250	0	7	1,867	2,447	1,662	632	1,970	1,066
Tonga	57	36	760	1,471	264	710	1,105	611	655	1,213	829
Tuvalu	675	467	930	1,491	475	406	1,501	1,426	944	1,448	665
Vanuatu	4,790	6,077	4,281	6,819	6,604	5,419	7,513	7,972	5,602	3,195	5,180
Wallis and Futuna	0	3	0	0	0	0	0	0	0	0	0
Samoa	2,529	1,415	2,038	1,642	800	840	823	1,638	1,364	1,442	700
Total	76,856	55,826	71,823	69,285	59,208	60,532	57,197	72,281	63,030	65,985	57,006
EEZ percent	48	59	59	57	66	62	71	50	57	52	51
HS percent	52	41	41	43	34	38	29	50	43	48	49

Table 2: Annual southern WCPFC-CA albacore troll catch estimates by EEZ and High Seas, Since 2010. Note: Available operational and aggregate logsheet data raised to annual catch estimates. EEZ are approximate 200-mile boundaries (excluding archipelagic waters); High seas is the high seas in the WCPFC Convention Area, south of the equator.

EEZ	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
High seas	307	472	235	390	466	177	166	860	442	873	1,913
New Zealand	1,832	2,787	2,727	2,836	1,937	2,425	1,969	1,959	2,272	1,907	2,859
Total	2,139	3,259	2,962	3,226	2,403	2,602	2,135	2,819	2,714	2,780	4,772
EEZ percent	86	86	92	88	81	93	92	69	84	69	60
HS percent	14	14	8	12	19	7	8	31	16	31	40

Table 3: Total VMS fishing days (augmented by logsheets for New Caledonia and French Polynesia) by year and geographic area in the WCPFC-CA south of 10°S.

EEZ	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
EEZ	71,881	75,238	77,642	79,918	66,947	67,918	73,576	73,985	71,104	78,833	79,425
High seas	20,632	22,782	23,008	30,890	26,524	22,182	19,387	23,438	21,344	27,715	34,914
Total	92,513	98,019	100,650	110,807	93,471	90,100	92,963	97,422	92,447	106,548	114,339
EEZ percent	78	77	77	72	72	75	79	76	77	74	69
HS percent	22	23	23	28	28	25	21	24	23	26	31

Table 4: Annual total and monthly average transshipment of albacore in the high seas of the WCPFC-CA in metric tonnes.

Year	Annual total	Monthly average
2010	4,085	681
2011	9,367	781
2012	5,487	457
2013	9,321	777
2014	9,586	799
2015	9,943	829
2016	18,590	1,549
2017	18,193	1,516
2018	23,432	1,953
2019	22,234	1,853
2020	18,960	1,580
2021	6,732	1,122

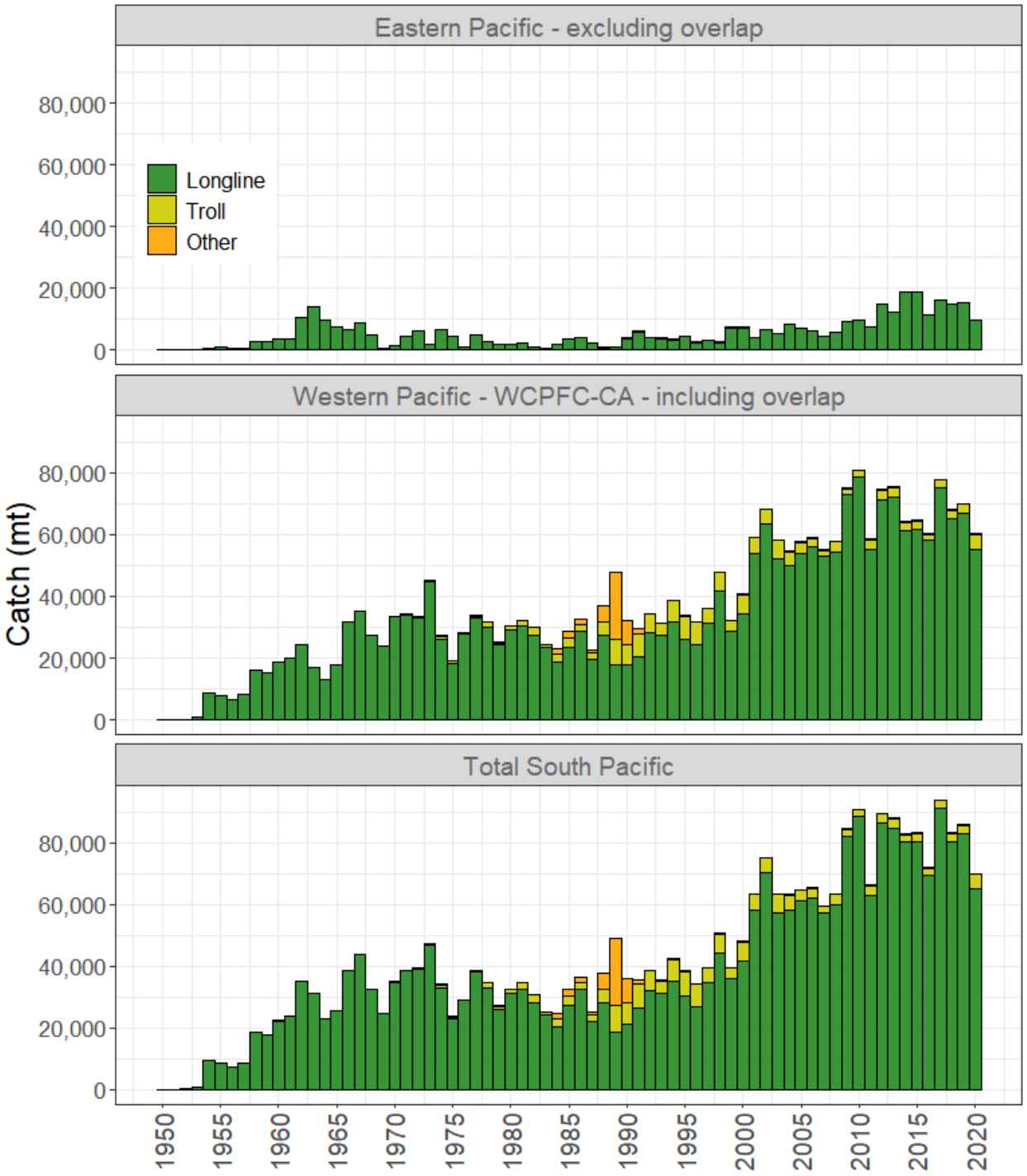

Figure 1: South Pacific albacore catch by gear (all Pacific Ocean waters south of the equator, including archipelagic waters).

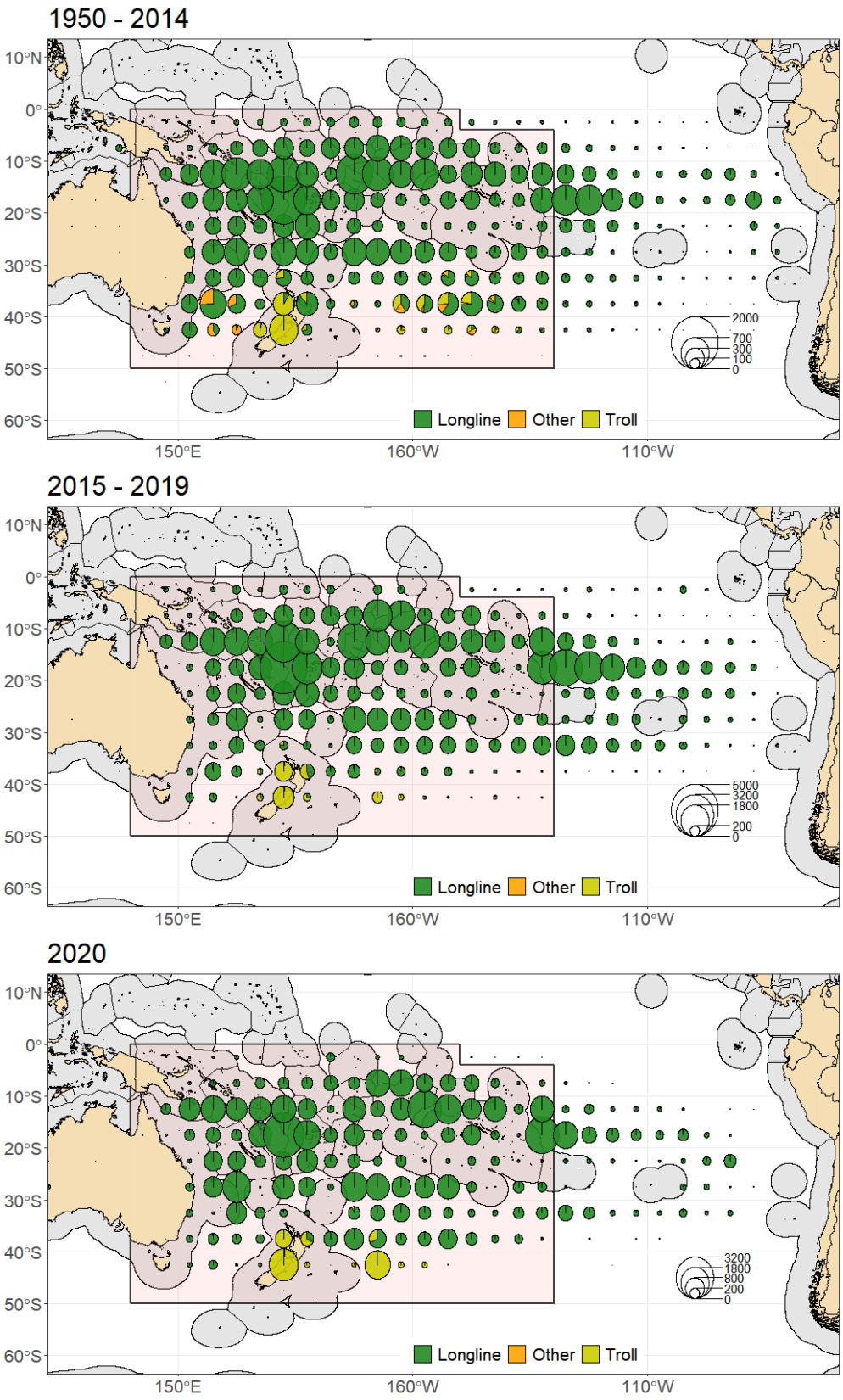

Figure 2: Albacore tuna catch distribution by gear type and 5°×5° degree region in the South Pacific Ocean for the period 1950-2014 (top), 2015 -2019 (middle) and 2020 (bottom). Circle size represents total catch volume with maximum circle size presented in the legends.

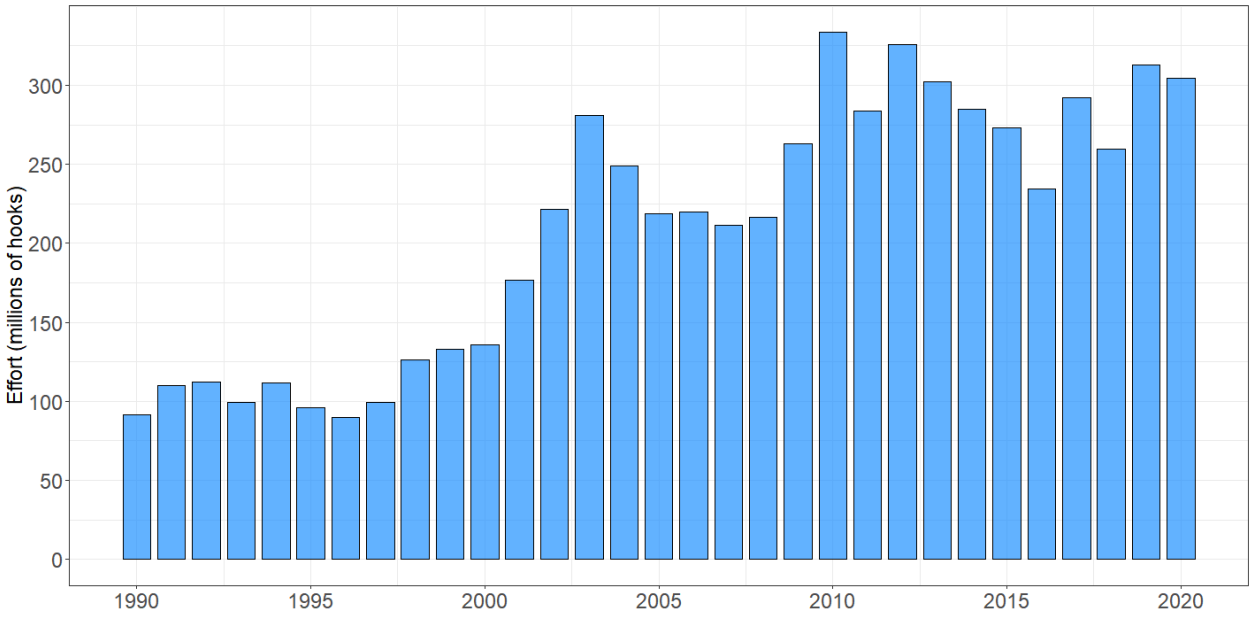

Figure 3: Temporal trends in effort (millions of hooks) in the southern longline fishery (WCPFC-CA south of 10°S).

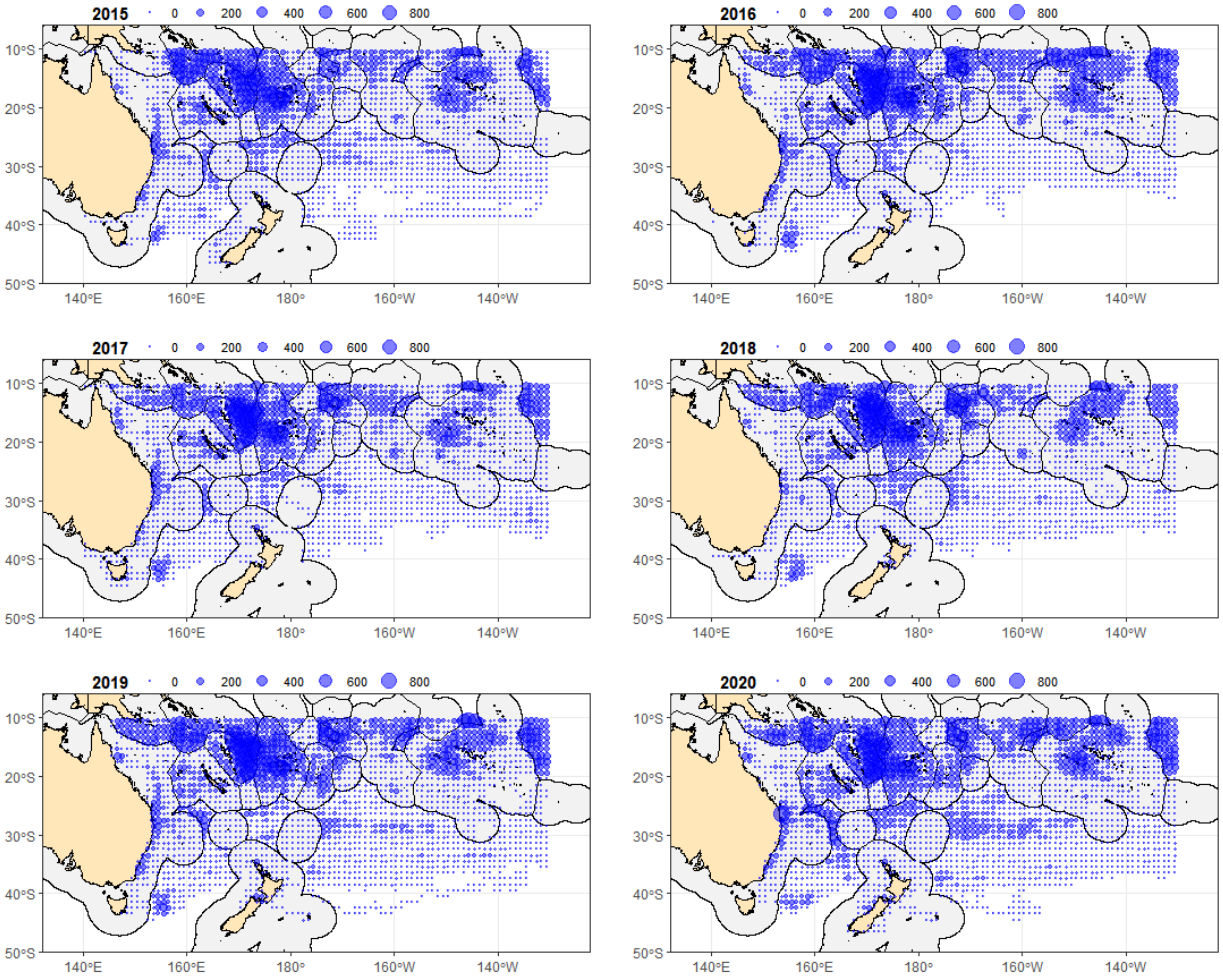

Figure 4: Longline VMS fishing days (augmented by logsheets for New Caledonia and French Polynesia) within the southern WCPFC-CA south of 10°S at the 1°×1° scale.

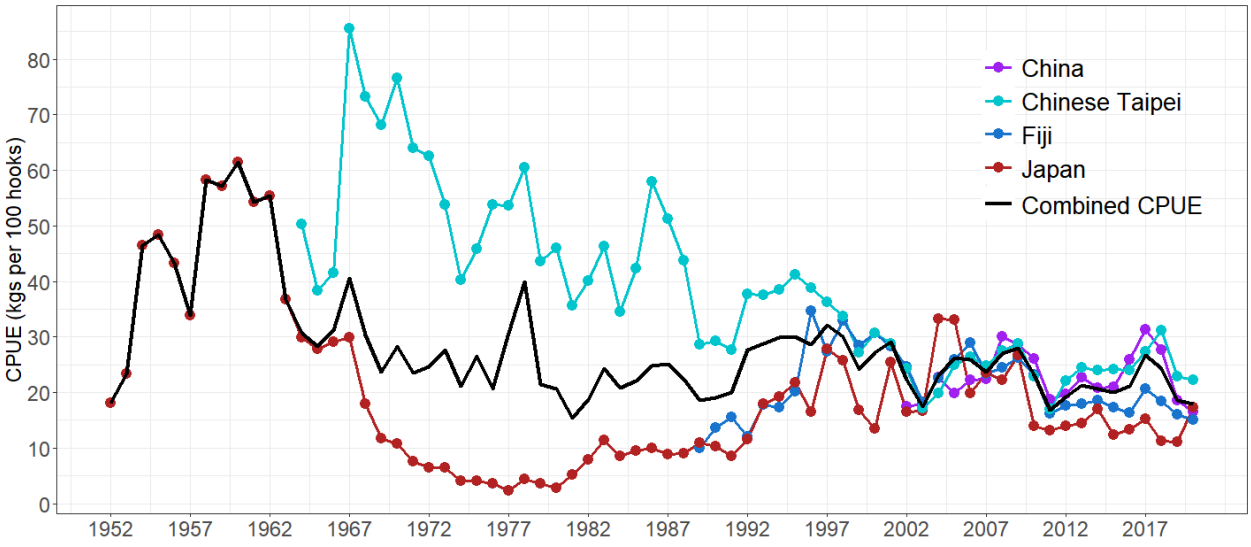

Figure 5: Trends in the nominal CPUE (kg per 100 hooks) over time for key fleets in the southern WCPFC-CA south of 10°S. The black line is the combined CPUE over each of the fleets shown.

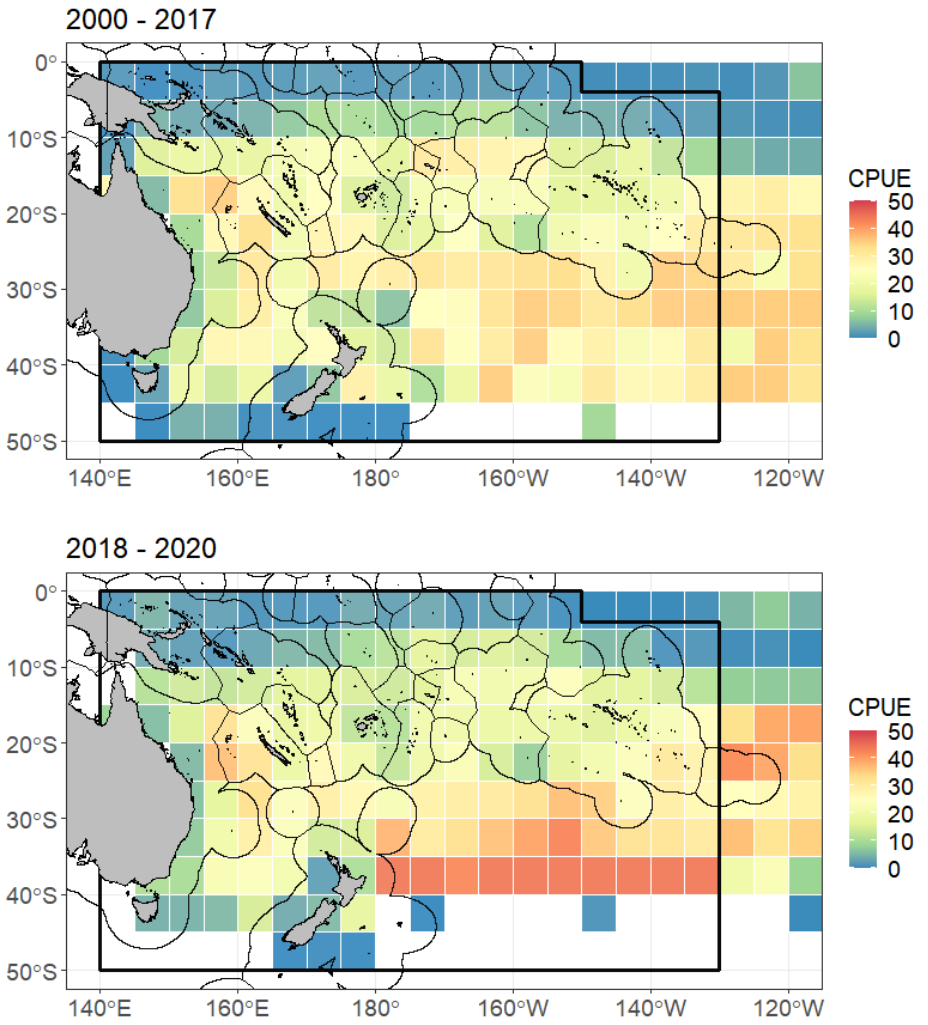

Figure 6: Albacore tuna longline CPUE distribution for the period 2000–2017 (top), and 2018–2020 (bottom). CPUE (kg/100 hooks) for a given 5°×5° square is indicated by the colour of the tile.

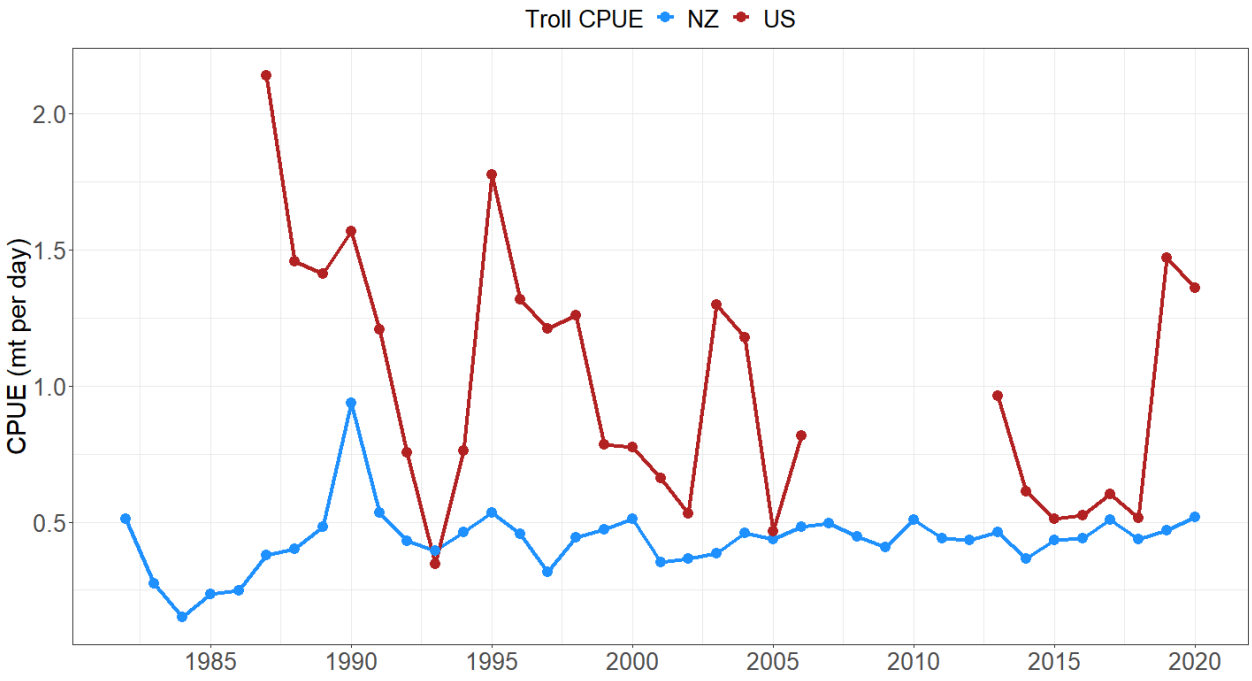

Figure 7: Trends in troll CPUE (albacore mt/day) over time in the WCPFC-CA south of 10°S for two troll fleets.

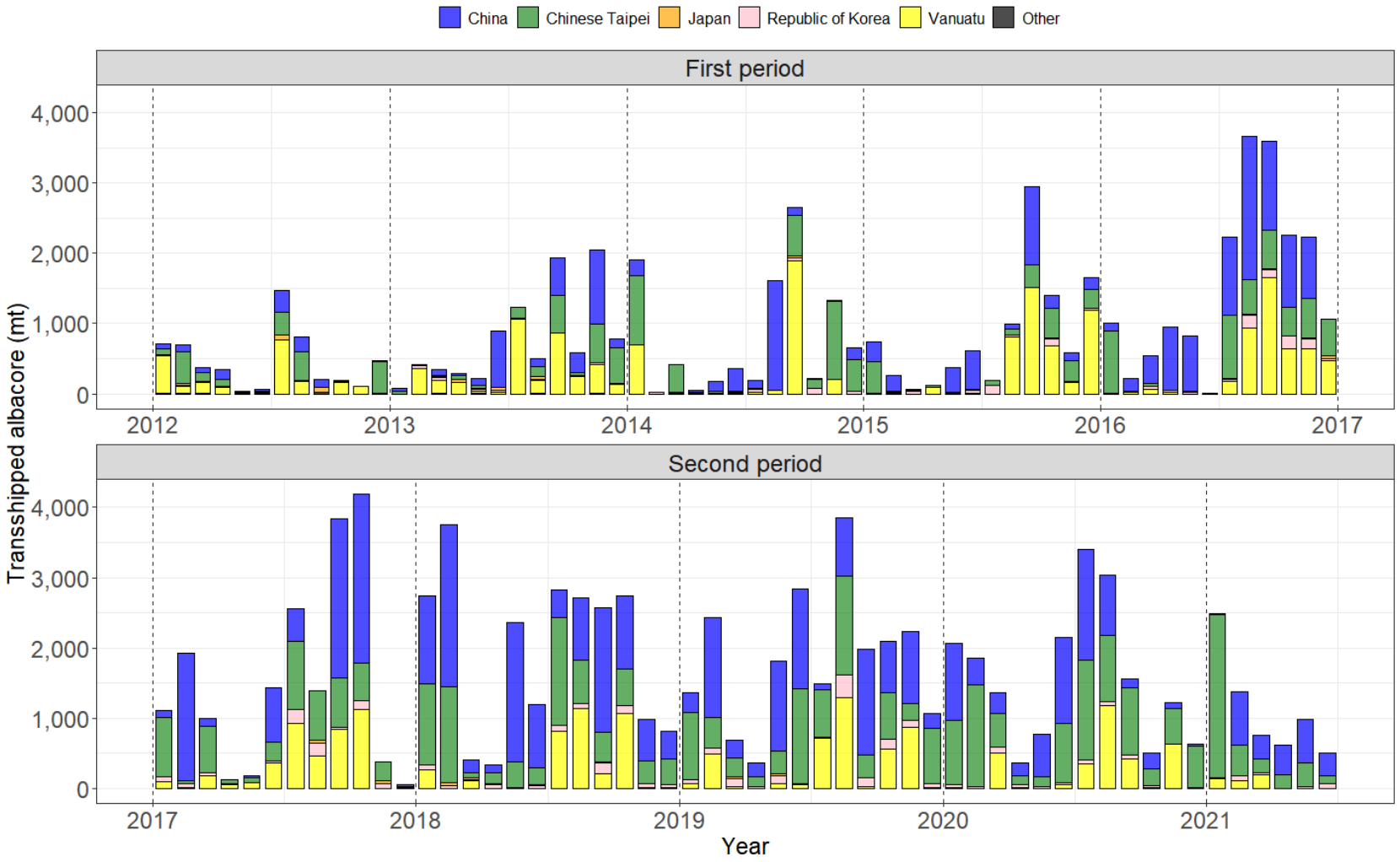

Figure 8: Reported transshipment (mt) by flag and month for 2012 to 2017 (top) and 2017 to 2021 - bottom). Source: WCPFC Transshipment Events Database (1 July 2021).

Appendix 1: Summaries of South Pacific albacore longline and troll catch, by flag/geographic region

Table A1-1: Annual southern WCPFC-CA albacore longline catch estimates by Vessel Nation, 2010 - 2020. Note: Available operational and aggregate logsheet data raised to annual catch estimates (ACE). Differences in annual totals between this table and Table 1 result from rounding errors. Southern WCPFC-CA is approximated - some EEZ and high seas areas span the equator.

Flag	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Australia	745	653	709	773	737	949	916	831	752	798	1,163
Belize	5	52	18	7	0	0	0	0	0	0	0
Cook Islands	2,423	2,182	2,757	1,354	1,186	1,167	1,352	2,562	3,083	2,277	1,194
China	12,926	11,846	24,523	23,789	14,471	14,494	16,123	29,154	21,130	22,643	20,591
Spain (EC)	13	6	3	3	2	1	2	2	2	2	4
Fiji	8,603	9,947	9,369	8,708	7,016	7,016	7,274	9,763	8,854	8,343	6,401
FSM	1	1	156	634	366	1,224	1,966	250	1,455	2,082	460
Japan	2,635	2,057	2,048	1,752	1,151	901	1,578	1,755	1,162	1,132	1,284
Kiribati	66	200	349	40	7	357	509	653	340	1,122	1,870
Republic of Korea	1,027	488	892	767	691	1,013	1,387	1,134	1,064	1,693	571
New Caledonia	1,939	1,736	1,715	1,714	1,630	1,583	1,747	1,734	1,752	2,011	1,897
Niue	97	0	0	0	0	0	0	0	0	0	0
New Zealand	460	418	266	302	311	223	233	181	239	845	171
French Polynesia	3,483	3,225	3,594	3,512	3,744	3,418	3,277	2,148	3,058	3,439	2,812
PNG	791	245	693	235	308	336	48	627	92	36	18
Portugal (EC)	0	4	1	67	1	0	0	0	0	0	0
Solomon Islands	7,716	899	0	0	14,236	11,249	1,703	0	1,918	2,538	1,686
Tonga	57	34	20	13	25	29	42	26	23	29	13
Tuvalu	0	184	432	169	78	97	52	175	121	64	117
Chinese Taipei	16,440	12,949	11,594	13,387	7,367	7,954	11,803	12,520	9,180	8,740	10,631
USA	4,082	2,555	3,461	2,213	1,543	1,961	1,655	1,539	1,567	1,090	537
Vanuatu	10,817	4,726	7,185	8,202	3,540	5,722	4,582	4,855	5,554	4,492	4,172
Wallis and Futuna	0	3	0	0	0	0	0	0	0	0	0
Samoa	2,529	1,415	2,038	1,642	800	840	947	2,374	1,684	2,610	1,413

Table A1-2: Annual southern WCPFC-CA albacore longline catch estimates by Vessel Nation in each EEZ, 2010 - 2020. Note: Available operational and aggregate logsheet data raised to annual catch estimates (ACE). Differences in annual totals between this table and Table 1 result from rounding errors. Southern WCPFC-CA is approximated - some EEZ and high seas areas span the equator.

EEZ	Flag	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
American Samoa	US	2,838	1,784	2,416	1,769	1,377	1,760	1,511	1,511	1,552	1,062	513
Australia	AU	745	652	702	757	728	945	910	830	751	796	1,158
	JP	0	0	0	0	0	0	1	0	0	0	0
Cook Islands	CK	2,229	2,178	2,726	1,223	1,073	1,040	1,267	2,370	2,299	1,196	362
	CN	0	148	2,970	2,223	3,186	2,238	1,542	687	940	2,610	1,608
	FJ	140	396	329	80	0	0	0	0	0	0	0
	FM	0	0	134	573	174	1,198	1,945	248	1,437	1,491	445
	KI	0	0	244	29	0	0	0	0	0	5	0
	KR	0	0	0	0	0	1	0	0	0	0	0
	TW	193	163	311	0	0	0	0	6	38	1	25
	US	971	576	650	267	40	75	0	0	0	0	0
	VU	1,378	2,098	3,263	1,590	10	4	3	0	0	0	0
Fiji	CN	152	298	433	305	201	324	643	214	20	10	5
	FJ	5,606	3,763	3,852	3,253	3,715	5,312	4,139	5,656	5,443	5,130	3,819
	KR	11	69	0	38	0	0	2	0	0	0	2
	TV	0	0	0	0	0	0	0	0	0	0	0
	TW	1	5	0	3	1	0	0	0	2	0	0
	VU	1	30	1	43	0	5	0	1	0	0	0
High seas	AU	0	1	7	16	9	4	6	1	1	2	5
	BZ	5	52	14	7	0	0	0	0	0	0	0
	CK	50	4	23	28	0	1	6	110	270	165	313
	CN	11,468	7,768	16,262	12,940	5,880	8,098	3,121	18,481	11,138	15,433	9,548
	ES	13	6	3	3	2	1	2	2	2	2	4
	FJ	1,328	2,467	2,468	1,891	1,791	1,039	1,085	1,466	1,512	1,011	1,468
	FM	1	1	21	61	192	25	20	2	18	591	13
	JP	902	1,532	1,091	1,181	1,089	689	579	663	364	464	1,157
	KI	0	193	16	3	1	162	13	240	283	160	232
	KR	422	226	427	425	163	272	464	639	499	1,186	559
	NC	7	2	3	1	2	4	2	14	10	0	0

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Table A1-2: Annual southern WCPFC-CA albacore longline catch estimates by Vessel Nation in each EEZ, 2010 - 2020. Note: Available operational and aggregate logsheet data raised to annual catch estimates (ACE). Differences in annual totals between this table and Table 1 result from rounding errors. Southern WCPFC-CA is approximated - some EEZ and high seas areas span the equator.

EEZ	Flag	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	NZ	0	0	0	0	0	0	0	0	0	0	0
	PF	1	1	3	17	0	0	1	0	0	0	0
	PG	0	0	0	0	0	0	33	139	0	0	0
	PT	0	4	1	67	1	0	0	0	0	0	0
	SB	1,897	72	0	0	970	1,644	144	0	17	46	462
	TO	0	0	0	0	1	0	0	1	0	0	0
	TV	0	10	15	10	1	1	1	52	15	4	115
	TW	15,304	8,605	6,517	8,883	6,592	7,077	8,593	9,857	8,191	8,131	10,123
	US	274	195	395	177	125	126	144	28	15	28	24
	VU	8,679	1,771	2,498	3,987	3,165	3,902	2,597	4,072	4,958	4,114	4,172
	WS	0	0	0	0	0	0	5	34	107	20	3
Jarvis (USA)	US	0	0	0	0	0	0	0	0	0	0	0
Kiribati	BZ	0	0	5	0	0	0	0	0	0	0	0
	CN	399	209	293	225	308	1,330	3,024	170	4	80	1,182
	FJ	0	16	41	29	176	139	143	4	0	50	0
	FM	0	0	0	0	0	0	1	1	0	0	2
	JP	19	13	45	8	6	0	0	0	0	0	0
	KI	66	7	46	3	1	54	406	207	57	958	1,638
	KR	359	99	335	187	351	612	416	11	9	38	6
	TV	0	3	48	0	0	0	0	0	0	0	0
	TW	49	130	328	351	263	237	668	33	3	1	9
	VU	398	73	78	26	152	205	95	0	0	1	0
Matthew and Hunter	FJ	14	6	9	0	0	1	1	0	1	0	0
	NC	0	0	1	0	0	1	0	1	0	2	1
	VU	1	0	0	0	0	0	0	1	0	0	0
New Caledonia	NC	1,932	1,734	1,711	1,713	1,628	1,578	1,745	1,719	1,742	2,009	1,896
Niue	CK	99	0	0	85	33	0	0	0	362	386	165
	FJ	0	0	0	277	157	193	88	14	0	0	0
	NU	97	0	0	0	0	0	0	0	0	0	0

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Table A1-2: Annual southern WCPFC-CA albacore longline catch estimates by Vessel Nation in each EEZ, 2010 - 2020. Note: Available operational and aggregate logsheet data raised to annual catch estimates (ACE). Differences in annual totals between this table and Table 1 result from rounding errors. Southern WCPFC-CA is approximated - some EEZ and high seas areas span the equator.

EEZ	Flag	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	TW	0	0	0	0	18	3	0	0	2	0	0
New Zealand	NZ	460	418	266	302	311	223	233	181	239	845	171
French Polynesia	PF	3,482	3,224	3,591	3,495	3,744	3,418	3,276	2,148	3,058	3,439	2,812
PNG	CN	0	0	0	1	3	0	101	0	559	20	603
	JP	0	0	0	0	0	105	998	1,091	796	669	127
	PG	791	245	693	235	308	336	14	488	92	36	18
	TW	4	49	108	2	0	19	72	32	4	31	5
Solomon Islands	CK	0	0	5	18	79	0	0	0	0	0	0
	CN	69	985	1,737	2,903	239	0	1,511	3,321	3,875	1,753	2,563
	FJ	92	1,129	1,305	1,783	130	0	563	163	558	213	1
	JP	1,471	506	855	563	55	106	0	0	1	0	0
	KI	0	0	0	5	0	0	0	1	0	0	0
	KR	34	43	111	96	57	34	2	39	11	16	2
	SB	3,959	827	0	0	12,136	6,747	530	0	1,901	2,492	1,224
	TV	0	12	0	0	0	0	0	0	0	0	0
	TW	378	2,737	3,239	2,424	278	0	1,142	1,906	452	1	2
	VU	18	185	919	1,282	136	0	0	119	223	23	0
Tokelau	CK	0	0	0	0	0	125	78	82	152	531	354
	CN	0	0	0	0	0	0	5	57	6	0	0
	FJ	0	75	89	0	1	1	0	0	0	0	0
	KI	0	0	26	0	5	140	91	204	0	0	0
	TV	0	16	134	0	0	0	0	0	0	0	0
	TW	0	17	0	0	0	0	267	107	0	0	3
	VU	0	0	0	0	0	1,601	1,886	510	262	292	0
	WS	0	0	0	0	0	0	119	702	212	1,147	710
Tonga	CN	0	0	12	155	107	61	1	7	13	0	0
	FJ	0	0	29	123	1	2	1	0	131	608	350
	TO	57	34	20	13	24	29	42	25	23	29	13
	TW	0	2	700	1,179	133	618	1,061	578	488	576	465

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Table A1-2: Annual southern WCPFC-CA albacore longline catch estimates by Vessel Nation in each EEZ, 2010 - 2020. Note: Available operational and aggregate logsheet data raised to annual catch estimates (ACE). Differences in annual totals between this table and Table 1 result from rounding errors. Southern WCPFC-CA is approximated - some EEZ and high seas areas span the equator.

EEZ	Flag	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Tuvalu	CK	35	0	3	0	0	0	0	0	0	0	0
	CN	0	77	0	3	129	148	271	475	153	78	367
	FJ	183	164	548	192	149	64	675	383	140	804	295
	JP	243	5	57	0	0	0	0	0	0	0	0
	KI	0	0	17	0	0	0	0	0	0	0	0
	KR	201	52	19	21	120	94	504	445	545	453	1
	TV	0	144	234	159	77	95	51	123	106	60	2
	TW	12	3	0	87	0	0	0	0	0	0	0
	US	0	0	1	0	0	0	0	0	0	0	0
	VU	1	23	51	1,029	0	5	0	0	0	53	0
Vanuatu	CK	10	0	0	0	0	0	0	0	0	0	0
	CN	839	2,361	2,817	5,034	4,419	2,295	5,904	5,743	4,423	2,660	4,714
	FJ	1,241	1,930	698	1,080	896	265	580	2,077	1,070	527	466
	SB	1,860	0	0	0	1,130	2,858	1,029	0	0	0	0
	TW	500	1,237	392	459	83	1	0	0	0	0	0
	VU	341	548	374	246	77	0	0	152	110	9	0
Wallis and Futuna	WF	0	3	0	0	0	0	0	0	0	0	0
Samoa	WS	2,529	1,415	2,038	1,642	800	840	823	1,638	1,364	1,442	700

Table A1-3: Annual south Pacific albacore troll catch estimates in the southern WCPFC-CA, by flag, 2000–2020.

Year	Canada	Cook Islands	New Zealand	USA	Total
2000	351	335	3,336	2,433	6,455
2001	206	202	2,736	2,107	5,253
2002	144	166	3,012	1,337	4,661
2003	0	688	3,721	1,574	5,984
2004	63	376	3,212	960	4,614
2005	72	89	2,855	576	3,592
2006	135	121	2,043	587	2,886
2007	27	53	1,736	272	2,088
2008	0	0	3,352	151	3,503
2009	0	0	1,794	237	2,031
2010	0	0	1,832	307	2,139
2011	1	0	2,787	471	3,259
2012	0	0	2,727	235	2,962
2013	0	0	2,836	390	3,226
2014	0	21	1,937	445	2,403
2015	0	21	2,425	156	2,602
2016	0	21	1,969	145	2,135
2017	55	0	1,959	805	2,819
2018	0	1	2,272	441	2,714
2019	0	0	1,907	873	2,780
2020	0	0	2,859	1,913	4,772

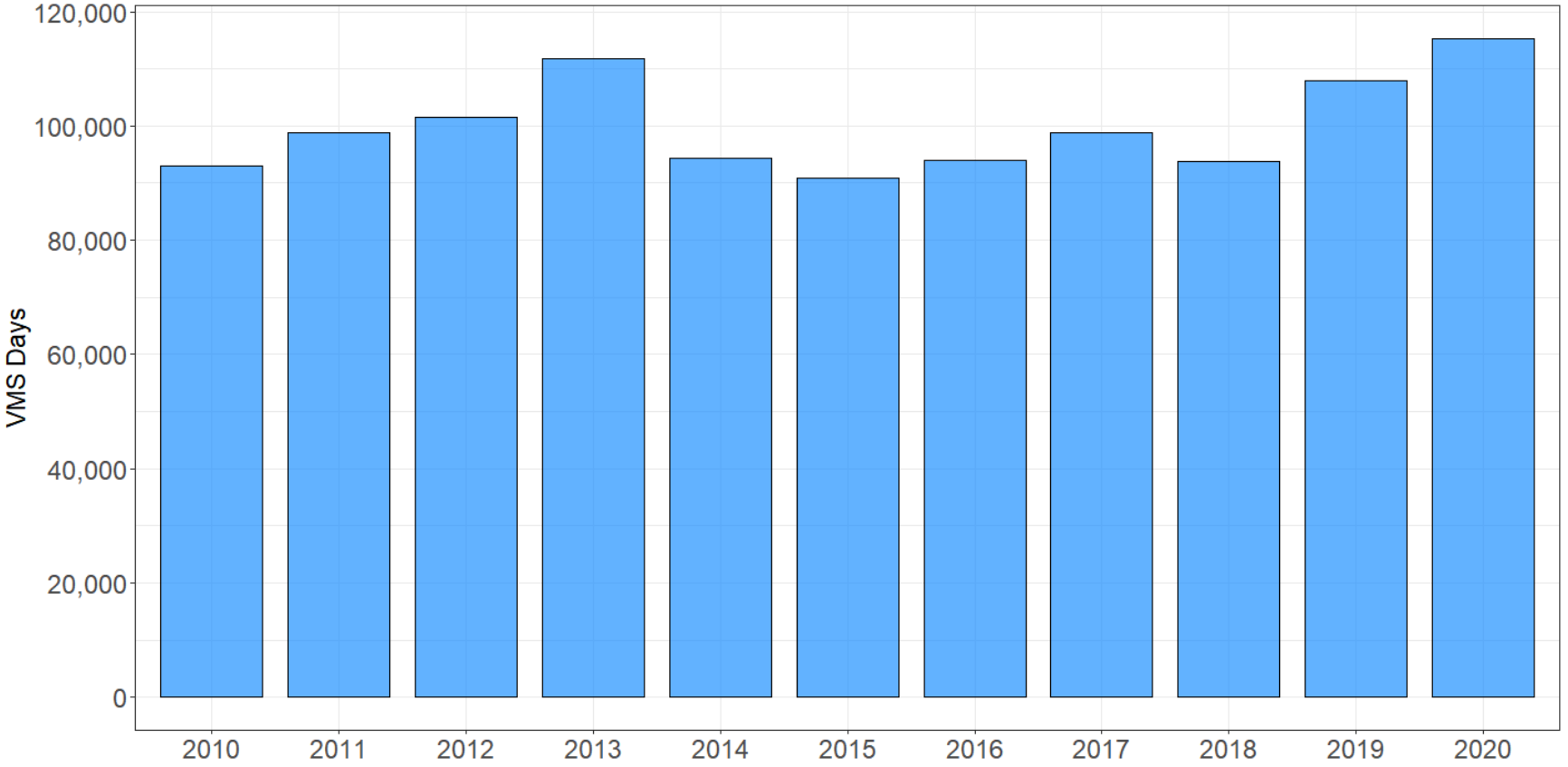

Figure A1-1: Longline VMS fishing days (augmented by logsheets for New Caledonia and French Polynesia) within the southern WCP-CA at 1°×1°, south of 10°S.

Appendix 2: Notes on the time series of longline VMS information in the South Pacific

This analysis summarises the longline VMS information available to SPC through the FFA and WCPFC over the period 2010-2020, by geographic region of the southern WCPFC-CA. Effort in that database corresponds to fishing days. Please note:

- This analysis uses annual VMS data available up to and including 19 July 2021;
- Effort represents total longline effort, not just that targeted at South Pacific albacore;
- VMS effort presented for EEZs includes that in archipelagic waters;
- Effort data for some countries (e.g. those with domestic longliners not on FFA VMS) will not be included within EEZ patterns;
- Effort for some countries (e.g. New Caledonia; French Polynesia) may be incomplete and so data were augmented with logsheets for those two countries;
- Some trends may result from improved VMS coverage of vessels over time;
- EEZ effort excludes the Indonesian EEZ.

Table A2-1: Total VMS fishing days (augmented by logsheets for New Caledonia and French Polynesia) by year for all EEZs and the High Seas (HS), south of 10°S (Figure A2-1)

EEZ	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
American Samoa	1,686	1,345	1,755	1,663	1,198	943	1,371	2,406	2,443	2,549	2,230
Australia	760	1,488	1,268	1,216	1,519	3,510	3,504	4,287	1,900	4,111	4,611
Cook Islands	4,356	5,427	9,276	7,458	5,315	3,825	4,887	5,274	3,888	4,677	5,604
Fiji	14,123	16,673	18,214	14,993	13,749	14,619	13,149	13,911	14,498	14,979	13,035
High seas	20,632	22,782	23,008	30,890	26,524	22,182	19,387	23,438	21,344	27,715	34,914
Kiribati	2,386	1,880	2,294	3,558	1,312	1,642	4,038	492	34	1,018	3,098
Matthew and Hunter	82	106	65	55	90	86	68	54	45	60	132
New Caledonia	3,408	3,115	3,188	2,894	2,653	2,583	2,804	2,763	2,701	2,708	3,481
Niue	242	25	47	456	392	340	590	427	803	900	991
New Zealand	345	576	624	296	264	378	323	279	326	851	1,002
French Polynesia	6,178	6,684	7,321	9,556	9,745	10,338	10,229	9,617	10,222	11,163	11,571
PNG	1,601	720	447	178	54	249	2,155	2,417	3,103	3,841	3,147
Solomon Islands	20,888	17,791	15,257	19,232	17,736	14,450	10,272	8,518	13,957	12,516	10,680
Tokelau	20	62	45	66	96	1,167	1,517	1,062	460	843	735
Tonga	134	318	1,926	4,885	1,181	1,735	2,244	1,980	931	2,948	2,429
Tuvalu	737	962	630	261	297	302	1,045	1,215	300	512	672
Vanuatu	14,823	17,789	14,800	12,394	10,908	9,872	12,012	15,647	11,138	11,864	12,753
Wallis and Futuna	70	185	257	267	286	327	319	196	161	219	189
Samoa	41	92	228	490	153	1,550	3,049	3,442	4,193	3,075	3,064
Total	92,513	98,019	100,650	110,807	93,471	90,100	92,963	97,422	92,447	106,548	114,339
EEZ percent	78	77	77	72	72	75	79	76	77	74	69
HS percent	22	23	23	28	28	25	21	24	23	26	31

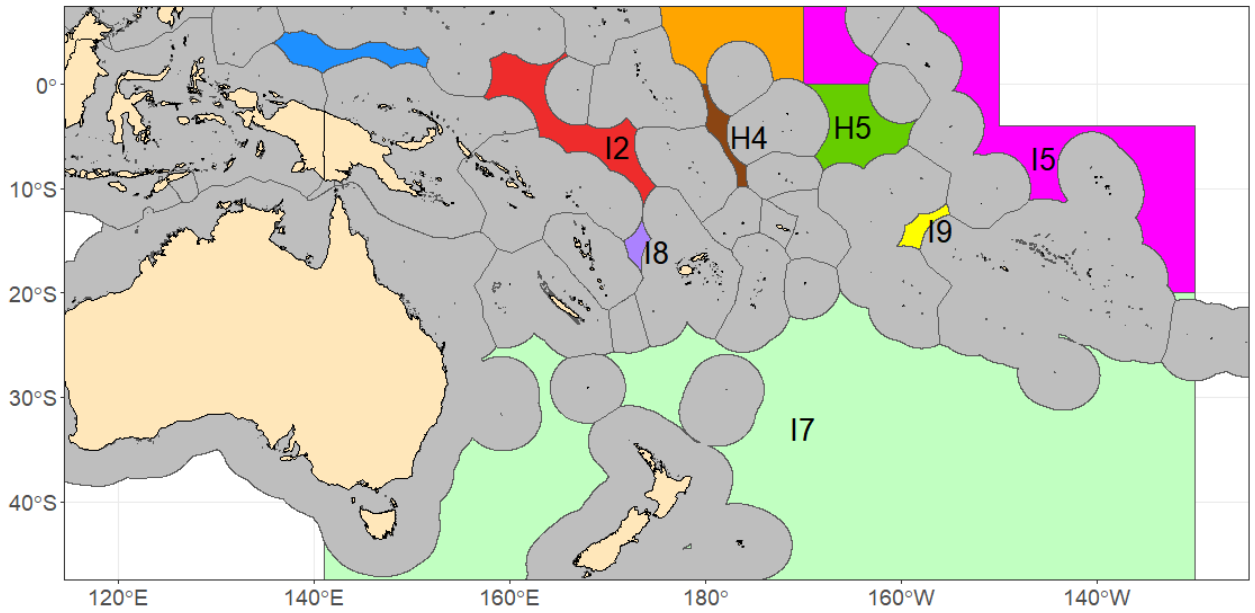

Figure A2-1: Map of International Waters in the southern WCPFC-CA.

Table A2-2: Total VMS fishing days by year in International Waters, south of 10°S (Figure A2-1).

EEZ	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
I2	169	185	248	302	262	381	593	544	547	215	362
I5	5,459	4,494	4,973	10,301	7,656	6,176	7,236	7,963	4,631	9,645	9,114
I7	10,592	12,415	10,486	13,141	13,134	11,129	7,151	9,094	11,037	12,281	20,017
I8	2,699	3,271	2,287	2,873	2,706	3,060	3,408	4,758	4,361	3,865	3,366
I9	1,713	2,416	5,014	4,272	2,766	1,436	1,000	1,078	769	1,709	2,056
Total	20,632	22,782	23,008	30,890	26,524	22,182	19,387	23,438	21,344	27,715	34,914

Appendix 3: High Seas transshipment data for albacore based on CMM 2009-06 reporting

The tables below show high Seas transshipment data for albacore, by flag, year and month from July 2010 - May 2020.
Notes:

1. Responsible CCM is the country responsible for reporting for the Fishing Vessel
2. The requirement to report (within 15 days of transshipment) high seas transshipment activities commenced in July 2010.
3. The data refer to high seas transshipments inside and outside the WCPFC Convention Area, and it should be noted that a proportion of the catch will likely have been caught within EEZs in the Convention Area and the IATTC Convention area.
4. Weights are in metric tonnes.

Table A3-1: Table of albacore transhipments - 2010.

Responsible CCM	Jul	Aug	Sep	Oct	Nov	Dec
Belize	0	0	0	0	3	0
China	0	0	166	211	247	17
Chinese Taipei	0	115	166	125	148	21
Indonesia	0	0	0	0	41	1
Japan	0	1	0	54	35	30
Republic of Korea	17	0	22	38	0	6
Philippines	0	0	0	8	0	5
Vanuatu	0	1,435	271	232	522	149
Total	17	1,551	625	668	996	229

Table A3-2: Table of albacore transhipments - 2011.

Responsible CCM	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Belize	2	0	0	36	0	0	1	0	0	0	0	0
China	5	102	24	32	32	30	62	749	35	82	63	28
Chinese Taipei	818	183	871	15	52	194	707	466	347	95	321	407
Indonesia	0	0	0	1	8	0	0	0	8	30	0	7
Japan	11	80	0	0	2	2	1	3	0	32	57	5
Republic of Korea	43	3	46	34	6	16	4	0	1	6	80	6
Philippines	0	0	0	0	0	0	17	2	0	10	0	7
Vanuatu	100	110	1,020	291	1	14	817	313	62	13	0	341
Total	979	478	1,961	409	101	256	1,609	1,533	453	268	521	801

Table A3-3: Table of albacore transhipments - 2012.

Responsible CCM	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Belize	0	0	0	0	0	0	1	0	0	0	0	0
China	68	96	62	149	8	20	306	217	118	7	0	11
Chinese Taipei	87	438	127	92	12	0	327	406	0	18	0	457
Indonesia	2	5	2	0	0	12	0	0	0	0	0	5
Japan	0	31	2	13	2	13	67	3	73	0	3	0
Republic of Korea	4	13	14	5	13	17	6	0	0	0	5	0
Philippines	2	0	5	0	0	0	0	0	19	0	0	0
Vanuatu	545	108	161	90	2	0	765	185	0	165	105	0
Total	708	691	373	349	37	62	1,472	811	210	190	113	473

Table A3-4: Table of albacore transhipments - 2013.

Responsible CCM	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Belize	0	0	0	0	0	0	0	0	0	0	0	0
China	42	7	85	24	90	806	0	111	543	283	1,049	128
Chinese Taipei	34	0	5	59	51	0	157	140	532	39	544	499
Indonesia	0	0	7	0	6	0	0	0	0	0	0	2
Japan	0	0	9	38	3	39	14	42	0	15	11	3
Republic of Korea	0	45	54	0	30	27	0	20	0	0	24	19
Philippines	0	0	5	0	8	0	0	16	0	0	3	0
Vanuatu	0	362	175	165	28	28	1,063	175	865	249	412	130
Total	76	414	340	286	216	900	1,234	504	1,940	586	2,043	781

Table A3-5: Table of albacore transhipments - 2014.

Responsible CCM	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Belize	0	0	0	0	0	0	0	0	0	0	0	0
China	225	1	0	32	139	332	103	1,551	116	7	16	171
Chinese Taipei	986	1	386	9	31	1	0	0	576	130	1,110	449
Indonesia	0	0	0	0	0	4	0	0	0	0	0	0
Japan	4	0	27	0	2	0	21	0	24	8	0	0
Republic of Korea	0	22	0	9	3	14	47	6	38	74	0	38
Philippines	0	1	0	0	0	0	0	0	0	0	0	0
Vanuatu	691	0	3	0	0	13	18	49	1,896	1	206	0
Total	1,906	25	416	50	175	364	189	1,606	2,650	220	1,332	658

Table A3-6: Table of albacore transhipments - 2015.

Responsible CCM	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Belize	0	0	0	0	0	0	0	0	0	0	0	0
China	273	216	4	0	351	558	6	71	1,102	181	122	169
Chinese Taipei	449	8	13	19	0	6	62	81	330	419	294	275
Indonesia	0	0	0	0	0	0	0	0	0	0	0	0
Japan	2	5	6	2	0	0	1	1	0	6	7	0
Republic of Korea	2	22	43	4	26	50	128	26	0	101	4	22
Philippines	0	0	0	0	0	0	0	0	0	0	0	0
Vanuatu	9	5	0	91	4	5	0	817	1,508	687	161	1,190
Total	735	256	66	116	381	619	197	996	2,940	1,394	588	1,656

Table A3-7: Table of albacore transhipments - 2016.

Responsible CCM	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Belize	0	0	0	0	0	0	0	0	0	0	0	0
China	115	187	386	898	783	0	1,099	2,046	1,258	1,028	869	0
Chinese Taipei	874	0	47	6	18	0	902	485	556	400	562	521
Indonesia	0	0	0	0	0	0	0	0	0	0	0	0
Japan	3	0	0	0	0	2	14	12	5	0	10	47
Republic of Korea	3	4	37	29	20	7	27	188	118	188	152	29
Philippines	0	0	0	0	0	0	0	0	0	0	0	0
Vanuatu	10	28	72	20	0	3	182	937	1,654	642	635	470
Total	1,005	219	542	953	821	12	2,224	3,668	3,591	2,258	2,228	1,067

Table A3-8: Table of albacore transhipments - 2017.

Responsible CCM	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Belize	0	0	0	0	0	0	0	0	0	0	0	0
China	91	1,822	109	1	29	772	454	2	2,253	2,404	10	39
Chinese Taipei	841	40	665	50	60	264	972	709	708	526	265	6
Indonesia	0	0	0	0	0	0	0	0	0	0	0	0
Japan	0	0	0	1	0	0	0	34	0	5	43	14
Republic of Korea	72	56	49	18	8	28	193	189	34	130	66	0
Philippines	0	0	0	0	0	0	0	0	0	0	0	0
Vanuatu	101	13	179	58	80	371	932	461	837	1,122	3	5
Total	1,105	1,931	1,002	128	177	1,435	2,551	1,395	3,832	4,187	387	64

Table A3-9: Table of albacore transhipments - 2018.

Responsible CCM	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Belize	0	0	0	0	0	0	0	0	0	0	0	0
China	1,252	2,304	185	118	1,978	907	390	886	1,768	1,043	591	389
Chinese Taipei	1,146	1,365	72	161	367	244	1,530	612	429	515	322	363
Indonesia	0	0	0	0	0	0	0	0	0	0	0	0
Japan	1	30	19	8	0	2	0	0	9	0	0	9
Republic of Korea	68	45	24	56	15	48	87	74	154	107	56	40
Philippines	0	0	0	0	0	0	0	0	0	0	0	0
Vanuatu	271	5	107	1	0	1	814	1,137	212	1,074	12	12
Total	2,738	3,749	407	344	2,360	1,202	2,821	2,709	2,572	2,739	981	813

Table A3-10: Table of albacore transhipments - 2019.

Responsible CCM	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Belize	0	0	0	0	0	0	0	0	0	0	0	0
China	285	1,419	253	198	1,279	1,427	95	824	1,497	724	1,016	213
Chinese Taipei	961	433	272	140	333	1,346	666	1,407	332	658	249	787
Indonesia	0	0	0	0	0	0	0	0	0	0	0	0
Japan	0	0	31	0	18	0	0	0	0	0	0	0
Republic of Korea	49	81	110	29	114	15	18	324	121	149	94	53
Philippines	0	0	0	0	0	0	0	0	0	0	0	0
Vanuatu	72	494	27	2	74	58	716	1,293	30	558	871	18
Total	1,367	2,427	693	369	1,818	2,846	1,495	3,848	1,980	2,089	2,230	1,071

Table A3-11: Table of albacore transhipments - 2020.

Responsible CCM	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Belize	0	0	0	0	0	0	0	0	0	0	0	0
China	1,092	373	309	194	602	1,229	1,577	853	131	235	90	35
Chinese Taipei	911	1,454	475	123	138	836	1,423	941	957	228	503	583
Indonesia	0	0	0	0	0	0	0	0	0	0	0	0
Japan	0	0	0	0	0	0	0	0	0	0	0	0
Republic of Korea	47	21	76	38	33	29	48	56	57	28	3	12
Philippines	0	0	0	0	0	0	0	0	0	0	0	0
Vanuatu	12	8	511	18	1	60	357	1,181	418	19	629	8
Total	2,062	1,856	1,371	373	774	2,154	3,405	3,031	1,563	510	1,225	638