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OVERVIEW OF TUNA FISHERIES IN THE WESTERN AND CENTRAL PACIFIC OCEAN, INCLUDING ECONOMIC CONDITIONS – 2021

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ABSTRACT

This paper provides a broad description of the major fisheries in the WCPFC Statistical Area (WCP-CA) highlighting activities during the most recent calendar year (2021) and covering the most recent summary of catch estimates by gear and species.

The provisional total WCP–CA tuna catch for 2021 was estimated at **2,493,571 mt,** around 210,000 mt lower than the 2020 level and nearly 500,000 mt lower than the record catch in 2019 (2,987,931 mt). The WCP–CA tuna catch (2,493,571 mt) for 2021 represented 87% of the total Pacific Ocean tuna catch of 2,845,153 mt, and 56% of the global tuna catch (the provisional estimate for 2021 is 4,436,543 mt), noting that unlike other oceans, over 85% of the WCP–CA tuna catch occurs in the waters of the coastal states.

The **2021 WCP–CA catch of skipjack** (**1,547,945 mt** – 62% of the total catch) was nearly 500,000 mt lower than the record in 2019 (2,037,902 mt). The **WCP–CA yellowfin catch** for 2021 (**695,097 mt** – 28%) was a slight decline of around 40,000 mt on the record 2020 catch (735,394 mt), noting the past five years have consistently produced the highest annual yellowfin catches on record. The recent high yellowfin tuna catches are related to some extent to recent high catch levels from the "other" category (primarily small-scale fisheries in Indonesia).

The **WCP–CA bigeye catch** for 2021 (**169,113** mt – 7%) was the highest since 2014. The **2021 WCP–CA albacore catch** (**81,416 mt** – 3%) was the lowest since 1993, and clearly lower than the record catch in 2002 of 148,051 mt. The provisional **south Pacific albacore catch in 2021 (52,173 mt)**, was the lowest since 2000 and around 40,000 mt less than the record catch taken in 2017 (94,504 mt).

The provisional **2021 purse seine catch of 1,740,370 mt** was the lowest catch since 2011, and around 360,000 mt lower than the record catch in 2019 (2,101,405 mt). The 2021 purse seine skipjack catch (1,254,022 mt: 72% of the catch) was a clear drop of around 440,000 mt on the record in 2019 (~1,700,000 mt). The 2021 purse seine catch for yellowfin tuna (405,915 mt; 23% of the total purse seine tuna catch) was around 95,000 mt lower than the record catch in 2017 (501,109 mt) but still amongst the highest annual catches for this fishery. The provisional catch estimate for purse seine bigeye tuna for 2021 (79,167 mt) was the highest since 2014 and a clear increase on the relatively low purse seine bigeye tuna catch in 2019 (49,958 mt). The increased bigeye tuna catches in both 2020 and 2021 appears to be related to a higher number of associated sets in conjunction with La Nina conditions.

The provisional **2021 pole-and-line catch (123,528 mt)** was lower than the 2020 catch (200,345 mt) and at this stage, the lowest annual catch since the early-1960s, due to reduced catches in both the Japanese and the Indonesian fisheries, although 2021 estimates are provisional at this stage.

The provisional **WCP–CA longline catch (191,666 mt) for 2021** is the lowest catch since 1993 at this stage, acknowledging the negative impacts due to COVID-19 but also that coverage of available 2021 data is not yet complete.

The **2021 South Pacific troll albacore catch (4,037 mt)** was slightly less than 2020 (4,733 mt) but amongst highest catches since 2004 (4,990 mt). The New Zealand troll fleet (157 vessels catching 3,383 mt in 2021) and the United States troll fleet (21 vessels catching 654 mt in 2021) accounted for most of the 2021 albacore troll catch.

Market prices in 2021 for purse seine caught product **remain around 2020 levels** with Thai imports averaging $1,373/mt, 1% higher than 2020 levels, and the Yaizu price declining 3% to $1,423/mt.

Prices for longline caught yellowfin across all markets in 2021 increased significantly except for Japanese fresh imports from Oceania which fell 15% to ¥912/kg($8,310/mt). Prices for longline caught bigeye in 2021 also rose across the selected markets including that for Japanese fresh imports from

Oceania. Thai imports prices and US fresh prices for albacore declined in 2021 to $3,310/mt and $5,543/mt respectively while Japan selected ports fresh increased 4% to $3,271/mt.

The total estimated delivered value of the tuna catch in the WCP-CA declined 9% to $4.6 billion in 2021. The purse seine fishery was valued at $2.6 billion a decline of 5% on 2020 and equivalent to 56% of the total value of the tuna catch. A significant decline was also seen with the value of the longline fishery which fell 17% to $1.14 billion. Similarly, the value of the pole and line catch fell significantly 41% to $228 million primarily driven by the significant declines in catches and prices. In contrast, the value of the catch by other gears increased 8% to $691 million in 2021. The 2021 WCP–CA skipjack catch was valued at $2.17 billion, the yellowfin catch at $1.61 billion, the bigeye catch at $633 million and the albacore catch at $231 million.

Economic conditions for the topical purse seine in 2021 was at its lowest level since 2015 as fish prices and catch rates declined and increases in fuel costs. However, the index in 2020 remained significantly above its 20-year average as catch rates remained relatively high despite increase in fuel costs and decline in prices.

CONTENTS

1. INTRODUCTION

The tuna fishery in the Western and Central Pacific Ocean is diverse, ranging from small-scale artisanal operations in the coastal waters of Pacific states, to large-scale, industrial purse seine, pole-and-line and longline operations in both the exclusive economic zones of Pacific states and on the high seas. The main species targeted by these fisheries are skipjack tuna (*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*), bigeye tuna (*T. obesus*) and albacore tuna (*T. alalunga*).

This review provides a broad description of the major fisheries in the WCPFC Statistical Area (**WCP–CA**; see Figure 1), highlighting activities during the most recent calendar year – 2021. The review draws on the latest catch estimates compiled for the WCP–CA, found in Information Paper WCPFC–SC18-ST IP–1 *(Estimates of annual catches in the WCPFC Statistical Area – SPC-OFP, 2022)*. Where relevant, comparisons with previous years' activities have been included, although data for 2021, for some fisheries, are provisional at this stage.

This paper includes sections covering the four target tuna species, as well as blue marlin (*Makaira mazara*), black marlin (*Istiompax indica*), striped marlin (*Kajikia audax*) and swordfish (*Xiphias gladius*) catch in the WCP–CA tuna fisheries and an overview of the WCP–CA tuna fisheries by gear, including economic conditions in the main fisheries. In each section, the paper comments on recent developments in each fishery, with emphasis on 2021 catches relative to those of recent years, but refers readers to the SC18 National Fisheries Reports, which offer more detail on recent activities at the fleet level.

Additional graphical information that provides more information related to the recent condition of the fishery and certain WCPFC Conservation and Management Measures (CCMs) has been provided in an APPENDIX of this document, and other tabular and graphical information on the fishery can be found in Hare et al. (2022), and WCFPC Secretariat and SPC-OFP (2022).

This overview includes brief summaries of several fisheries in the north Pacific Ocean, including those fisheries catching albacore tuna, Pacific bluefin tuna (*T. orientalis*), striped marlin and swordfish. Information on these fisheries may be expanded in future reviews, depending on the availability of more complete data.

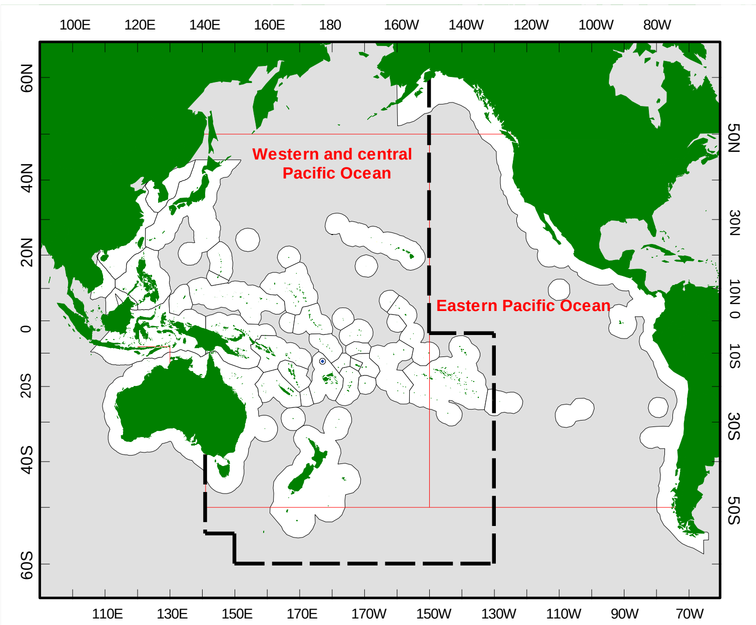

Figure 1.1 The western and central Pacific Ocean (WCPO), the eastern Pacific Ocean (EPO) and the WCPFC Convention Area (WCP–CA in dashed lines)

2. TOTAL TUNA CATCH AND CATCH VALUE FOR 2021

Annual total catches of the four main tuna species (skipjack, yellowfin, bigeye and albacore) in the WCP–CA increased steadily during the 1980s and 1990s with the purse seine fleet becoming clearly the dominant fishery in terms of catch volume. The increasing trend in total tuna catch continued through to 2009, followed by two years (2010-2011) of reduced catches (due in part to La Nina conditions), before returning to record levels in successive years over the period 2012–2014. Catches in the period 2015–2017 were lower than 2014 but increased again over the next two years, with a new record catch taken in 2019. Catches over the past two years (2020-2021) have since declined, partially due to the impacts of the COVID-19 pandemic (Figure 2.1 and Figure 2.2).

The provisional total WCP–CA tuna catch for 2021 was estimated at **2,493,571 mt,** around 210,000 mt lower than the 2020 level and nearly 500,000 mt lower than the record catch in 2019 (2,987,931 mt). For 2021, the **purse seine fishery** accounted for a catch of **1,740,370 mt** (70% of the total catch), with **pole-and-line** taking an estimated **123,528 mt** (5%), the **longline fishery** an estimated **191,666 mt** (8%), and the remainder (17%) taken by troll gear and a variety of artisanal gears, mostly in eastern Indonesia and the Philippines. The WCP–CA tuna catch (2,493,571 mt) for 2021 represented 87% of the total Pacific Ocean tuna catch of 2,845,153 mt, and 56% of the global tuna catch (the provisional estimate for 2021 is 4,436,543 mt), noting that unlike other oceans, over 85% of the WCP–CA tuna catch occurs in the waters of the coastal states (see Figure A1 in the Appendix).

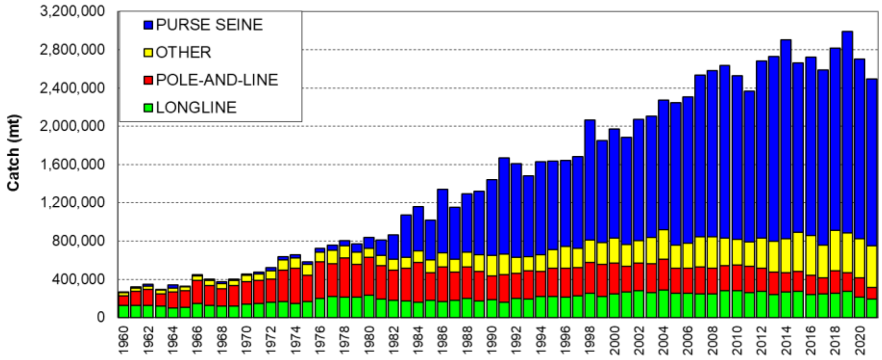

Figure 2.1 Catch (mt) of albacore, bigeye, skipjack and yellowfin in the WCP–CA, by longline, pole-and-line, purse seine and other gear types

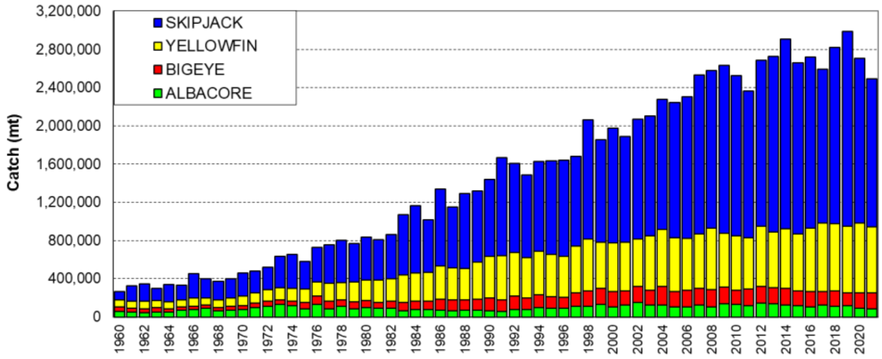

Figure 2.2 Catch (mt) of albacore, bigeye, skipjack and yellowfin in the WCP–CA.

The **2021 WCP–CA catch of skipjack** (**1,547,945 mt** – 62% of the total catch) was nearly 500,000 mt lower than the record in 2019 (2,037,902 mt). The **WCP–CA yellowfin catch** for 2021 (**695,097 mt** – 28%) was a slight decline of around 40,000 mt on the record 2020 catch (735,394 mt), noting the past five years have consistently produced the highest annual yellowfin catches on record. The **WCP–CA bigeye catch** for 2021 (**169,113** mt – 7%) was the highest since 2014. The **2021 WCP–CA albacore**[1] **catch** (**81,416 mt** – 3%) was the lowest since 1993, and clearly lower than the record catch in 2002 of 148,051 mt.

[1] includes catches of north and south Pacific albacore in the WCP–CA, which comprised 89% of the total Pacific Ocean albacore catch of 191,405 mt in 2021; the section 8.4 "Summary of Catch by Species – South Pacific Albacore" is concerned only with catches of south Pacific albacore (52,173 mt in 2021), which made up approximately 57% of the Pacific albacore catch in 2021.

In 2021, the value of the provisional total WCP–CA tuna catch was valued at around $4.6 billion 9% lower than from the previous year. The purse seine fishery in 2021 was valued at $2.6 billion, equivalent to 56% of the total value of the tuna catch. The value of the longline and the pole and line fishery continued to decline in 2021 to be at $1.1 billion and $228 million respectively while the value of the catch taken by other gears increased to $691 million. The value of the longline fishery accounted for 25% of the total value of the tuna catch while the pole and line fishery and other gears contributed 5% and 15% respectively.

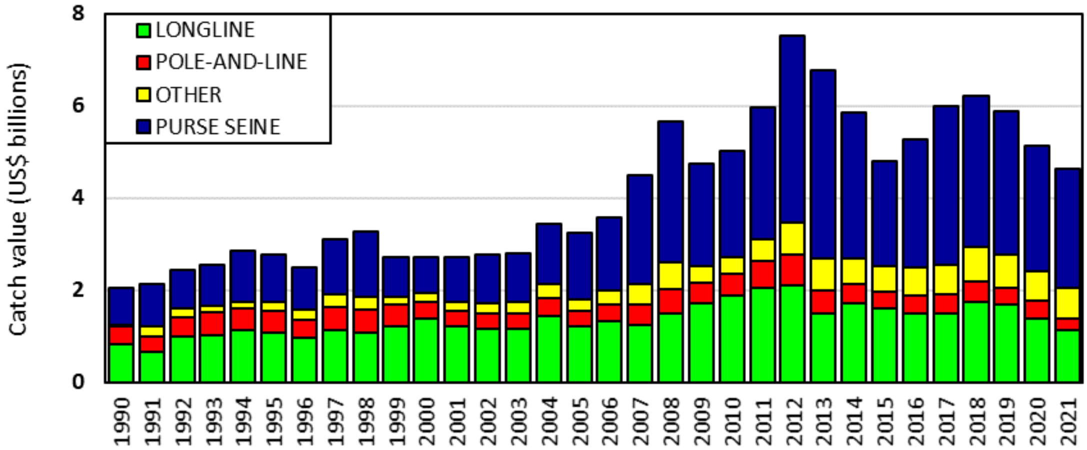

Figure 2.3 Catch value of albacore, bigeye, skipjack and yellowfin in the WCP–CA, by longline, pole-and-line, purse seine and other gear types.

The value of the 2020 WCP–CA skipjack catch in 2021 was estimated to be **$US 2.17 billion,** 11% lower than for 2020 and accounted for 47% of the total value of the tuna catch. The **WCP–CA yellowfin catch in 2021 is estimated to be at $1.6 billion,** a decline of 6% from the previous year. The **value of the WCP–CA bigeye catch declined 4% to around $633 million** and was at its lowest level since 2005 and accounted for 14% of the total value of the tuna catch. The **value of the WCP–CA albacore catch in 2021 declined by almost 30% to $231 million** and was at its lowest level since 2016 driven by a 24% decrease in catch.

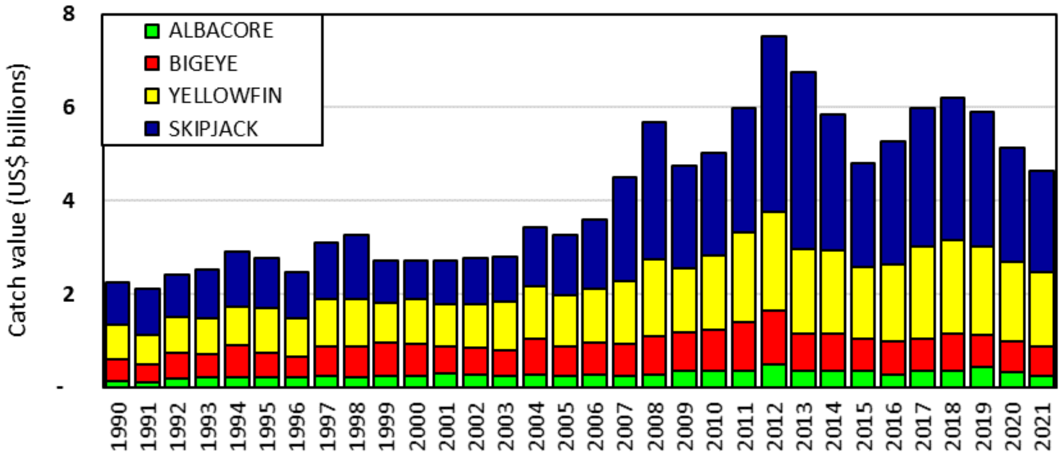

Figure 2.4 Catch value of albacore, bigeye, skipjack and yellowfin in the WCP–CA.

3 WCP–CA PURSE SEINE FISHERY

3.1 Historical Overview

During the mid-1980s, the purse seine fishery (400,000-450,000 mt) accounted for only 40% of the total catch but has grown in significance to a level now over 70% of total tuna catch volume (with more than 2,000,000 mt in 2014 and 2019). The majority of the historic WCP–CA purse seine catch has come from the four main Distant Water Fishing Nation (DWFN) fleets – Japan, Korea, Chinese-Taipei and USA, which numbered a combined 163 vessels in 1992 (Figure 3.1.1) but declined to a low of 111 vessels in 2006 (due to reductions in the US fleet), before some rebound in recent years (up to 129 vessels in 2017 and only 106 vessels in 2021[2]). The Pacific Islands fleets have gradually increased in numbers over the past two decades to a level of 142 vessel in 2021 (Figure 3.3.1). The remainder of the purse seine fishery includes several fleets which entered the WCPFC tropical fishery during the 2000s (e.g. China, Ecuador, El Salvador, New Zealand and Spain).

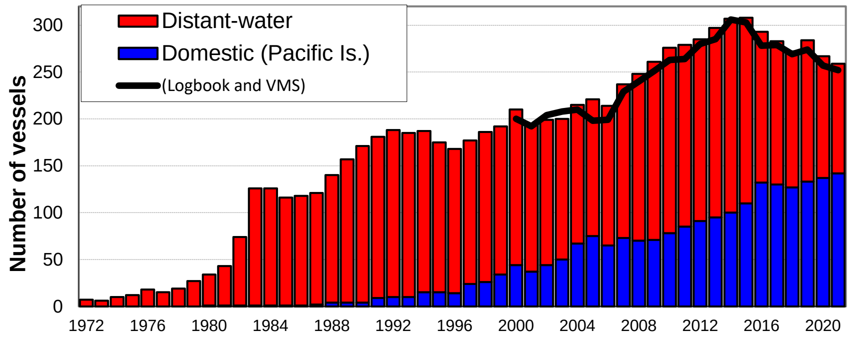

Figure 3.1.1 Number of purse seine vessels operating in the WCP–CA tropical fishery
(excludes Indonesia, Philippine and Vietnam domestic purse seine/ringnet fleets; bars represent WCPFC yearbook vessel number data)

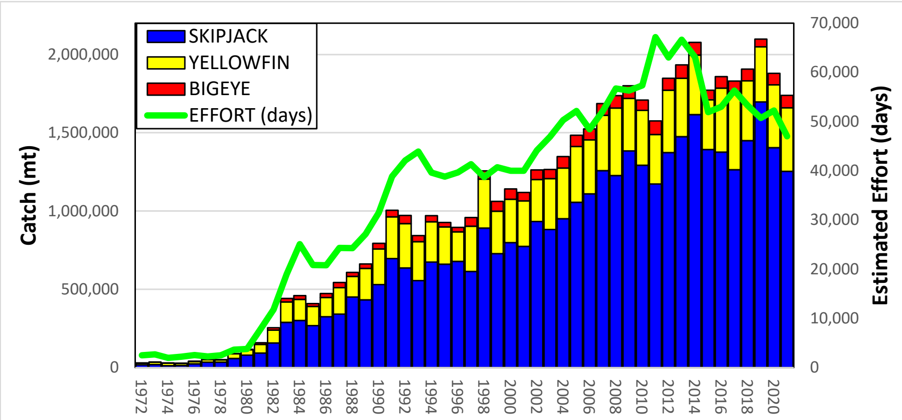

Figure 3.1.2 Purse seine catch (mt) of bigeye, skipjack and yellowfin and fishing effort (days fishing and searching) in the WCP–CA
(**EFFORT**: excludes Indonesia, Philippine, and Vietnam domestic purse seine/ringnet fleets)

The total number of purse seine vessels was relatively stable over the period 1990-2006 (in the range of 180–220 vessels), but thence until 2014, the number of vessels gradually increased, attaining a record level of 308 vessels in 2015, before steadily declining since (to 262 vessels in 2021). Further declines occurred in 2020 and 2021 with a significant reduction in vessels from one component of the US purse seine fleet. Table 4 in WCPFC-Sec & SPC-OFP (2022) provides a breakdown on purse seine vessel numbers, tuna catch and effort by fleet, set type and species in the tropical tuna purse seine fishery based on raised logsheet data.

The WCP–CA purse seine fishery is essentially a skipjack fishery, unlike those inother ocean areas. Skipjack generally account for 65–77% of the purse seine catch, with yellowfin accounting for 20–30% and bigeye accounting for only a small proportion – 2-5%. Small amounts of albacore tuna are also taken in temperate water purse seine fisheries in the North Pacific.

Features of the purse seine catch by species during the past two decades include:

- Annual skipjack catches fluctuating between 600,000 and 850,000 mt prior to 2002, a significant increase in the catch during 2002, with subsequent skipjack catches maintained well above 1,200,000 mt;

[2] The number of vessels by fleet in 1992 was Japan (38), Korea (36), Chinese-Taipei (45) and USA (44) and in 2021 the number of active vessels by fleet was Japan (33), Korea (23), Chinese Taipei (29) and USA (21). In 2021, there was an additional 25 vessels in the category less than 200 GRT which are a part of the Japanese offshore purse seine fleet but not included here.

- Annual yellowfin catches fluctuating considerably between 300,000 and 400,000 mt, with a significant catch (record) of 496,000 mt taken in 2017. The proportion of large yellowfin in the catch is generally higher during El Niño years and lower during La Niña years, although other factors appear to affect purse seine yellowfin catch;
- Increased bigeye tuna purse seine catch estimates, coinciding with the introduction of drifting Fish Aggregating Devices –FADs (since mid-late 1990s). Significant bigeye catch years have been 2011 (87,302 mt–record), 2013 (84,404 mt) and 2014 (81,430 mt) which correspond to years with a relatively high proportion of associated sets, increased bigeye tuna availability to the gear, and/or strong bigeye recruitment.

Total estimated effort shows the same increasing trend as the catch over time (Figure 3.1.2), with years of relatively higher catch rates apparent when the effort line is clearly lower than the top of the histogram bar (i.e. in 1998 and 2006–2009, 2014–2021).

3.2 Provisional catch estimates, fleet size and effort (2021)

The provisional **2021 purse seine catch of 1,740,370 mt** was the lowest catch since 2011, and around 360,000 mt lower than the record catch in 2019 (2,101,405 mt). The 2021 purse seine skipjack catch (1,254,022 mt: 72% of the catch) was a clear drop of around 440,000 mt on the record in 2019 (~1,700,000 mt). The 2021 purse seine catch for yellowfin tuna (405,915 mt; 23% of the total purse seine tuna catch) was around 95,000 mt lower than the record catch in 2017 (501,109 mt) but still amongst the highest annual catches for this fishery. The provisional catch estimate for bigeye tuna for 2021 (79,167 mt) was the highest since 2014 and a clear increase on the relatively low purse seine bigeye tuna catch in 2019 (49,958 mt). The increased bigeye tuna catches in both 2020 and 2021 appears to be related to a higher number of associated sets in conjunction with La Nina conditions.

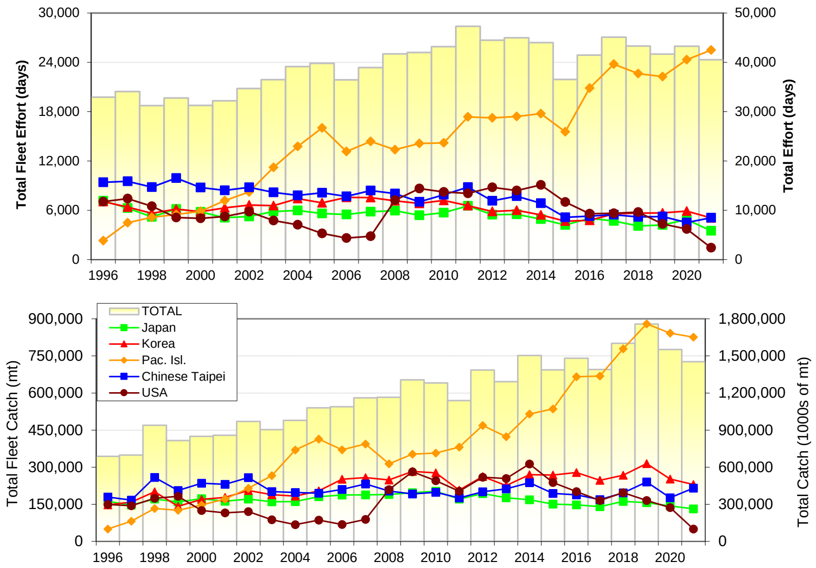

Figure 3.2.1. Trends in annual effort (top) and catch (bottom) estimates for the top five individual purse seine fleets operating in the tropical WCP–CA, 1996–2021.

Individual fleets (lines; left axis) and the total values for five fleets (bars; right axis)

Figure 3.2.1 compares annual purse seine effort and catches for the five main purse seine fleets operating in the tropical WCP–CA in recent years. The combined "main-fleet" effort was relatively stable over the period 2010–2014, before the clear decline in effort for 2015 and then relatively stable effort levels over the period 2016–2021. In contrast, catches have clearly trended upwards over this recent period, suggesting increased efficiency and, in some instances, better catch rates; the 2019 catch for the "main fleets" is consistent with the overall record catch and a year with good catch rates. The decline in effort during 2015/2016 was related to several factors including reduced access to fishing areas for some fleets, economic conditions and simply a choice to fish in areas outside the WCPFC area. The general trend in higher catch levels over recent years (despite a stable trend in effort) is related to increases in efficiency, including how the fishing is conducted (i.e. strategy) during the prevailing environmental conditions, and the relative availability of skipjack tuna (the main target) to the gear in each year. The slight drop in effort from 2017 to 2021 appears to be primarily related to a decline in vessel numbers, and the decline in catches over the past two years (2020-2021) maybe due to less favourable fishing conditions affecting catch rates (Figure 3.1.1).

The combined Pacific-Islands fleet has been clearly the most dominant in the tropical purse seine fishery since 2003 and unlike the other fleets shown in Figure 3.2.1, their recent catches continue to increase each year. There was a hiatus in the Pacific-Islands fleet development in 2008 (when some vessels reflagged to the US purse seine fleet) but catch/effort has picked up in recent years and catch by this component of the fishery was clearly at its highest level in last two years (2020 and 2021). The combined Pacific-islands fleet catch in 2021 (826,270 mt) easily exceeded the combined catch from the other fleets shown in Figure 3.2.1 (combined 2021 catch for Japan, Korea, Chinese Taipei and USA was 627,931 mt). The fleet sizes and effort by the Japanese and Korean purse seine fleets have been relatively stable for most of this time series. Several Chinese-Taipei vessels re-flagged in 2002, dropping the fleet from 41 to 34 vessels, with fleet numbers relatively stable since. Since 2014, the catch/effort by most of the non-Pacific Island fleets have tended to decline while the catch/effort by the combined Pacific Islands fleet have continued to increase, related to the reflagging of vessels from these distant-water fleets.

The total number of combined Pacific-island fleet vessels has gradually increased over the past two decades, attaining its highest level in 2021 (142 vessels); increases in these years include the reflagging and chartering of vessels from the Asian fleets. The combined Pacific-islands purse seine fleet covers vessels fishing under the FSM Arrangement, bilateral agreements and domestically based vessels and comprises vessels from the Federated States of Micronesia (FSM; 28 vessels in 2021), Kiribati (26 vessels), Marshall Islands (11 vessels), Papua New Guinea (PNG: 40 vessels including their chartered vessels), Solomon Islands (8 vessels), Tuvalu (6 vessels) and Vanuatu (7 vessels). Nauru purse seine vessels (2) entered the fishery for the first time in 2018 and their fleet has now grown to 15 vessels fishing in 2021. The Cook Islands entered the purse seine fishery in 2019 with 1 newly flagged vessel.

The domestic Philippine purse seine and ring-net fleets operate in Philippine waters and, since 2013 (as was the case prior to 2010), in the high seas pocket between Palau, Indonesia, FSM and PNG; this fleet accounted for a catch in the range 55,000-90,000 mt annually in the period since 2013. Prior to 2013, the domestic Indonesian purse seine fleet accounted for a similar catch level to the Philippines domestic fishery but generally has not fished in high seas areas. During 2013, the Indonesian fleet catch increased substantially (215,582 mt) with more on-shore processing facilities and more vessels entering the fishery. However, the purse seine catch in 2015 (~56,000 mt) dropped considerably from this level, mainly due to the introduction of a ban on transhipment-at-sea for vessels not built in Indonesia (which is nearly all of the current fleet). The Indonesian purse seine catch recovered (214,605 mt in 2017) apparently due to increased catches by the smaller-scale purse seine component of this fleet, although in recent years, the catch has been around 135,000 mt. Prior to 2009, the domestic fleets of Indonesia and Philippines accounted for about 13-16% of the WCP-CA total purse seine catch, although this proportion has dropped below 10% since then.

Figure 3.2.2 shows annual trends in sets by set type (left) and total tuna catch by set type (right) for the major purse seine fleets. Sets on free-swimming (unassociated) schools of tuna dominate during recent years (62% of all sets for these fleets in 2021). The proportion of sets on drifting FADs in 2021 (35%) was amongst the highest ever and understood to be related to the need to rely on this fishing strategy in the prevailing La Niña conditions. The number and proportion (1% in 2020 and 2021) of sets on natural logs was clearly the lowest in the fishery for the major fleets and reflects a move away from this type of fishing, in line with the improvements in technology/efficiency involving drifting FAD use. Associated set types, particularly drifting FAD sets, generally account for a higher average catch per set than unassociated sets, so the percentage of catch for drifting FADs (for 2021 = 48%: Figure 3.2.2–right [red]) will be higher than the percentage of sets for drifting FADs (for 2021 = 35%: Figure 3.2.2–left [red]). In contrast, the catch from unassociated schools in 2021 was 49% of the total catch but taken from 62% of the total sets.

It is noteworthy that drifting FAD sets represented 94% of all sets undertaken by the US purse seine fleet during 2021, highlighting the reliance on using this strategy in the eastern areas of the tropical WCPO (Figure 3.4.6–right). Table 4 in WCPFC-Sec & SPC-OFP (2022) provides a more detailed breakdown of catch and effort by set type in 2000-2021 using available logsheet and observer data.

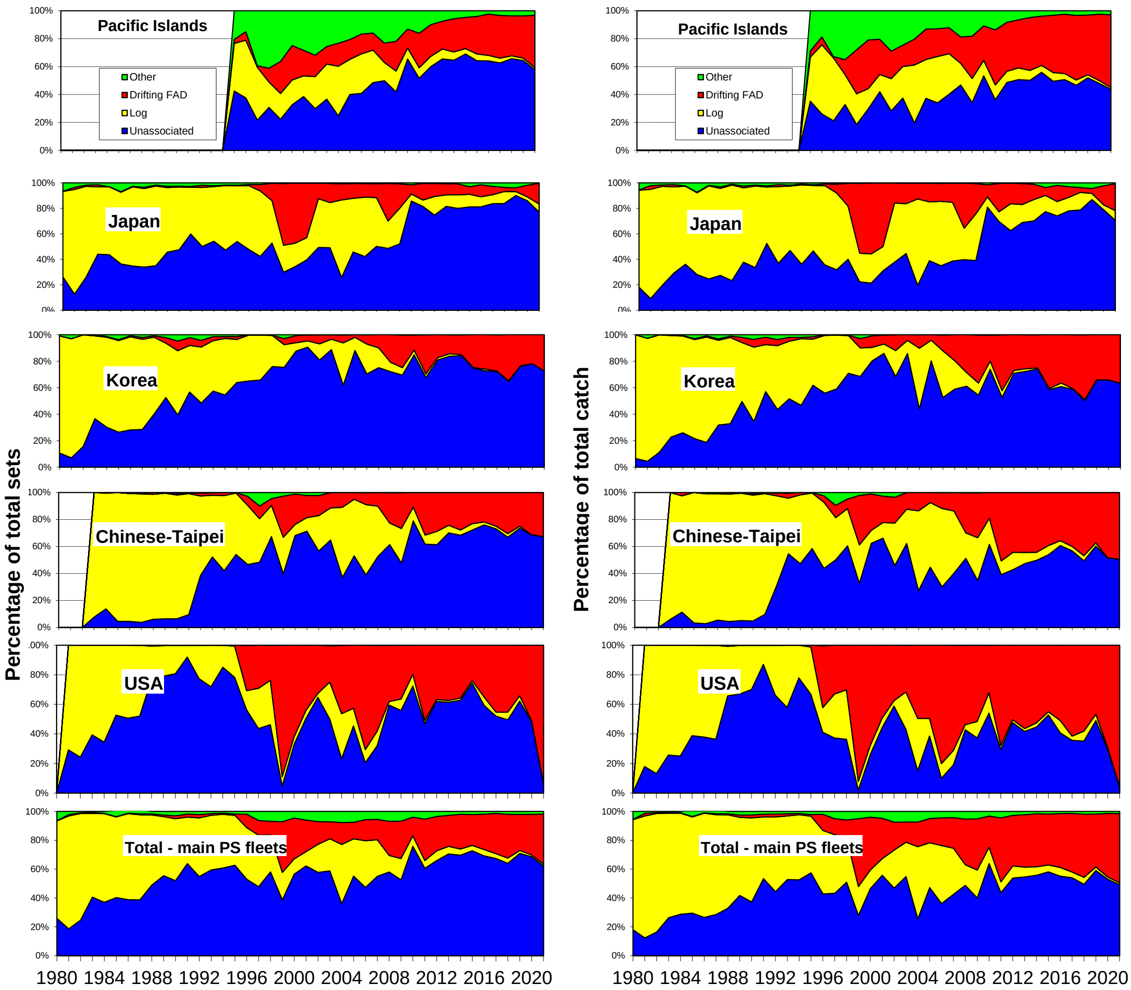

Figure 3.2.2 Time series showing the percentage of total sets (left) and total catch (right), by school type for the major purse seine fleets operating in the WCP–CA.

3.3 Environmental conditions

The purse seine catch/effort distribution in tropical areas of the WCP–CA is strongly influenced by El Niño–Southern Oscillation Index (ENSO) events (Figure 3.3.1). Figure 3.4.1 (left) demonstrates the effect of ENSO events on the spatial distribution of the purse seine activity, with fishing effort typically expanding further to the east during El Niño years and contracting to western areas during La Niña periods.

The WCP–CA fishery moved into El Niño conditions during 2014 which strengthened in 2015 to a level not experienced in the fishery for almost 20 years (i.e. since 1997/1998). El Niño conditions continued into the first half of 2016 but then abruptly moved to a neutral state by the middle of the year which presided over the fishery into 2017. La Niña conditions developed in late 2017 and continued into the early months of 2018, before transitioning through a neutral state which presided over the rest of 2018. Weak-moderate El Niño conditions developed in late 2018, leading into the middle of 2019, and then subsided later in the year to neutral conditions by the start of 2020. La Niña conditions gradually emerged in 2020 and had peaked by the 3rd-4th quarters 2021 before waning briefly in the first quarter of 2021. However, La Nina conditions quickly returned by mid-2021 and persisted to the end of 2021 and into 2022. The current outlook is a persistence of La Niña conditions for the remainder of 2022.

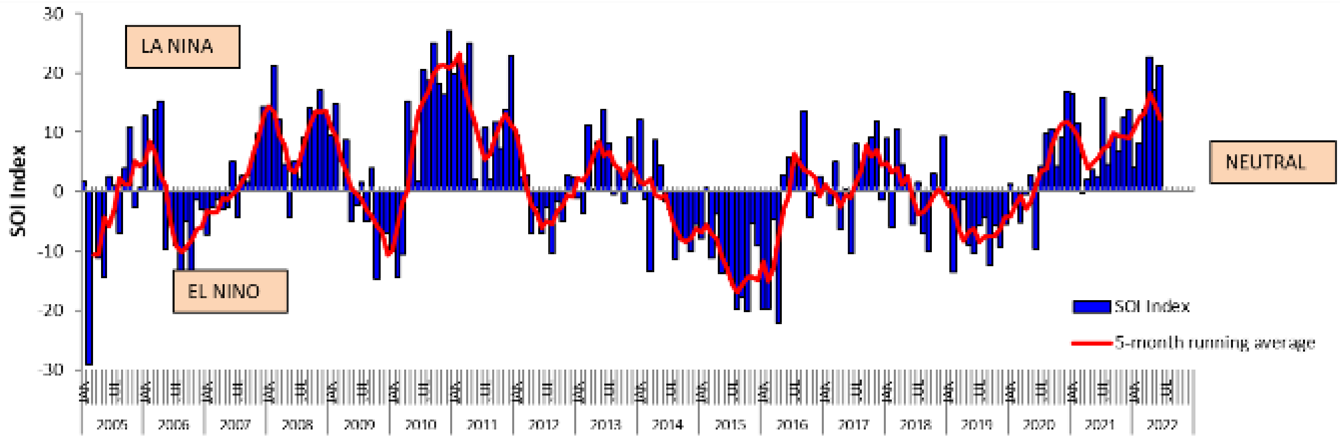

Figure 3.3.1 Trends in El Niño Southern Oscillation Index (ENSO), 2005-2022

3.4 Distribution of fishing effort and catch

Despite the FAD closure for certain periods in each year since 2010, drifting FAD sets remain an important fishing strategy (Figure 3.4.1–right), particularly to the east of 160°E. The relatively high proportion of unassociated sets in the eastern areas (e.g. Gilbert Islands) was a feature of the fishery in 2015–2016 (i.e. corresponding to El Niño conditions). The move to ENSO-neutral conditions, then weak La Niña during 2017 into early 2018 resulted in more effort in the area west of 160°E (Figure 3.4.1–bottom left; Figure 3.7.3–right) compared to recent years, and a higher use of drifting FADs in the area east of 160°E (Figure 3.4.1–bottom left). By late 2018, weak El Niño conditions presided over the fishery and relatively high catches were taken in the eastern tropical areas, in and adjacent to the waters of Tokelau and the Phoenix Group (Figure 3.7.3). El Niño conditions continued into 2019 with purse seine effort extending further to the east compared to recent years (Figure 3.4.1) and very good catches were taken in a few concentrated areas of the eastern tropical waters (see Figure 3.7.3). The La Niña conditions experienced in 2020 and 2021 resulted in a general westward shift of fishing effort compared to 2019.

Figures 3.4.2 through 3.4.6 show the distribution of purse seine effort for the five major purse seine fleets during 2020 and 2021. In general, the distribution of effort for most fleets in 2021 is similar to 2020 activities, no doubt related to the prevailing (La Niña) conditions in both years. The US fleet typically fishes in the more eastern areas as was the case during 2020 with effort extended into the Gilberts, Phoenix and Line Islands, the Cook Islands, Tokelau and the adjacent eastern high seas areas with increasingly less effort west of 160°E; during 2021, the US fleet fished even further east, in the Line Group and the high seas areas north of the Cook Islands and French Polynesian EEZs. The difference in areas fished by the non-Pacific islands' fleets (Figures 3.4.2–3.4.5) is related to the areas they have access to and perhaps also related to fishing strategy (e.g. use of traditional fishing grounds, e.g. FSM, PNG and the Solomon Islands by the Japan fleet).

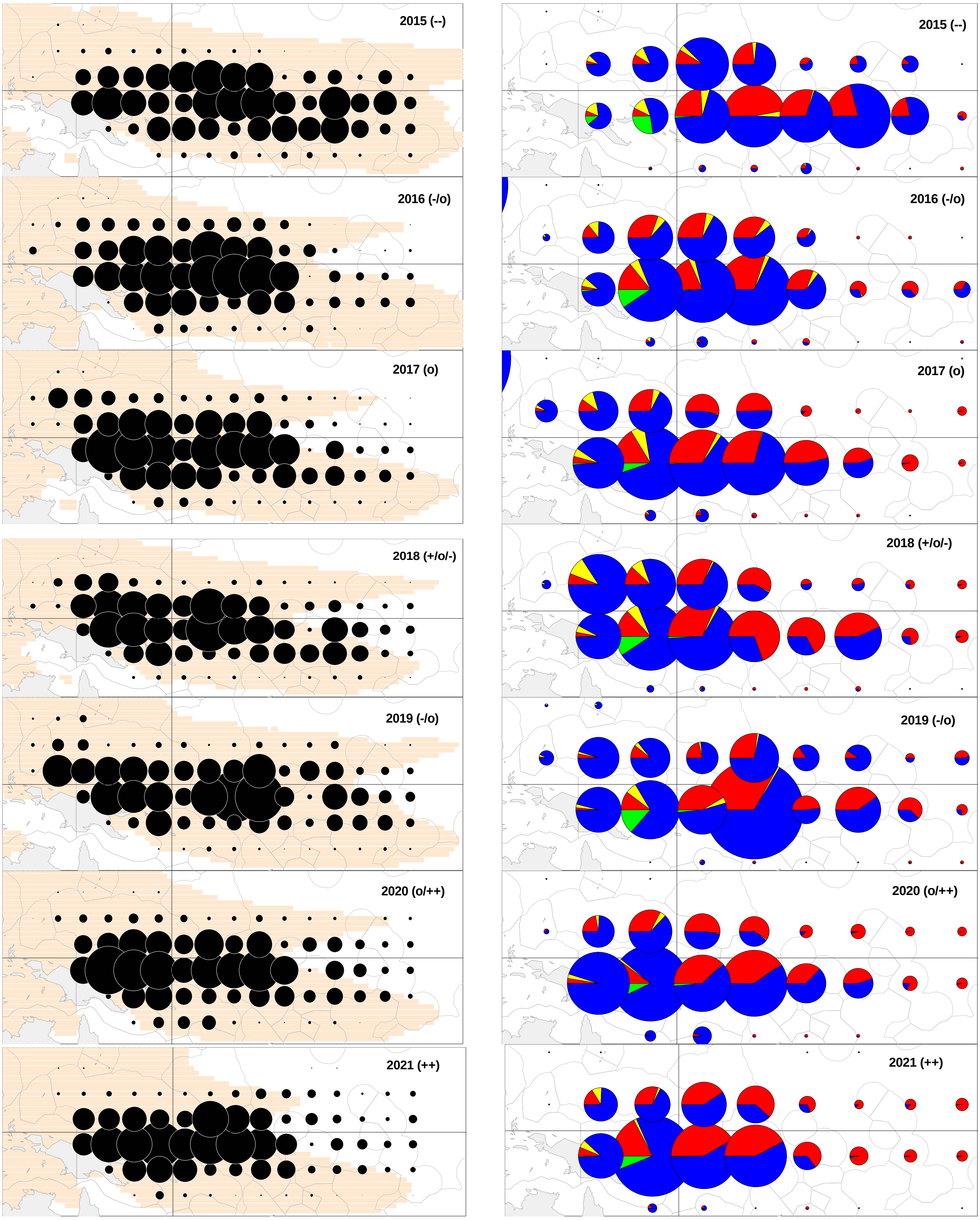

Figure 3.4.1 Distribution of purse seine effort (days fishing – left; sets by set type – right), 2015–2021. (Blue–Unassociated; Yellow–Log; Red–Drifting FAD; Green–Anchored FAD).

Pink shading represents the extent of average sea surface temperature > 28.5°C

ENSO trends are denoted by "+": La Niña; "-": El Niño; "o": transitional period.

Figure 3.4.2 Distribution of effort by Pacific Islands fleets during 2020 and 2021
lines for the equator (0° latitude) and 160°E longitude included.

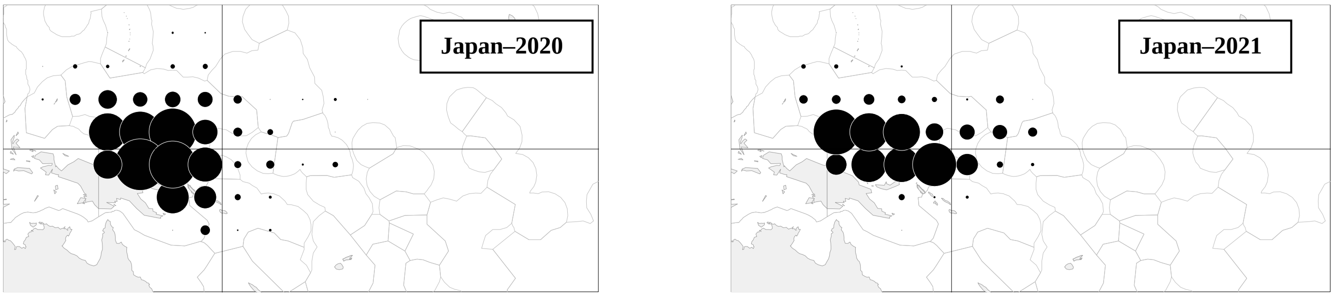

Figure 3.4.3 Distribution of effort by the Japanese purse seine fleet during 2020 and 2021
lines for the equator (0° latitude) and 160°E longitude included.

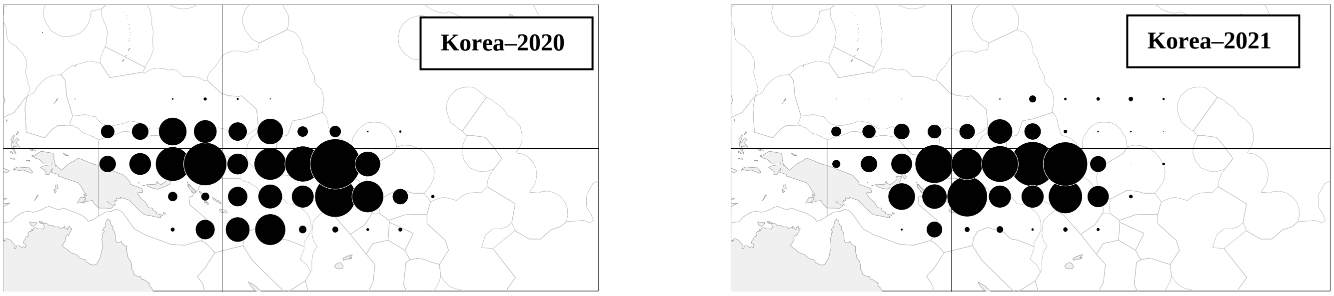

Figure 3.4.4 Distribution of effort by the Korean purse seine fleet during 2020 and 2021
lines for the equator (0° latitude) and 160°E longitude included.

Figure 3.4.5 Distribution of effort by the Chinese-Taipei purse seine fleet during 2020 and 2021
lines for the equator (0° latitude) and 160°E longitude included.

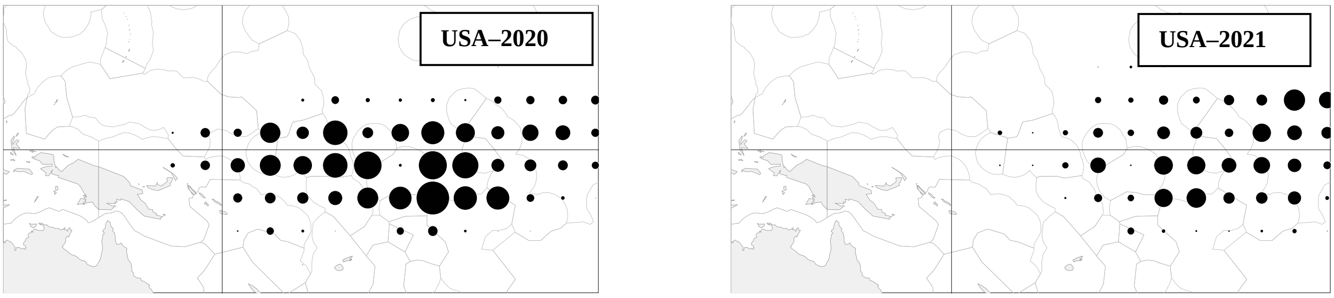

Figure 3.4.6 Distribution of effort by the US purse seine fleet during 2020 and 2021
lines for the equator (0° latitude) and 160°E longitude included.

3.5 Catch per unit of effort

Figure 3.5.1 shows the annual time series of nominal CPUE by set type and vessel nation for skipjack (left) and yellowfin (right). These trends are not standardised for environmental factors or factors that may relate to the efficiency of the fleets, e.g. technological improvements and increased vessel power, so therefore must be interpreted with caution. Recent reviews of the available logsheet data used to determine nominal CPUE highlight an apparent change in reporting behaviour, with a clear increase in the reporting of transit days (over days searching); since transit days are not included as purse seine effort (and days searching is included), this change will inevitably result in a positive bias in the nominal CPUE data presented herein.

Purse seine skipjack CPUE in 2021 for most fleets declined further from the record levels experienced in 2019 when a combination of environmental conditions and strong recruitment were contributing factors to the high catch rates in that year. Over the entire time series, the trend for skipjack CPUE is clearly increasing, although, as noted, these graphs present nominal CPUE and do not consider the increase in fishing efficiency (often referred to as 'effort creep'). A possible indicator of an increase in fishing efficiency is the gradual reduction in average trip length over time, which is apparent in the linear trend of VMS trip length, which is estimated to decrease from about 32 days in early 2009 to around 28.5 days by mid-2021 (Figure 3.5.3).

Yellowfin purse seine CPUE shows strong inter-annual variability and there is greater variation in CPUE among the fleets than for skipjack. Unassociated-set yellowfin CPUE appears influenced by ENSO variation in the WCP–CA, with CPUE generally higher during El Niño episodes. This is believed to be related to increased catchability of yellowfin tuna due to a shallower surface-mixed layer during these periods. Associated (log and drifting FAD) sets generally yield higher catch rates (mt/day) for skipjack than unassociated sets, while unassociated sets sometimes yield a higher catch rate for yellowfin than associated sets. The higher yellowfin CPUE from free-schools occurs when "pure" schools of large, adult yellowfin are more available to the gear in the more eastern areas of the tropical WCP-CA, and so account for a larger catch (by weight) than the (mostly) juvenile yellowfin encountered in associated sets.

The purse seine yellowfin CPUE for free-schools in 2021 for the US fleet was only slightly higher than the very low level in 2021, noting that this fleet typically fishes in the eastern areas compared to the other 'main' fleets shown in these CPUE trends (refer to Figures 3.4.3–3.4.6). In contrast, yellowfin free school CPUE in 2021 increased slightly for those fleets with effort concentrated more in the central areas in 2021 (Chinese Taipei and Korea). Figure 3.6.2 shows that for unassociated sets, the "pure" schools of large, adult yellowfin were not present in the east during 2020, perhaps related to the prevailing ENSO conditions and/or different fishing strategies related to market demands.

Yellowfin catch rates on drifting FADs in 2021 remained at a similarly high level as in 2020, and the increase in drifting FAD sets (Figure 3.2.2) produced a larger proportion of yellowfin tuna (23%) in the purse seine catch than in recent years (SPC-OFP, 2022). The long-term time series for yellowfin CPUE shows more inter-annual variability and overall, a flatter trend than the skipjack tuna CPUE. It is unknown whether these trends reflect an increasing ability to target skipjack tuna at the expense of yellowfin, or reflect a change in yellowfin abundance, given that fishing efficiency has increased.

The difference in the time of day that sets are undertaken is thought to be one of the main reasons why bigeye tuna are rarely taken in unassociated schools compared to log and drifting FAD schools, which have catch rates of this species an order of magnitude higher (Figure 3.5.2). The trends in estimated bigeye tuna CPUE since 2000 varies by fleet and set type with no clear pattern evident, but with drifting FADs accounting for the highest catches and most variability. The bigeye tuna CPUE levels increased again in 2021 after the relatively low levels experienced during 2019 and perhaps related to a shallower thermocline in the eastern and central tropical areas with the restriction of the warm pool under La Niña conditions during 2021 (Figure 3.5.2 and 3.7.3). The bigeye tuna CPUE for drifting FADs for the US fleet has been clearly higher in recent years, no doubt related to fishing in eastern tropical areas.

Figure 3.5.3 shows the inverse relationship between monthly CPUE (total tuna catch (mt) per day) and average trip length estimates (from logsheets and VMS); logsheet trip length tends to fluctuate in synchrony with CPUE, with shorter trips corresponding to higher CPUE. Average trip length (from VMS data) generally compares well to average trip length (from logsheet data), but as logsheet coverage declines (e.g. early 2022), estimates from these two sources tend to diverge since available logsheets are probably not representative. The FAD closure period each year (commencing in 2010) generally coincides with a decline in total tuna CPUE, with longer trips and apparent difficulties obtaining consistent catches from free-swimming schools. The pattern in high CPUE in the months immediately following the FAD closure periods is understood to be mainly due to the build-up of unexploited biomass which then becomes available through FADs, although this increase in CPUE was notably absent in the 4th quarter of 2021. The drop in CPUE from late 2016 into the first 6-8 months of 2017 may simply be due to a return to conditions prior to the most recent El Niño of 2014–2016. For 2021, the total tuna CPUE was at, or slightly lower than recent-year average for most of the year, but appears to have increased into the 1st quarter of 2022 (noting that fluctuations in catch levels are also influenced by economic conditions).

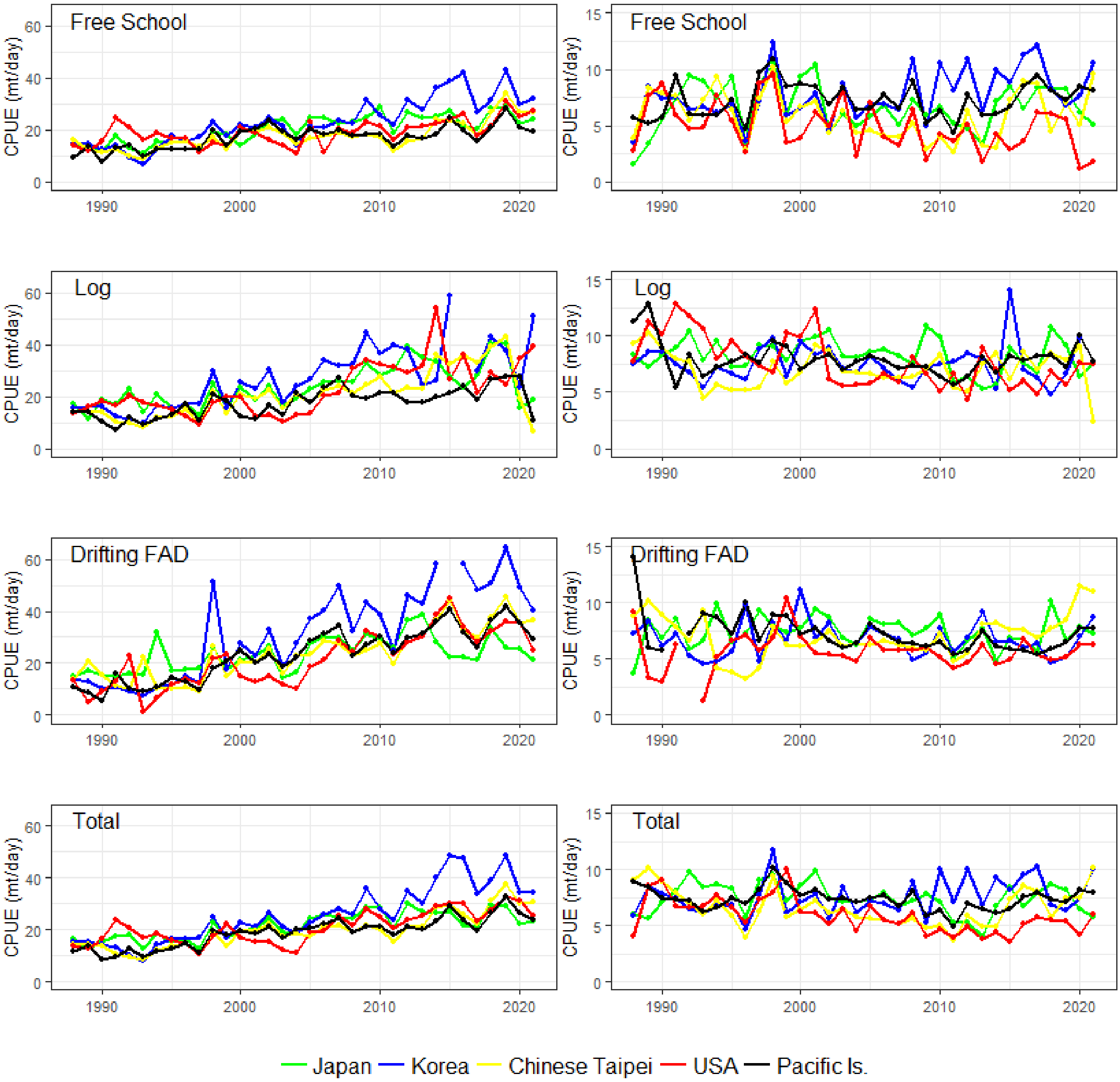

Figure 3.5.1 Skipjack tuna CPUE (mt per day–left) and yellowfin tuna CPUE (mt per day–right) by set-type, and all set types combined, for selected purse seine fleets fishing in the tropical WCP–CA.

Effort and CPUE were partitioned by set type according to the proportions of total sets attributed to each set type.
Thick black line for "All set types" represents **the Pacific Islands purse seine fleets combined**.

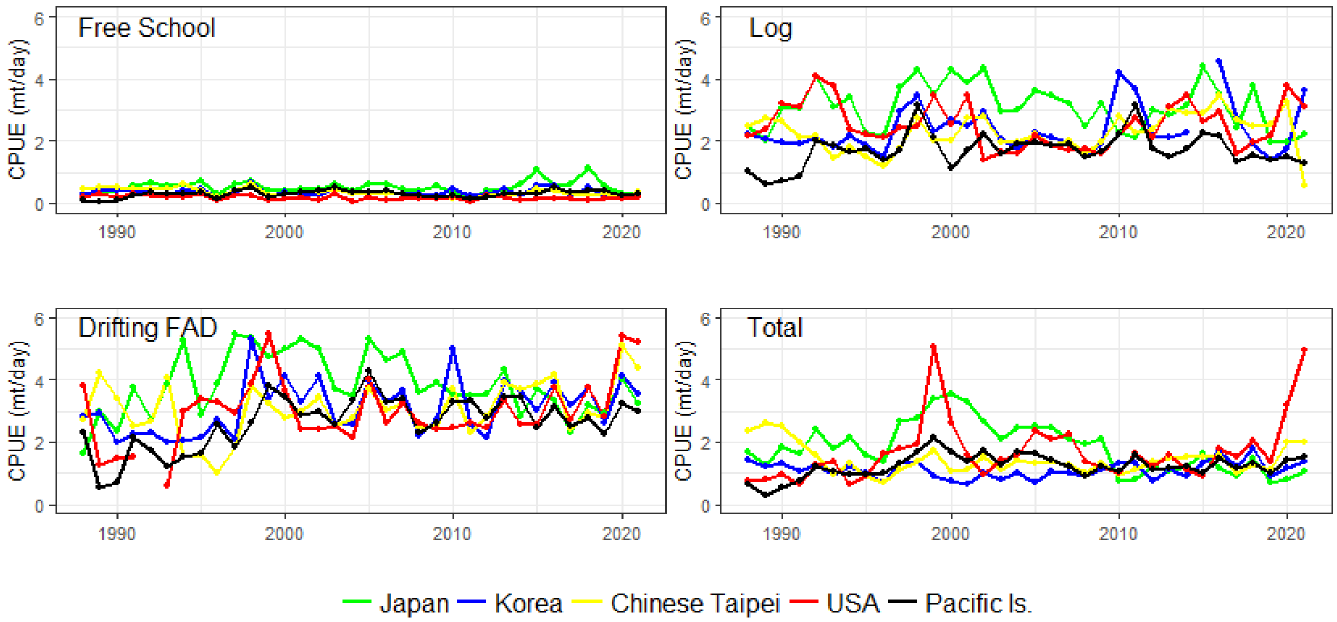

Figure 3.5.2 Estimated bigeye tuna CPUE (mt per day) by major set-type categories (free-school, log and drifting FAD sets) and all set types combined for Japanese, Korean, Chinese-Taipei and US purse seiners fishing in the tropical WCP–CA.

Effort and CPUE were partitioned by set type according to the proportions of total sets attributed to each set type.
Thick black line for "All set types" represents **the Pacific Islands purse seine fleets combined**.

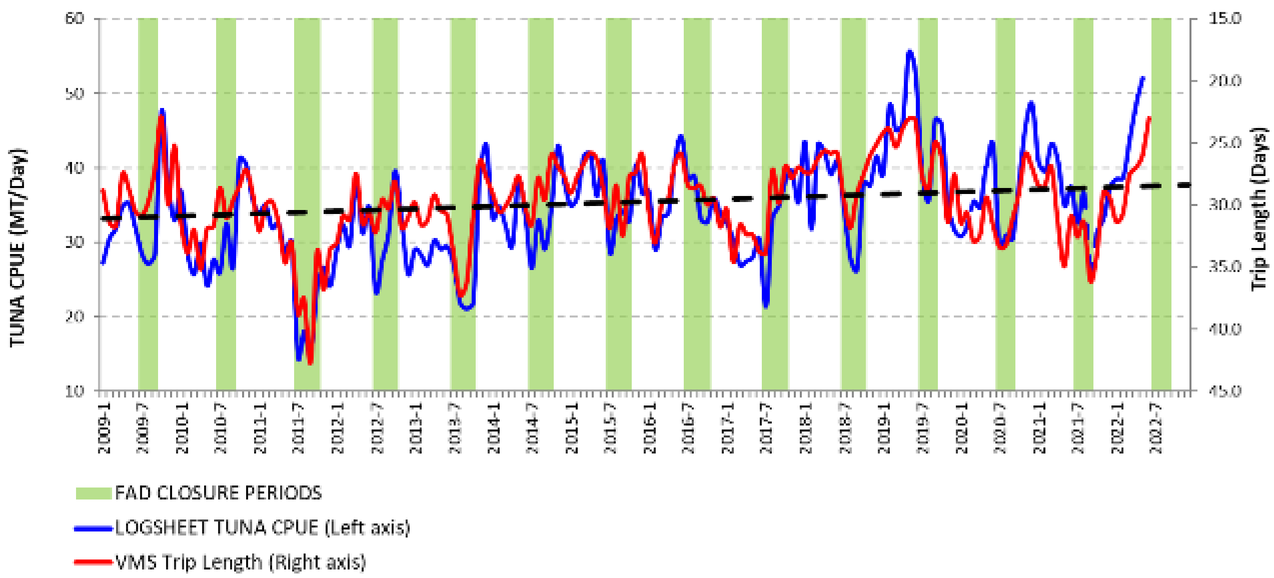

Figure 3.5.3 Monthly purse seine tuna CPUE (mt/day) and average trip length (VMS days), 2009–2022

Dashed, black line represents the linear trend on VMS Trip length. VMS Trip length axis (right) is inverted.
For 2020 and 2021, only the full-fishery, mandatory FAD closure period (July-Sept) is shown and acknowledges that flag states must choose an additional two-month FAD closure period as per the requirements in CMM 2018-01 and 2020-01 paras. 17.

3.6 Species/Size composition of the catch

Figures 3.6.1 and 3.6.2 show the species and size composition of the purse seine catch for 2020 and 2021, by set type and broad area of the tropical fishery. Points of interest in the comparison of these graphs include:

- Larger tuna catches for both set-type categories in 2020 compared to 2021 for the tropical area east of 170°E, perhaps partly related to the prevailing La Niña conditions;
- Slightly larger skipjack tuna in the area west of 170°E from associated sets in 2021 compared with 2020;
- A higher proportion of the bigeye tuna in associated sets east of 170°E (compared to the west), and the presence of medium-size (70–90 cm) bigeye tuna during 2020, which was not evident in 2021;
- The absence of large yellowfin tuna in the unassociated set catch in the area east of 170°E in 2020, compared to unassociated set catch in the area west of 170°E in the same year. In contrast, there was a higher proportion of large yellowfin tuna in the unassociated catch in the area east of 170°E during 2021.

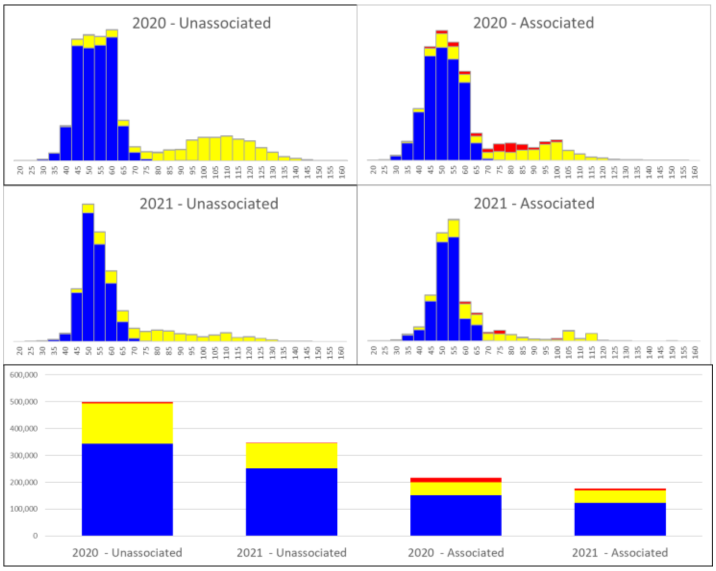

Figure 3.6.1 Species composition (MT: Y-axis) of the 2020 and 2021 purse seine catch, by set type and 5cm size categories (X-Axis) for the tropical fishery, west of 170°E.

Skipjack tuna–blue; Yellowfin tuna–yellow; Bigeye tuna–red

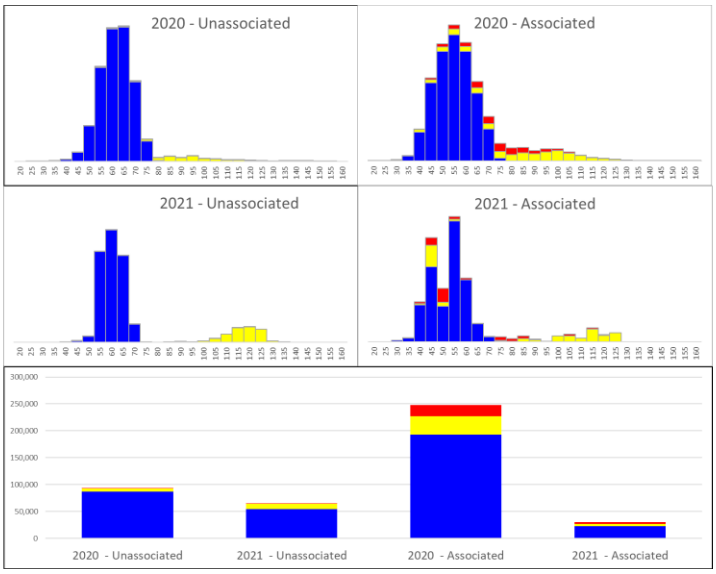

Figure 3.6.2 Species composition (MT: Y-axis) of the 2020 and 2021 purse seine catch, by set type and 5cm size categories (X-Axis) for the tropical fishery, east of 170°E.

Skipjack tuna–blue; Yellowfin tuna–yellow; Bigeye tuna–red

Bottom graph shows the catch volume by year, species and set type; Source : observer data (coverage for 2020: 50%; 2021: 10%)

3.7 Seasonality

Figures 3.7.1 and 3.7.2 show the seasonal average CPUE for skipjack and yellowfin tuna in the purse seine fishery for the period 2016–2021, respectively. Figure 3.7.3 shows the distribution of effort by quarter for the period 2016-2020 in comparison to effort by quarter in 2021. Prior to implementation of the FAD closure, the average monthly skipjack CPUE was generally highest in the first half of the year and slightly lower thereafter, which contrasts with the yellowfin CPUE, which was at its lowest during the first six months, but higher thereafter. This situation corresponds to the seasonal eastward extension of the fishery in the second half of the year, to an area where schools of large yellowfin are thought to be more available than areas to the west due to, *inter alia*, a shallower surface-mixed layer. The FAD closure implementation since 2009 has tended to reduce CPUE during those [FAD-closure] months, with relatively high catch rates experienced immediately following the last FAD-closure month.

The trend in monthly skipjack CPUE for 2021 was above the 2016-2020 monthly average for the 1st quarter but was then generally at or below the average for the remainder of the year, demonstrating difficult fishing conditions. The monthly 2021 skipjack CPUE was consistent to the average for the months July to August (FAD closure months), before very low CPUE/catch months in Sept–Dec (the lowest monthly CPUEs over the period 2016-2021).

The monthly yellowfin CPUE for 2021 was very similar to the 2016–2021 average in the first five months of 2021, then declined below the average during Jun-Jul 2021. From August (2021) onwards, the monthly CPUE was clearly higher than the average, particularly very high CPUE in the last quarter of 2021, with good yellowfin tuna catches experienced in PNG and adjacent waters (Figures 3.7.2 and 3.7.3).

The quarterly extent of the warm pool (i.e. surface water >28.5°C on average) in 2021 compared to the average for 2016-2020 (Figure 3.7.3) shows that the La Niña conditions during 2021 restricted the warm pool to the western areas compared to the recent 5-year average (2016–2020). Relatively higher catches were taken in PNG in the 1st quarter 2021 compared to the 2016-2020 average period (Figure 3.7.3), and high proportion of yellowfin tuna in the catches in and around PNG during the 4th quarter 2021. There was a lower proportion of tuna catches than the recent average (2016-2020) during the 2nd quarter in the areas west of 160°E (Figure 3.7.3), which may require further investigation to understand the reasons.

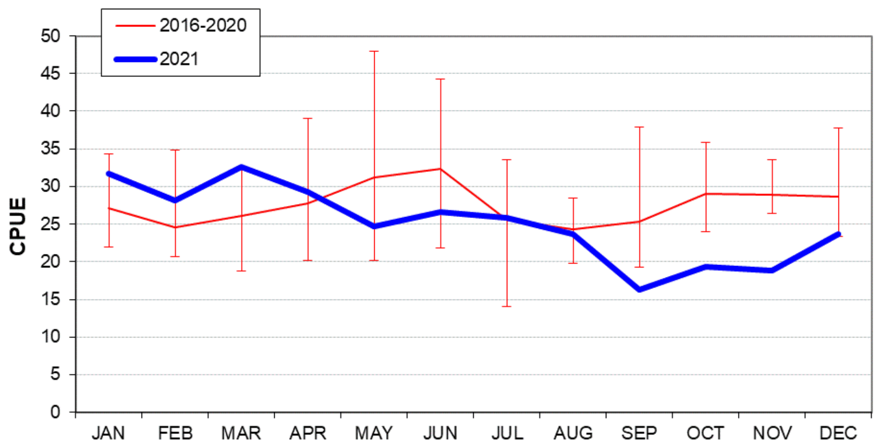

Figure 3.7.1 Average monthly skipjack tuna CPUE (mt per day) for purse seiners fishing in the tropical WCP–CA, 2016–2021.

Red line represents the period 2016–2020 and the blue line represents 2021.
The bars represent the range (i.e. minimum and maximum) of monthly values for the period 2016–2020.

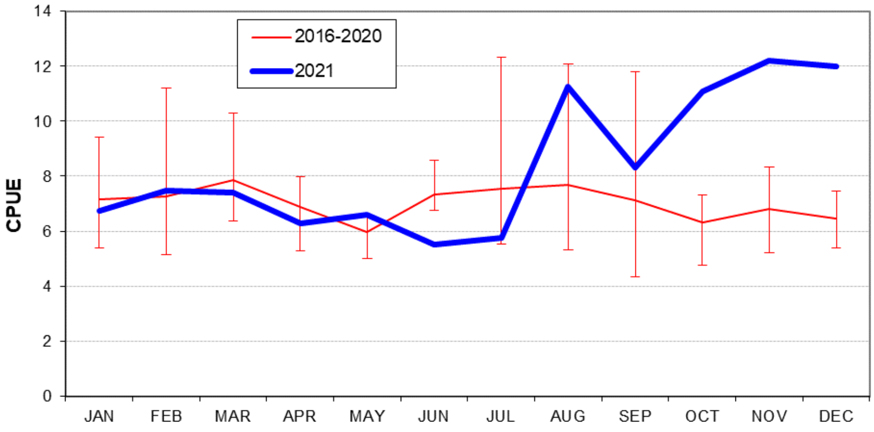

Figure 3.7.2 Average monthly yellowfin tuna CPUE (mt per day) for purse seiners fishing in the tropical WCP–CA, 2016–2021.

Red line represents the period 2016–2020 and the blue line represents 2021.

The bars represent the range (i.e. minimum and maximum) of monthly values for the period 2016–2020.

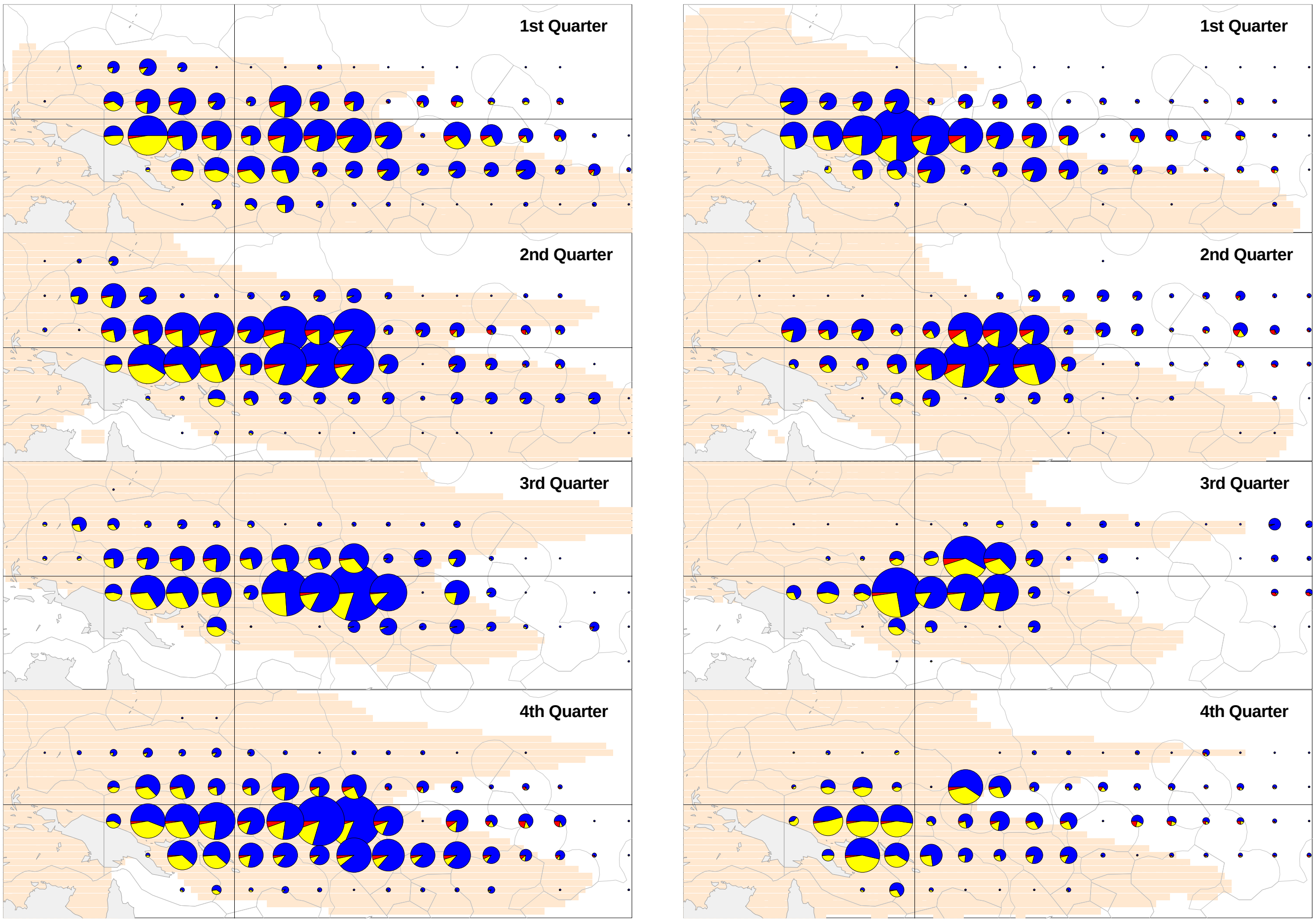

Figure 3.7.3 Quarterly distribution of purse seine catch by species for 2016–2020 (left) and 2021 (right).

(Blue–Skipjack; Yellow–Yellowfin; Red–Bigeye)

Pink/light brown shading represents the extent of average sea surface temperature >28.5°C by quarter for the period 2016–2020 (left) and 2021 (right)

3.8 Prices, catch value and overall economic conditions

3.8.1 Prices

Skipjack

Global skipjack prices were on a general downward trend between 2017 and 2020 following the significant increaese seen in 2017. In 2019 and 2020, the price of Thai imports (c&f) both fell 15% to $1,401/mt and 3% to $1,359/mt respectively. However in 2021, prices steadied with Thai import prices increasing 1% to $1,373/mt and Yaizu purse seine caught skipjack prices (ex-vessel) declining by less than 1% to ¥156/kg ($1,423/mt). In real terms (that is, adjusting for inflation[3]) 2021, Thai import and Yaizu purse seine caught USD skipjack prices were both 15% lower than their 20-year averages. Over the year to May in 2022, Thai import purse seine caught skipjack prices have averaged $1,554/mt while Yaizu prices averaged around ¥194/kg ($1,578/mt) over the year to June.

In the first quarter of 2021, Bangkok market reports indicate that skipjack prices (4-7.5lbs, c&f) increased from $1,200/mt to $1,340/mt before declining to $1,280/mt at the end of May. At the beginning of the second half of the year, the skipjack prices rose to $1,500/mt in July before declining again from August to September. From October to December, the skipjack price was on an upward trend and reached its highest level to $1,750/mt in December. In the first quarter of 2022, the prices continue to increase to as high as 1,800/mt in April before declining to be $1,425/mt at the end of June. The Bangkok skipjack (4-7.5lbs, c&f) price index over the period 2021 to June 2022 is currently below that of the FAO Food Price Index which has increased signficantly in 2021 and 2022 and is now at its highgest level since 2011. (Figure 3.8.2). Over the period to May in 2022 Thai import volumes were lower by 10% compared with 2021.

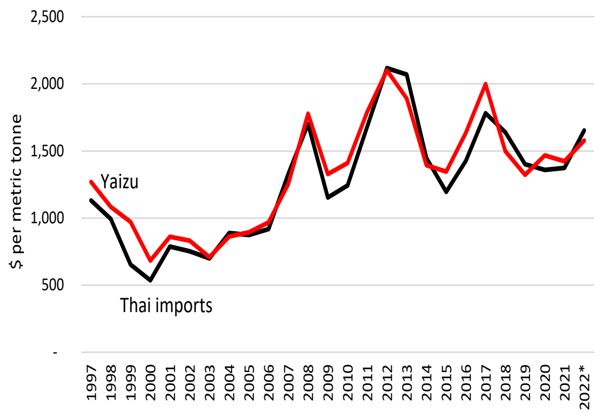

Figure 3.8.1 Annual skipjack prices, Thai imports (c&f) and Yaizu (ex-vessel)
Note: *For the period January to June

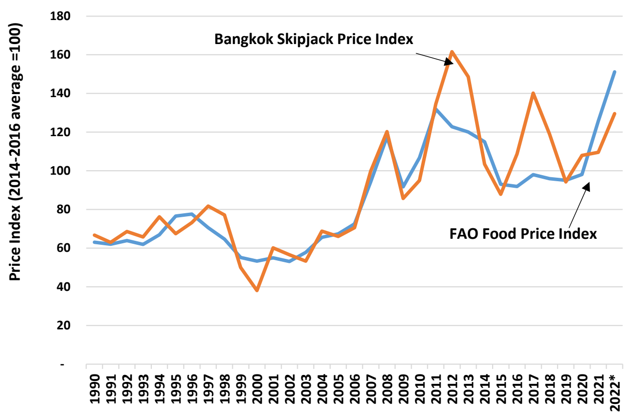

Figure 3.8.2 FAO Food Price Index and Bangkok 4-7.5lbs skipjack price (c&f) index
Note: *For the period January to June

[3] Based on the US CPI as measured by the Bureau of Labor Statistics All Urban Consumers CPI (www.bls.gov/cpi/data.htm)

Yellowfin

For yellowfin, the Thai import price (c&f) in 2021 increased 5% to averaged $1,774/mt from the previous year level. The Yaizu purse seine caught yellowfin prices (ex-vessel) increased siginificantly, rising by 22% to ¥270/kg ($2,457/mt). In real terms, the Thai import prices were 12% lower than the 20 year average with the Yaizu real prices were 10% lower..

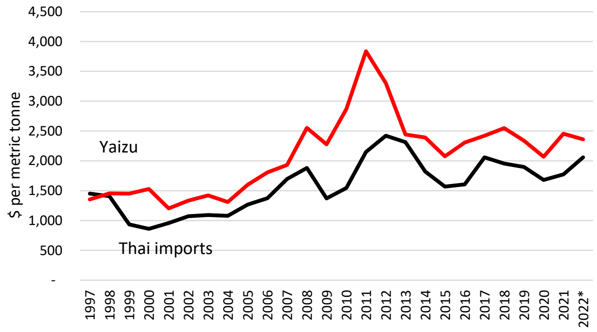

Figure 3.8.3 Annual yellowfin prices, Thai imports (c&f) and Yaizu (ex-vessel)
Note: *For the period January to June

Over the period to the end of May 2022, the average price was significantly higher than the levels seen in 2021 with Thai import prices averaging $2,058/mt. Similarly, over the period to June 2022, Yaizu prices averaged ¥290/kg ($2,363/mt) also significantly higher (58%) than the same period in 2021. Thai import volumes in 2022 over the year to May are 7% lower than for the same period in 2021.

3.8.2 Catch Value

The estimated delivered value of the purse seine tuna catch in the WCP-CA area for 2021 is $2.6 billion, a marginal decline of 5% ($138 million) from 2020.[4] This is around 37% lower than that seen in 2012 and 2013 when the value of the purse seine fishery catch was at least $4 billion as a result of high prices for raw material for canning. This represents the 2nd lowest nominal value for the purse seine catch since 2011.

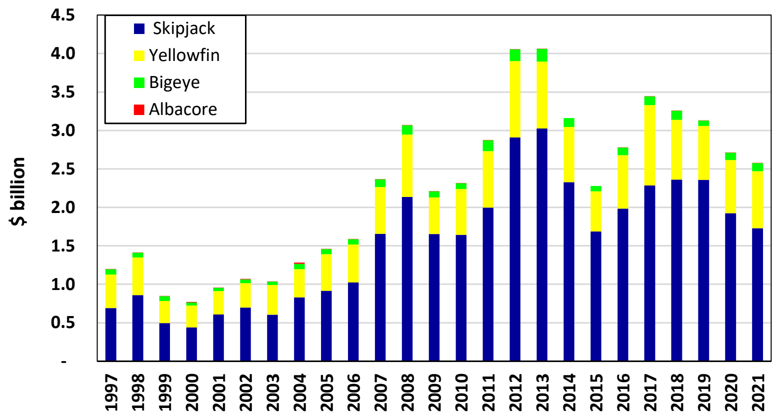

Figure 3.8.4 Value of the WCPFC-CA purse seine fishery tuna catch by species

The 10% decline in the value of the skipjack catch in 2021 to $1.73 billion from $1.92 billion in 2020 (67% of the total purse seine tuna catch value) was largely driven by a 11% decline in catch. In contrast the value of the yellowfin catch in 2021 increased by 7% to $739 million (29% of the total value of the purse seine catch) from the previous year and this was primarily driven by an increase in prices.

3.8.3 Economic Conditions in the tropical purse seine fishery

Economic conditions indexes for the major WCPFC-CA tuna fisheries have been presented to SC for a number of years. These indexes assess economic conditions in a fishery based on relative fish price, fishing cost (excluding license and access fee payments) and catch rates over the past 20 years (that is, 2002-2021). Together, information from the three components is combined into a single value expressed as an index against the average value over the preceding 20 years, set to 100, and provide a relative measure of changes in economic conditions over time. Values below 100 suggest that the fishery is experiencing below average economic conditions, while values of

[4] The delivered value of each year's catch is estimated as the sum of the product of the annual purse catch of each species, excluding the Japanese purse seine fleet's catch, and the average annual Thai import price for each species (bigeye was assumed to attract the same price as for skipjack) plus the product of the Japanese purse seine fleet's catch and the average Yaizu price for purse seine caught fish by species. Thai import and Yaizu market prices were used as they best reflect the actual average price across all fish sizes as opposed to prices provided in market reports which are based on benchmark prices, for example, for skipjack the benchmark price is for fish of size 4-7.5lbs. In deriving these estimates certain assumptions were made due to data and other constraints that may or may not be valid and as such caution is urged in the use of these figures.

over 100 show periods in which economic conditions in the fishery are relatively favourable.[5] It is important to note that the indexes relate to the fishery not the vessels operating within it and, as such, while favourable economic conditions may be indicative of the ability of the fishery to generate significant profits they do not indicate which parties, e.g. vessel owners or coastal states, these profits accrue to.

The tropical purse seine fishery[6] economic conditions index continued to decline in 2021 to be at 104. While the index in 2021 remained above its 20-year average it was at its 2nd lowest level over the past decade with the decline observed since 2019 being driven by reductions in prices and catch rates.

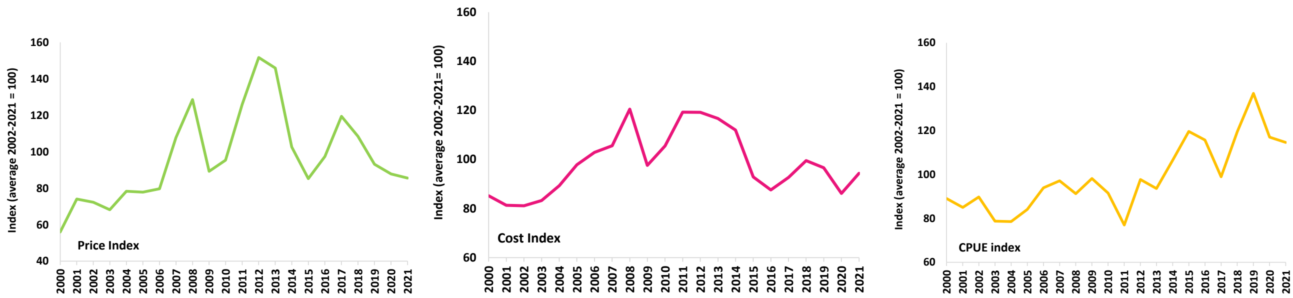

Figure 3.8.5 Tropical purse seine fishery economic conditions component indexes

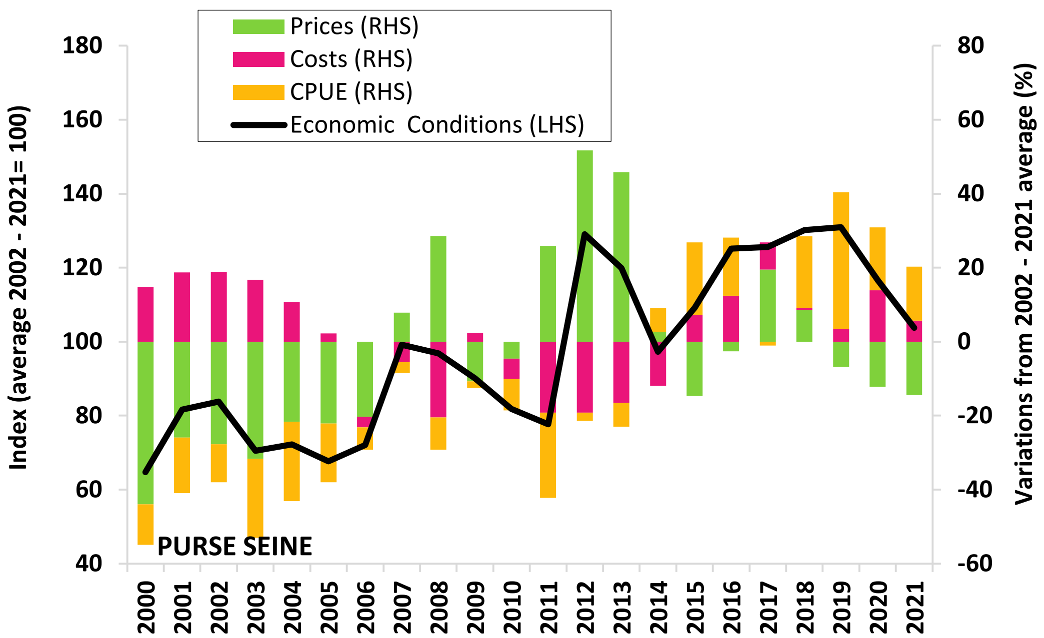

Figure 3.8.6 Tropical purse seine fishery economic conditions index (LHS) and variance of component indices against average (2001-2020) conditions (RHS)

[5] Full details of the methodology used to derive the economic conditions indexes presented can be found in Skirtun, M and Reid, C. 2018, Analyses and projections for economic condition in WCPO fisheries, WCPFC-SC14-2018 ST- IP-06, Busan, Republic of Korea, August 8-16.

[6] The tropical purse seine fishery economic conditions index is based on the fishery that lies between 10ºN and 10ºS of the WPCFC-CA, excluding the waters of Indonesia, Philippines and Vietnam.

4 WCP–CA POLE-AND-LINE FISHERY

4.1 Historical Overview

The WCP–CA pole-and-line fishery has several components:

- the year-round tropical skipjack fishery, mainly involving the domestic fleets of Indonesia, Solomon Islands and French Polynesia, and the distant water fleet of Japan
- seasonal sub-tropical skipjack fisheries in the domestic (home) waters of Japan, Australia, Hawai'i and Fiji (although no recent activity in the last three fisheries)
- a seasonal albacore/skipjack fishery east of Japan (largely an extension of the Japanese home-water fishery).

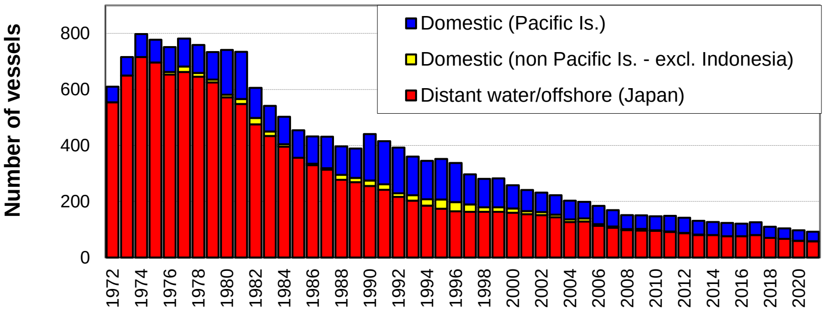

Figure 4.1.1 Pole-and-line vessels operating in the WCP–CA
(excludes pole-and-line vessels from the Japanese Coastal and Indonesian domestic fisheries)

Economic factors and technological advances in the purse seine fishery (primarily targeting the same species, skipjack) have resulted in a gradual decline in the number of vessels in the pole-and-line fishery (Figure 4.1.1) and in the annual pole-and-line catch during the past 15–20 years (Figure 4.1.2). The gradual reduction in numbers of vessels has occurred in all pole-and-line fleets over the past decade. Pacific Island domestic fleets have declined in recent years – fisheries formerly operating in Fiji, Palau and Papua New Guinea are no longer active, only one vessel is now operating (occasionally) in Kiribati, and fishing activity in the Solomon Islands fishery during the 2000s was reduced substantially from the level experienced during the 1990s. Several vessels continue to fish in Hawai'i, and the French Polynesian *bonitier* fleet remains active (30 vessels in 2021), but an increasing number of vessels have turned to longline fishing. Vessel and catches from Indonesian pole-and-line fleet have also declined over recent years. There is continued interest in pole-and-line fish associated with certification/eco-labelling.

4.2 Catch estimates (2021)

The provisional 2021 pole-and-line catch (123,528 mt) was lower than the 2020 catch (200,345 mt) and at this stage, the lowest annual catch since the early-1960s, due to reduced catches in both the Japanese and the Indonesian fisheries, although 2021 estimates are provisional at this stage.

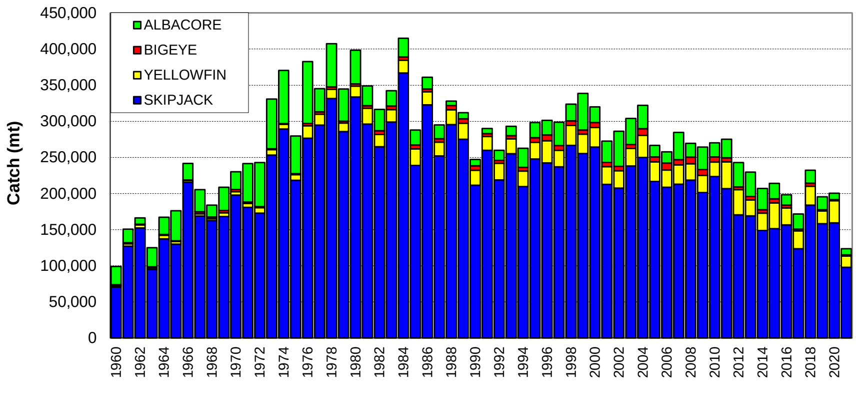

Figure 4.2.1 Pole-and-line catch in the WCP–CA

Skipjack accounts for the majority of the catch (~70-83% in recent years, but typically more than 85% of the total catch in tropical areas) and albacore (5–10% in recent years) is taken by the Japanese coastal and offshore fleets in the temperate waters of the north Pacific. Yellowfin tuna (recently 10–15%) and a small component of bigeye tuna (1–4%) make up the remainder of the catch. There are only four pole-and-line fleets currently active in the WCPO (French Polynesia, Japan, Indonesia and Solomon Islands). Japanese distant-water and offshore fleets (67,910 mt in 2021), and the Indonesian fleets (54,204 mt in 2021), account for nearly all of the WCP–CA pole-and-line catch (99% in 2021). The catches by the Japanese distant-water and offshore fleets in recent years have been the lowest for several decades and this is no doubt related to the continued reduction in vessel numbers (although the vessel numbers have been stable at around 75-80 over the past 5 years). The Solomon Islands fleet recovered from low catch levels experienced in the early 2000s (only 2,773 mt in 2000 due to civil unrest) to reach a level of 10,448 mt in 2003. This fleet ceased operating in 2009 but resumed fishing in 2011 with catches generally around 1,000 mt (1,200 mt in 2021 from 4 vessels).

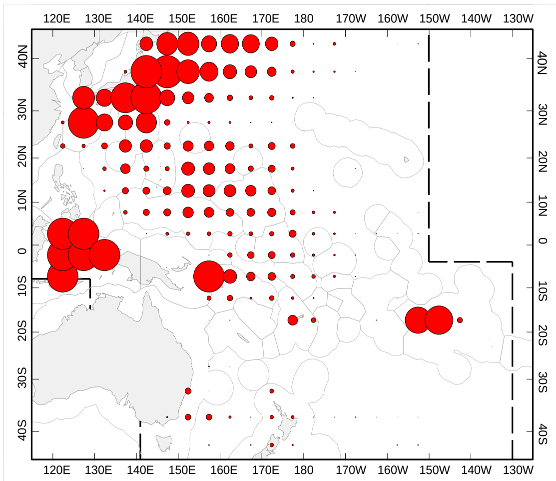

Figure 4.2.2 Average distribution of WCP–CA pole-and-line effort (1995–2021).

Figure 4.2.2 shows the average distribution of pole-and-line effort for the period 1995–2021. Effort in tropical areas is usually year-round and includes domestic fisheries in Indonesia and the Solomon Islands, and the Japanese distant-water fishery. The pole-and-line effort in the vicinity of Japan by both offshore and distant-water fleets is seasonal (highest effort and catch occurs in the 2nd and 3rd quarters). There was also some seasonal effort by pole-and-line vessels in Fiji, New Zealand and Australia during this period. The effort in French Polynesian waters is essentially the *bonitier* fleet. Effort by the pole-and-line fleet based in Hawai'i is not shown in this figure because spatial data are not available.

4.3 Prices and catch value

4.3.1 Prices

The WCP- CA pole and line fishery are dominated by the fleets of Japan and Indonesia with small catches taken by the fleets of Solomon Islands and French Polynesian. For the Japanese fleet, skipjack pole and line fishing are seasonal with the period of southern skipjack pole and line fishing normally between November and June and then both near shore albacore and eastern offshore skipjack mainly during the period from July to October.

The Yaizu price for pole and line caught skipjack in 2021 averaged $1,967/mt, a significant decline of 33% compared with the previous year. Similarly, the price of catch taken in waters off and south of Japan declined to average $1,865/mt (¥205/kg) and $2,196/mt (¥241) respectively in 2021. The price of skipjack taken in waters off Japan was significantly lower (almost 50%) than that seen in 2020 with the price of skipjack taken in the southern fishery 16% lower. Over the period to June 2022, the price for skipjack caught in waters off and south of Japan averaged ¥336/kg and ¥385/kg respectively and were significantly higher by more than 50% than for the same period in 2021.

In 2021, the volumes of pole and line skipjack caught in waters off Japan into Yaizu port saw a significant increase of more than 200%. In contrast the skipjack caught in waters south of Japan was 24% lower from 2020 level.

4.3.2 Catch Value

The estimated delivered value of the total catch in WCPFC pole and line fishery for 2021 was $228 million[7] a decline of 41% from the $383 million seen in 2020. The value of the skipjack catch in 2021 also decreased significantly, falling by $130 million (44%) to $167 million (73% of the total pole and line tuna catch value). Similarly, the value of yellowfin, bigeye and albacore catch declined 44%, 25% and 6% driven by the significant declines in catch volumes.

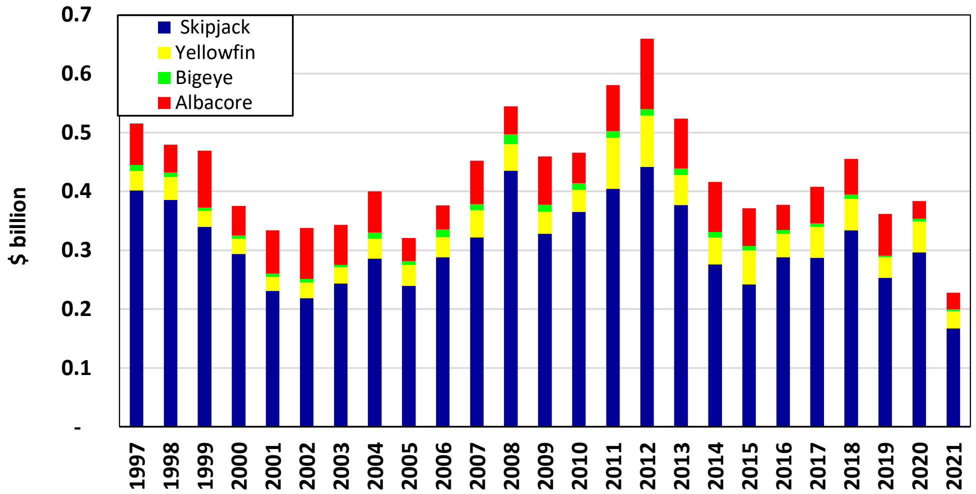

Figure 4.3.1 Value of the WCPFC-CA pole and line fishery tuna catch by species

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[7] Delivered skipjack prices for the Japanese pole and line fleet are based on a weighted average of the Yaizu 'south' and 'other' pole and line caught skipjack prices. Delivered yellowfin price for the Japanese pole and line fleet are based on the Yaizu purse seine caught yellowfin price. All other prices are based on Thai import prices. All prices are converted into USD using representative exchange rates provided by the IMF.

5 WCP–CA LONGLINE FISHERY

5.1 Overview

The longline fishery now accounts for only 8–10% of the total WCP–CA catch (OFP, 2021), but approaches the much larger purse seine catch in landed value. It provides the longest time series of catch estimates for the WCP–CA, with estimates available since the early 1950s. The total number of vessels involved in the fishery generally fluctuated between 3,000 and 6,000 for the period 1970–2004 (Figure 5.1.1), although for some distant-water fleets, vessels operating in areas beyond the WCP–CA could not be separated out and more representative vessel numbers for WCP–CA have only become available in recent years[8]. Total longline vessel numbers have slowly declined over the past 15 years, with the provisional estimate of 1,543 vessels in 2021 showing a 57% drop on vessel numbers in 2005 and a 9% drop on 2019 vessel numbers, mainly due to a decline in the category of non-Pacific Islands domestic fleets, but also no doubt due to the impacts of COVID-19.

The fishery involves two main types of operation –

- large (typically >250 GRT) **distant-water** freezer vessels which undertake long voyages (months) and operate over large areas of the region. These vessels may target either tropical (yellowfin, bigeye tuna) or subtropical (albacore tuna) species. Voluntary reduction in vessel numbers by at least one fleet has occurred in recent years;
- smaller (typically <100 GRT) **offshore** vessels which are usually **domestically-based**, undertaking trips of less than one month, with ice or chill capacity, and serving fresh or air-freight sashimi markets, or [albacore] canneries. There are several foreign offshore fleets based in Pacific Island countries.

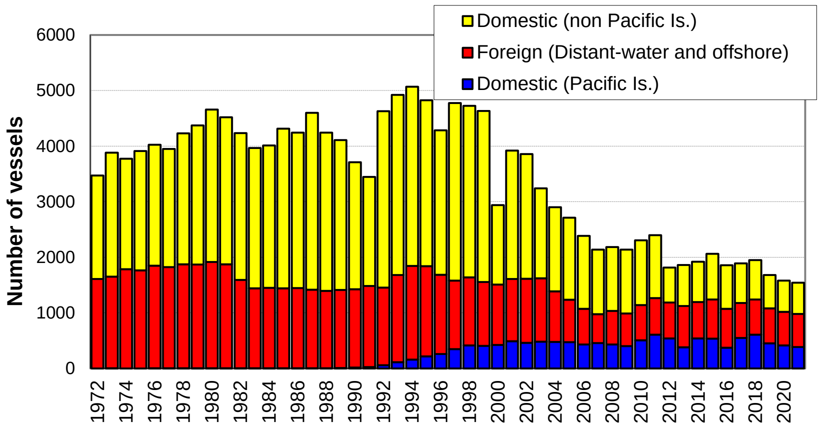

Figure 5.1.1 Longline vessels operating in the WCP–CA
(Available data does not make the distinction between foreign "distant-water" and "offshore")

The following broad categories of longline fishery, based on type of operation, area fished and target species, are currently active in the WCP–CA:

- **South Pacific offshore albacore fishery** comprises Pacific-Islands domestic "offshore" vessels, such as those from American Samoa, Cook Islands, Fiji, French Polynesia, Kiribati, New Caledonia, PNG, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu; these fleets mainly operate in subtropical waters, with albacore the main species taken. Two new entrants, Tuvalu and Wallis & Futuna, joined this category during 2011, although the latter fleet has not fished recently. Vessel numbers have stabilised in recent years, but they may also vary depending on charter arrangements.
- **Tropical offshore bigeye/yellowfin-target fishery** includes "offshore" sashimi longliners from Chinese-Taipei, based in Micronesia, Guam, Philippines and mainland Chinese vessels based in Micronesia, and domestic fleets based in Indonesia, Micronesian countries, Philippines, PNG, the Solomon Islands and Vietnam.
- **Tropical distant-water bigeye/yellowfin-target fishery** comprises "distant-water" vessels from Japan, Korea, Chinese-Taipei, mainland China and Vanuatu. These vessels primarily operate in the eastern tropical waters of the WCP–CA (and into the EPO), targeting bigeye and yellowfin tuna for the frozen sashimi market.
- **South Pacific distant-water albacore fishery** comprises "distant-water" vessels from Chinese-Taipei, mainland China and Vanuatu operating in the south Pacific, generally below 20°S, targeting albacore tuna destined for canneries.
- **Domestic fisheries in the sub-tropical and temperate WCP–CA** comprise vessels targeting different species within the same fleet depending on market, season and/or area. These fleets include the domestic fisheries of

[8] Since 2005, more detailed information on fleet/vessel number breakdown has been required through WCPFC reporting requirements and are therefore more representative of WCP–CA longline activity.

Australia, Japan, New Zealand and Hawai'i. For example, the Hawaiian longline fleet has a component that targets swordfish and another that targets bigeye tuna.

- **South Pacific distant-water swordfish fishery** is a relatively new fishery and comprises "distant-water" vessels from Spain and Portugal (one vessel started fishing in 2011).
- **North Pacific distant-water albacore and swordfish fisheries** mainly comprise "distant-water" vessels from Japan (swordfish and albacore), Chinese-Taipei (albacore only) and Vanuatu (albacore only).

Additionally, small vessels in Indonesia, Philippines and Vietnam use handline and small vertical longline gears, usually fishing around the numerous arrays of anchored FADs in home waters and more recently, fishing at night using intense lights to attract prey for the tuna (these types of vessels are not included in Figure 5.1.1). The commercial handline fleets target large yellowfin tuna which comprise the majority of their overall catch (> 90%). The WCP-CA large-fish (yellowfin target) handline fishery took approximately 40,000 mt in 2021 (see Section 7.1).

The WCP–CA longline tuna catch steadily increased from the early years of the fishery (i.e. the early 1950s) to 1980 (230,625 mt), but declined to 162,111 mt in 1984 (Figure 5.1.2). Since then, catches steadily increased over the next 15 years until the late 1990s, when catch levels were again similar to 1980. Annual catches in the longline fishery since 2000 have been amongst the highest ever, but the composition of the catch in recent years (e.g. ALB–36%; BET–26%; YFT–38% in 2021) differs from the period of the late 1970s and early 1980s, when yellowfin tuna contributed a higher proportion of catch (e.g. ALB–18%; BET–27%; YFT–54% in 1980).

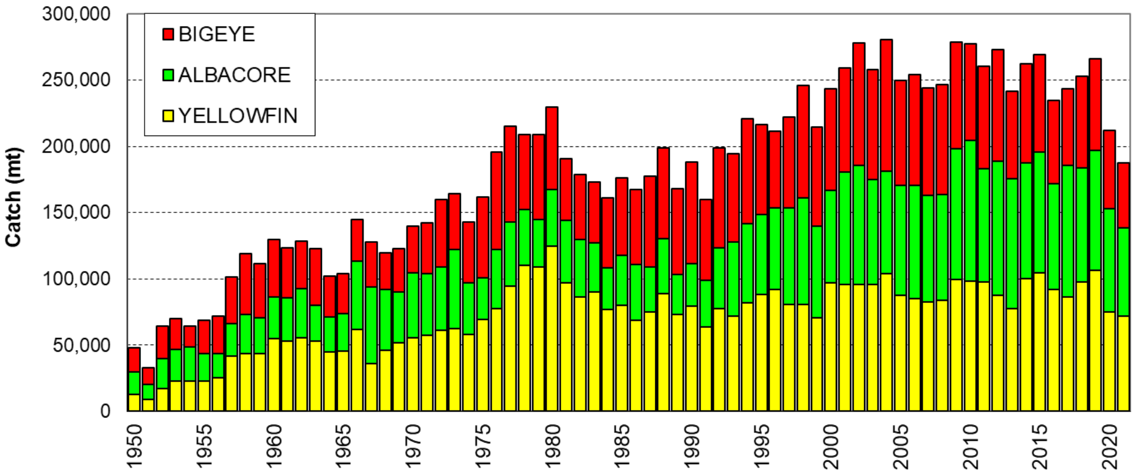

Figure 5.1.2 Longline catch (mt) of target tunas in the WCP–CA

5.2 Provisional catch estimates and fleet sizes (2021)

The provisional WCP–CA longline catch (191,666 mt) for 2021 is the lowest catch since 1993 at this stage, acknowledging the negative impacts due to COVID-19 but also that coverage of available 2021 data is not yet complete (see Figure A2 in the APPENDIX). The COVID-19 restrictions played a role in the distribution of 2021 effort in the longline fishery, with clear declines in effort in both the south Pacific Albacore fishery (Figure A3) and in the tropical longline fishery (Figure A4). The *La Niña* conditions during 2020 and 2021 may also have contributed to lower catches in the longline fishery, although further investigation would be required to confirm this hypothesis.

The WCP–CA albacore longline catch (66,475 mt – 35%) for 2021 was the lowest since 1996, and nearly 40,000 mt lower than the record of 106,142 mt attained in 2010. The provisional bigeye catch (49,511 mt – 26%) for 2021 was the lowest since 1983, and well down on the bigeye catch levels experienced in the 2000s (e.g. the 2004 longline bigeye catch was 99,709 mt). The yellowfin catch for 2021 (71,847 mt – 37%), as in 2020, was a significant drop on the high catch level in 2019 (106,279 mt).

A significant change in the WCP–CA longline fishery over the past 10–15 years has been the growth of the Pacific Islands domestic albacore fishery, which has risen from taking 33% of the total South Pacific albacore longline catch in 1998 to accounting for around 50-60% of the catch in recent years. The combined national fleets (including chartered vessels) mainly active in the Pacific Islands domestic albacore fishery have numbered more than 500 (mainly small "offshore") vessels in recent years and catches are now at a similar level as the distant-water longline vessels active in the WCP–CA.

The distant-water fleet dynamics have continued to evolve in recent years, with catches down from record levels in the mid-2000s initially due to a reduction in vessel numbers, although vessel numbers for some fleets appear to be on the rise again in recent years, but with variation in areas fished and target species. The Japanese distant-water and offshore longline fleets have experienced a substantial decline in both bigeye catches (from 20,725 mt in 2004 to 1,524 mt in 2021) and vessel numbers (366 in 2004 to 71 in 2021). The Chinese-Taipei distant-water longline fleet bigeye catch declined from 16,888 mt in 2004 to 3,667 mt in 2021, mainly related to a substantial drop in vessel numbers (137 vessels in 2004 reduced to 85 vessels in 2021). The Korean distant-water longline fleet experienced some decline in bigeye and yellowfin catches since the period of highest catches 15–20 years ago in line with a reduction in vessel numbers – from 184 vessels active in 2002 reduced to 94 vessels in 2021.

In contrast, the China longline fleet catches of albacore tuna have been amongst the highest ever in recent years (this fleet caught on average 20,000–25,000 mt of albacore tuna in the WCP-CA in recent years, although the 2021 albacore tuna catch was 16,076 mt).

With domestic fleet sizes continuing to increase as foreign-offshore and distant-water fleets decrease (Figure 5.1.1), this evolution in fleet dynamics no doubt has some effect on the species composition of the catch. For example, the increase in effort by the Pacific Islands domestic fleets has primarily been in albacore fisheries, although this had been balanced to some extent by the switch to targeting bigeye tuna (from albacore) by certain vessels in the distant-water Chinese-Taipei fleet almost a decade ago. More detail on individual fleet activities during recent years is available in the WCPFC–SC18 National Fisheries Reports.

5.3 Catch per unit effort

Time series of nominal CPUE provide a broad indication of the abundance and availability of target species to the longline gear, and as longline vessels target larger fish, the CPUE time series should be more indicative of adult tuna abundance. However, as is the case with nominal purse seine CPUE, the interpretation of nominal longline CPUE is confounded by various factors, such as the changes in fishing depth that occurred as longliners progressively switched from primarily yellowfin tuna targeting in the 1960s and early 1970s to bigeye tuna targeting from the late 1970s onwards. Such changes in fishing practices will have changed the effectiveness of longline effort with respect to one species over another, and such changes need to be accounted for if the CPUE time series are to be interpreted as indices of relative abundance.

Nominal CPUE graphs are provided in the other papers (see Hare et al., 2022; WCPFC_Sec & OFP, 2022), and this paper does not attempt to explain trends in longline CPUE or effective effort, as this is referenced and dealt with more appropriately in specific studies on the subject and CPUE standardisation papers regularly prepared as WCPFC Scientific Committee (SC) papers.

5.4 Geographic distribution

Figure 5.4.1 shows the distribution of effort by category of fleet for the period 2000–2021. Effort by the **large-vessel, distant-water fleets** of Japan, Korea and Chinese-Taipei accounts for most of the effort, but there has been some reduction in vessel numbers in some fleets over the past decade. Effort is widespread as sectors of these fleets target bigeye and yellowfin for the frozen sashimi market in central and eastern tropical waters, and albacore for canning in the more temperate waters (see Figure 5.4.3), mainly in international waters.

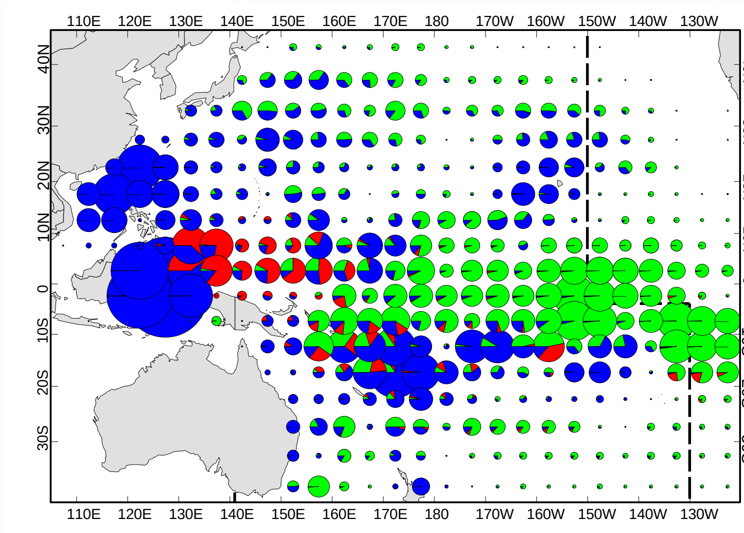

Figure 5.4.1 Distribution of longline effort (100s of hooks) for distant-water fleets (green), foreign-offshore fleets (red) and domestic fleets (blue) for the period 2000–2021.
(Note that distant-water effort for Chinese-Taipei and other fleets targeting albacore in the North Pacific is poorly covered)

Activity by the **foreign-offshore fleets** from Japan, mainland China and Chinese-Taipei is restricted to tropical waters, targeting bigeye and yellowfin for the fresh sashimi market; these fleets have limited overlap with the distant-water fleets. The substantial "**offshore**" effort in the west of the region is primarily by the Indonesian, Chinese-Taipei and Vietnamese **domestic fleets** targeting yellowfin and bigeye (the latter now predominantly using handline gear).

The growth in **domestic fleets** targeting albacore tuna in the South Pacific over the past decade has been noted; the most prominent fleets in this category are the Cook Islands, Samoa, Fiji, French Polynesia, Solomon Islands (when chartering arrangements are active), Tonga and Vanuatu fleets (Figure 5.4.2).

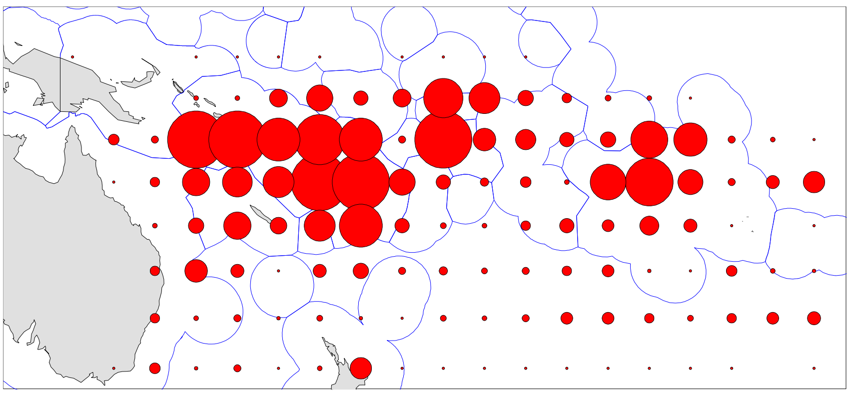

Figure 5.4.2 Distribution of effort for south Pacific albacore-target DOMESTIC longline fleets

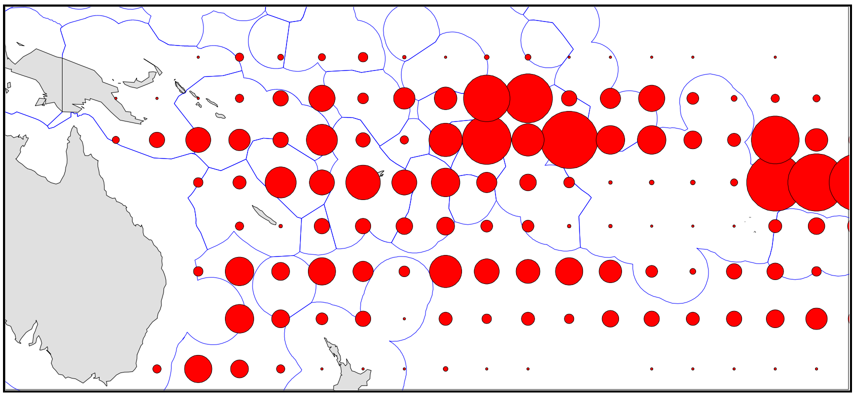

Figure 5.4.3 Distribution of effort for south Pacific albacore-target FOREIGN longline fleets

Figure 5.4.4 shows quarterly species composition by area for the period 2010–2019 and 2020 (there is a lag in the provision of complete 2021 aggregate data by time and area, so they are not presented). The majority of the yellowfin catch is taken in tropical areas, especially in the western parts of the region, with smaller amounts in seasonal subtropical fisheries. The majority of the bigeye catch is also taken from tropical areas, but in contrast to yellowfin, mainly in the eastern parts of the WCP–CA, adjacent to the traditional EPO bigeye fishing grounds. The albacore catch is mainly taken in subtropical and temperate waters in both hemispheres. In the North Pacific, albacore are primarily taken in the 1st and 4th quarters. In the South Pacific, albacore are taken year round, although they tend to be more prevalent in the catch during the 3rd quarter. Species composition also varies from year to year in line with changes in environmental conditions, particularly in waters where there is some overlap in species targeting, for example, in the latitudinal band from 0°–20°S.

As mentioned above, the comparison of the most recent ten-year period (2010-2019) is only possible with 2020 data in Figure 5.4.4 at this stage since there is a lag in the provision of complete 2021 aggregate data by time and area. There were relatively larger bigeye catches in the area just south of the Hawaii EEZ in the second quarter of 2020 when compared to the 2010-2019 quarterly averages (Figure 5.4.4 –left) with the 2020 catches (Figure 5.4.4 –right). There is a clear change in species composition and catch volume by 10° latitude band for the area bounded by 0°–30°S, 150E°-170°W from the 2nd quarter 2020, with high catches of yellowfin tuna, to the 3rd quarter, when there are clearly high proportions of albacore tuna in the longline catch. Also noteworthy is the relatively high catches of albacore and bigeye tuna in the 4th quarter 2020 on the eastern fringe of the WCPFC Area, south of the equator (WCPFC-IATTC overlap area), a pattern observed in the long-term average (2010-2019).

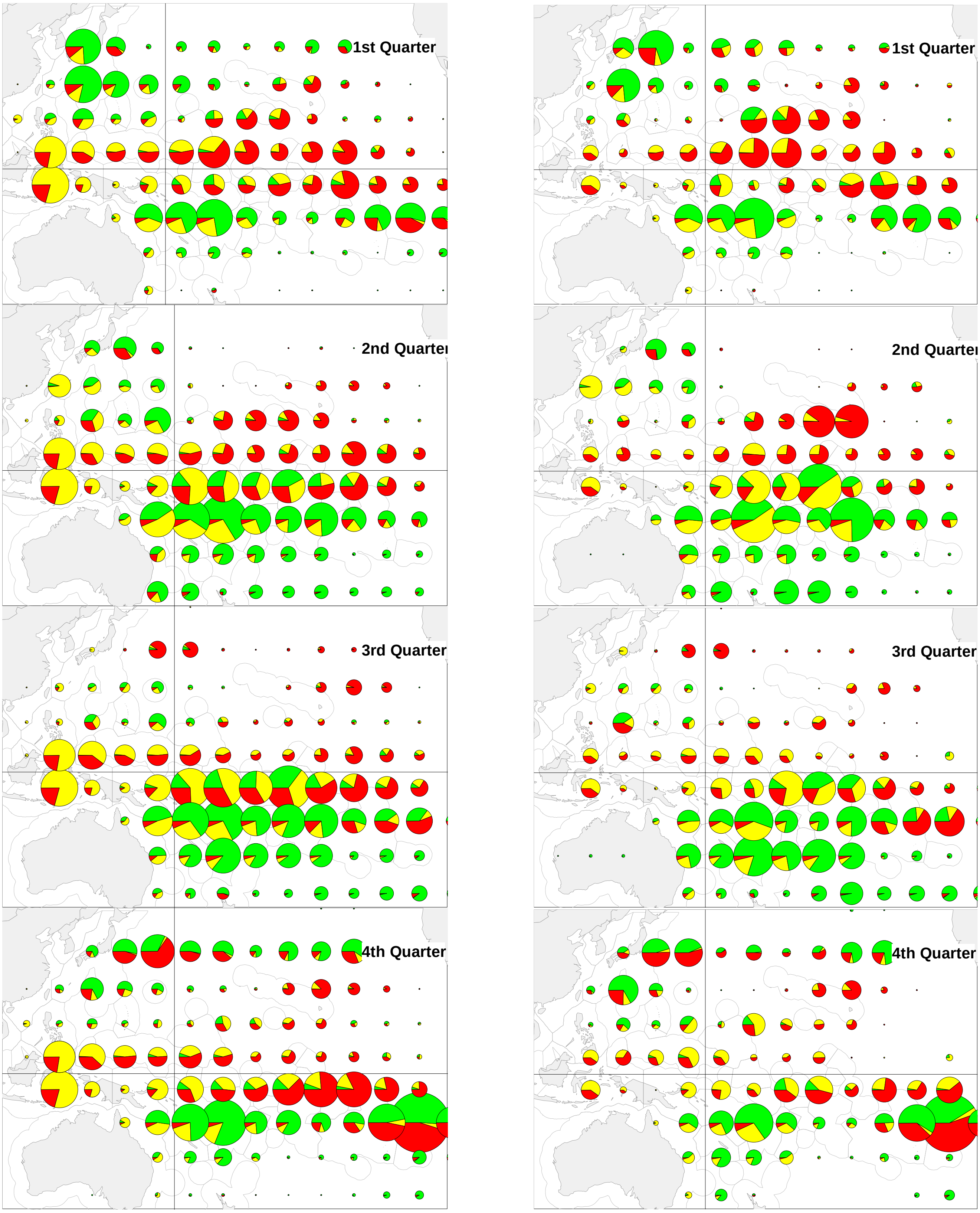

Figure 5.4.4 Quarterly distribution of longline tuna catch by species, 2010-2019 (left) and 2020 (right*)*

(Yellow–yellowfin; Red–bigeye; Green–albacore)

(The year prior to the last calendar year is selected due to lag in provision of data. Note that catches from some distant-water fleets targeting albacore in the North Pacific may not be fully covered; excludes the Vietnam HL/LL fishery)

5.5 Prices and catch values

5.5.1 Prices

There are a large number of markets and product forms in which longline caught tuna and billfish are sold. In this section trends for selected longline fishery related price data for yellowfin, bigeye, albacore, swordfish and striped marlin are provided.

Yellowfin

Following significant increases in yellowfin prices across all markets in 2017, the prices in 2021 across all markets examined increased significantly except for Japanese imports of fresh yellowfin from Oceania which declined 15% to ¥912/kg ($8,310/mt). Yaizu longline caught prices also increased significantly by 46% to ¥784/kg($7,141/mt) in 2021 from ¥537/kg ($5,029/mt) in 2020. Similarly, both fresh yellowfin prices at selected port prices increased 5% and frozen yellowfin price increased significantly by 50% to ¥904/kg($8,239/mt).

In 2021, prices for fresh yellowfin imports into the US rose marginally to $9.91/kg from 2020. In US dollar terms, yellowfin prices across all markets increased except for fresh imports from Oceania which saw a decline of 17% to $8.31/kg. The Yaizu longline caught yellowfin saw a significant increase in 2021 by 42% to average to $7.14/kg. Similarly, the frozen yellowfin prices at selected ports increased significantly by 46% to $8.24/kg with 2% increase with the fresh yellowfin price to $8.24/kg from the previous year.

Following the significant declines of import volumes for fresh yellowfin into Japan and the US in 2020 largely caused by the Covid-19 pandemic in which has resulted in some vessels supplying fresh markets are laying idle, saw a further decline of the Japan fresh imports by 39% over the year 2021. However, over the period to May 2022, the import volumes have slowly recovered and were higher than in the same period in 2021. Similarly, the US fresh imports have slowly recovered in 2021 with more than 100% increase of imports than in 2020. This was also seen over the period to May 2022 with the import volumes were higher by 46% than in the same period in 2021.

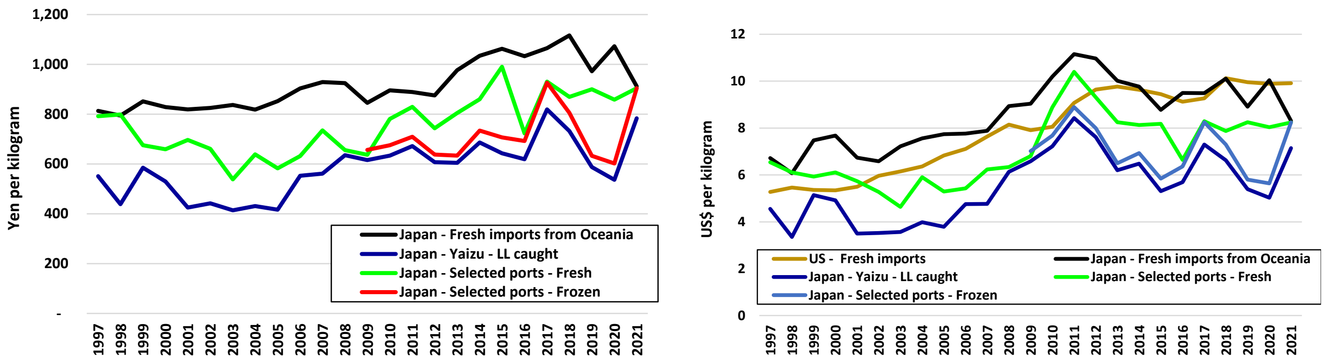

Figure 5.5.1 Japan and US Yellowfin in Yen (LHS) and US dollars (RHS)

Note: Japan fresh imports from Oceania are c.i.f prices, Yaizu and Japan selected port are ex-vessel prices and US imports are f.a.s prices. Frozen at selected ports excludes purse seine caught landings

Bigeye

In 2021, fresh bigeye prices across all markets were increased. The Japan selected ports fresh and frozen prices averaged ¥1,381/kg (+10%) and ¥996/kg (+20%) respectively. Similarly, the price for fresh imports from Oceania rose 10% to ¥1,375/kg.

US fresh bigeye import prices continued to increase in 2021, rising by 13% to $11.60/kg, the highest price on record. In US dollar terms, the 2021 selected ports fresh and frozen prices increased by 7% and 17% to $12.59/kg and $9.08/kg respectively. Similarly, the price for fresh imports from Oceania rose by 7% to $12.53/kg in 2021.

Since the Covid-19 pandemic in 2020 which saw a significant decline in import volumes into Japan and US, a further decline of 36% was seen with the Japan bigeye fresh imports over the period 2021. Over the period of May 2022, the Japan fresh bigeye imports volumes continue to decline to lower levels. In contrast, the US bigeye imports over the period 2021 have recovered slowly with the total imports was only 9% lower than the 2019 level and 44% higher than the level in 2020.

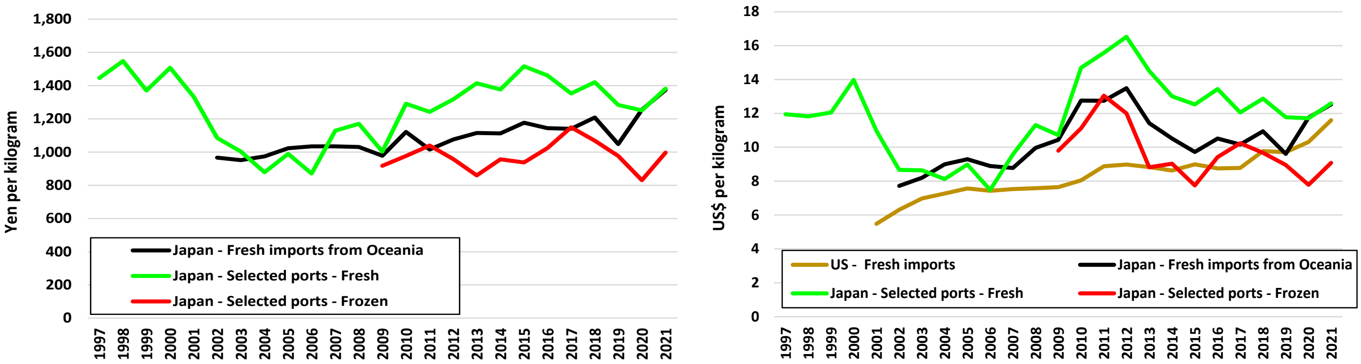

Figure 5.5.2 Japan and US bigeye prices in Yen (LHS) and US dollars (RHS)

Note: Japan fresh imports from Oceania are c.i.f prices, Japan selected ports are ex-vessel prices and US imports are f.a.s prices. Frozen at selected ports excludes purse seine caught landings

Albacore

Following the recent peak for the US fresh albacore prices in 2020 with the price (c&f) rising 10% to average $5.92/kg which is the highest on record, it dropped 6% to $5.54/kg in 2021. Similarly, the Thai frozen import also declined 6% to 3.31/kg in 2021 while the Japan selected ports fresh prices increased by 4% to $3.27/kg.

In 2020 Thai import volumes for frozen albacore increased by 20% due to, at least in part, the disruptions in longline caught yellowfin and bigeye markets resulting in some vessels shifting to targeting albacore. However, in 2021, Thai import volumes declined by 33% to around 42,000 metric tonnes from 63,000 metric tonnes in 2020. Over the period to May 2022, the import volumes continue to decline to lower levels.

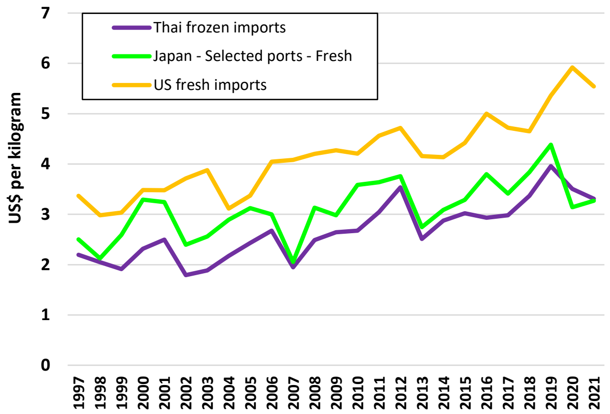

Figure 5.5.3 Albacore prices in US dollars

Note: Thai frozen imports are c&f prices, Japan selected ports are ex-vessel prices and US imports are f.a.s prices.

Swordfish and striped marlin

In 2021, the Japan fresh swordfish price across all markets increased except the price for the fresh striped marlin at selected Japanese ports. Price for fresh swordfish and fresh striped marlin at selected Japanese ports increased significantly by 19% (to ¥1,138/kg) and fell 4% (to ¥509/kg) respectively in 2021. Similarly, the US fresh swordfish also increased 14% to average $8.07/kg in 2021, its highest level since 2017.

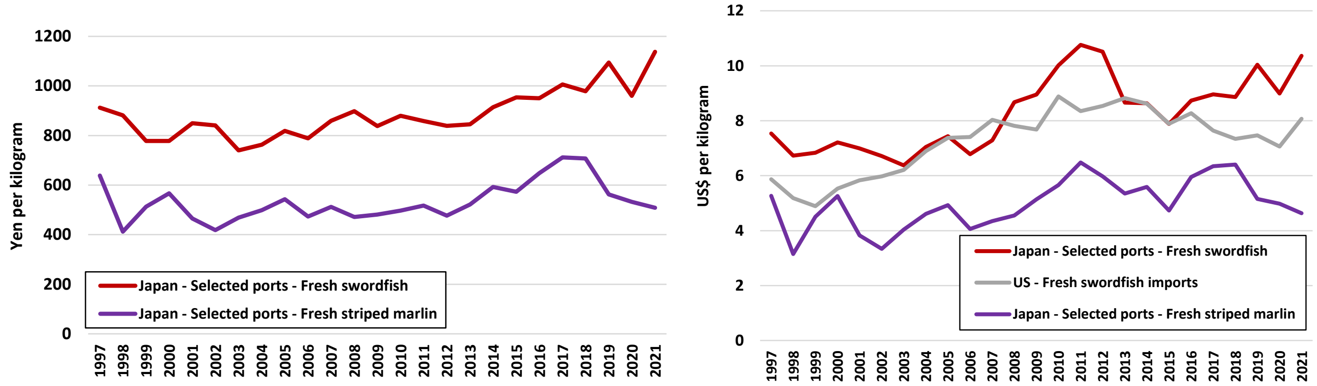

Figure 5.5.4 Japan and US swordfish and striped marlin prices in Yen (LHS) and US dollars (RHS)

Note: Japan selected ports are ex-vessel prices and US imports are f.a.s prices.

5.5.2 Catch Value

In 2021, the value of the total catch in the WCPFC longline is estimated to be at $1.14 billion, equivalent to 25% of the total value of the WCPO tuna catch of $4.64 billion. This represents a decline of $242 million (-17%) from the estimated value of the longline catch in 2020.[9] The value of the catch of all target species declined with the value of yellowfin catch falling 17% to $479 million, a decline of $97 million from the previous year. The bigeye catch value declined by $61 million (-11%) while the catch value for albacore declined by $86 million (-32%).

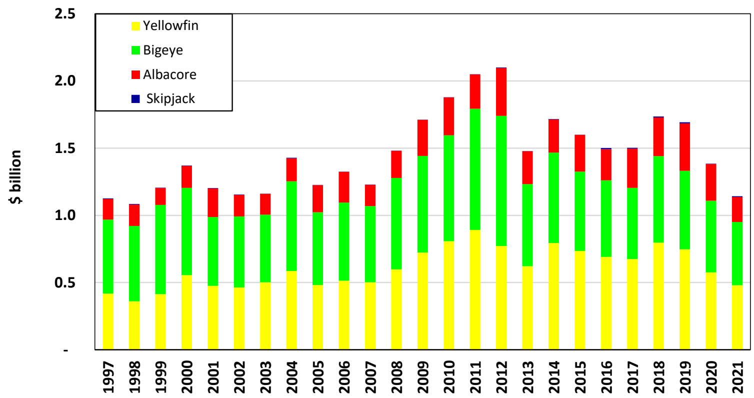

Figure 5.5.5 Value of the WCPFC-CA longline fishery tuna catch by species

These declines came about despite the increase in prices for longline caught yellowfin and bigeye in 2021 and were largely driven by the significant decline of 18% in the longline catch in 2021.

[9] For the yellowfin and bigeye caught by fresh longline vessels it is assumed that 80% of the catch is of export quality and 20% is non-export quality. For export quality the annual prices for Japanese fresh yellowfin and bigeye imports from Oceania are used, while it is simply assumed that non-export grade tuna attracted $1.50/kg throughout the period 1997-2013. For yellowfin caught by frozen longline vessels the delivered price is taken as the Yaizu market price for longline caught yellowfin. For bigeye caught by frozen longline vessels the delivered price is taken as the frozen bigeye price at selected major Japanese ports. For albacore caught by fresh and frozen longline vessel the delivered prices is taken as the Thai import price. The frozen longline catch is taken to be the catch from the longline fleets of Japan and Korea and the distant water longline fleet of Chinese Taipei.

6 SOUTH-PACIFIC TROLL FISHERY

6.1 Overview

The South Pacific troll fishery is based in the coastal waters of New Zealand, and along the Sub-Tropical Convergence Zone (STCZ, east of New Zealand waters located near 40°S). The fleets of New Zealand and the United States have historically accounted for the great majority of the catch that consists almost exclusively of albacore tuna.

The fishery expanded following the development of the STCZ fishery after 1986, with the highest catch attained in 1989 (8,370 mt). Over the past decade, catches have declined to range from 2,000–5,000 mt, which are catch levels not been experienced since prior to 1988 (Figure 6.1.1). The level of effort expended by the troll fleets each year can be driven by the price conditions for the product, and by expectations concerning likely fishing success.

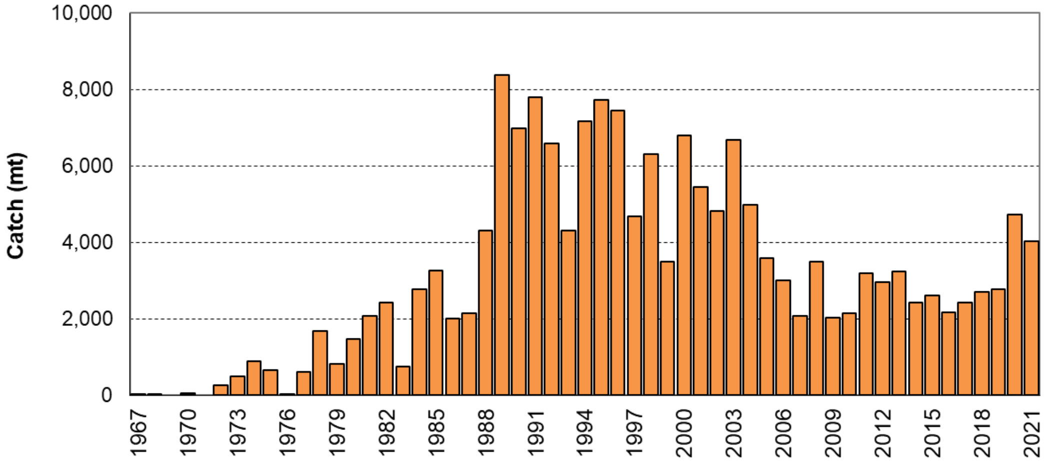

Figure 6.1.1 Troll catch (mt) of albacore in the south Pacific Ocean

6.2 Provisional catch estimates (2021)

The 2021 South Pacific troll albacore catch (4,037 mt) was slightly less than 2020 (4,733 mt) but amongst the highest catches since 2004 (4,990 mt). The New Zealand troll fleet (157 vessels catching 3,383 mt in 2021) and the United States troll fleet (21 vessels catching 654 mt in 2021) accounted for most of the 2021 albacore troll catch, although minor contributions also come from the Canadian, the Cook Islands and French Polynesian fleets when their fleets are active in this fishery.

Effort by the South Pacific albacore troll fleets is concentrated off the coast of New Zealand and across the Sub-Tropical Convergence Zone (STCZ) – refer to Figure 6.2.1.

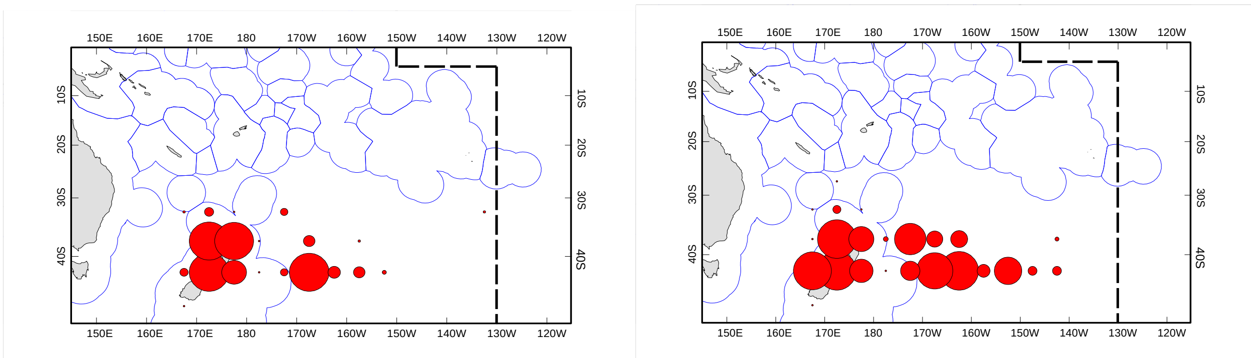

Figure 6.2.1 Distribution of South Pacific troll effort during 2020 (left) and 2021 (right)

7 OTHER FISHERIES

There are a number of other, mainly small-scale, fisheries in the WCP–CA that target the key tuna species, including handline gear that targets large yellowfin tuna, small-scale troll/hook-and-line fisheries, small-scale gillnet and a range of other artisanal gears. The following sections attempt to provide some information on some of these "other" fisheries.

7.1 Large-fish Handline Fishery

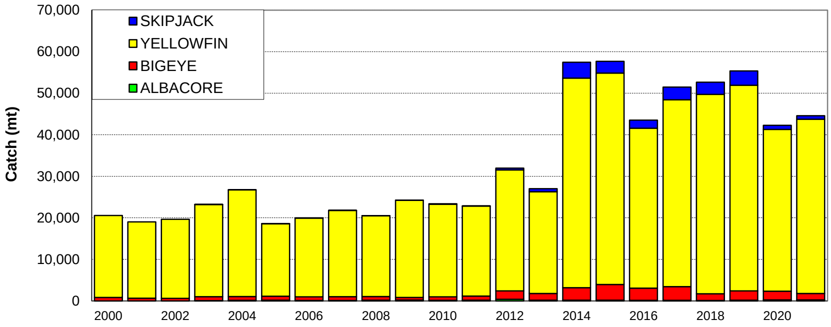

Figure 7.1.1 WCP–CA large-fish Handline catch (mt) by species

Large-fish Handline fisheries exist in the Philippines, Indonesia and Hawaii, where the target is essentially large yellowfin tuna (and also bigeye tuna in the case of Hawaii). In the Philippines and Indonesia, this fishery can be comprised of both small craft and larger vessels (> 24m or > 20GRT). The larger vessels can have several small associated one-person boats (called *pakura* in the Philippines) used to fish in the vicinity of the larger vessel. The vessels that target large yellowfin tuna with the handline gear are also referred to as "pump boats" in the Philippines. The general characteristics that distinguish the vessels targeting small-fish with the "hook-and-line" gear to those targeting large yellowfin tuna in the Philippines and Indonesia is that the latter fishery is conducted at night, at a depth typically greater than 50 metres with larger hooks. [However, this distinction is not always clear, for example, there are instances when small craft can target both large yellowfin at night and small tunas in the day within one trip]. Large yellowfin tuna dominates the catch from this gear type in the Philippines and Indonesia (typically >= 95% of the total catch) and the catches are landed locally where it is processed and available for export or the high-end local markets.

Over the past two decades, annual catch estimates from the large-fish handline fishery have been in the range of 20,000–57,000 mt (Figure 7.1.1), although the estimates prior to 2014 are acknowledged to exclude the catches from the Indonesian fishery (that is, estimates for Indonesia have only been compiled from 2014 onwards). The 2021 catch was similar to 2020, but a clear decline on catches in recent years and understood to be mainly due to the impacts of COVID-19.

7.2 Small-scale troll and hook-and-line Fishery

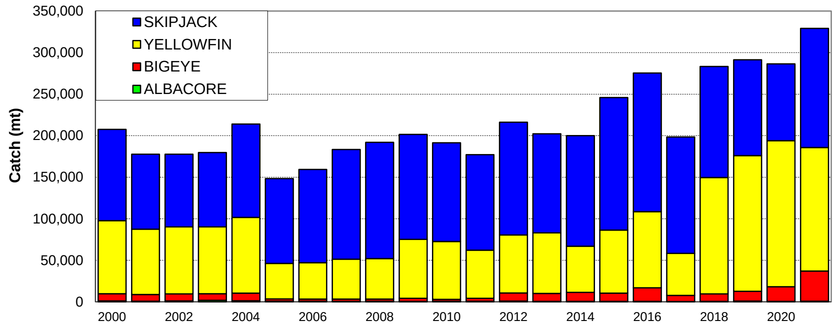

Figure 7.2.1 WCP–CA troll / hook-and-line catch (mt) by species

The small-scale troll and hook-and-line fishery comprises small craft that, due to their size and concerns on safety, conduct trips that do not usually exceed one day and are restricted to coastal waters, rarely venturing beyond territorial seas and/or archipelagic waters (where relevant). The method of fishing is varied and includes trolling, and surface fishing in the vicinity of FADs with one or multiple hooks per line. Small skipjack and yellowfin tuna are the main species taken in this fishery and most coastal states in the tropical and sub-tropical WCP-CA have vessels in this fishery, with the highest catches reported from the Indonesia and the Philippines domestic fisheries, followed by Kiribati, Japan, French Polynesia and Tuvalu (catches from some countries, while only minor, have yet to be compiled and provided to the WCPFC). The catches from this fishery are typically for subsistence or sold at local markets.

Over the past two decades annual catch estimates from the small-scale troll and hook-and-line fishery have been in the range of 120,000–300,000 mt (Figure 7.2.1), although the trends in some years may be a result of the lack of resources to compile or confirm estimates, rather than a change in the fishery. The increasing trend over the past decade may be related to improvements in estimates in some fisheries (noting the provisional 2021 estimate is a record for this fishery). The species composition tends to fluctuate with some years having a high proportion of small yellowfin tuna (e.g., in recent years, small yellowfin tuna catch was estimated to at least 50% of the total tuna catch for this fishery).

7.3 Small-scale gillnet Fishery

The main small-scale gillnet fisheries operate in coastal waters of Vietnam and Indonesia, with smaller catches from this gear in Japan and in the archipelagic waters of the Philippines. This fishery targets skipjack tuna but also take small amounts of other pelagic species.

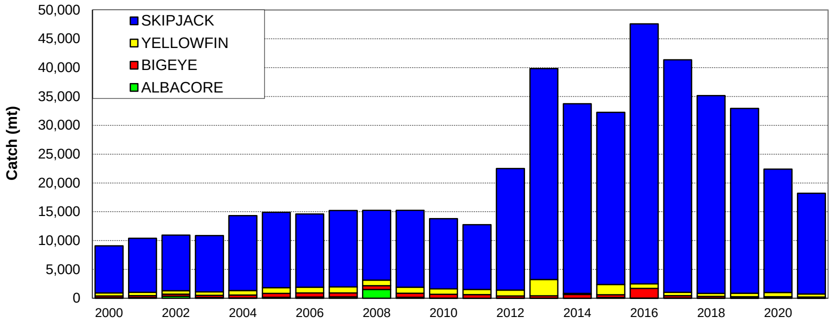

Figure 7.3.1 WCP–CA small-scale gillnet catch (mt) by species

The available annual catch estimates (Figure 7.3.1) are only representative of Vietnam, Philippines and Japan fisheries at this stage; the total tuna catch from these drift gillnet fisheries has ranged from less than 20,000 mt to 48,000 mt over the past decade. Indonesia first separated out the gillnet catch by species from their “other/unclassified gear” tuna catch estimates in 2013 and these have yet to be included in this time series; the Indonesia small-scale gillnet catch has ranged from 5,000–40,000 mt over this period.

8. SUMMARY OF CATCH BY SPECIES

8.1 SKIPJACK

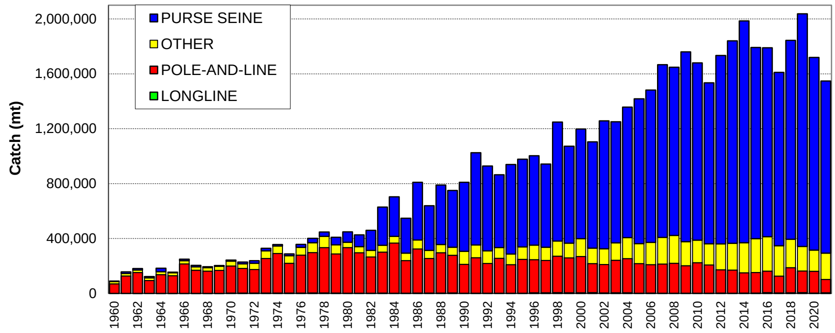

Figure 8.1.1 WCP–CA skipjack catch (mt) by gear

Total skipjack catches in the WCP–CA have increased steadily since 1960, more than doubling during the 1980s, and continuing to increase in subsequent years. Annual catches have exceeded 1.5 million mt in the last decade (Figure 8.1.1). Pole-and-line fleets, primarily Japanese, initially dominated the fishery, with the catch peaking at 380,000 mt in 1984. The relative importance of the pole-and-line fishery, however, has declined over the years primarily due to economic constraints. The skipjack catch increased during the 1980s due to growth in the international purse seine fleet, combined with increased catches by domestic fleets from Philippines and Indonesia (which have made up around 10% of the total skipjack catch in WCP–CA.

The **2021 WCP–CA skipjack catch** of 1,547,945 mt was the lowest for ten years and nearly 500,000 mt lower than the record in 2019 (2,037,920 mt). Catch in the **purse seine** fishery for 2021 (1,254,022 mt – 81%) was also well down on the 2019 record for that fishery, noting that the trend in purse seine skipjack catch typically drives the trends in overall skipjack catch. The **pole-and-line** catch for 2021 (97,908 mt – 6%) was amongst lowest catches since 1963, with reductions in both the Japanese and the Indonesian catches (noting 2021 estimates for this fishery are provisional). The various "**artisanal**" gears in the domestic fisheries including Indonesia, Philippines and Japan took 189,997 mt in 2021 (12% of the total catch) which was lower than the recent 5-year average. The **longline** fishery accounted for less than 1% of the total catch.

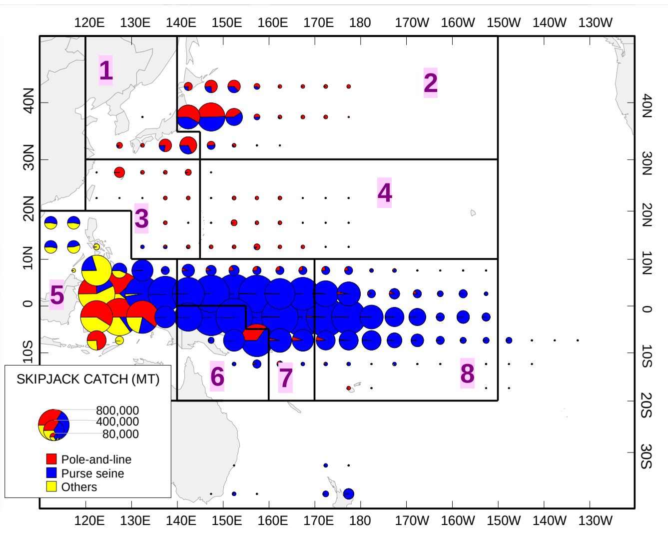

Figure 8.1.2 Distribution of skipjack tuna catch, 1990–2021.

The eight-region spatial stratification used in stock assessment is shown.

The majority of the skipjack catch is taken in equatorial areas, and most of the remainder is taken in the seasonal domestic (home-water) fishery of Japan (Figure 8.1.2). The domestic fisheries in Indonesia (purse seine, pole-and-line and unclassified gears) and the Philippines (e.g. ring-net and purse seine) account for the majority of the skipjack catch in the western equatorial portion of the WCP–CA. Central tropical waters are dominated by purse seine catches from several foreign and domestic fleets. As mentioned in Section 3, the spatial distribution of skipjack catch by purse seine vessels in the central and eastern equatorial areas is influenced by the prevailing ENSO conditions.

The Philippines and Indonesian domestic fisheries (archipelagic waters) generally account for most of the skipjack catch in the 20–40 cm size range (Figure 8.1.3), although associated purse seine catch also contribute to this range (e.g. in 2020). Most of the WCP–CA skipjack catch (by weight) is in the range 40–70 cm (corresponding to 1–2+ year-old fish – Figure 8.1.4). Medium-large (60–70 cm) skipjack typically make up the greater proportion of the catch from unassociated, free swimming school sets. The overall purse seine skipjack size distribution in 2021 is different to recent years with a narrower size range (45-55 cm) for most of the catch (Figure 8.1.4). The skipjack size distributions in the Philippine/Indonesia archipelagic fisheries have been relatively constant for a number of years (Figure 8.1.4 – yellow).

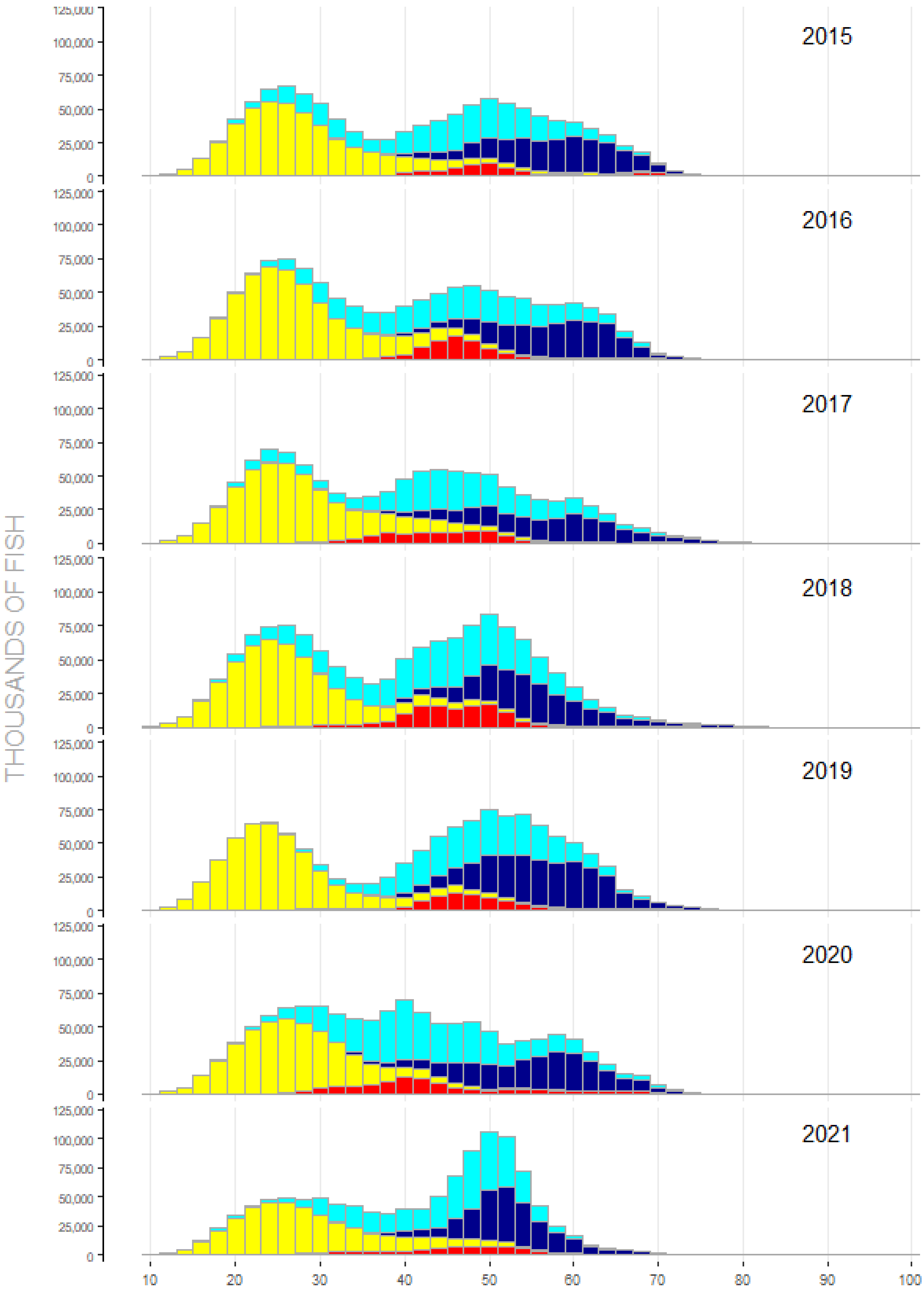

Figure 8.1.3 Annual catches (no. of fish) of skipjack tuna in the WCPO by size (2cm intervals) and gear type, 2015–2021.
(red–pole-and-line; yellow–Phil-Indo archipelagic fisheries; light blue–purse seine associated; dark blue–purse seine unassociated)

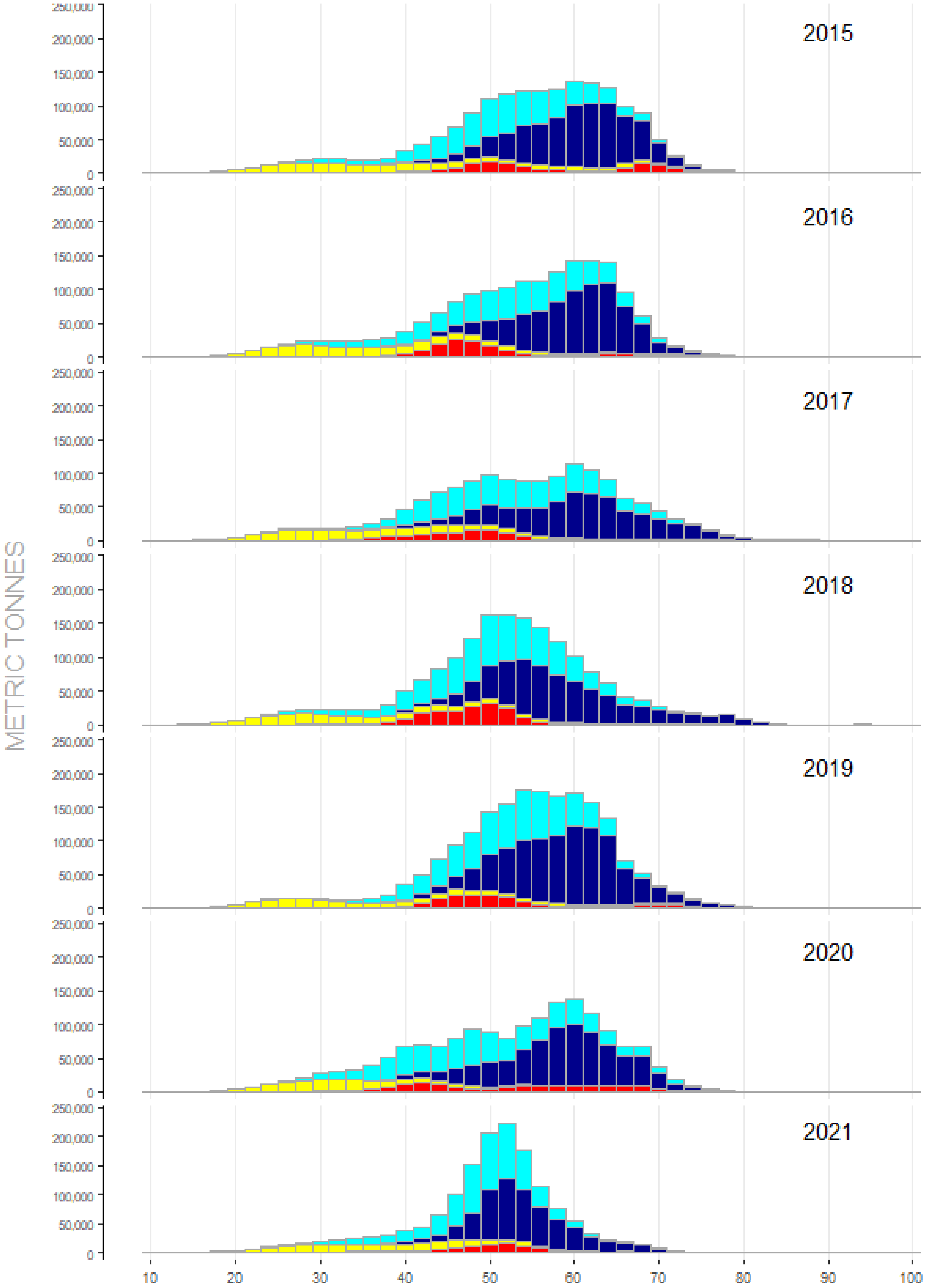

Figure 8.1.4 Annual catches (MT) of skipjack tuna in the WCPO by size (2cm intervals) and gear type, 2015–2021.

(red–pole-and-line; yellow–Phil-Indo archipelagic fisheries; light blue–purse seine associated; dark blue–purse seine unassociated)

8.2 YELLOWFIN

The total yellowfin tuna catch in the WCP–CA has slowly increased over time but since 1998, jumped to a new level with annual catches regularly exceeding 500,000 mt (Figure 8.2.1), mainly due to increased catches in the purse seine fishery. The 2021 yellowfin catch (**695,097 mt**) was amongst the highest on record, and around 40,000 mt less than the previous record in 2020 (735,394 mt). The recent high yellowfin tuna catches are related to some extent to recent high catch levels from the "other" category (primarily small-scale fisheries in Indonesia – provisional 2021 estimate for "Other" is 199,029 mt – 29% of the total catch).

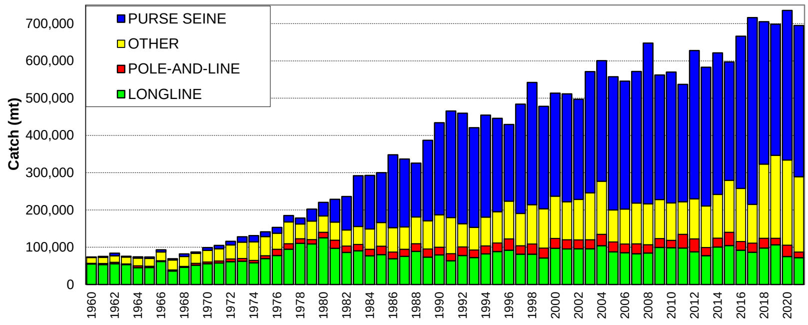

Figure 8.2.1 WCP–CA yellowfin catch (mt) by gear

The WCP–CA **longline** catch for 2021 (71,847 mt–10%) was the lowest catch since 1999 and less than 35,000 mt compared to the 2019 catch in this fishery; a decrease in effort in the broad area where yellowfin are mainly targeted (due to COVID-19) no doubt contributed to this decline. Since the late 1990s, the **purse seine** catch of yellowfin tuna (405,915 mt in 2021–58%) has accounted for about 3-5 times the **longline** yellowfin tuna catch.

The **pole-and-line** fisheries took only 15,392 mt during 2021 (~2% of the total yellowfin catch) which is the lowest since the 1970s but considered provisional at this stage.

Catches in the '**other**' category are largely composed of yellowfin taken by various assorted gears (e.g. troll, ring-net, bagnet, gillnet, large-fish handline, small-fish hook-and-line and seine net) in the domestic fisheries of the Philippines and eastern Indonesia. Figure 8.2.2 shows the distribution of yellowfin catch by gear type for the period 1990–2021. As with skipjack, the great majority of the catch is taken in equatorial areas by large purse seine vessels, and a variety of gear types in the Indonesian and Philippine fisheries.

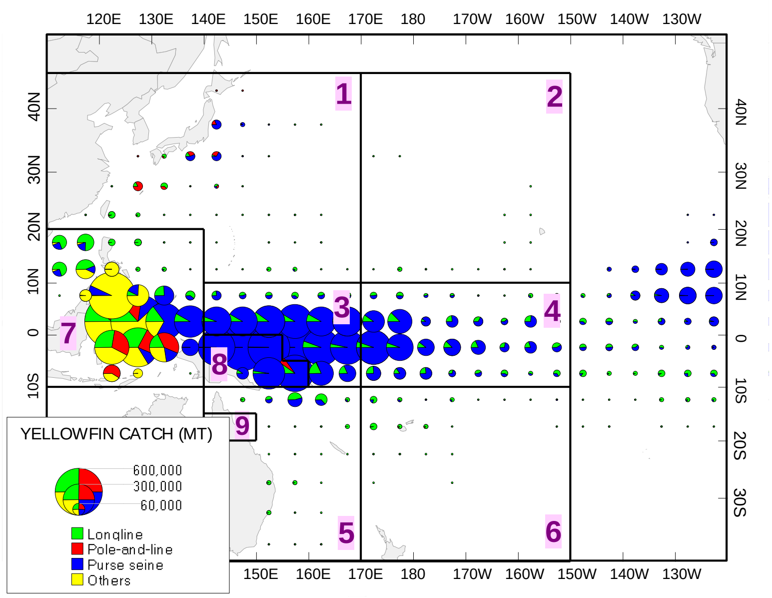

Figure 8.2.2 Distribution of yellowfin tuna catch in the WCP–CA, 1990–2021.

The nine-region spatial stratification used in stock assessment is shown.

The domestic surface fisheries of the Philippines and Indonesia (archipelagic waters) take large numbers of small yellowfin in the 20–50 cm range (Figure 8.2.3), and their deep-water handline fisheries take smaller quantities of large yellowfin tuna (> 110 cm). In the purse seine fishery, smaller yellowfin are caught in log and FAD sets than in unassociated sets. A major portion of the purse seine catch is adult (> 100 cm) yellowfin tuna, to the extent that the purse seine catch (by weight) of adult yellowfin tuna is clearly higher than the longline catch. Most of the catch of large yellowfin tuna in the size range 120–140 cm from the purse seine unassociated sets is typically taken in the eastern tropical WCP-CA. There were lower catches of large yellowfin tuna from purse seine unassociated sets during 2021, and only a small proportion of fish >130cm in the 2021 purse seine catch in contrast to the catch in years 2016–2017 for example (Figure 8.2.4). There are typically two modes of small fish (< 50 cm) and one mode of large fish (>100 cm from the handline gear) in the yellowfin catches from the Indonesia/Philippines domestic fisheries. There was a clear mode of small fish around 45-50 cm in the purse seine associated catch during 2021. Section 3.6 also provides some insights into the distribution of purse seine yellowfin catch by area and size.

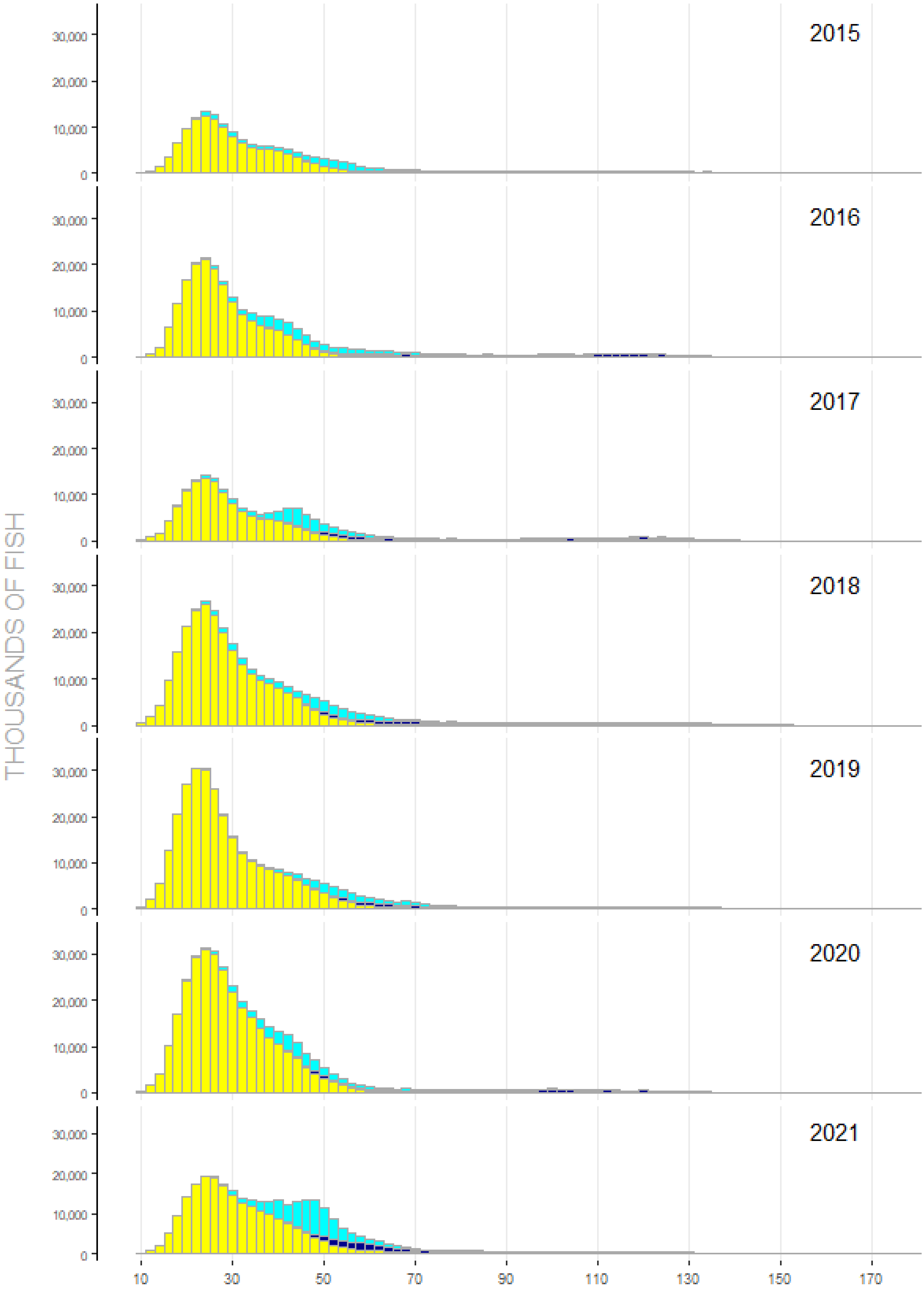

Figure 8.2.3 Annual catches (no. of fish) of yellowfin tuna in the WCPO by size (2cm intervals) and gear type, 2015–2021.
(green–longline; yellow–Phil-Indo archipelagic fisheries; light blue–purse seine associated; dark blue–purse seine unassociated)

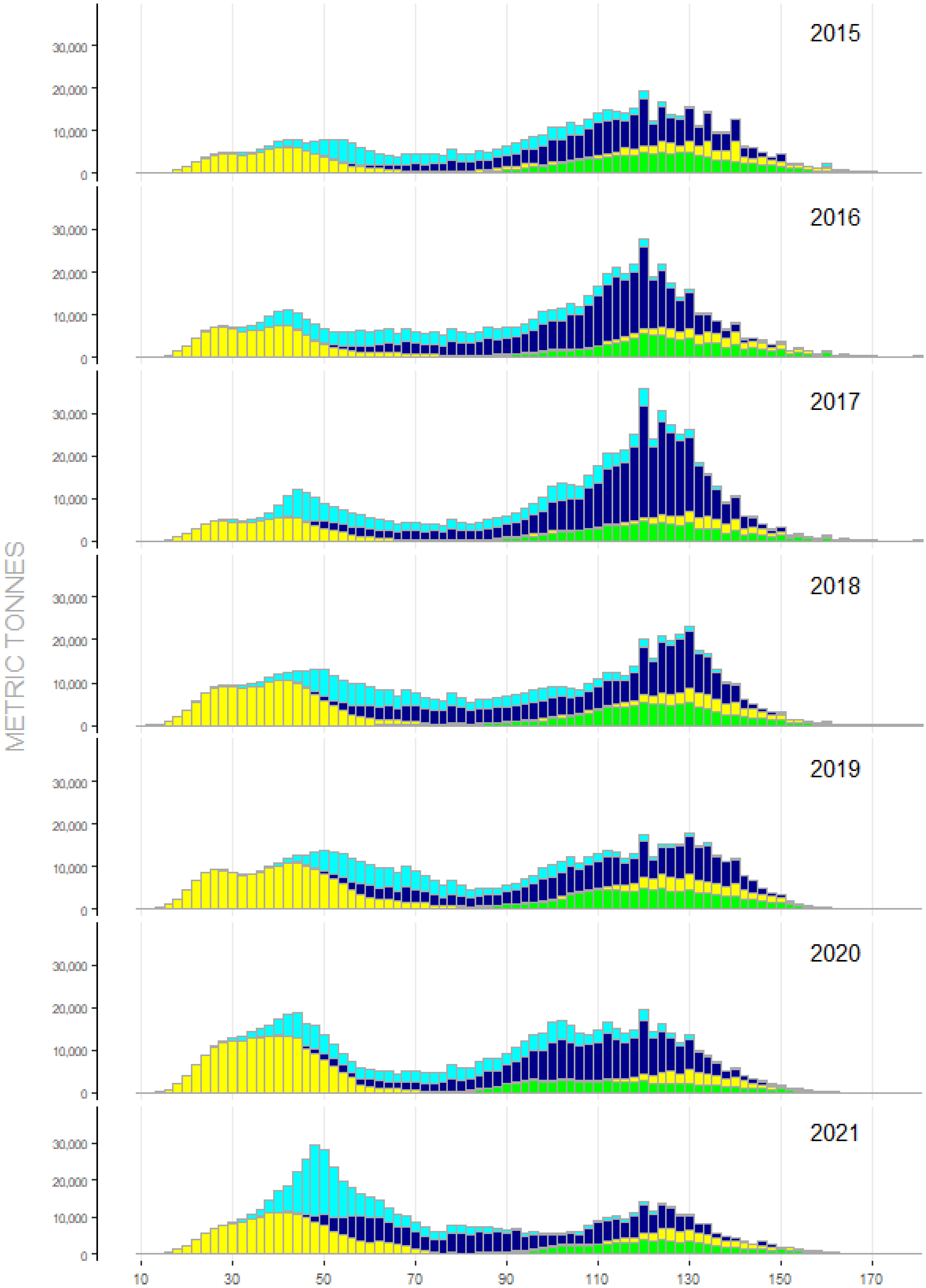

Figure 8.2.4 Annual catches (MT) of yellowfin tuna in the WCPO by size (2cm intervals) and gear type, 2015–2021.

(green–longline; yellow–Phil-Indo archipelagic fisheries; light blue–purse seine associated; dark blue–purse seine unassociated)

8.3 BIGEYE

The provisional **WCP-CA bigeye catch** (169,113 mt) for 2021 was the highest catch in ten years, mainly due to higher catches in the purse seine fishery and small-scale fisheries in south-east Asian countries (provisional). The provisional **WCP-CA longline** bigeye catch (49,511 mt) was clearly lower than the recent ten-year average and understood to be partly due to the impacts of the COVID-19 pandemic. The provisional **WCP–CA purse seine** bigeye catch for 2021 was estimated to be 79,167 mt which was the highest since 2014, and higher than the recent ten-year average (Figure 8.3.1). The WCP-CA purse seine bigeye catch has exceeded the longline catch for most of the past ten years. The purse seine and longline fisheries have accounted for an average of 89% of the total WCP-CA bigeye catch over the past ten years.

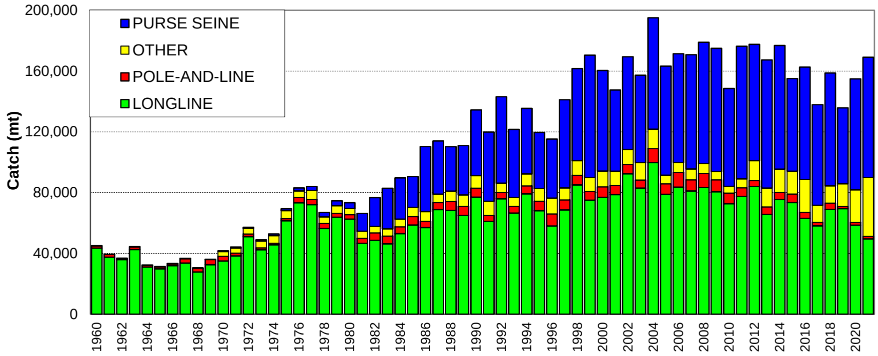

Figure 8.3.1 WCP–CA bigeye catch (mt) by gear

The **WCP–CA pole-and-line** fishery has generally accounted for between 1,000–10,000 mt (1-6%) of bigeye catch annually over the past decade. The "**other**" category, representing various gears (including troll) in the Philippine, Indonesia[10], Vietnam and Japanese domestic fisheries has fluctuated between an estimated 4,000–21,000 mt (3–14% of the total WCP–CA bigeye catch) over the past two decades, although the provisional catch for 2021 is clearly the highest on record (38,597 mt) but pending further review.

Figure 8.3.2 shows the spatial distribution of bigeye catch in the Pacific for the period 1990–2021. The majority of the WCP–CA catch is taken in equatorial areas, both by purse seine and longline, but with some longline catch in sub-tropical areas (e.g. east of Japan and off the east coast of Australia). In the equatorial areas, much of the longline catch is taken in the central Pacific, continuous with the important traditional bigeye longline area in the eastern Pacific.

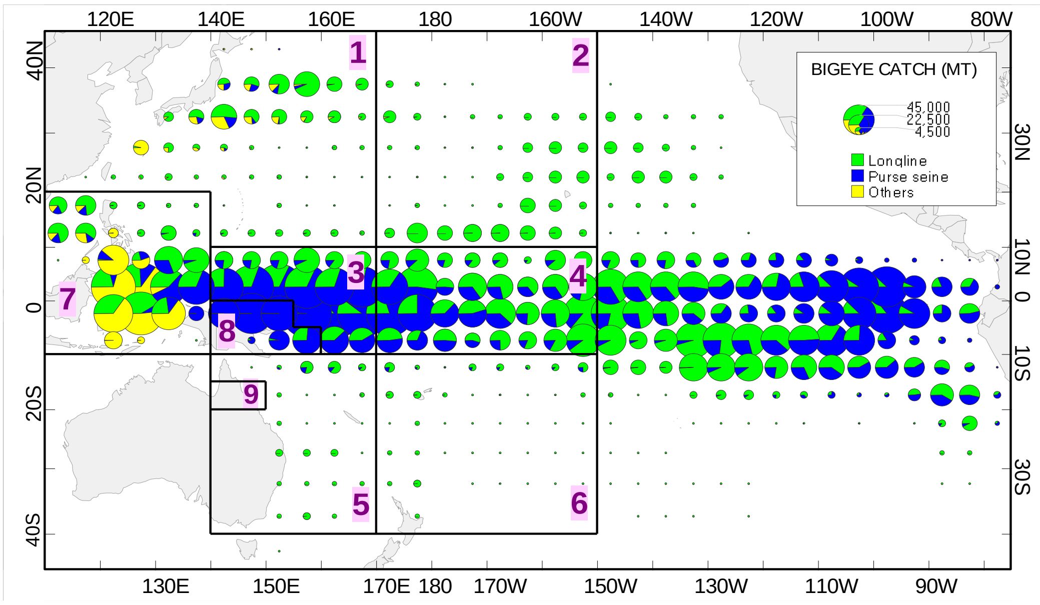

Figure 8.3.2 Distribution of bigeye tuna catch, 1990–2021.
The nine-region spatial stratification used in stock assessment for the WCP–CA is shown.

[10] Bigeye tuna estimates in the Indonesian troll fishery were provided for the first time for 2013 but have subsequently (since 2017) been included in the "other" category.

As with skipjack and yellowfin tuna, the domestic surface fisheries of the Philippines and Indonesia (archipelagic waters) take relatively large numbers of small bigeye in the range 20–60 cm (Figure 8.3.3). The longline fishery clearly accounts for most of the catch (by weight) of large bigeye in the WCP–CA (Figure 8.3.4). This contrasts with large yellowfin tuna, which (in addition to longline gear) are also taken in significant amounts from unassociated (free-swimming) schools in the purse seine fishery and in the Philippines handline fishery. Large bigeye tuna are very rarely taken in the WCPO purse seine fishery and only a relatively small amount come from the handline fishery in the Philippines. Bigeye tuna sampled in the longline fishery are predominantly adult fish with a mean size of ~130 cm FL (range 80–170+ cm FL). Associated sets account for nearly all the bigeye catch in the WCP–CA purse seine fishery with considerable variation in the sizes from year to year, but the majority of associated-set bigeye tuna are generally in the range of 45–75 cm.

The year class represented by the mode of fish in the size range of about 25-30 cm in the Philippines/Indonesian domestic fisheries during 2018 appears to progress to a mode of 50-60 cm in the same fisheries during 2019 (and possibly also the purse seine associated catch in 2020; Figure 8.3.3).

The graphs for 2021 show potentially several distinct modes (i) at 25-30 cm and 45-50 cm for the Philippines/Indonesia domestic fisheries, (ii) around 45-55 cm for the purse seine associated fishery (which is different to 2020 when the mode in this fishery was around 80 cm), and (iii) the typical broad mode at around 130-135 cm for the longline fishery.

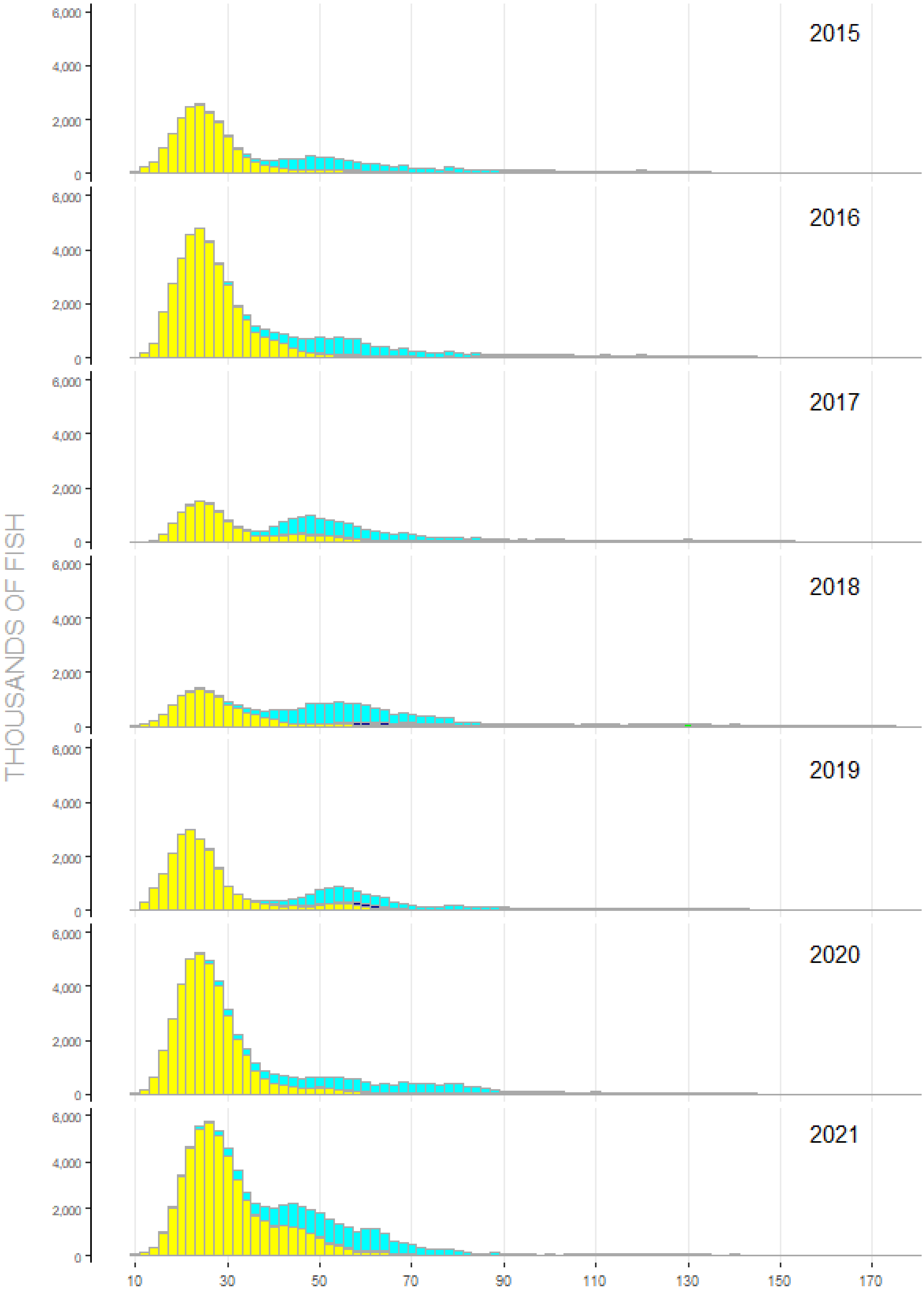

Figure 8.3.3 Annual catches (no. of fish) of bigeye tuna in the WCPO by size (2cm intervals) and gear type, 2015–2021.

(green–longline; yellow–Phil-Indo archipelagic fisheries; light blue–purse seine associated; dark blue–purse seine unassociated)

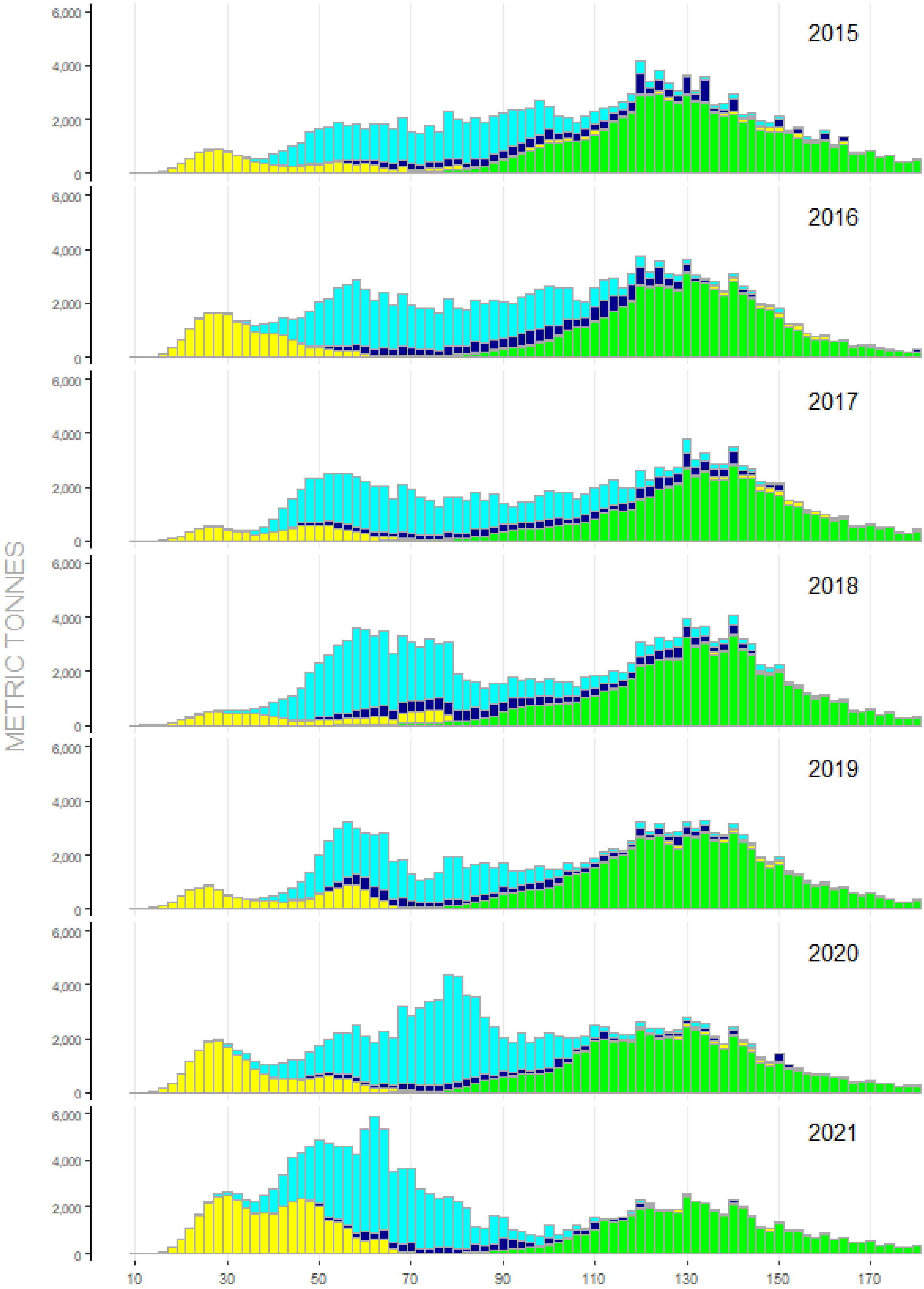

Figure 8.3.4 Annual catches (MT) of bigeye tuna in the WCPO by size (2cm intervals) and gear type, 2015–2021.

(green–longline; yellow–Phil-Indo archipelagic fisheries; light blue–purse seine associated; dark blue–purse seine unassociated)

8.4 SOUTH PACIFIC ALBACORE

Prior to 2001, south Pacific albacore catches were generally in the range 25,000–50,000 mt, with a significant peak in 1989 (49,076 mt) when driftnet fishing was in existence. Since 2001, catches have greatly exceeded this range, primarily as a result of the growth in several Pacific Islands domestic longline fisheries. The provisional **south Pacific albacore** catch in 2021 (52,173 mt), was the lowest since 2000 and around 40,000 mt less than the record catch taken in 2017 (94,504 mt).

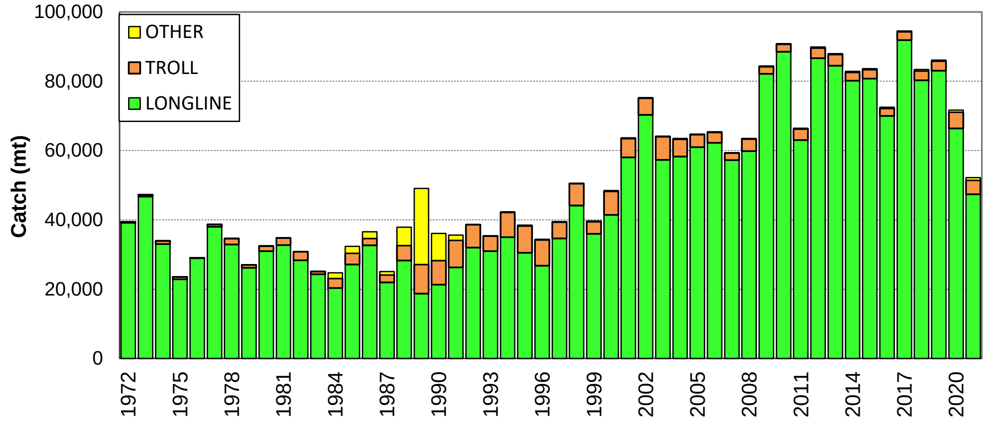

Figure 8.4.1 South Pacific albacore catch (mt) by gear ("Other" is primarily catch by the driftnet fishery.)

In the post-driftnet era, **longline** has accounted for most of the South Pacific albacore catch (> 75% in the 1990s, but > 90% in recent years). The annual South Pacific Albacore **troll** catch (with a season spanning November–April) dropped from a range between 4,000–8,000 mt during the 1990s, to a range of 2,000–3,500 mt (Figure 6.1.1) over the past 10–15 years, although the troll catches in recent years (4,733 mt for 2020 and 4,037 mt for 2021) were the highest since 2004. The provisional **WCP–CA albacore catch** for 2021 (81,416 mt) was the lowest catch since 1993 and around 66,000 mt lower than the record (148,051 mt in 2002). The **WCP–CA** albacore catch (which includes catches from fisheries in the North Pacific Ocean west of 150°W) typically contributes around 80%–90% of the Pacific catch of albacore (provisional Pacific Ocean albacore tuna catch for 2021 is 91,405 mt).

The longline catch of albacore is distributed over a large area of the south Pacific (Figure 8.4.2) but concentrated in the west. The Chinese-Taipei distant-water longline fleet catch is taken in all regions, while the Pacific Island domestic longline fleet catch is restricted to the latitudes 10°–25°S. Troll catches are distributed in New Zealand's coastal waters, mainly off the South Island, and along the Sub-tropical Convergent Zone (SCTZ)**.** Less than 20% of the overall south Pacific albacore catch is usually taken east of 150°W.

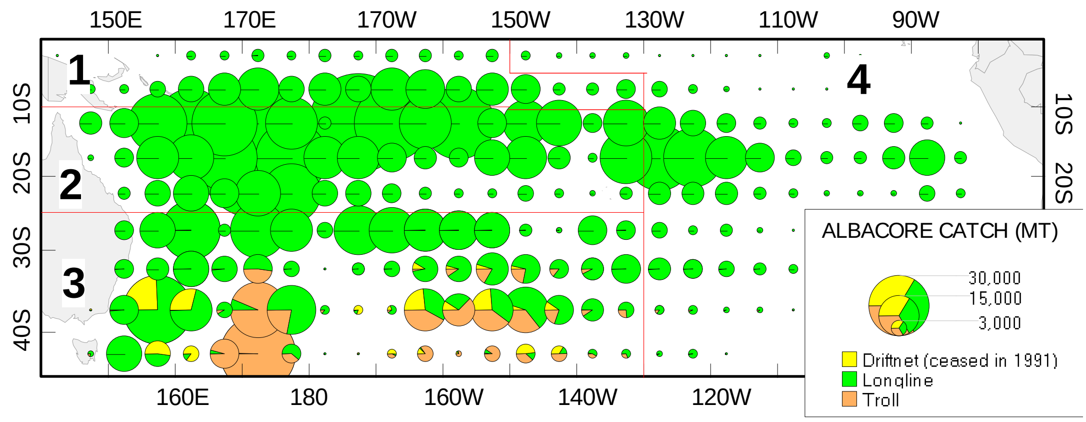

Figure 8.4.2 Distribution of South Pacific albacore tuna catch, 1988–2021.
The four-region spatial stratification used in stock assessment is shown.

The longline fishery takes adult albacore in the narrow size range of 90–105 cm and the troll fishery take juvenile fish in the range of 45–80cm (Figure 8.4.3 and Figure 8.4.4). Juvenile albacore also appears in the longline catch from time to time (e.g. fish in the range 60–70 cm sampled from the longline catch). The size distribution in the south Pacific albacore catch for recent years shows a clear mode of small albacore around 60cm from the troll fishery and slightly larger fish than for recent years in the longline fishery.

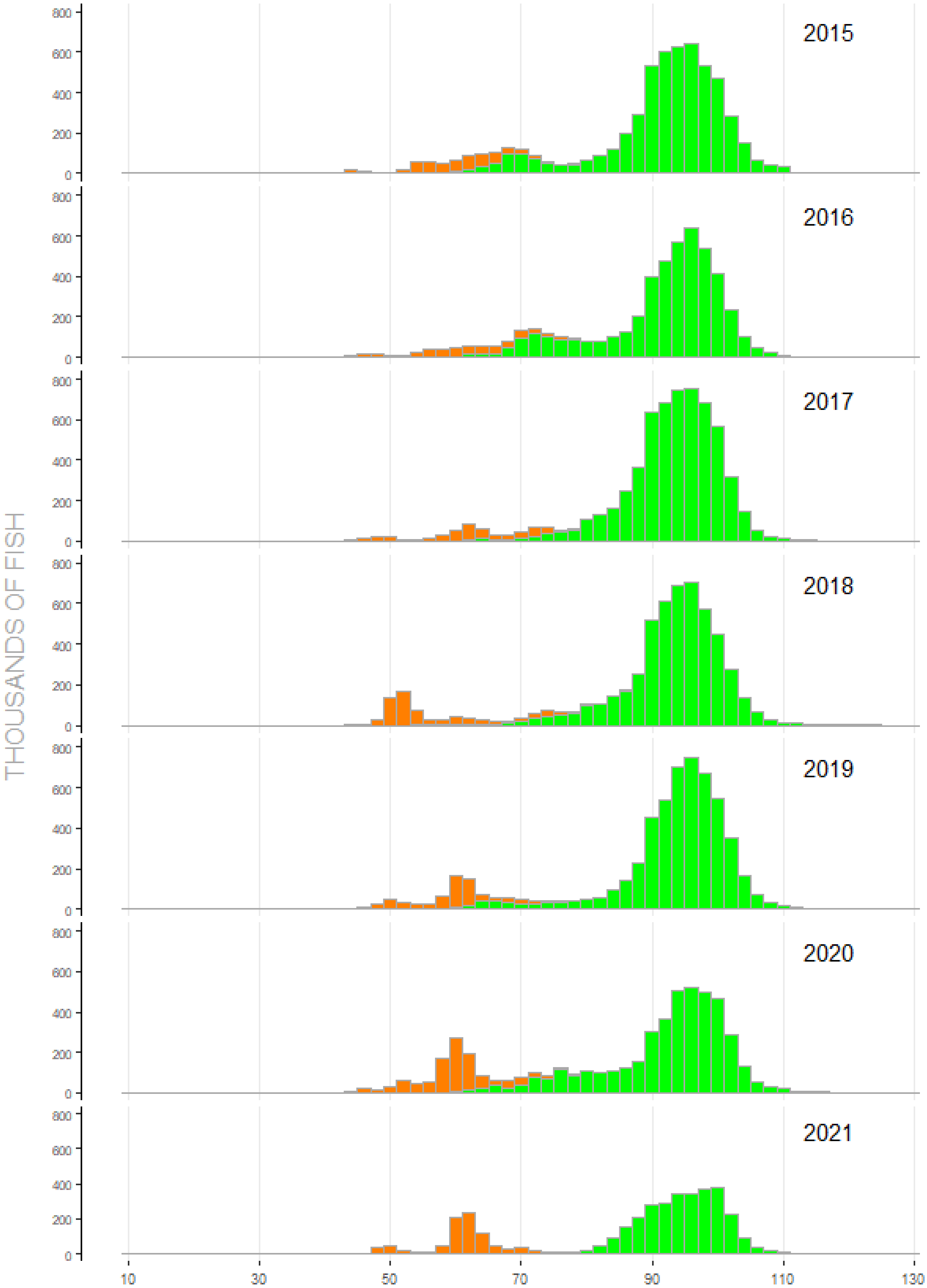

Figure 8.4.3 Annual catches (no. of fish) of albacore tuna in the South Pacific Ocean by size (2cm intervals) and gear type, 2015–2021. **(green–longline; orange–troll)**

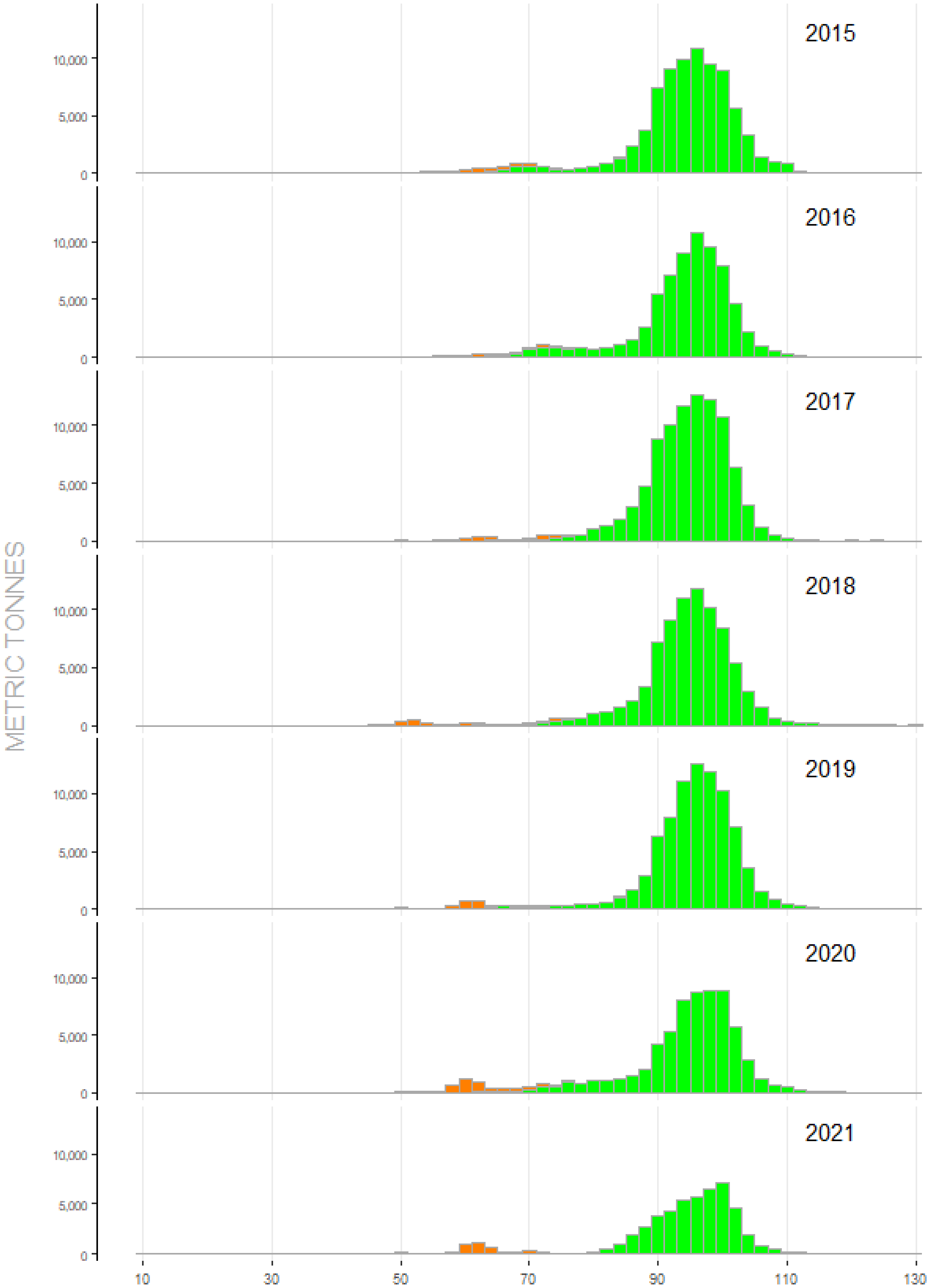

Figure 8.4.4 Annual catches (MT) of albacore tuna in the South Pacific Ocean by size (2cm intervals) and gear type, 2015–2021. **(green–longline; orange–troll);**

8.5 SOUTH PACIFIC SWORDFISH

The distant-water Asian fleets (Japan, Chinese Taipei and Korea) accounted for most of the south Pacific swordfish catch from 1972 to the mid-1990s (Figure 8.5.1), with catches slowly increasing from 2,500 mt to about 5,000 mt. The development of target (domestic) fisheries in Australia and New Zealand accounted for most of the increase in total catch to around 10,000 mt in early 2000s, with burgeoning Pacific Island domestic fleets also contributing. The EU-Spanish longline fleet targeting swordfish (which account for most of the OTHER category in Figure 8.5.1) entered the fishery in 2004 and resulted in total swordfish catches increasing significantly to a new level of around 15,000 mt, and then to more than 20,000 mt over the period 2011-2018, with contributions from the distant-water Asian fleet catches. The provisional **2021 catch estimate for the South Pacific swordfish** (16,609 mt) was a slight decline on the 2020 catch and clearly lower than the record 2015 catch, mainly due to a reduction in distant-water Asian fleet catches (although 2021 estimates for some fleets were provisional at the time of writing this paper).

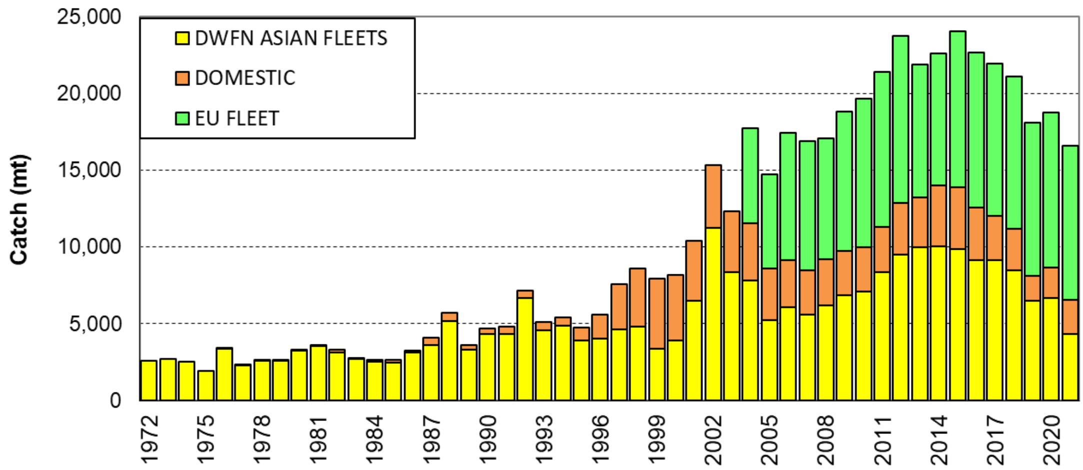

Figure 8.5.1 South Pacific longline swordfish catch (mt) by fleet

The catch of **swordfish for the WCP-CA south of the equator** (Figure 8.5.2) in 2021 was 5,855 mt, a similar level to recent years but a clear decline of annual catches since 2012 in each category of fleet, and the lowest since the late 1990s. As with other WCPFC fisheries, the impacts or COVID-19 were one of the reasons contributing to this decline, although the EU-Spanish fleet catch in 2021 (1,813 mt) was the highest since 2016.

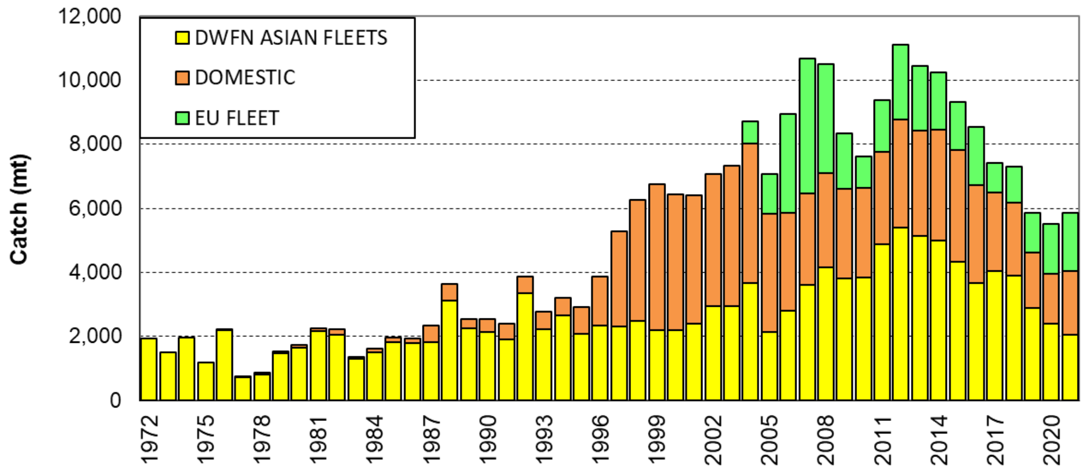

Figure 8.5.2 WCP–CA (south of equator) longline swordfish catch (mt) by fleet

The longline catch of swordfish is distributed over a large area of the south Pacific (Figures 8.5.3 and A10). There are four main areas of catches (i) the far eastern Pacific Ocean off Chile and Peru, where most of the EU-Spanish fleet catch comes from but also some of the distant-water Asian catches; (ii) the south central Pacific Ocean region south of the Cook Islands and French Polynesia, predominantly covered by the EU-Spanish fleet; (iii) the coastal waters of New Zealand, Australia and adjacent Pacific Island countries (domestic fleets); and (iii) the equatorial Pacific Ocean between 130–160°W, covered by the distant-water Asian fleets.

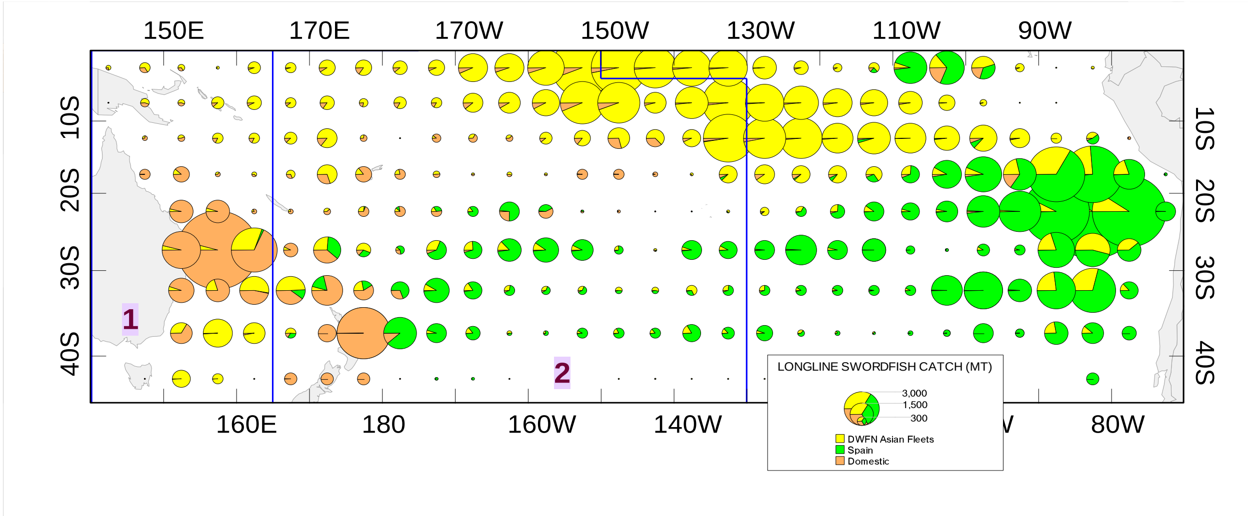

Figure 8.5.3 Distribution of South Pacific longline swordfish catch, 1995–2021.

The swordfish caught throughout the South Pacific Ocean are generally in the range of 110–250 cm, with a mean around 180 cm (lower jaw-fork length – Figures 8.5.4 and 8.5.5). There is evidence of inter-annual variation in the size of swordfish taken by fleet and variation in the size of fish by fleet, for example, the EU-Spanish fleet generally catch larger swordfish than the distant-water Asian fleets, which could be related to area fished. Note the two modes of fish at around 140 cm and 180 cm in the 2019 size data (Figure 8.5.4). There were no size data collected for the EU-Spanish longline fleet during 2020 and 2021 due to the impact of COVID-19 restrictions.

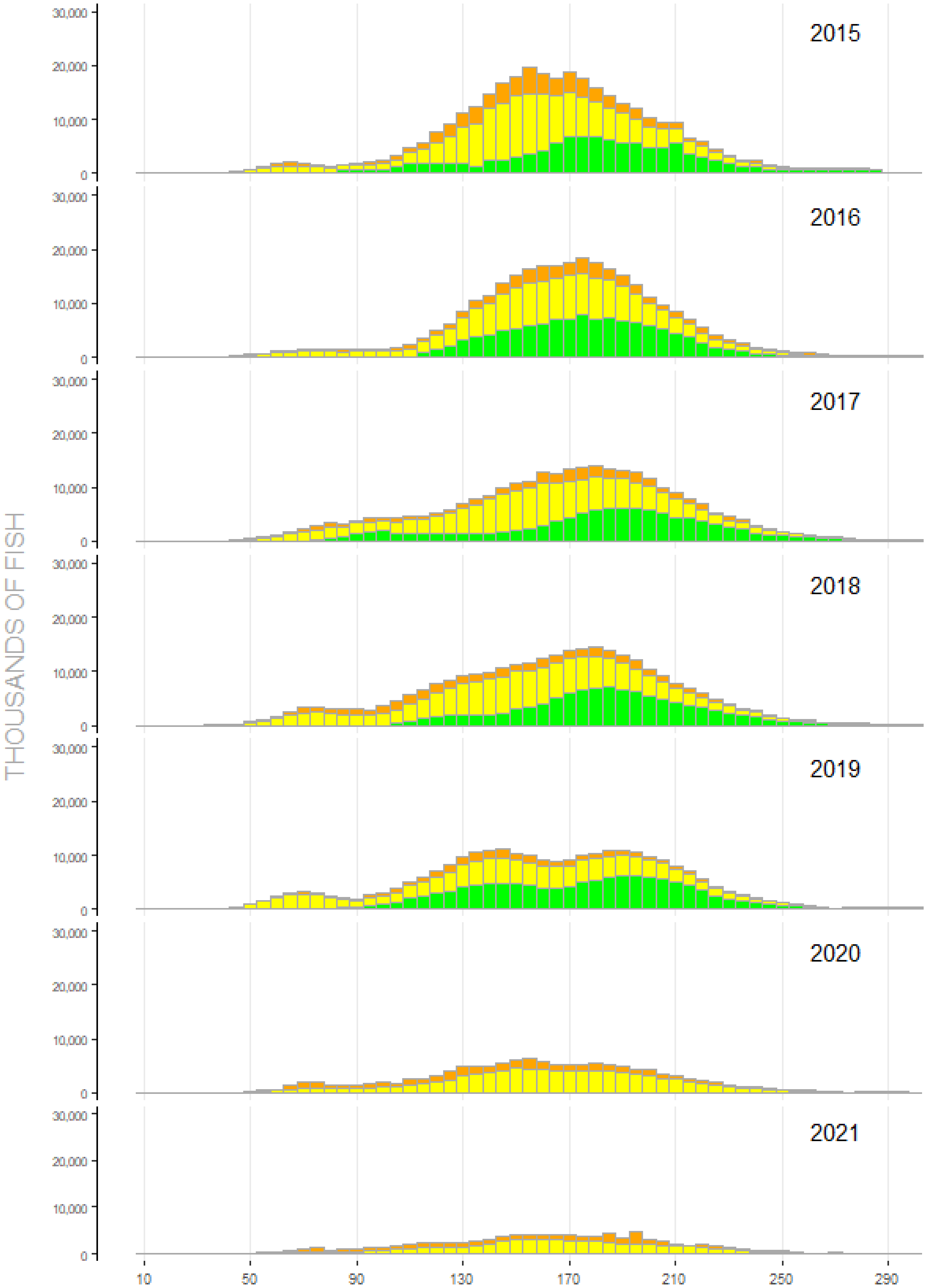

Figure 8.5.4 Annual catches (number of fish) of swordfish in the WCP–CA (south of the equator) by size (5cm intervals) and fleet, 2015–2021. **(green–EU-Spanish fleet catch; yellow–distant-water Asian fleet catch; orange– Domestic fleets) 2020-2021 data for EU-Spanish longline fleet are not available.**

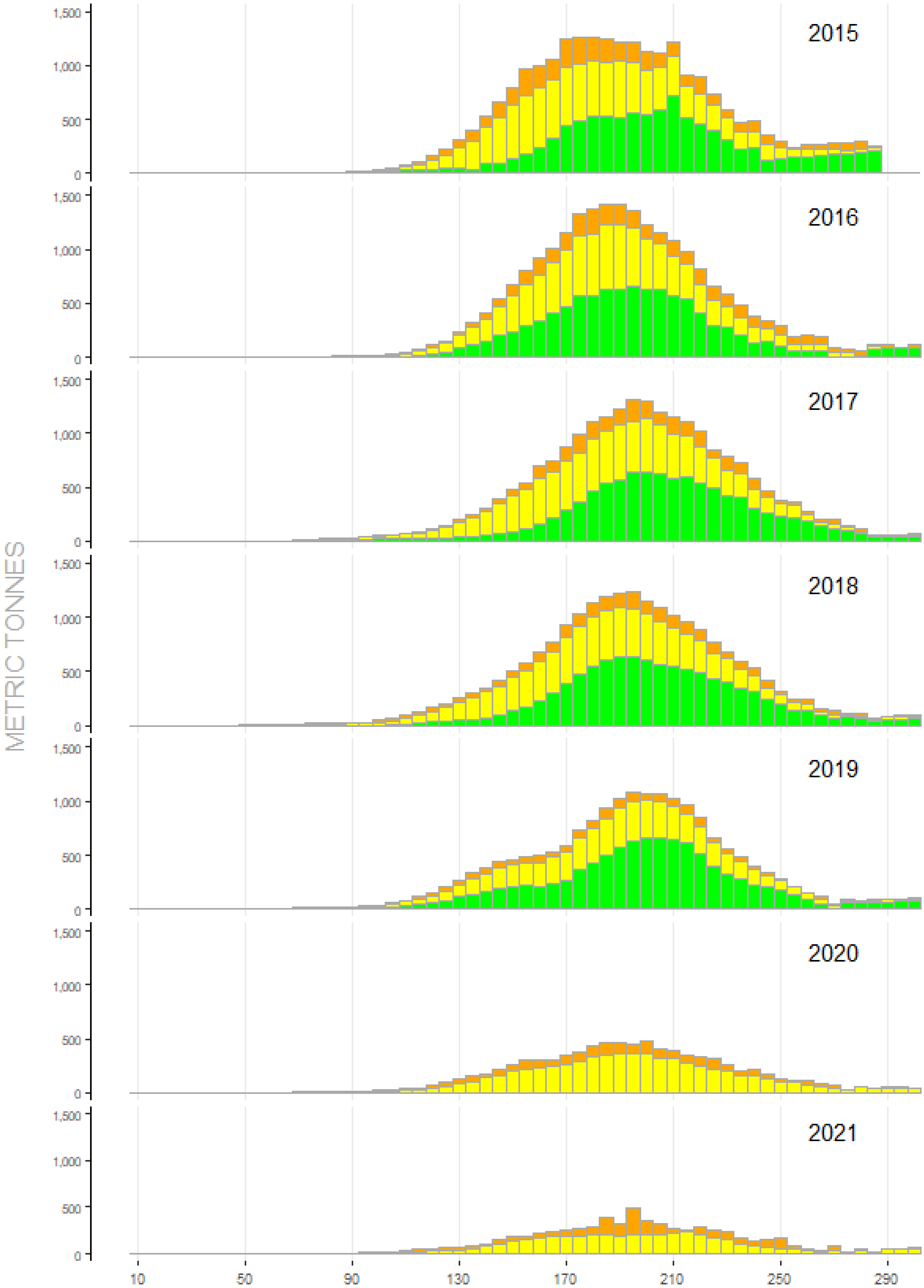

Figure 8.5.5 Annual catches (metric tonnes) of swordfish in the WCP–CA (south of the equator) by size (5cm intervals) and fleet, 2015–2021. **(green–EU-Spanish fleet catch; yellow–distant-water Asian fleet catch; orange–Domestic fleets) 2020-2021 data for EU-Spanish longline fleet are not available.**

8.6 OTHER BILLFISH

8.6.1 Blue Marlin

Blue marlin are mainly taken by the longline gear in the tropical WCP-CA with relatively small amounts also taken by purse seine, troll, handline and a range of other small-scale gears (e.g. gillnet). WCP-CA catches of blue marlin have ranged from around 8,000–25,000 mt since the 1970s although there remains some uncertainty around some of the estimates by fleet and gear. The provisional **WCP-CA blue marlin catch** (11,088 mt) for 2021 is a further decline from recent years and the lowest since the 1980s (Figure 8.6.1). Figure 8.6.2 shows the distribution of longline-caught blue marlin highlighting that they are more prevalent in the western tropical waters of the WCP–CA (complete aggregate data stratified by area are not available for the other gears at this stage). The decline in the catch for 2020 and 2021 may be related to the general decline in the longline catch in the areas where blue marlin are usually taken, due to the impacts of COVID-19.

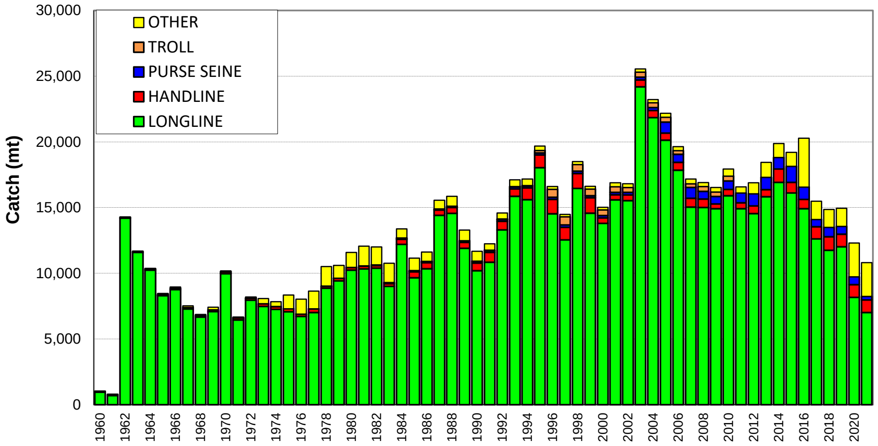

Figure 8.6.1 WCP–CA blue marlin catch (mt) by gear

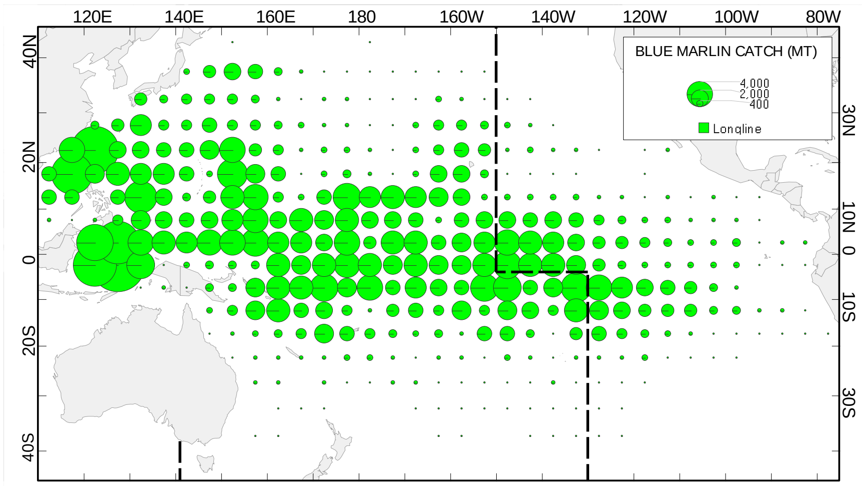

Figure 8.6.2 Distribution of longline Blue marlin catch in the Pacific Ocean, 1990–2021.

8.6.2 Black Marlin

Black marlin are mainly taken by the longline gear in the tropical WCP-CA but also catches by purse seine, handline and a range of other small-scale gears (e.g. gillnet). WCP-CA catches of black marlin have ranged from around 1,300–3,800 mt since the early 1970s (when catches were at their highest), although there remains some uncertainty around some of the estimates by fleet and gear. The provisional **WCP-CA black marlin catch** (3,291 mt) for 2021 was an increase to catches in recent years, but clearly higher than the recent ten-year average (Figure 8.6.3). The recent increase in catches have come from several south-east Asian fisheries (including domestic purse seine) and further review is required. Figure 8.6.4 shows the distribution of longline-caught black marlin highlighting that their distribution does not extend to the eastern areas as much as blue marlin and they are clearly more prevalent in the western tropical waters of the WCP–CA, and to a lesser extent in the waters of PNG, Solomon Islands, New Caledonia and north-east Australia. Complete aggregate data stratified by area are not available for the other gears at this stage, but black marlin catches by Indonesia and Philippines handline and Vietnam gillnet overlap the main areas of the longline catch for this species.

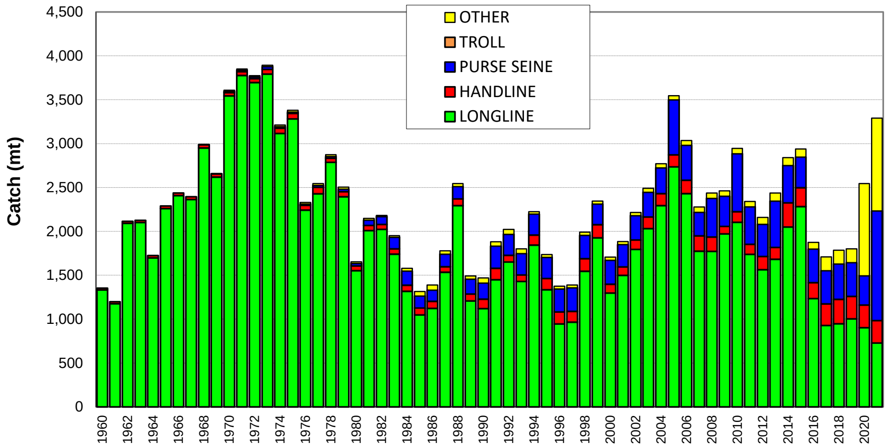

Figure 8.6.3 WCP–CA black marlin catch (mt) by gear

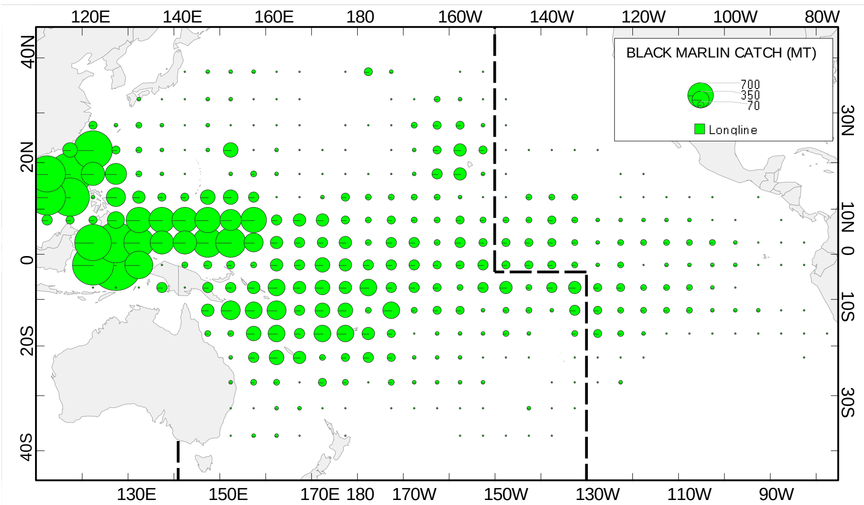

Figure 8.6.4 Distribution of longline Black marlin catch in the Pacific Ocean, 1990–2021.

8.6.3 Striped Marlin

Striped marlin are mainly taken by the longline gear in the sub-tropical areas of the WCP-CA with minor catches by other gears, principally several gillnet fisheries. WCP-CA annual catches of striped marlin often exceeded 8,000 mt prior to 1990, with the gillnet fishery catch comprising a significant proportion of this catch during the 1970s. Since 2000, catches have been generally below 6,000 mt., although there remains some uncertainty around the availability and quality of estimates for some fleets and gears. Species identification is also acknowledged to be an issue in some fisheries. **WCP-CA striped marlin catch** (3,544 mt) for 2021 was similar to catches in recent years, and around the level of the recent ten-year average (Figure 8.6.5). Figure 8.6.6 shows the distribution of longline-caught striped marlin, with catches concentrated in the waters off the east coast of Japan, the Coral and Tasman Seas between eastern Australia, New Caledonia and New Zealand, and in the eastern areas, in and around Hawaii and French Polynesia. Complete aggregate data stratified by area are not available for the other gears at this stage.

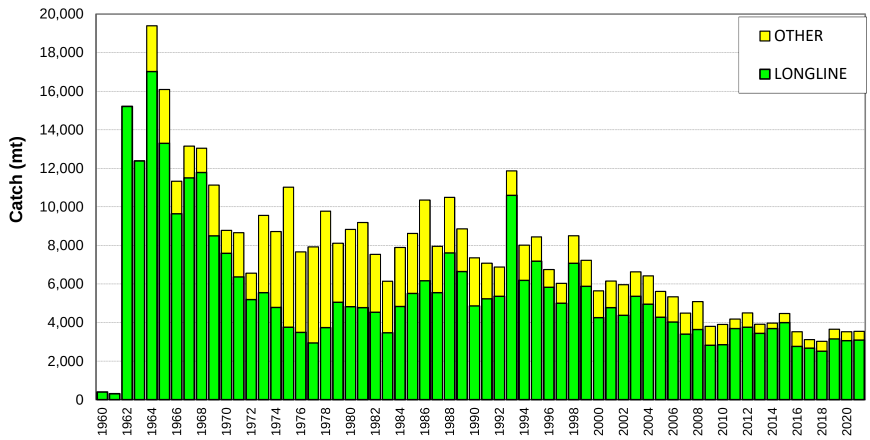

Figure 8.6.5 WCP–CA striped marlin catch (mt) by gear

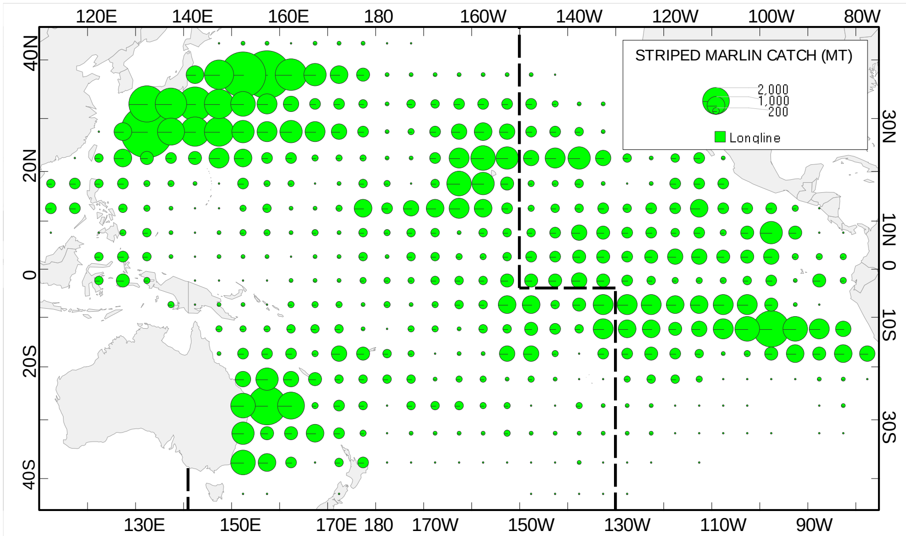

Figure 8.6.6 Distribution of longline Striped marlin catch in the Pacific Ocean, 1990–2021.

8.6.4 North Pacific Swordfish

Swordfish are mainly taken by the longline gear in the north Pacific Ocean with minor catches by other gears, including gillnet fisheries. Annual catches of north Pacific swordfish have generally exceeded 10,000 mt since 1972 (Figure 8.6.7). In recent years, the catches have been amongst the highest recorded (after the record catch in 1993), although there remains some uncertainty around the availability and quality of estimates for some fleets and gears, and these estimates have yet to be reconciled with estimates from the ISC[11] and the IATTC[12]. The provisional **North Pacific swordfish catch** (9,613 mt) for 2021 was a clear decline on catches in recent years and the lowest since the 1980s (Figure 8.6.7). As with the catches of other species, the decline in the North Pacific swordfish catch for 2021 may be related to the general decline in the longline catch in the areas where swordfish are usually taken due to the impacts of COVID-19.

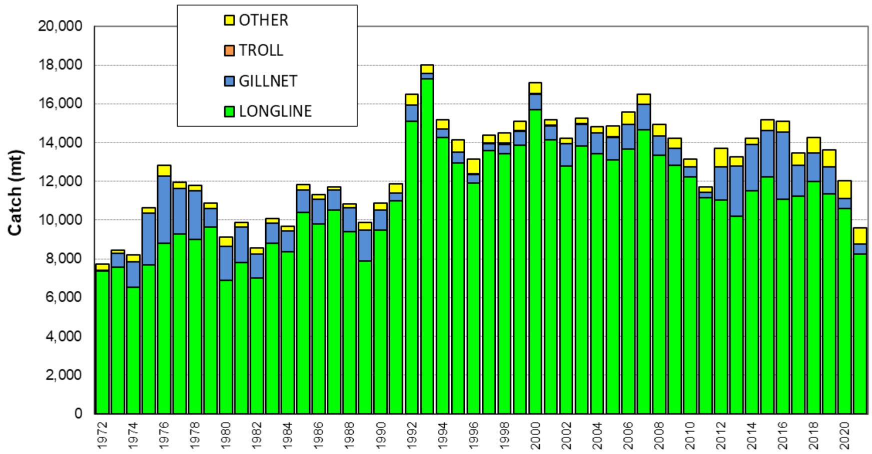

Figure 8.6.7 North Pacific Swordfish catch (mt) by gear

Figure 8.6.8 shows the distribution of longline-caught swordfish in the Pacific Ocean, with catches concentrated across the Pacific Ocean, north of 20°N, including the waters off the east coast of Japan, and adjacent to the Hawaii EEZ. Swordfish catches in the north Pacific Ocean are also prevalent in Indonesia and in the waters bounded by China, Chinese Taipei, Philippines and Vietnam. Complete aggregate data stratified by area are not available for the other gears at this stage.

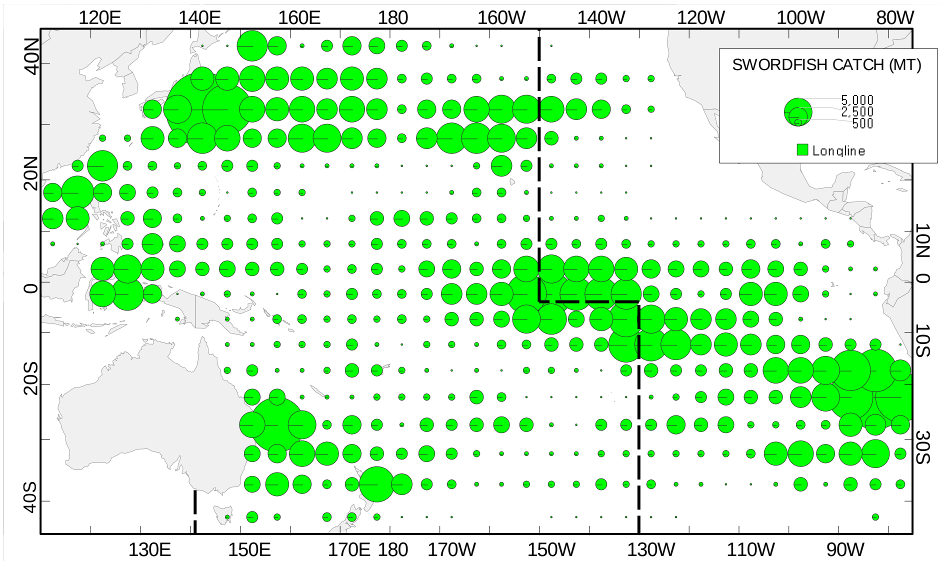

Figure 8.6.8 Distribution of longline swordfish catch in the Pacific Ocean, 1990–2021.

[11] ISC – The International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean

[12] IATTC – Inter-American Tropical Tuna Commission

8.7 NORTH PACIFIC ALBACORE

Albacore tuna are mainly taken by the longline, pole-and-line and troll gears in the north Pacific Ocean, with minor catches by purse seine; albacore tuna was also the target of the driftnet fishery in the 1980s. Annual catches of North Pacific albacore have fluctuated since the 1950s, with peak periods in the 1970s and then again in the late 1990s into the early 2000s (Figure 8.7.1). In recent years, catches have been lower, due to declines in the pole-and-line and longline catches. There remains some uncertainty around the availability and quality of estimates for some fleets and gears, and these estimates have yet to be reconciled with estimates from the ISC and the IATTC. The **North Pacific albacore catches** in the past two years (38,881 mt for 2020 and 39,232 mt for 2021) were clearly the lowest in this time series (Figure 8.7.1) and understood to be partly due to the impact of COVID-19 on several fisheries (noting that these estimates are provisional).

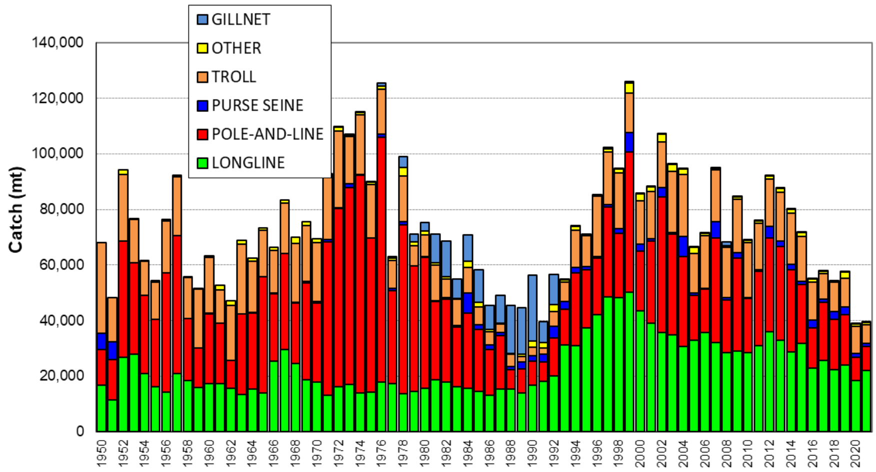

Figure 8.7.1 WCP–CA North Pacific Albacore catch (mt) by gear

8.8 NORTH PACIFIC BLUEFIN

Bluefin tuna are mainly taken by the purse seine gear in the north Pacific Ocean with minor catches from the longline, troll and by other small-scale gears in Japan waters; there have also been significant historic catches from the troll and pole-and-line gears. Annual catches of north Pacific bluefin tuna have fluctuated since the 1970s, with peak periods in the early 1980s and for certain years in the mid-late 1990s and into the first decade of 2000s (Figure 8.8.1). Catches declined in the period 2012–2015 but have increased in recent years. There remains some uncertainty around the availability and quality of estimates for some fleets and gears, and these estimates have yet to be reconciled with estimates from the ISC and the IATTC. The provisional **North Pacific bluefin tuna catch** (10,431 mt) for 2021 was the highest since 2018 and on a similar level to the recent ten-year average (Figure 8.8.1), but clearly lower than the long-term average catch.

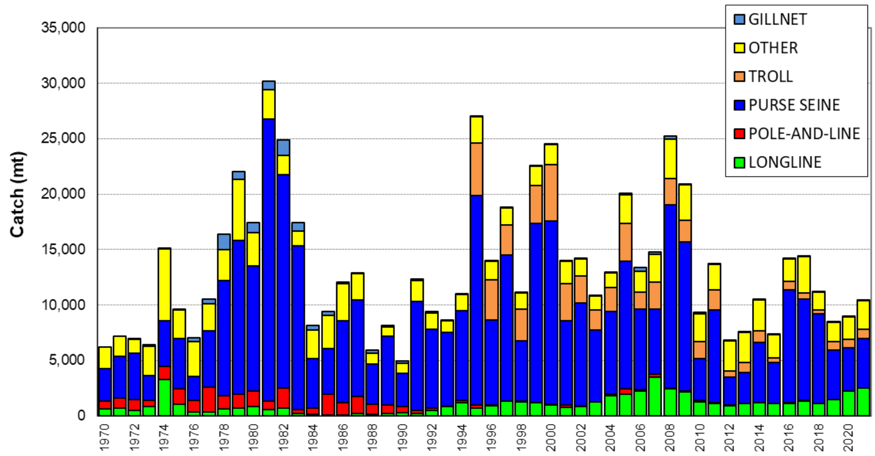

Figure 8.8.1 North Pacific Bluefin catch (mt) by gear

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S. Hare, G. Pilling, P. Williams (2022). A compendium of fisheries indicators for target tuna stocks in the WCPFC Convention Area. Information Paper SA–IP–01. Eighteenth Regular Session of the Scientific Committee of the WCPFC (SC18). Online Meeting, 10–18 August 2022.

APPENDIX - ADDITIONAL INFORMATION

ALL FISHERIES – Additional Information

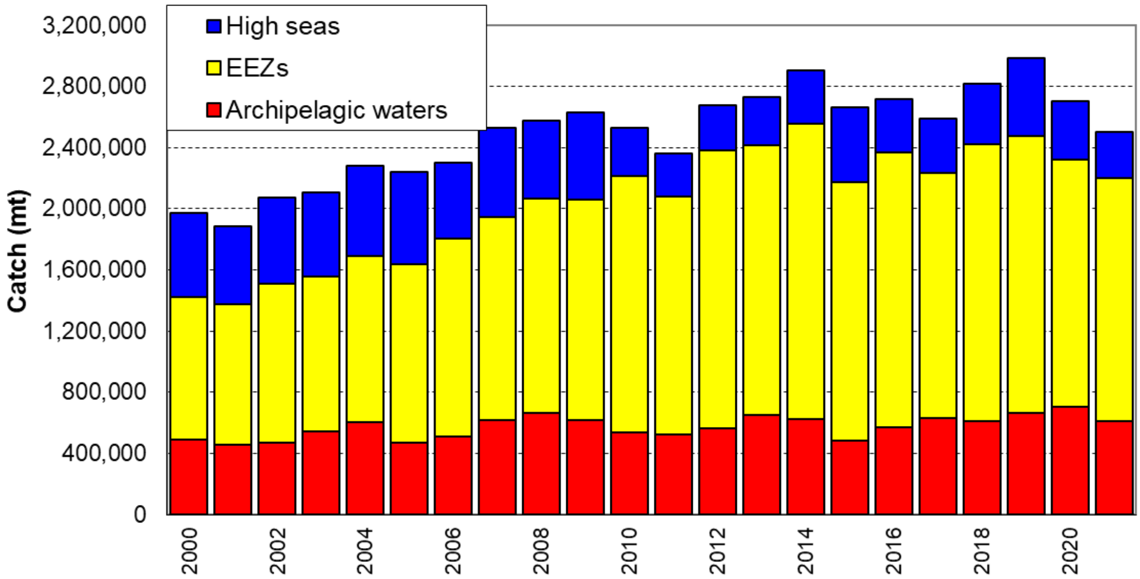

Figure A1. Catch estimates (mt) of the tropical tuna species (albacore, bigeye, skipjack and yellowfin) in the WCP–CA, by archipelagic waters (AWs), national waters (EEZs, excluded AWs) and the high seas for all gear types combined.

PURSE SEINE FISHERY – Additional Information

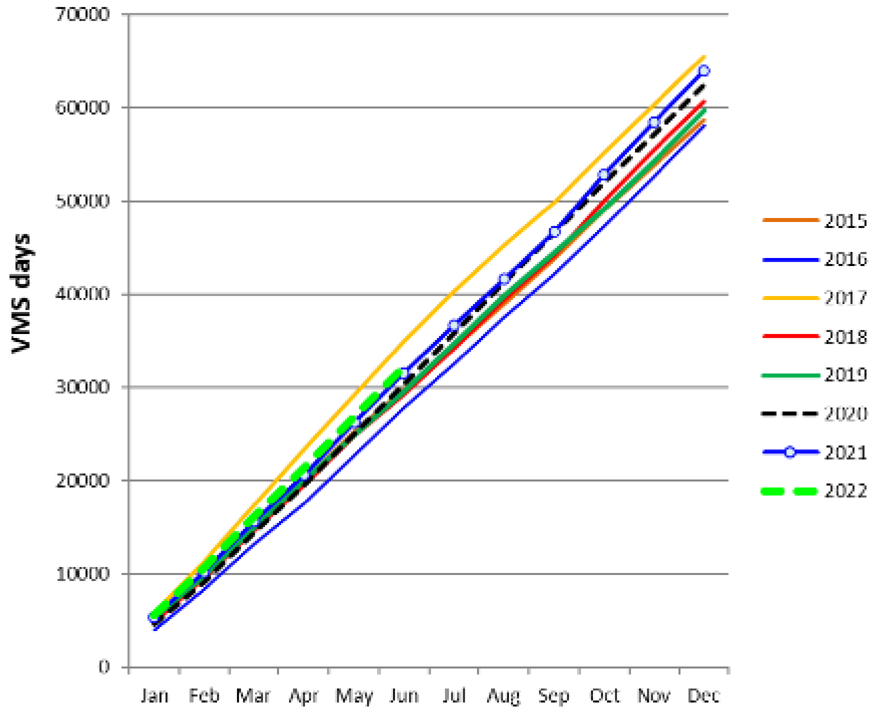

Figure A2. Cumulative tropical purse seine effort by month, 2009-2022, as measured by VMS
(excludes days in port and an estimation of days in transit)

LONGLINE FISHERY – Additional Information

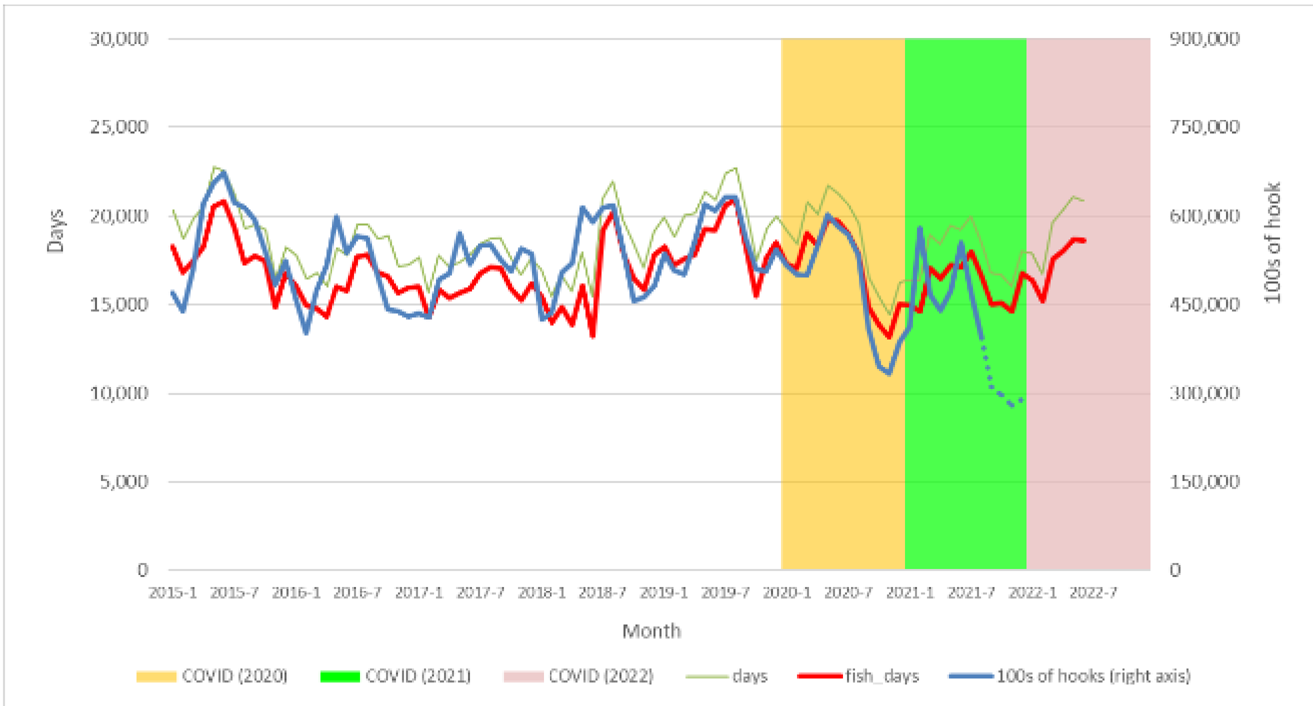

Figure A3. Monthly WCPFC longline fishery effort (VMS fishing days and 100s of Hooks, 2015-2022

(WCPFC Area; Longline Fishery Effort only considers VMS and logbook effort data for the main domestic, domestic-based foreign and distant-water fleets where VMS data with high coverage are available consistently over recent years)

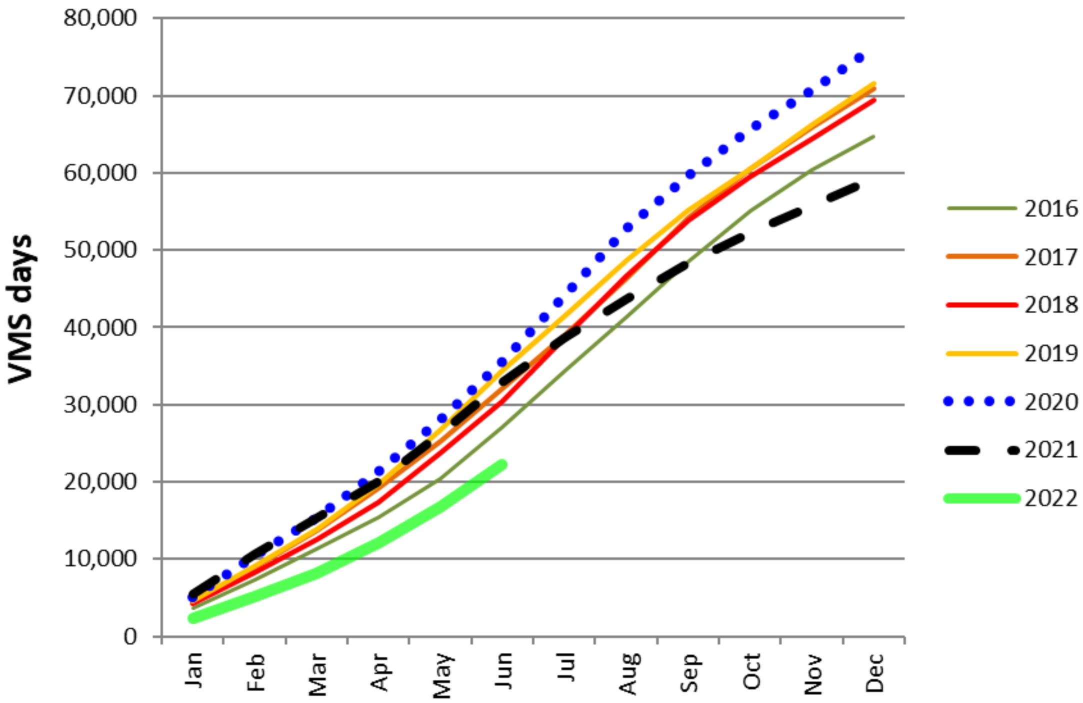

Figure A4. Cumulative South Pacific Albacore longline fishery effort by month, 2016-2022, as measured by VMS
(WCPFC Area south of 10°S; VMS estimated fishing days; only includes VMS data for the main domestic, domestic-based foreign and distant-water fleets where VMS data have been provided with high coverage consistently over recent years)

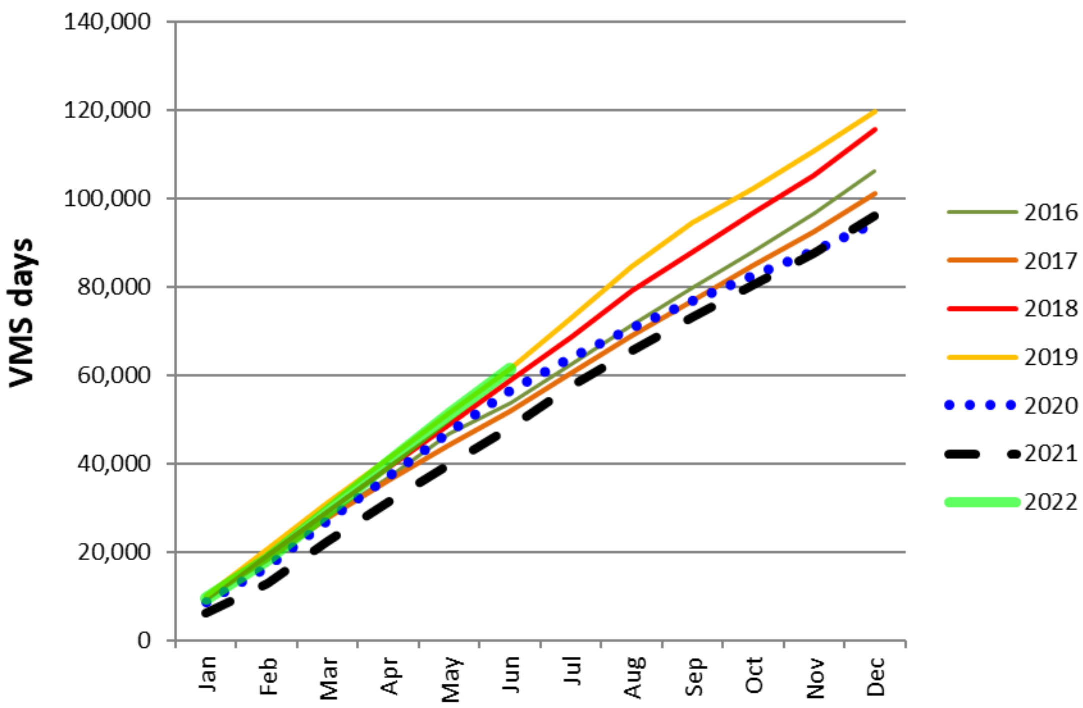

Figure A5. Cumulative Tropical longline fishery effort by month, 2016-2022, as measured by VMS
(WCPFC Area 20°N–10°S, 130°E–150°W; VMS estimated fishing days; only includes VMS data for the main domestic, domestic-based foreign and distant-water fleets where VMS data have been provided with high coverage consistently over recent years)