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OVERVIEW OF TUNA FISHERIES IN THE WESTERN AND CENTRAL PACIFIC OCEAN, INCLUDING ECONOMIC CONDITIONS – 2019

WCPFC-SC16-2020/GN IP-1 rev 3

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Revision 1
- Added Figure A11 in the APPENDIX in response to a WCPFC16 request from EU and PNA to include a graph showing the breakdown of catches by national waters and high seas.

Revision 2
- Updated Figure A1 to include the most recent 2020 VMS data.
- Added Figure A12 in the APPENDIX in response to a request from the SC16 online forum for cumulative South Pacific Albacore longline fishery effort by month, 2016-2020 (as measured by VMS)
- Slight modifications made in the Purse seine economics section (3.8.1 Prices – Yellowfin)

Revision 3
- A further updated to Figure A1 after resolving a gap in VMS data for late May/early June 2020

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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 (2019) and covering the most recent summary of catch estimates by gear and species.

The provisional total WCP–CA tuna catch for 2019 was estimated at **2,961,059 mt**, the highest on record, at around 76,000 mt higher than the previous record catch in 2014 (2,885,042 mt). The WCP–CA tuna catch (2,961,059 mt) for 2019 represented 81% of the total Pacific Ocean tuna catch of 3,656,813 mt, and 55% of the global tuna catch (the provisional estimate for 2019 is 5,403,368 mt), both of which are records.

The **2019 WCP–CA skipjack catch of 2,034,230 mt** was a record and around 45,000 mt higher than the previous record in 2014 (1,978,927 mt). The **2019 yellowfin catch (669,362 mt)** was the third highest on record, at around 44,000 mt less than the previous record in 2017. The high catches are related to some extent to recent high catch levels from the "other" category (primarily small-scale fisheries in Indonesia). The provisional **WCP-CA bigeye catch (135,680 mt)** for 2019 was lower than the recent ten-year average and amongst the lowest over the past two decades. The **2019 WCP–CA albacore catch** (**121,787 mt**) was higher than the 2018 catch and similar to the recent ten-year average, but remained around 26,000 mt lower than the record catch in 2002 of 147,793 mt. The **south Pacific albacore catch in 2019 (86,706 mt)**, was amongst the highest for this fishery, with the record catch taken in 2017 (93,415 mt).

The provisional **2019 purse-seine catch of 2,060,412 mt** was the highest on record, but only 1,000 mt higher than the previous record in 2014 (2,059,006 mt). The 2019 purse-seine skipjack catch (1,641,920 mt) was the highest on record, 32,000 mt higher than the previous record in 2014 (1,609,784 mt). The proportion of skipjack tuna (80%) in the 2019 purse seine tuna catch is the highest since the fishery was established in the 1960s. The 2019 purse-seine catch for yellowfin tuna (364,571 mt; 18%) was over 130,000 mt lower than the record catch in 2017 (498,822 mt) but still amongst the highest annual catches for this fishery. The provisional catch estimate for bigeye tuna for 2019 (50,819 mt) was the lowest since 2003, and the proportion of bigeye tuna (2%) represented in the purse seine tuna catch, the lowest since 1980. The relatively low bigeye tuna catch in 2019 appears to be related to both (i) a lower proportion of associated sets in 2019, and (ii) a lower proportion of bigeye tuna in the associated-set tuna species composition in 2019.

The provisional **2019 pole-and-line catch (183,193 mt)** was lower than the 2018 catch (231,155 mt) and amongst the lowest annual catches since the mid-1960s, due to reduced catches in both the Japanese and the Indonesian fisheries.

The provisional **WCP–CA longline catch (273,550 mt)** for 2019 was at the average level for the past five years. The WCP–CA albacore longline catch (95,280 mt, 35% of total catch) for 2019 was slightly higher than the recent ten-year average, and only 6,000 mt lower than the record of 101,820 mt attained in 2010. The provisional bigeye catch (68,371 mt, 25% of total catch) for 2019 was slightly lower than the recent ten-year average, and well down on the bigeye catch levels experienced in the 2000s (e.g. the 2004 longline bigeye catch was 99,705 mt). The yellowfin catch for 2019 (104,440 mt, 38% of total catch) was the highest catch since 1980 (which was a record for this fishery at 125,113 mt).

The **2019 South Pacific troll albacore catch (3,425 mt)** was the highest catch since 2008 (3,502 mt). The New Zealand troll fleet (144 vessels catching 2,272 mt in 2019) and the United States troll fleet (16 vessels catching 475 mt in 2019) accounted for all of the 2019 albacore troll catch.

Market prices in 2019 were mixed with prices for purse seine caught product declining for the second consecutive year with, for example, Thai imports averaging $1,399/mt over 2019 down 15% from 2018

levels which were 8% lower than the 2017 average of $1,782/mt. Yaizu prices for pole and line caught skipjack also saw significant declines.

Prices for longline caught yellowfin were mixed with prices for fresh imports into the US and Japan declining while the Japan fresh price at selected ports was marginally higher. Prices for longline caught bigeye in 2019 declined across the selected markets. Thai imports prices for albacore continue to increase to reach a record level of $3,960/mt in 2019. Albacore prices in 2020 have come of their recent highs but remained at relatively high levels with Thai imports averaging $3,744/mt during May.

The total estimated delivered value of the tuna catch in the WCP-CA declined by 7% to $5.8 billion in 2019. The value of the purse seine catch declined 6% to $3.02 billion and accounted for 52% of the total value of the tuna catch. The value of the longline fishery decreased 7% to $1.61 billion accounting for 28% of the total value of the tuna catch. The value of the pole and line catch declined 21% to $390 million as catch declined the same amount following a 35% increase in 2018 while with the value of the catch by other gears decline marginal marginally to $740 million. The 2019 WCP–CA skipjack catch was valued at $2.93 billion, the yellowfin catch at $1.7 billion, the bigeye catch at $692 million, and the albacore catch increased to $438 million its highest level since 2012.

Economic conditions in 2019 in the purse seine, tropical longline and southern longline fisheries of the WCP-CA showed mixed results. The tropical purse seine fishery, despite falls in prices, saw the continuation of good economic conditions as fuel prices declined and catch rates continued to increase. In the southern longline fishery after a recent improvements economic conditions have again deteriorated, as catch rates decline, despite relatively high fish prices and average costs. Economic conditions for the tropical longline fishery continue to remain below the 20-year average with CPUE and fish prices below their 20-year averages.

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 – 2019. The review draws on the latest catch estimates compiled for the WCP–CA, found in Information Paper WCPFC–SC16-ST IP–1 *(Estimates of annual catches in the WCPFC Statistical Area – OFP, 2020)*. Where relevant, comparisons with previous years' activities have been included, although data for 2019, for some fisheries, are provisional at this stage.

This paper includes sections covering each target tuna species, 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 makes some observations on recent developments in each fishery, with emphasis on 2019 catches relative to those of recent years, but refers readers to the SC16 National Fisheries Reports, which offer more detail on recent activities at the fleet level.

Additional tabular and graphical information that provide more information related to the recent condition of the fishery and certain WCPFC Conservation and Management Measures (CCMs) have been provided in an APPENDIX.

This overview now attempts to include 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.

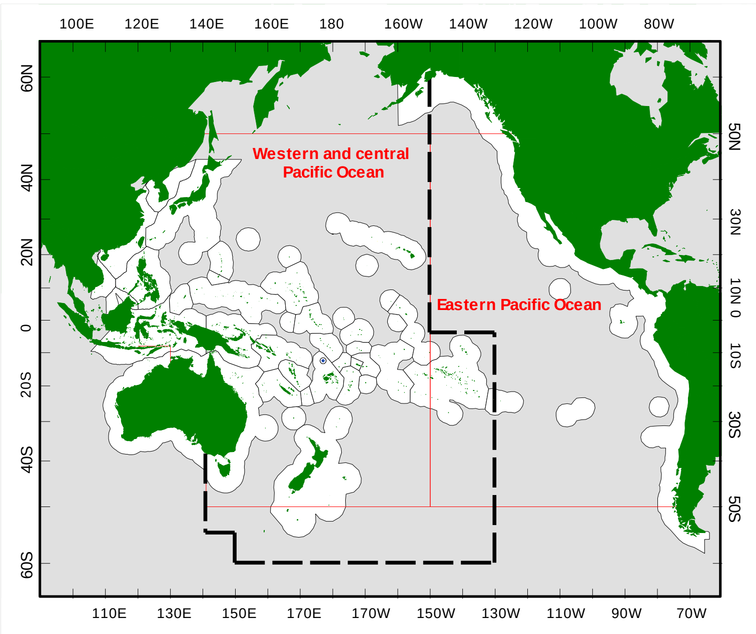

Figure 1.1 The western and central Pacific Ocean (WCPO), the eastern Pacific Ocean (EPO) and the WCPFC Convention Area (WCP–CA in dashed lines)

2. TOTAL TUNA CATCH AND CATCH VALUE FOR 2019

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 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, before returning to record levels in successive years over the period 2012–2014. Catches in the period 2015–2017 were lower than 2014, but have since increased again (Figure 2.1 and Figure 2.2).

The provisional total WCP–CA tuna catch for 2019 was estimated at **2,961,059 mt**, the highest on record, at around 76,000 mt higher than the previous record catch in 2014 (2,885,042 mt). For 2019, the **purse seine fishery** accounted for a catch of **2,060,412 mt** (70% of the total catch), with **pole-and-line** taking an estimated **183,193 mt** (6%), the **longline fishery** an estimated **273,550 mt** (9%), and the remainder (15%) taken by troll gear and a variety of artisanal gears, mostly in eastern Indonesia and the Philippines. The WCP–CA tuna catch (2,961,059 mt) for 2019 represented 81% of the total Pacific Ocean tuna catch of 3,656,813 mt, and 55% of the global tuna catch (the provisional estimate for 2019 is 5,403,368 mt), both of which are records.

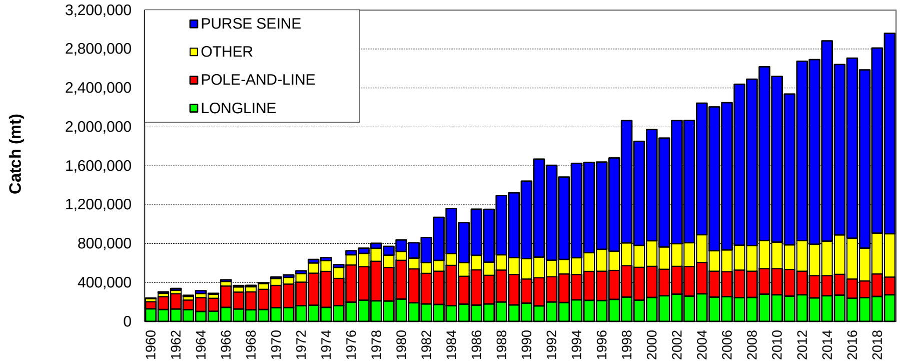

Figure 2.1 Catch (mt) of albacore, bigeye, skipjack and yellowfin in the WCP–CA, by longline, pole-and-line, purse seine and other gear types

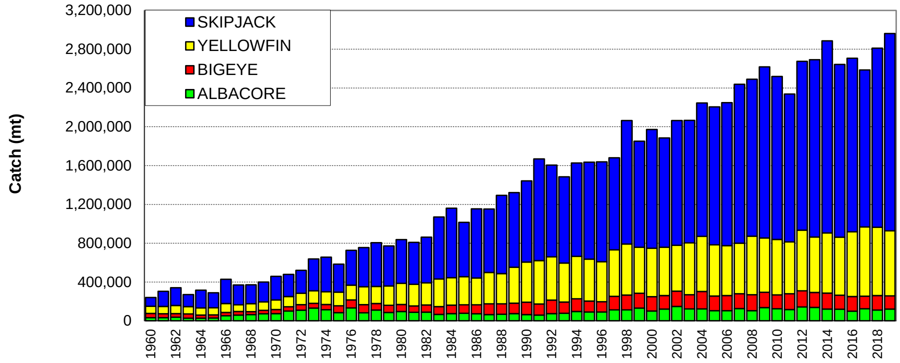

Figure 2.2 Catch (mt) of albacore, bigeye, skipjack and yellowfin in the WCP–CA.

The **2019 WCP–CA catch of skipjack** (**2,034,230 mt** – 69% of the total catch) was a record at around 45,000 mt more than record in 2014 (1,978,927 mt). The **WCP–CA yellowfin catch** for 2019 (**669,262 mt** – 23%) was the third highest recorded (44,000 mt lower than the record catch of 2017); the past four years have been the highest annual yellowfin catches. The **WCP–CA bigeye catch** for 2019 (**135,680** mt – 5%) was amongst the lowest for the past 20 years. The **2019 WCP–CA albacore**[1] **catch** (**121,787 mt** – 4%) was higher than the 2018 catch and similar to the recent ten-year average, but remained around 26,000 mt lower than the record catch in 2002 of 147,793 mt.

[1] includes catches of north and south Pacific albacore in the WCP–CA, which comprised 82% of the total Pacific Ocean albacore catch of 148,350 mt in 2019; the section 8.4 "Summary of Catch by Species – South Pacific Albacore" is concerned only with catches of south Pacific albacore (86,706 mt in 2019), which made up approximately 59% of the Pacific albacore catch in 2019.

In **2019 the value of the provisional total WCP–CA tuna catch was around $5.8 billion**[2] about 7% lower than in 2018. In 2019, the purse seine fishery is valued at about $3.02 billion, 52% of the total value of the tuna catch. The value of the longline fishery in 2019 is estimated to be at $1.61 billion and accounts for 28% of the total value of the tuna catch. The value of the pole and line catch continued to decline to be at $390 million while the catch by other gears was valued at $740 million.

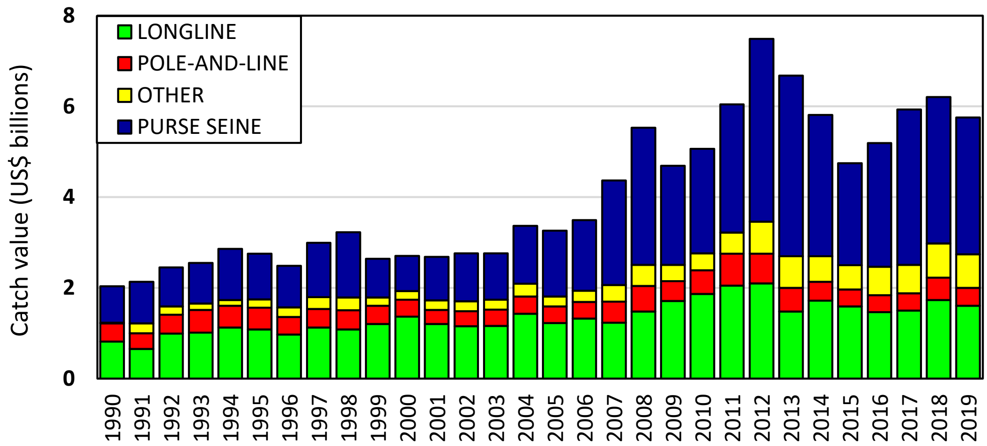

Figure 2.3 Catch value of albacore, bigeye, skipjack and yellowfin in the WCP–CA, by longline, pole-and-line, purse seine and other gear types.

The **value of the 2019 WCP–CA skipjack catch (US$2.93 billion)** was 5% lower than for 2018 and accounted for 51% of the total value of the tuna catch. The **WCP–CA yellowfin catch in 2019 is valued at $1.7 billion,** a decline of 14% from the previous year. The **value of the WCP–CA bigeye catch ($692 million)** was the second highest since 2016 and accounted for 12% of the total value of the tuna catch. The **value of the WCP–CA albacore catch in 2019 rose 22% to $438 million** to be at its highest level since 2012 driven by an 18% increase in prices.

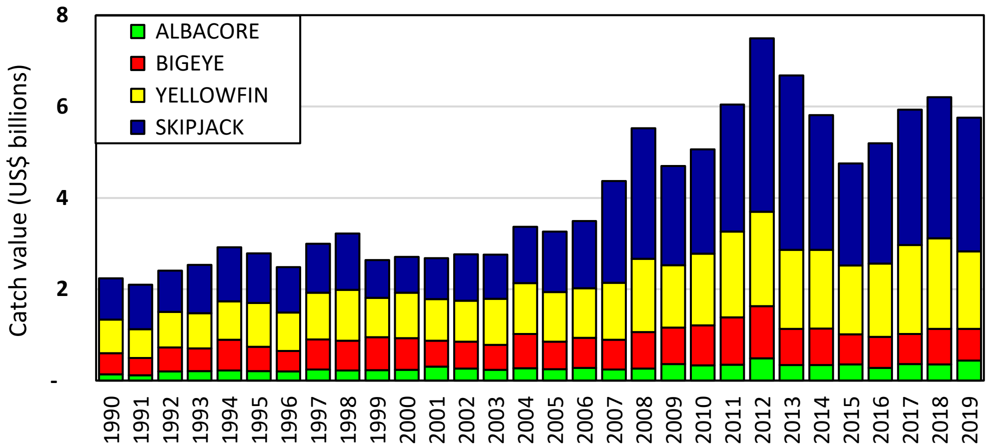

Figure 2.4 Catch value of albacore, bigeye, skipjack and yellowfin in the WCP–CA.

[2] All $ amounts refer to US dollars unless otherwise specified.

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 65% of total tuna catch volume (with more than 2,000,000 mt in 2014). 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 124 vessels in 2019[3]). The Pacific Islands fleets have gradually increased in numbers over the past two decades to a level of 133 vessel in 2019 (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).

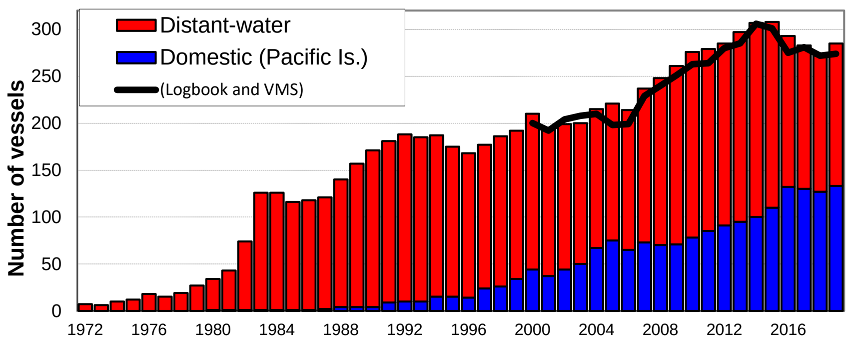

Figure 3.1.1 Number of purse seine vessels operating in the WCP–CA tropical fishery
(excludes Indonesia, Philippine and Vietnam domestic purse-seine/ringnet fleets)

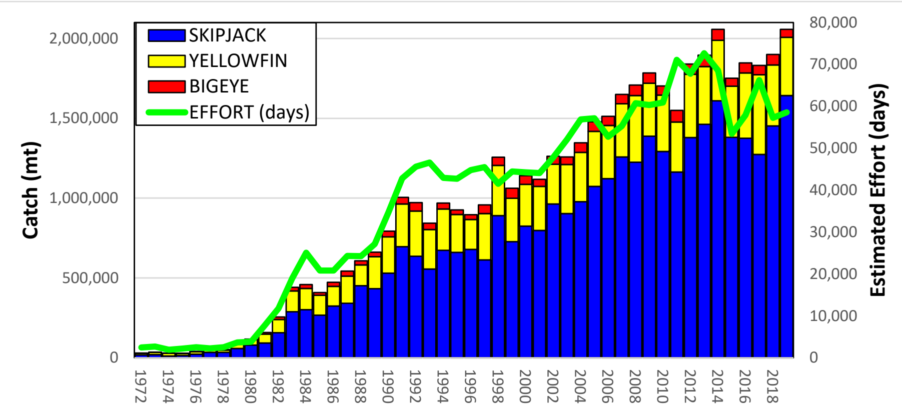

Figure 3.1.2 Purse seine catch (mt) of bigeye, skipjack and yellowfin and fishing effort (days fishing and searching) in the WCP–CA
(**EFFORT**: excludes Indonesia, Philippine and Vietnam domestic purse-seine/ringnet fleets)

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 285 vessels in 2019). Further declines are expected in 2020 with the announcement of a significant reduction in vessels from one component of the US purse seine fleet. Table A3 in the APPENDIX provides data on purse seine vessel numbers, tuna catch and effort by set type and species in the tropical tuna purse seine fishery based on raised logsheet data, with 274 vessels reported as operating in the tropical tuna purse seine fishery in 2019 (according to submitted logbook data).

The WCP–CA purse-seine fishery is essentially a skipjack fishery, unlike those of other 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;

[3] The number of vessels by fleet in 1992 was Japan (38), Korea (36), Chinese-Taipei (45) and USA (44) and in 2019 the number of active vessels by fleet was Japan (36), Korea (27), Chinese Taipei (30) and USA (31). In 2019, there was an additional 36 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 498,000 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 FADs (since mid-late 1990s). Significant bigeye catch years have been 2011 (73,850 mt–record), 2013 (70,963 mt) and 2014 (69,074 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, 2014–2019).

3.2 Provisional catch estimates, fleet size and effort (2019)

The provisional **2019 purse-seine catch of 2,060,412 mt** was the highest on record, but only 1,000 mt higher than the previous record in 2014 (2,059,006 mt). The 2019 purse-seine skipjack catch (1,641,920 mt) was the highest on record, 32,000 mt higher than the previous record in 2014 (1,609,784 mt). The proportion of the skipjack tuna (80%) catch taken by purse seine in 2019 was the highest since the fishery was established in the 1960s. The 2019 purse-seine catch for yellowfin tuna (364,571 mt; 18% of the total purse seine tuna catch) was over 130,000 mt lower than the record catch in 2017 (498,822 mt) but still amongst the highest annual catches for this fishery. The provisional catch estimate for bigeye tuna for 2019 (50,819 mt) was the lowest since 2003, and the proportion of bigeye tuna (2%) represented in the purse seine tuna catch, was the lowest since 1980. The relatively low bigeye tuna catch by purse seine in 2019 appears to be related to both (i) a lower proportion of associated sets in 2019, and (ii) a lower proportion of bigeye tuna in the associated-set tuna species composition in 2019.

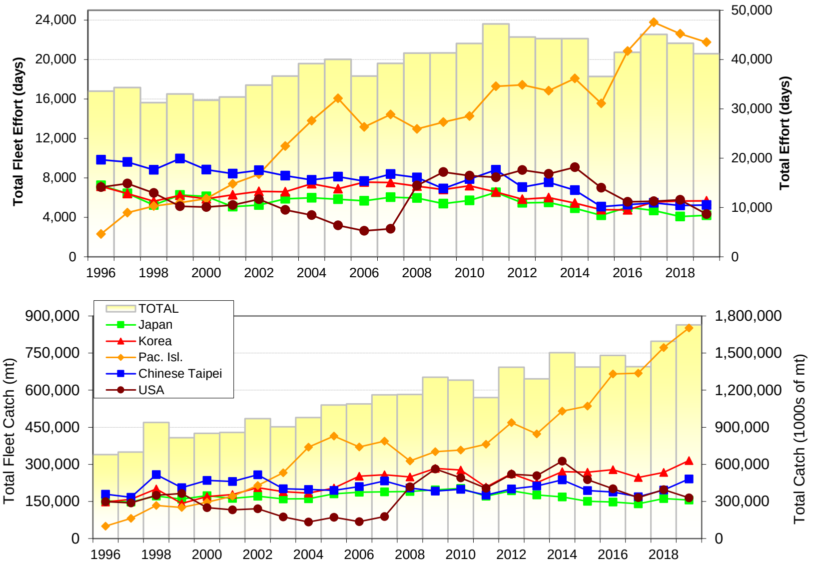

Figure 3.2.1. Trends in annual effort (top) and catch (bottom) estimates for the top five purse seine fleets operating in the tropical WCP–CA, 1996–2019.

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 2016–2019. 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 was also the highest ever. 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 maintenance of the high catch levels in 2015/2016 was due to good catch rates, in part due to the El Nino conditions. The drop in effort from 2017 to 2019 appears to be primarily related to a decline in vessel numbers (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 2019. The combined Pacific-islands fleet catch in 2019 (851,794 mt) was close to the combined catch from the other fleets shown in Figure 3.2.1 (combined 2019 catch for Japan, Korea, Chinese Taipei and USA was 876,047 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. The increase in annual catch by the Pacific Islands fleet until 2005 corresponded to an increase in vessel numbers, and to some extent, mirrors the decline in US purse seine catch, vessel numbers and effort over this period. However, the US purse-seine fleet commenced a rebuilding phase in late 2007, with vessel numbers more than doubling in comparison to recent years, but still below the fleet size in the early-mid 1990s. Since 2014, the catch/effort by the Chinese Taipei, Japan and US fleets have gradually declined while the catch/effort by the combined Pacific Islands fleet have continued to increase, related to the reflagging of vessels from the 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 2019 (133 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 comprise vessels from the Federated States of Micronesia (FSM; 23 vessels in 2019), Kiribati (22 vessels), Marshall Islands (11 vessels), PNG (Papua New Guinea; 50 vessels including their chartered vessels), Solomon Islands (11 vessels), Tuvalu (1 vessel) and Vanuatu (5 vessels). Nauru purse seine vessels (2) entered the fishery for the first time in 2018 and had nine vessels fishing in 2019. 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 55,000-80,000 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 the provisional 2019 catch was back to 98,734 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 (71% of all sets for these fleets in 2019). The proportion of sets on drifting FADs in 2019 (25%) was clearly lower than in 2018 (30%), but similar to the recent ten-year average for the major fleets. The number and proportion (2% in 2019) 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 2019 = 36%: Figure 3.2.2–right [red]) will be higher than the percentage of sets for drifting FADs (for 2019 = 25% : Figure 3.2.2–left [red]). In contrast, the catch from unassociated schools in 2019 was 59% of the total catch but taken from 71% of the total sets. Table A3 in the APPENDIX provides a more detailed breakdown of catch and effort by set type in 2000-2019 using available logsheet and observer data.

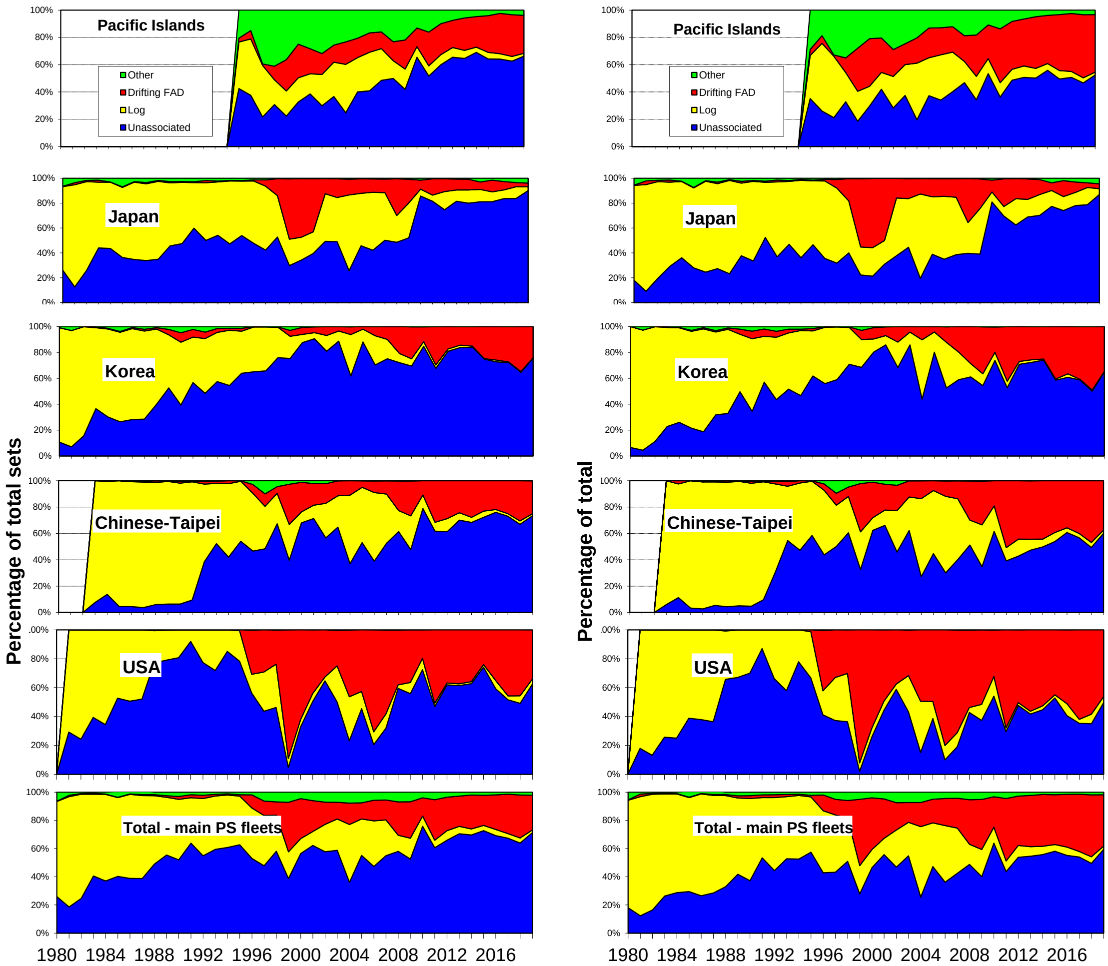

Figure 3.2.2 Time series showing the percentage of total sets (left) and total catch (right), by school type for the major purse-seine fleets operating in the WCP–CA.

3.3 Environmental conditions

The purse-seine catch/effort distribution in tropical areas of the WCP–CA is strongly influenced by El Nino–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 experienced weak-moderate La Niña conditions during 2013, then neutral conditions into early 2014. El Niño conditions developed during 2014 and 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 Nina 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 Nino 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. The current outlook for the remainder of 2020 is a possible move to La Nina conditions by the 3^{rd}-4^{th} quarters 2020.

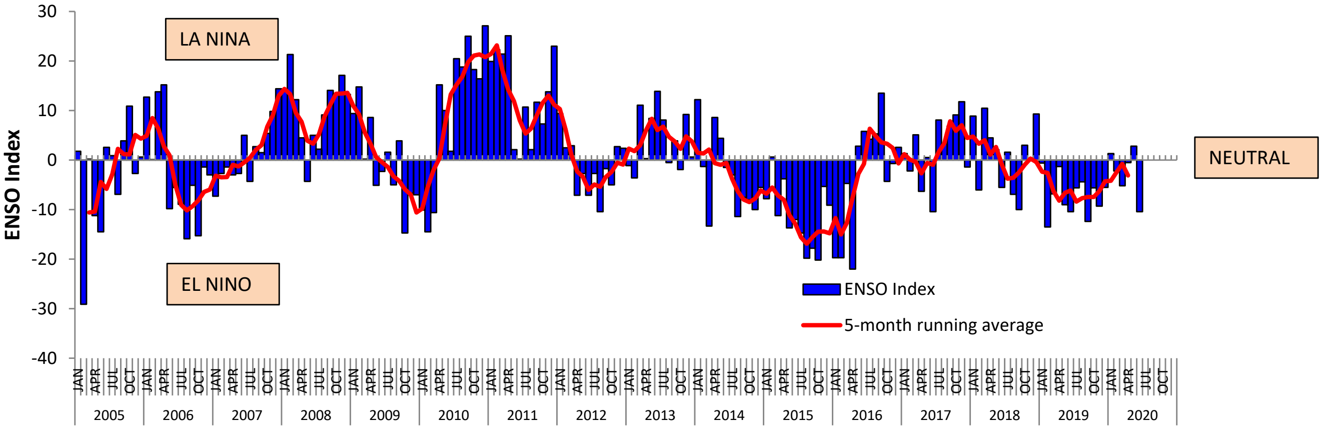

Figure 3.3.1 Trends in El Nino Southern Oscillation Index (ENSO), 2005-2020

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 Nino conditions). The move to ENSO-neutral conditions, then weak La Nina 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 Nino 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 Nino conditions continued into 2019 with purse seine effort extending further to the east compared to recent years (Figure 3.4.1–bottom left) and very good catches were taken in a few concentrated areas of the eastern tropical waters (see Figure 3.7.3).

Figures 3.4.2 through 3.4.6 show the distribution of purse seine effort for the five major purse seine fleets during 2018 and 2019. In general, the distribution of effort for each fleet in 2019 is very similar to 2018 activities, although some fleets (combined Pacific Island, Korea and USA) extending activities further east in 2019. The US fleet typically fishes in the more eastern areas and this was again the case during 2018/2019, with effort extended into the Phoenix and Line Islands, the Cook Islands, Tokelau and the adjacent eastern high seas areas with less effort west of 160°E. The difference in areas fished by the Asian fleets (Japan, Korean and Chinese Taipei) in 2018/2019 (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). During 2019, effort by the combined Pacific Islands fleet slightly to the east (e.g. lower proportion of effort in the domestic PNG fishery) compared to effort during 2018, no doubt related to the prevailing (El Nino) conditions.

Figure 3.4.7 shows the distribution of catch by species for the past seven years, Figure 3.4.8 shows the distribution of skipjack and yellowfin catch by set type for the same period, and Figure 3.4.9 shows the distribution of estimated bigeye catch by set type for the past seven years. There are some instances where the composition of the skipjack catch by set type is clearly different to the composition of the yellowfin catch by set type. Higher proportions of yellowfin tuna usually occur during El Niño years as fleets have access to "pure" schools of large yellowfin that are more available in the eastern tropical areas of the WCP–CA. In 2019, most of the yellowfin catch in the area from the Phoenix to the Line Islands was from unassociated sets (Figure 3.4.8–right), while associated sets in this area accounted for most of the skipjack catch (Figure 3.4.8–left).

The estimated bigeye catch in the area to the west of 160°E tends to be taken by a mixture of set types, but in contrast, is dominated by drifting FAD sets in the area to the east of 160°E, which is very clear for 2019 (Figure 3.4.9–bottom).

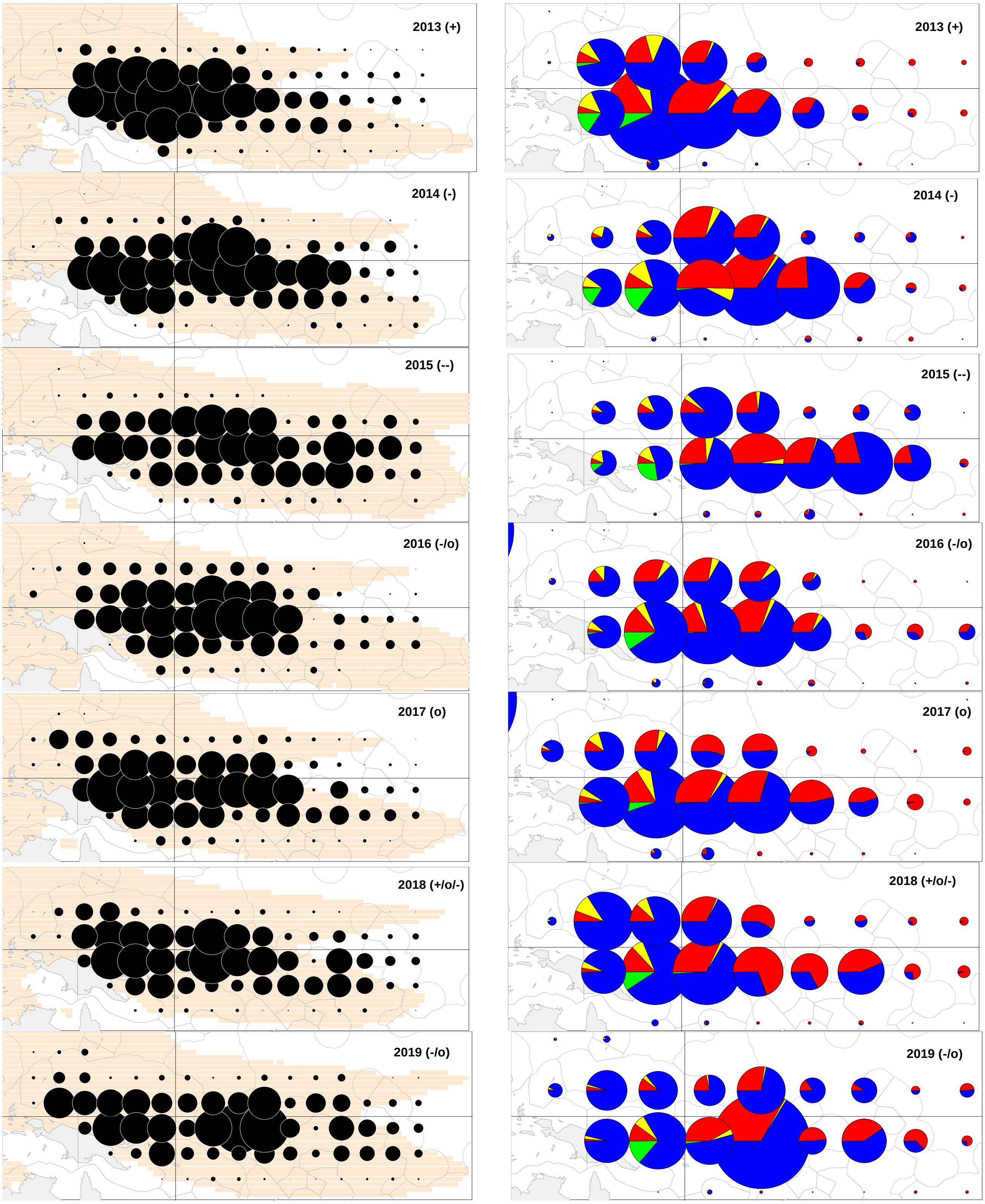

Figure 3.4.1 Distribution of purse-seine effort (days fishing – left; sets by set type – right), 2013–2019. (Blue–Unassociated; Yellow–Log; Red–Drifting FAD; Green–Anchored FAD).

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.

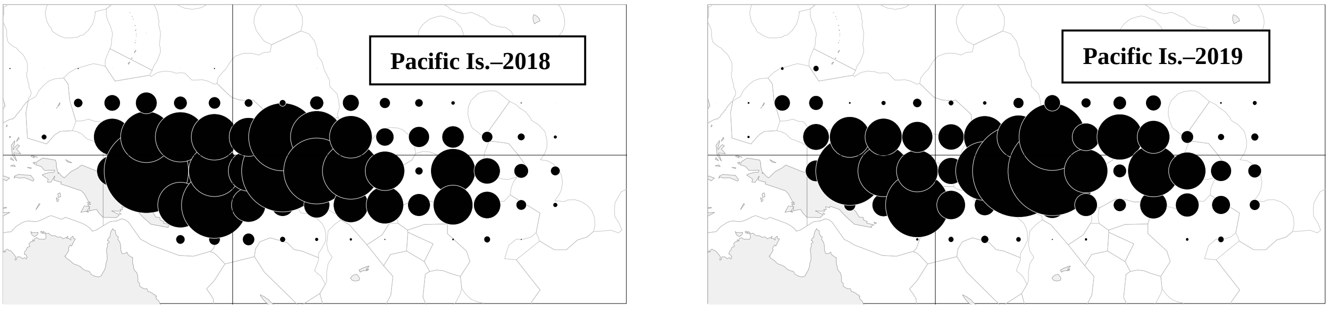

Figure 3.4.2 Distribution of effort by Pacific Islands fleets during 2018 and 2019
lines for the equator (0° latitude) and 160°E longitude included.

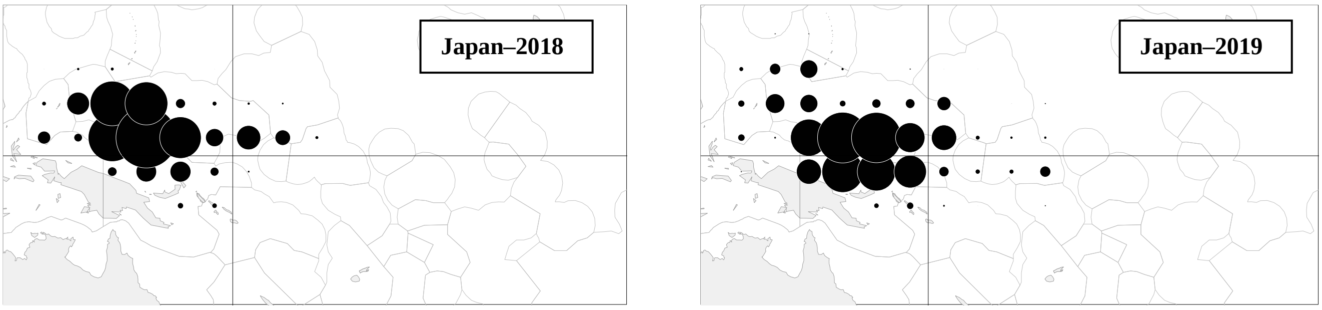

Figure 3.4.3 Distribution of effort by the Japanese purse seine fleet during 2018 and 2019
lines for the equator (0° latitude) and 160°E longitude included.

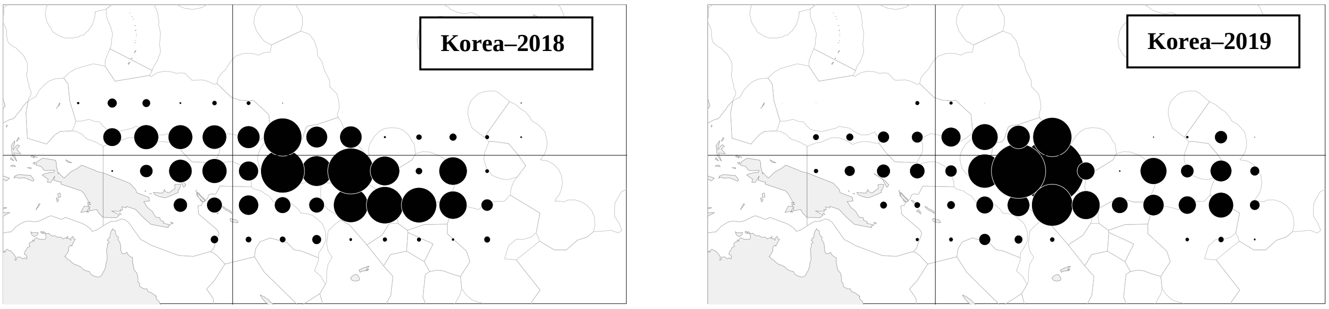

Figure 3.4.4 Distribution of effort by the Korean purse seine fleet during 2018 and 2019
lines for the equator (0° latitude) and 160°E longitude included.

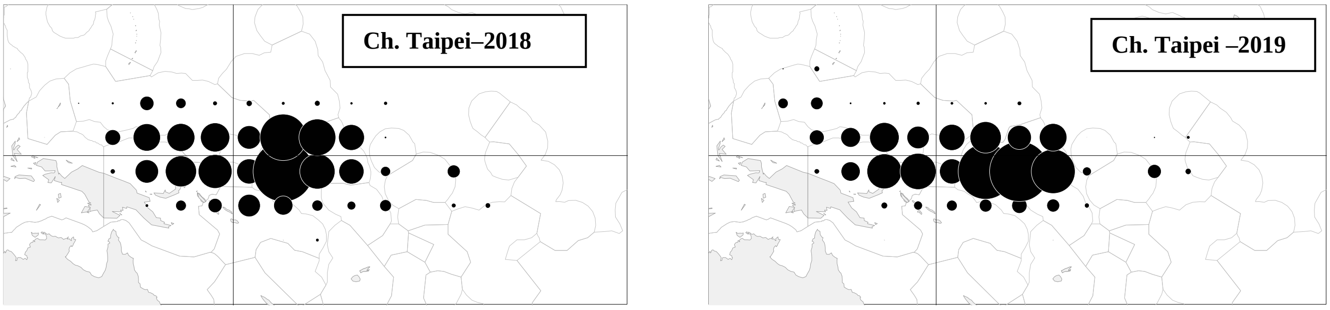

Figure 3.4.5 Distribution of effort by the Chinese-Taipei purse seine fleet during 2018 and 2019
lines for the equator (0° latitude) and 160°E longitude included.

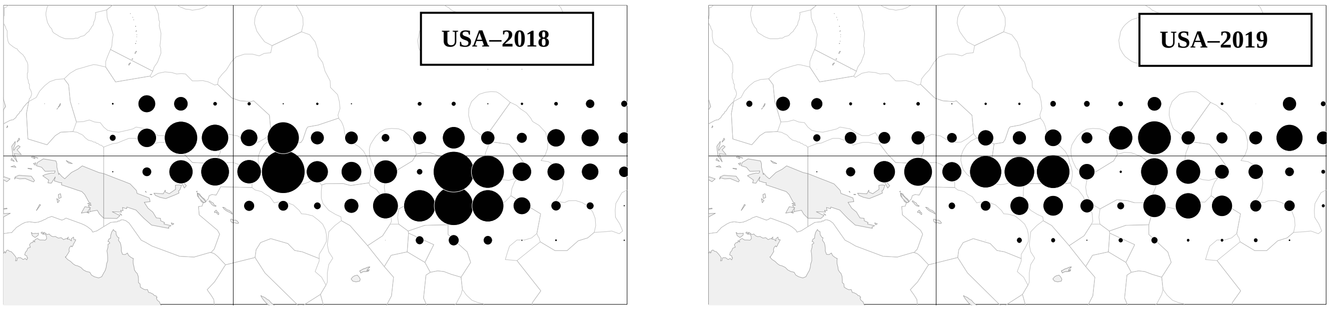

Figure 3.4.6 Distribution of effort by the US purse seine fleet during 2018 and 2019
lines for the equator (0° latitude) and 160°E longitude included.

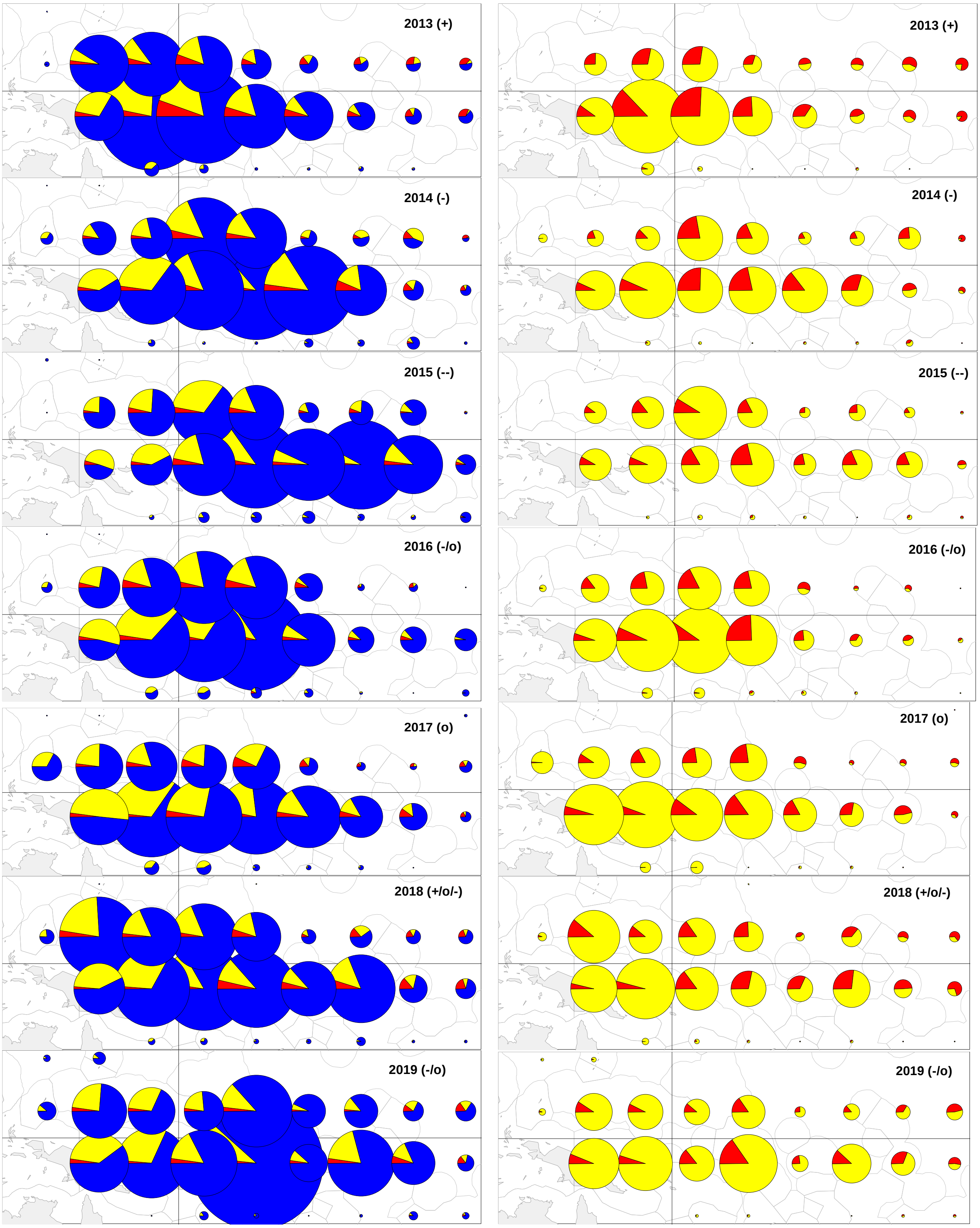

Figure 3.4.7 Distribution of purse-seine skipjack/yellowfin/bigeye tuna catch (left) and purse-seine yellowfin/bigeye tuna catch only (right), 2013–2019 (Blue–Skipjack; Yellow–Yellowfin; Red–Bigeye).

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

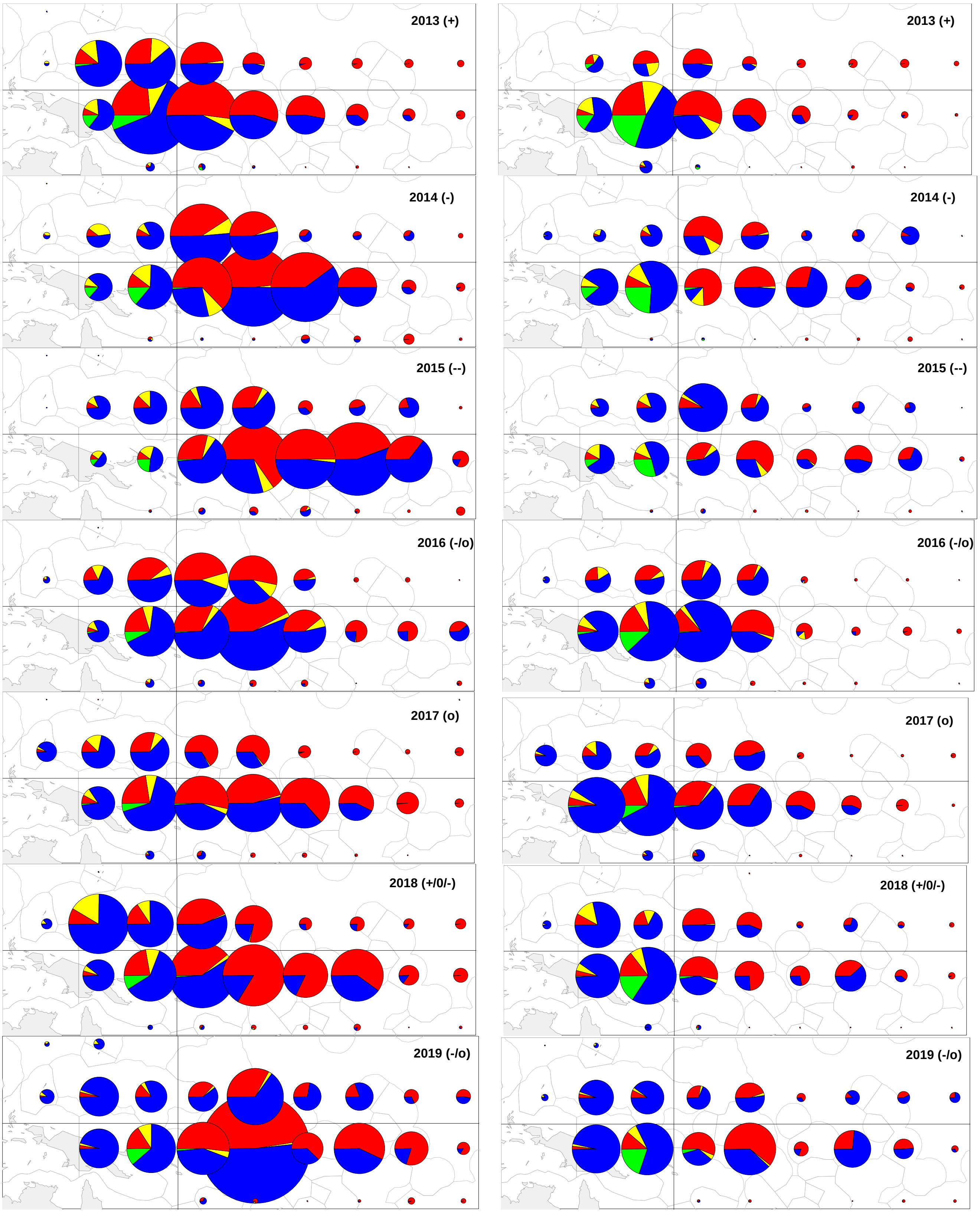

Figure 3.4.8 Distribution of skipjack (left) and yellowfin (right) tuna catch by set type, 2013–2019 (Blue–Unassociated; Yellow–Log; Red–Drifting FAD; Green–Anchored FAD).

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

Sizes of circles for all years are relative for that species only.

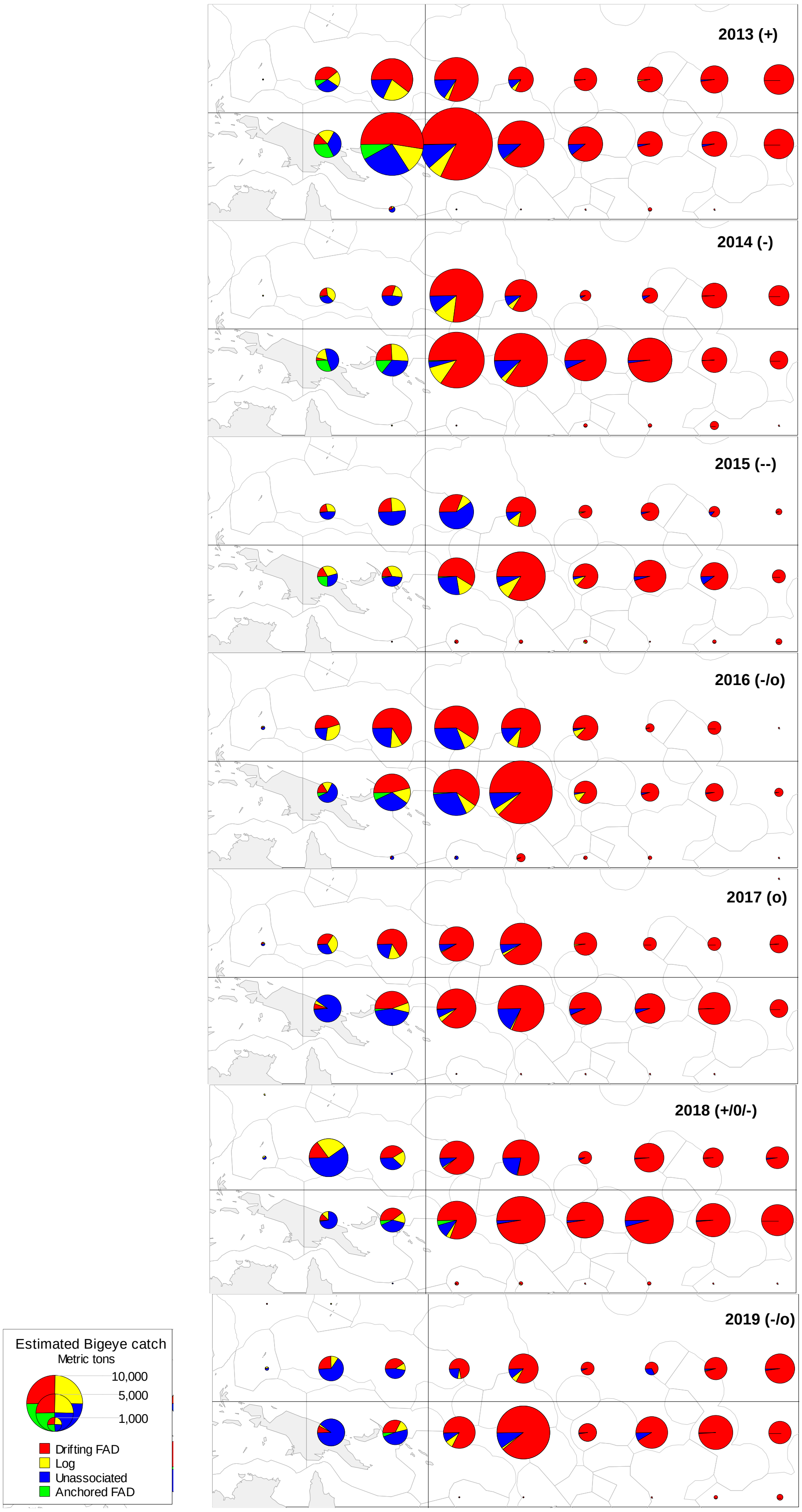

Figure 3.4.9 Distribution of estimated bigeye tuna catch by set type, 2013–2019 (Blue–Unassociated; Yellow–Log; Red–Drifting FAD; Green–Anchored FAD).

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

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 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 2019 for most fleets was amongst the highest ever, with high catch rates from both unassociated and drifting FAD sets. It is thought that environmental conditions and strong recruitment were contributing factors to the recent high catch rates. Over the entire time series, the trend for skipjack CPUE is clearly increasing, although, as noted, these graphs present nominal CPUE and do not take into account 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 31 days in early 2009 to 27.5 days by mid-2020 (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. School-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 2019 declined for the fleets typically fishing in the eastern areas (USA and to some extent Korea) but increased for those fleets with effort concentrated in the west (Japan and to some extent Chinese Taipei); refer to Figures 3.4.3–3.4.6. Figure 3.6.2 shows that for unassociated sets the "pure" schools of large, adult yellowfin were not present in the east during 2019 (compared to 2018), despite the prevailing El Nino conditions, and no doubt this is the reason for the decline in yellowfin CPUE for free-schools for the USA fleet, for example.

Yellowfin catch rates on drifting FADs increased slightly for the Korea, US and Chinese Taipei fleets during 2019, but the CPUE for the Japanese fleet declined; as for CPUE with unassociated sets, this trend is perhaps related to the respective areas fished. 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; drifting FADs account for the highest catches and most variability. The unusually low bigeye catch in 2019 is reflected in the clear declines in CPUE for all fleets (Figure 3.5.2).

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 2019), 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. 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 Nino of 2014–2016. For 2019, the total tuna CPUE was at record high levels, even during the mandatory FAD closure months (July–September). There was a subsequent decline in CPUE in late 2019 and into early 2020, noting that fluctuations in catch levels are also influenced by economic conditions.

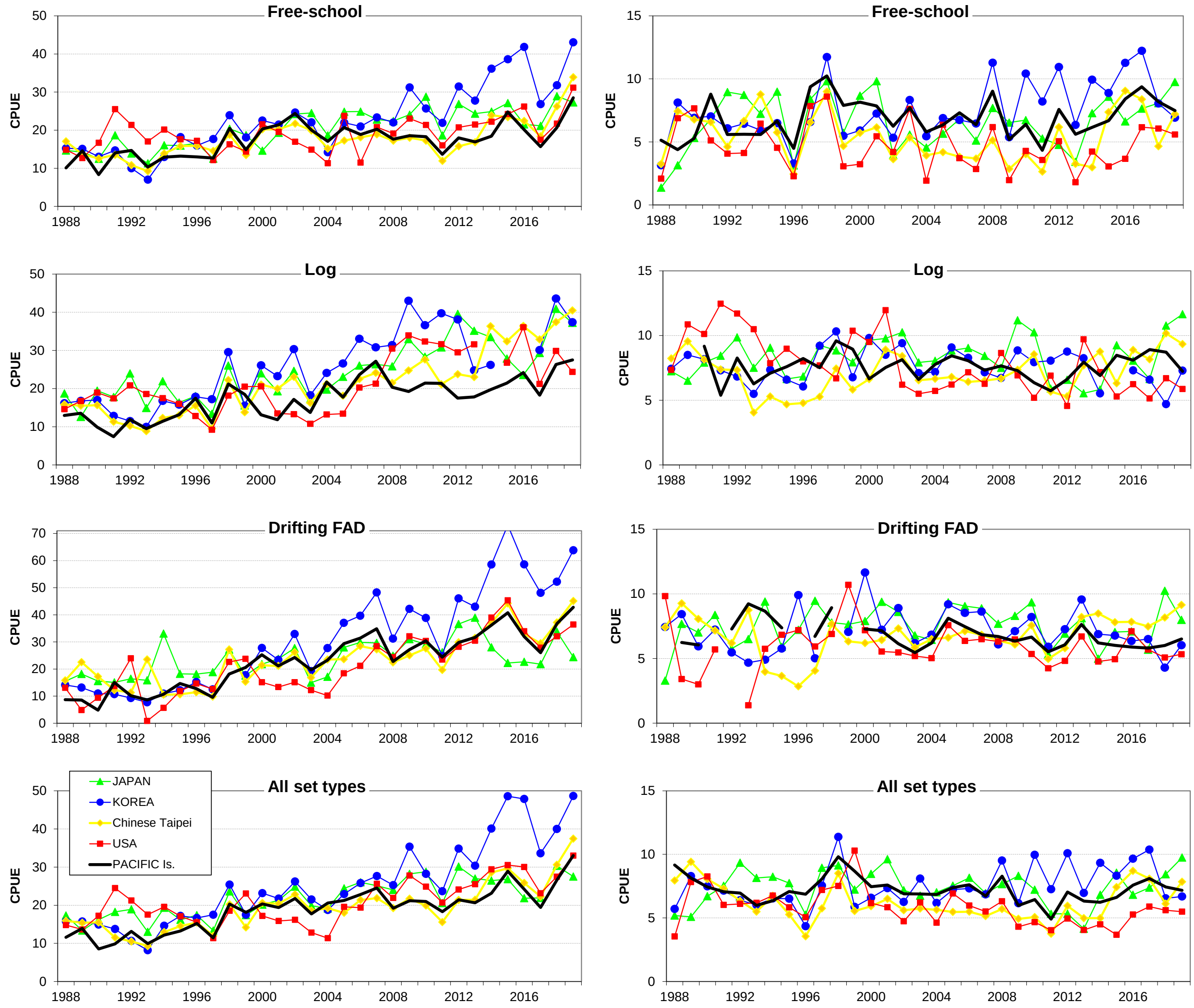

Figure 3.5.1 Skipjack tuna CPUE (mt per day–left) and yellowfin tuna CPUE (mt per day–right) by set-type, and all set types combined, for selected purse-seine fleets fishing in the tropical WCP–CA.

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**.

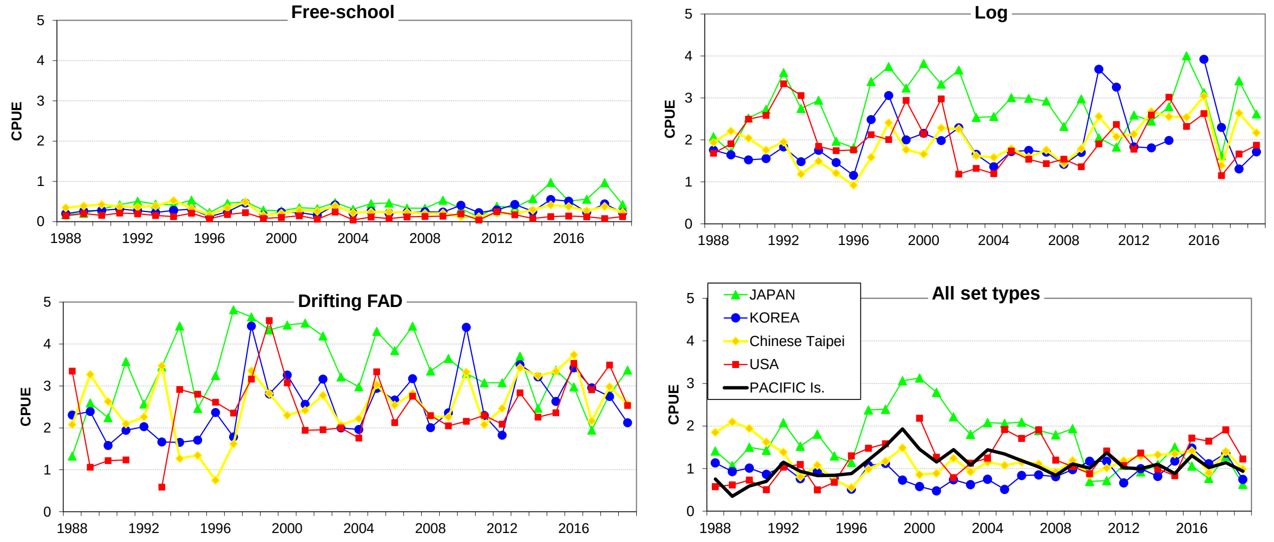

Figure 3.5.2 Estimated bigeye tuna CPUE (mt per day) by major set-type categories (free-school, log and drifting FAD sets) and all set types combined for Japanese, Korean, Chinese-Taipei and US purse seiners fishing in the tropical WCP–CA.

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**.

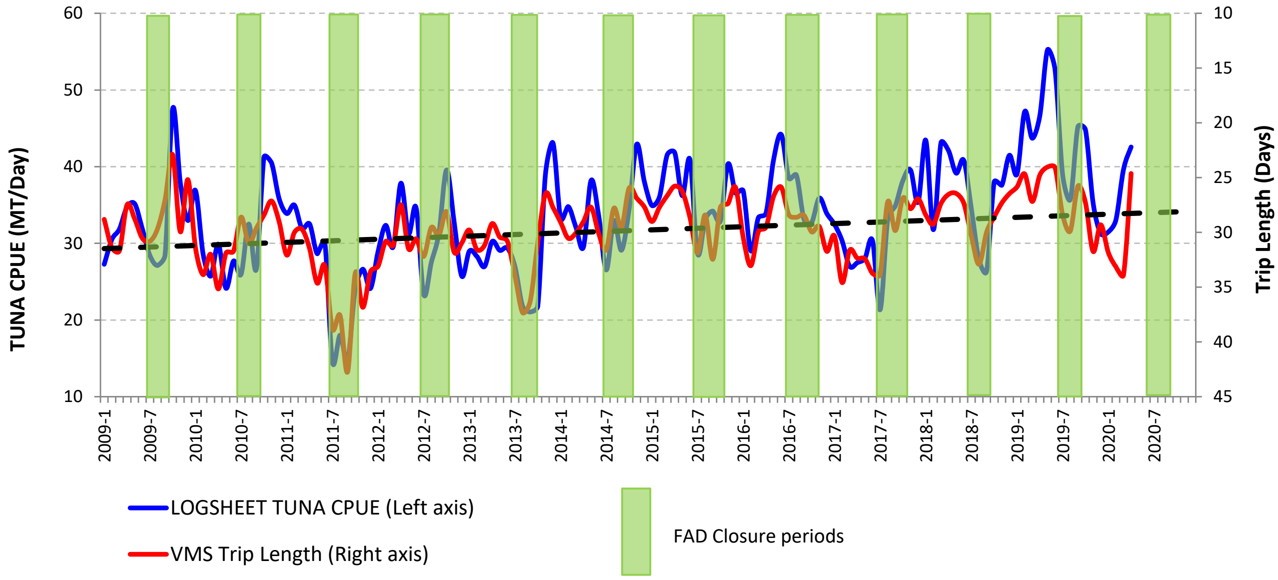

Figure 3.5.3 Monthly purse-seine tuna CPUE (mt/day) and average trip length (VMS days), 2005–2020

Dashed, black line represents the linear trend on VMS Trip length. VMS Trip length axis (right) is inverted.
For 2019, 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 para. 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 2018 and 2019, by set type and broad area of the tropical fishery. Points of interest in the comparison of these graphs include:

- A broader range of skipjack tuna (to 75 cm) in the area east of 170°E from unassociated sets in 2018 compared with 2019, but also compared to the associated sets in 2019 for the same area;
- A higher proportion of the bigeye tuna in associated sets east of 170°E than in the west;
- The absence of large yellowfin tuna in the unassociated set catch in the area east of 170°E in 2019 compared to 2018.

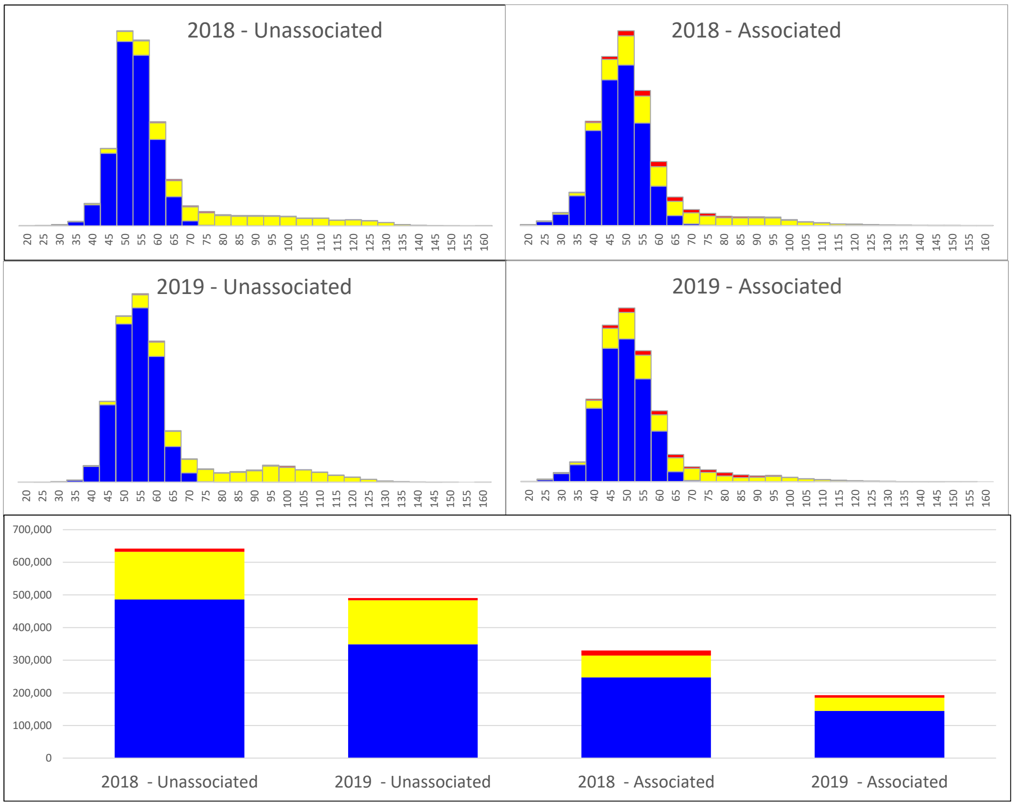

Figure 3.6.1 Species composition (MT: Y-axis) of the 2018 and 2019 purse seine catch, by set type and 5cm size categories (X-Axis) for the tropical fishery, west of 170°E.

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

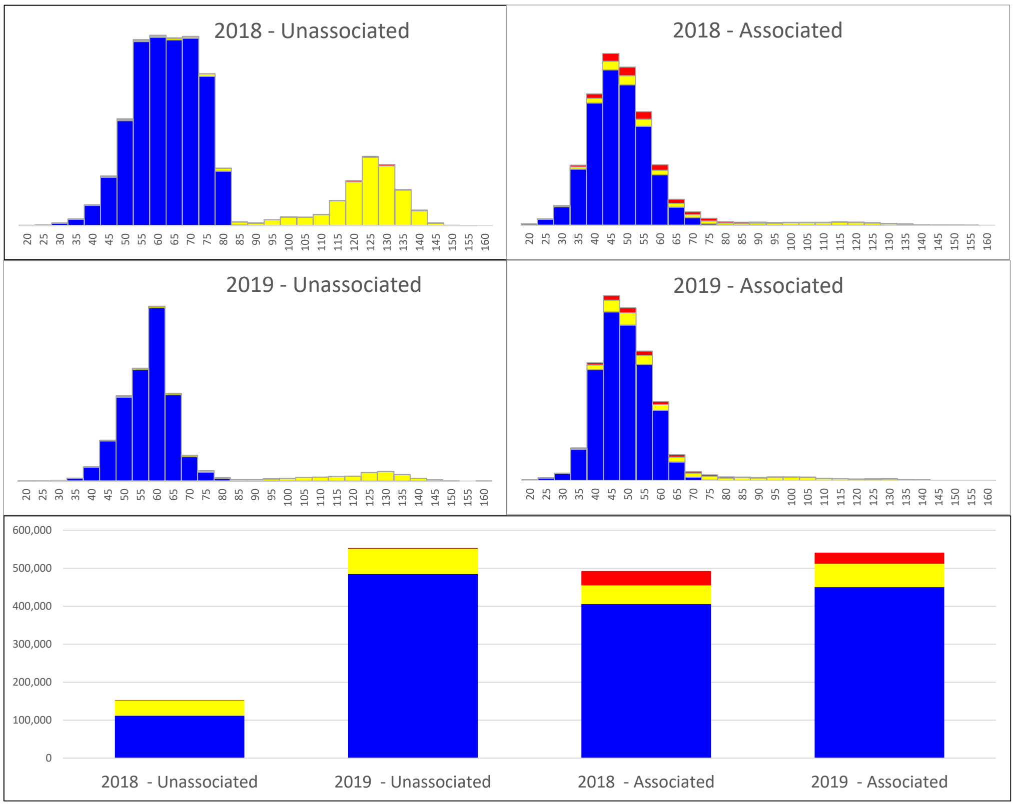

Figure 3.6.2 Species composition (MT: Y-axis) of the 2018 and 2019 purse seine catch, by set type and 5cm size categories (X-Axis) for the tropical fishery, east of 170°E.

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

Bottom graph shows the catch volume by year, species and set type

Source : observer data

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 2014–2019, respectively. Figure 3.7.3 shows the distribution of effort by quarter for the period 2014-2018 in comparison to effort by quarter in 2019. 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 is in contrast to the yellowfin CPUE, which was at its lowest during the first six months, but higher thereafter. This situation corresponds to the seasonal eastwards 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 2019 was above the 2014-2018 monthly average for all months Jan–Oct, with the highest monthly CPUE for the past six years in the months of Feb and Apr–Oct, with Nov–Dec as the only months below this average. High skipjack catches in the period to Apr-Oct were concentrated in the Gilbert Islands, Tuvalu, Nauru and adjacent high seas (Figure 3.7.3).

The quarterly extent of the warm pool (i.e. surface water >28.5°C on average) in 2019 compared to the average for 2014-2018 (Figure 3.7.3) shows that the El Nino conditions in early 2019 extended the warm pool and the fishery further east than the recent 5-year average (2014–2018). The monthly yellowfin CPUE for 2019 was higher than the 2014–2018 average in the 1st quarter of 2019, with good yellowfin tuna catches in PNG and the area from Phoenix to the Line Islands (Figures 3.7.2 and 3.7.3). The monthly yellowfin CPUE for 2019 was at the 2014–2018 monthly average for the 2nd quarter, but from July onwards, slightly lower that this recent 5-year average.

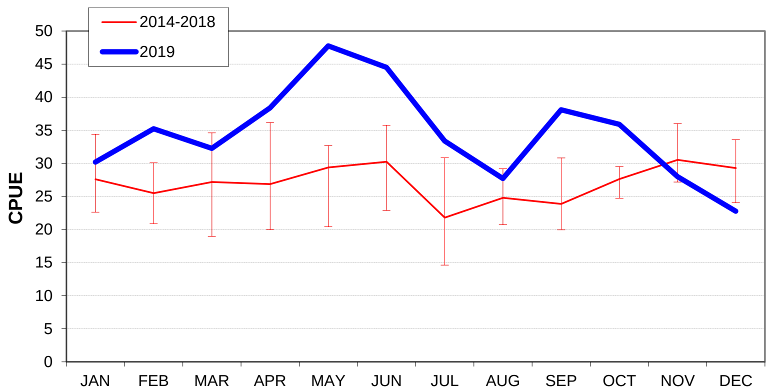

Figure 3.7.1 Average monthly skipjack tuna CPUE (mt per day) for purse seiners fishing in the tropical WCP–CA, 2014–2019.

Red line represents the period 2014–2018 and the blue line represents 2019.
The bars represent the range (i.e. minimum and maximum) of monthly values for the period 2014–2018.

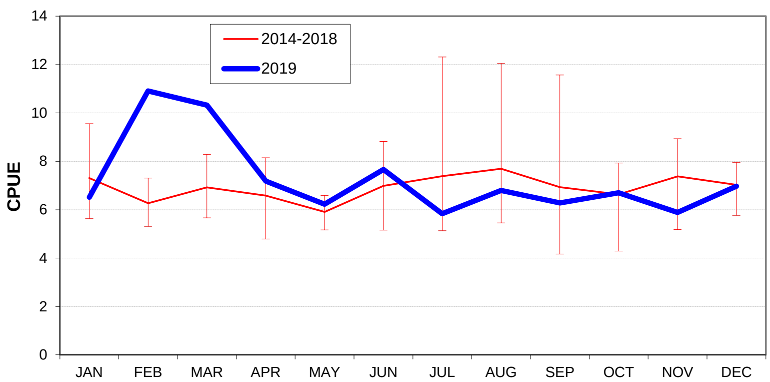

Figure 3.7.2 Average monthly yellowfin tuna CPUE (mt per day) for purse seiners fishing in the tropical WCP–CA, 2014–2019.

Red line represents the period 2014–2018 and the blue line represents 2019.
The bars represent the range (i.e. minimum and maximum) of monthly values for the period 2014–2018.

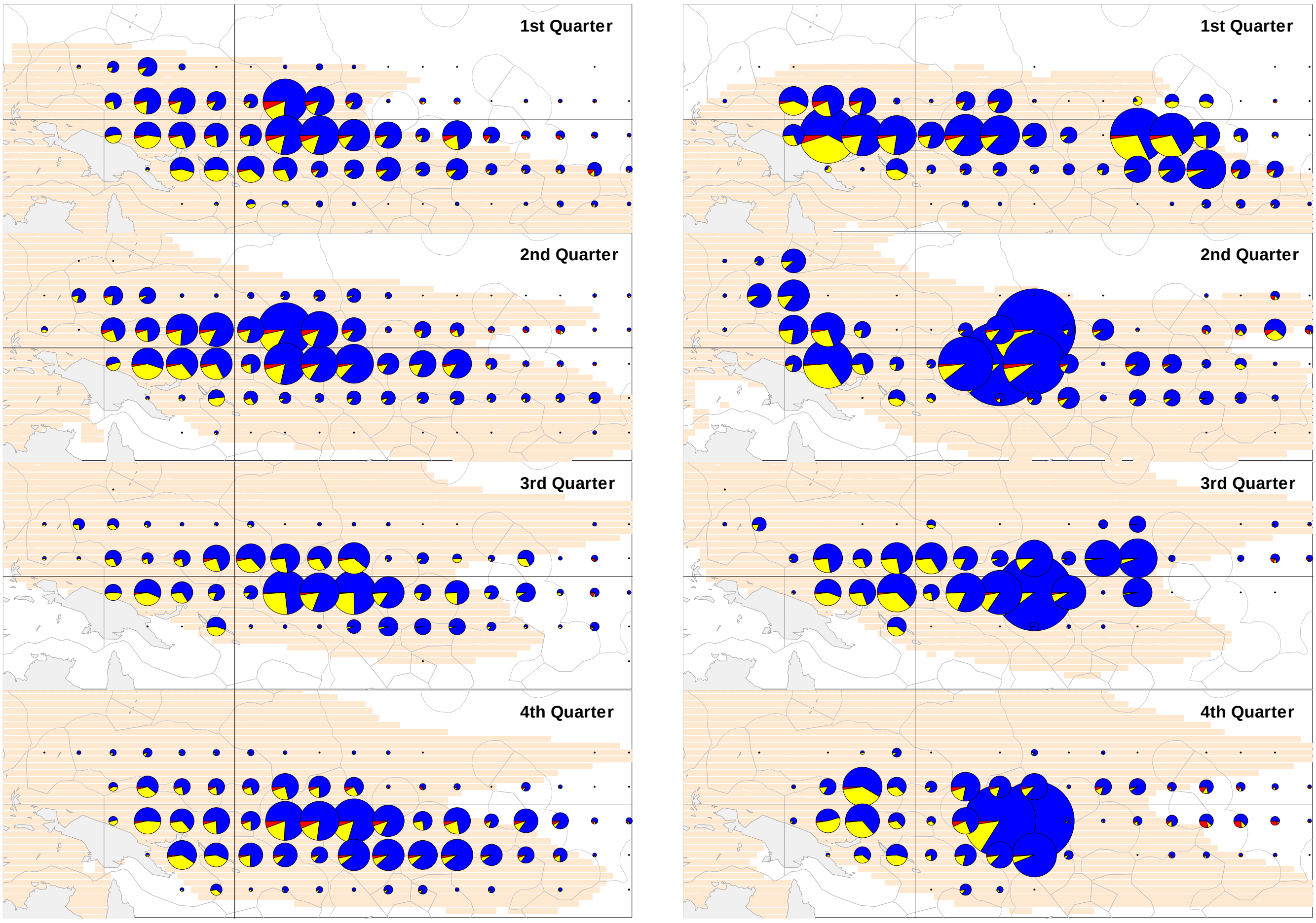

Figure 3.7.3 Quarterly distribution of purse-seine catch by species for 2014–2018 (left) and 2019 (right).

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

Pink shading represents the extent of average sea surface temperature >28.5°C by quarter for the period 2014–2018 (left) and 2019 (right)

3.8 Prices, catch value and overall economic conditions

3.8.1 Prices

Skipjack

Following their recent peak in 2017 global skipjack prices have been on a downward trend. In 2019 the price of Thai imports (c&f) fell 15% to average $1,399/mt while Yaizu purse seine caught skipjack prices (ex-vessel) fell 12% to average ¥144/kg ($1,321/mt). In real terms (that is, adjusting for inflation[4]) 2019 Thai import and Yaizu purse seine caught USD skipjack prices were 6% and 15% lower than their 20-year averages respectively. Over the period January to May in 2020, Thai import purse seine caught skipjack prices average $1,228/mt while Yaizu prices averaged around ¥169/kg ($1,556/mt). Bangkok market reports indicate that skipjack prices (4-7.5lbs, c&f) increased significant between late 2019 and the end the first Quarter of 2020, rising from $900/mt in November 2019 to $1,500 in March 2020, before declining again to be $1,200/mt at the end of June. The Bangkok skipjack (4-7.5lbs, c&f) price index over the year to May in 2020 is currently marginally above that of the FAO Food Price Index which has been relatively steady since 2015 (Figure 3.8.2). In addition, over the period to May in 2020 Thai import volumes were down by around 28% compared with 2019 with this decline reportedly driven by low catch rates in the early part of the year.

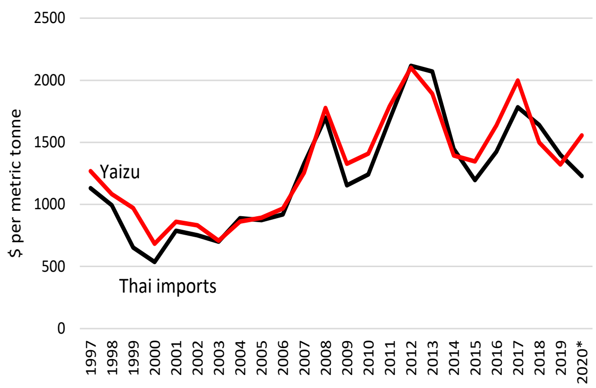

Figure 3.8.1 Annual skipjack prices, Thai imports (c&f) and Yaizu (ex-vessel)
Note: *For the period January to May

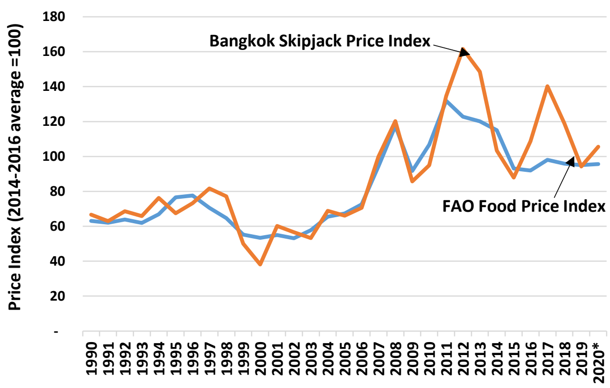

Figure 3.8.2 FAO Food Price Index and Bangkok 4-7.5lbs skipjack price (c&f) index
Note: *For the period January to June

Yellowfin

In 2019 the Thai import prices (c&f) for yellowfin averaged $1,925/mt, down by 2% from the previous year levels while Yaizu purse seine caught yellowfin prices (ex-vessel) declined 9% to ¥255/kg ($2,338/mt). In real terms the Thai import prices were only 3% higher in 2019 than the 20 year average while 2019 Yaizu real prices was below their 20 year average by 8%.

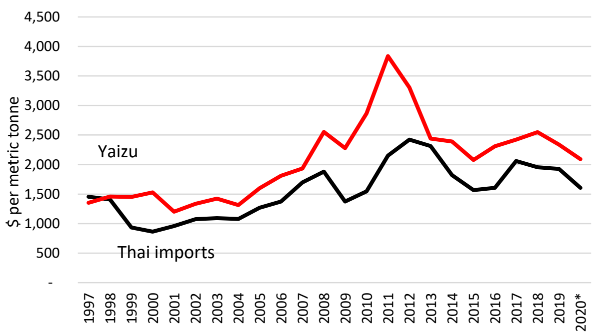

Figure 3.8.3 Annual yellowfin prices, Thai imports (c&f) and Yaizu (ex-vessel)
Note: *For the period January to May

Prices over the period to the end of May 2020 are below the levels seen in 2019 with Thai import prices averaging $1,605/mt and Yaizu prices averaging ¥227/kg ($2,092/mt). In addition, over the period to May in 2020 Thai import volumes were down by around 20% compared with 2019.

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

3.8.2 Catch Value

The purse seine tuna catch in the WCP-CA area for 2019 is estimated to be valued at $3.02 billion, a decline of $206 million (6%) from 2018.[5] This represents the 6th highest purse seine catch value level on record in nominal terms since 1997. The decline in nominal value in 2019 was driven by a significant decline in the value of the yellowfin, skipjack and bigeye catch of $113 million (15%), $66 million (3%) and $28 million (26%) respectively from the previous year.

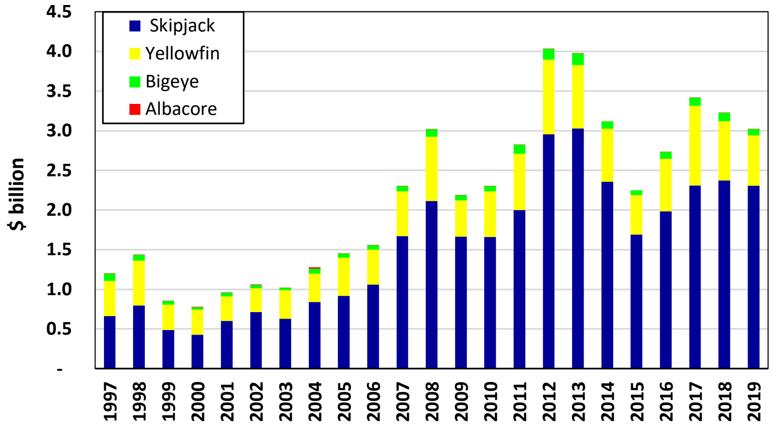

Figure 3.8.4 Value of the WCPFC-CA purse seine fishery tuna catch by species

The decline in the value of the skipjack catch in 2019 to $2.31 billion (76% of the total purse seine tuna catch value) was largely driven by lower prices. Similarly, the decline in yellowfin prices saw the value of the yellowfin catch declined to $635 million which represemnts 21% of the total value of the purse seine catch. Bigeye contributed $79 million or 3% of the total value of the purse seine catch in 2019.

3.8.3 Economic Conditions in the tropical purse seine fishery

Economic conditions indexes for the major WCPFC-CA tuna fisheries has 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, 1999-2018). Together, information from the three components are 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 over 100 show periods in which economic conditions in the fishery are relatively favourable.[6] 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.

Despite the falls in prices and increases in fuel costs, a surge in catch rates saw the continuation of good economic conditions in the purse fishery with the tropical purse seine fishery[7] economic conditions index remaining significantly above the 20-year average. Since 2012, the index has consistently outperformed the 20-year average index, however, in 2014 as fish prices declined, the index returned to more average levels. In the recent years, there is considerable variation in the contribution of the different index components. For instance, in 2012, 2013 and 2017, the high index readings were driven primarily by high fish prices while high catch rates were the main driver between 2014 and 2016 and in 2018 and 2019. The continuation of the decline in fish prices saw the economic conditions in 2019 decline marginally from 2018 levels despite the higher catch rates and lower fuel prices.

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[5] 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.

[6] 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.

[7] 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.

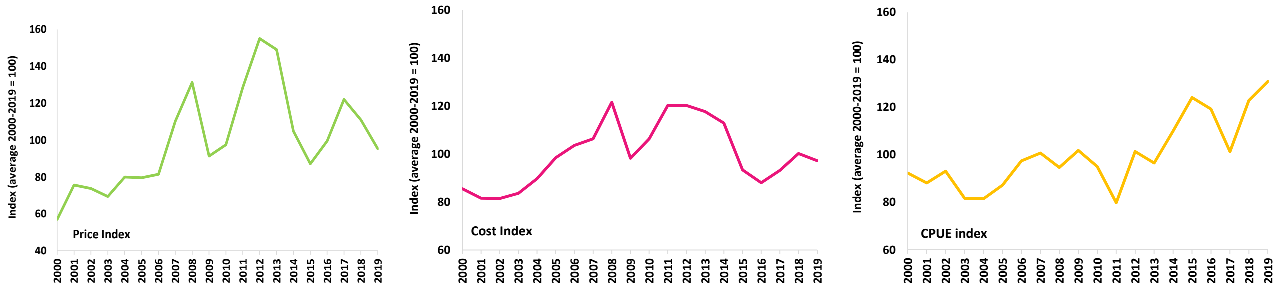


Figure 3.8.5 Tropical purse seine fishery economic conditions component indexes

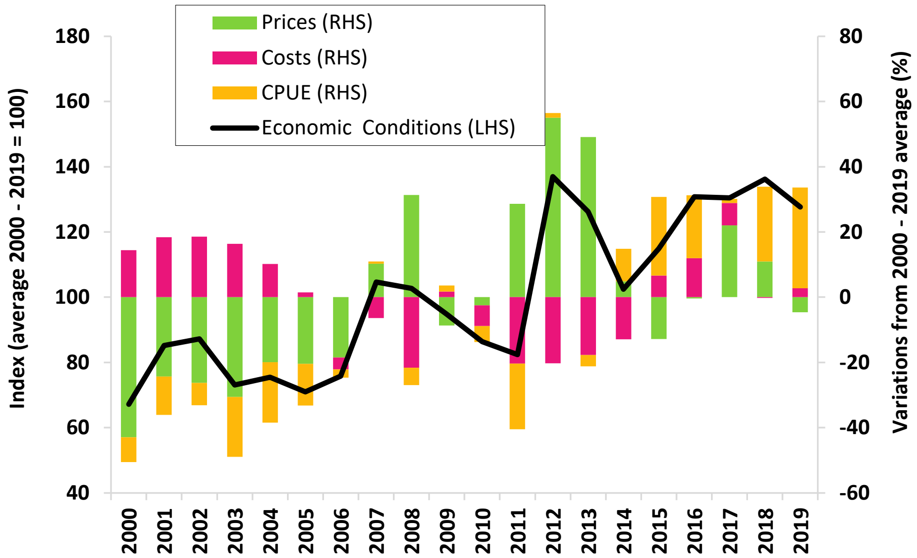


Figure 3.8.6 Tropical purse seine fishery economic conditions index (LHS) and variance of component indices against average (2000-2019) conditions (RHS)

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 activity now in the last three fisheries)
- a seasonal albacore/skipjack fishery east of Japan (largely an extension of the Japan home-water fishery).

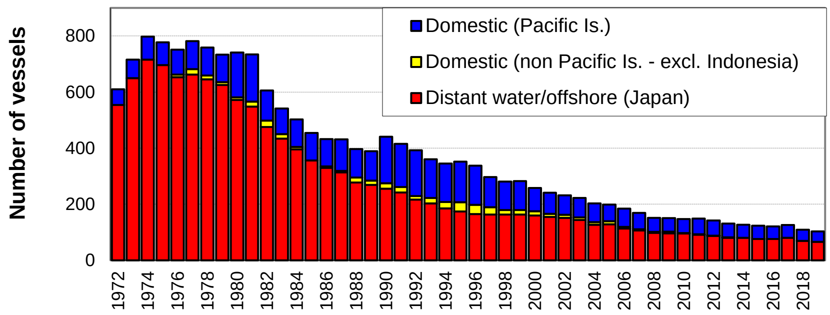
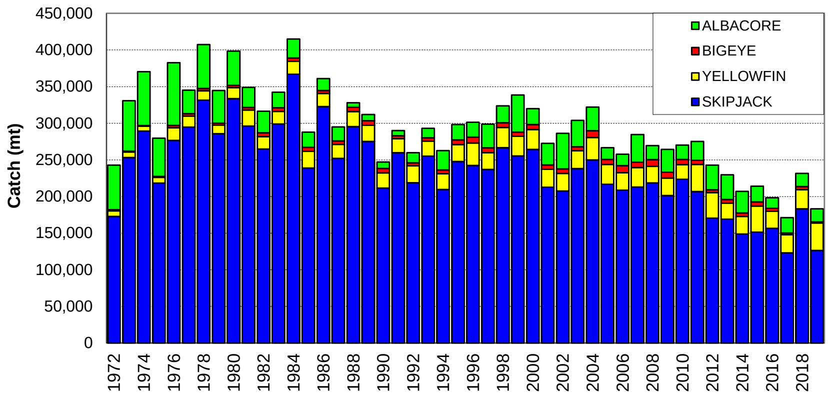


Figure 4.1.1 Pole-and-line vessels operating in the WCP–CA
(excludes pole-and-line vessels from the Japanese Coastal and Indonesian domestic fisheries)

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 (33 vessels in 2019), 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 (2019)

The provisional 2019 pole-and-line catch (183,193 mt) was lower than the 2018 catch (231,155 mt) and amongst the lowest annual catches since the mid-1960s, due to reduced catches in both the Japanese and the Indonesian fisheries.



Skipjack tends to account 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 (8–20% in recent years) is taken by the Japanese coastal and offshore fleets in the temperate waters of the north Pacific. Yellowfin tuna (5–16%) and a small component of bigeye tuna (1–4%) make up the remainder of the catch. There are only five pole-and-line fleets active in the WCPO (French Polynesia, Japan, Indonesian, Kiribati and Solomon Islands). Japanese distant-water and offshore fleets (93,442 mt in 2019), and the Indonesian fleets (88,377 mt in 2019), account for nearly all of the WCP–CA pole-and-line catch (99% in 2019). 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 (1,121 mt in 2019 from 4 vessels).

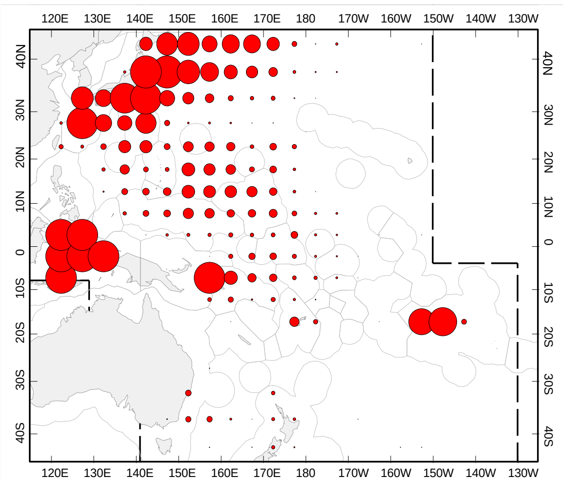


Figure 4.2.2 Average distribution of WCP–CA pole-and-line effort (1995–2019).

Figure 4.2.2 shows the average distribution of pole-and-line effort for the period 1995–2019. 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 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 with the year-round tropical skipjack fishery is largely dominated by the fleets of Japan and Indonesia with small catches taken by the fleets of Solomon Islands and French Polynesian. The pole and line fishing by the Japanese fleet is seasonal with the period of southern skipjack pole and line fishing normally between the month of November and June and then both near shore albacore and eastern offshore skipjack mainly during the period from July to October.

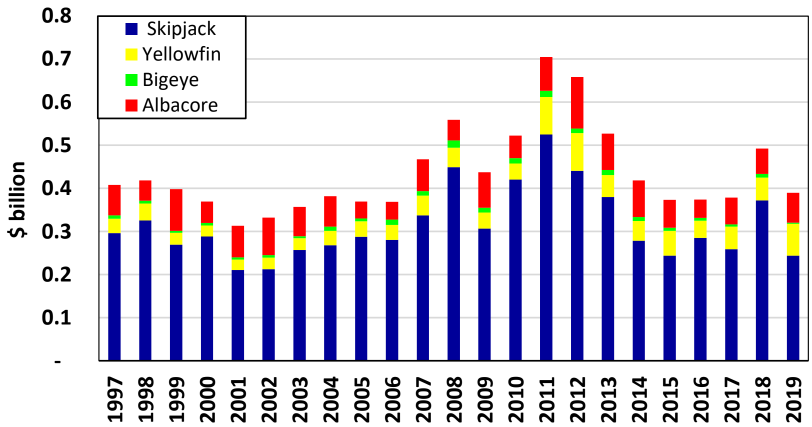


Figure 4.3.1 Value of the WCPFC-CA pole and line fishery tuna catch by species

The price of pole and line caught skipjack at Yaizu in 2019 averaged $2,338/Mt compared with $2,548 in 2018, a decline of 8%. The price of catch in waters off Japan averaged $1,651/Mt (¥180/kg) in 2019, a decline of 15% (16% in JPY terms) from the previous year. The price of skipjack caught in waters south of Japan decreased by 3% to $2,055/Mt (-4% to ¥224). Prices for skipjack caught in waters off and south of Japan for the period to May 2020 averaged ¥264/kg and ¥308/kg respectively and were higher than for the same period in 2019.

4.3.2 Catch Value

The estimated delivered value of the total catch in the WCPFC pole and line fishery for 2019 is $390 million[8] a decline of 21% or around $103 million on 2018 primarily driven by a decline in catch. The delivered value of the skipjack tuna catch in the WCPFC pole and line fishery for 2019 was estimated to be at $244 million.

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[8] 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 continues to account for around 10–13% of the total WCP–CA catch (OFP, 2019), but rivals 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 has 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[9]. Total longline vessel numbers have slowly declined over the past 15 years, with the provisional estimate of 1,672 vessels in 2019 showing a 48% drop on the vessels in 2005 and a 14% drop on 2018 vessel numbers, mainly due to a decline in the category of non-Pacific Islands domestic fleets.

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.

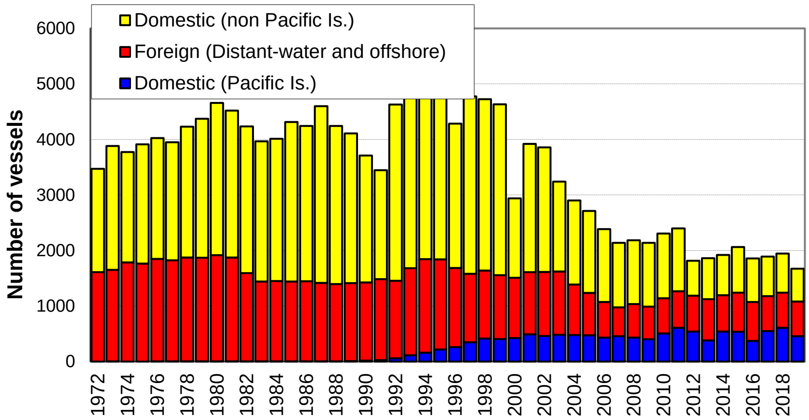


Figure 5.1.1 Longline vessels operating in the WCP–CA
(Available data does not make the distinction between foreign "distant-water" and "offshore")

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 Chinese-Taipei, 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

[9] 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 45,000 mt in 2019.

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–35%; BET–25%; YFT–38% in 2019) 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).

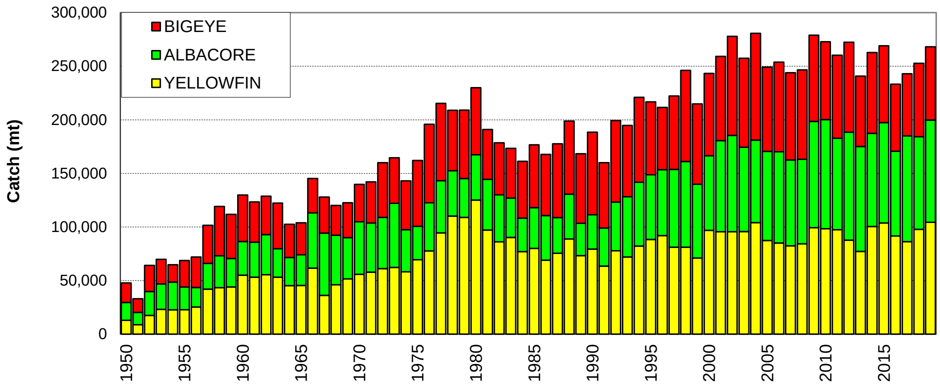


Figure 5.1.2 Longline catch (mt) of target tunas in the WCP–CA

5.2 Provisional catch estimates and fleet sizes (2019)

The provisional WCP–CA longline catch (273,550 mt) for 2019 was at the average level for the past five years. The WCP–CA albacore longline catch (95,280 mt – 35%) for 2019 was slightly higher than the recent ten-year average, and only 6,000 mt lower than the record of 101,820 mt attained in 2010. The provisional bigeye catch (68,371 mt – 25%) for 2019 was slightly lower than the recent ten-year average, and well down on the bigeye catch levels experienced in the 2000s (e.g .the 2004 longline bigeye catch was 99,705 mt). The yellowfin catch for 2019 (104,440 mt – 38%) was the highest catch since 1980 (which was a record for this fishery at 125,113 mt).

A significant change in the WCP–CA longline fishery over the past 10 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 3,931 mt in 2019) and vessel numbers (366 in 2004 to 80 in 2019). The Chinese-Taipei distant-water longline fleet bigeye catch declined from 16,888 mt in 2004 to 4,989 mt in 2019, mainly related to a substantial drop in vessel numbers (137 vessels in 2004 reduced to 75 vessels in 2019). 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 97 vessels in 2019.

In contrast, the China longline fleet catches of albacore tuna have been amongst the highest ever in recent years (this fleet continues to catch over 21,000 mt of albacore tuna in the WCP-CA in recent years).

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–SC16 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 Appendix (Figures A7, A8 and A9), but this paper does not attempt to explain trends in longline CPUE or effective effort, as this is 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 2000–2019. 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.

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 the handline gear).

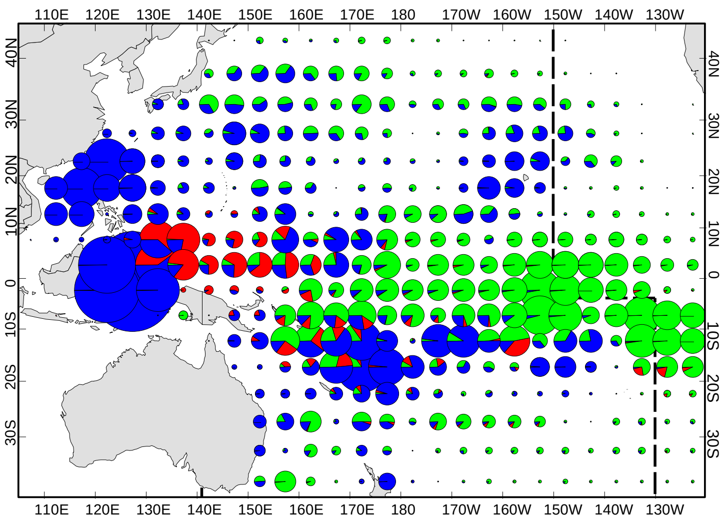


Figure 5.4.1 Distribution of longline effort (100s of hooks) for distant-water fleets (green), foreign-offshore fleets (red) and domestic fleets (blue) for the period 2000–2019.
(Note that distant-water effort for Chinese-Taipei and other fleets targeting albacore in the North Pacific is poorly covered)

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, Samoan, Fijian, French Polynesian, Solomon Islands (when chartering arrangements are active), Tonga and Vanuatu fleets (Figure 5.4.2).

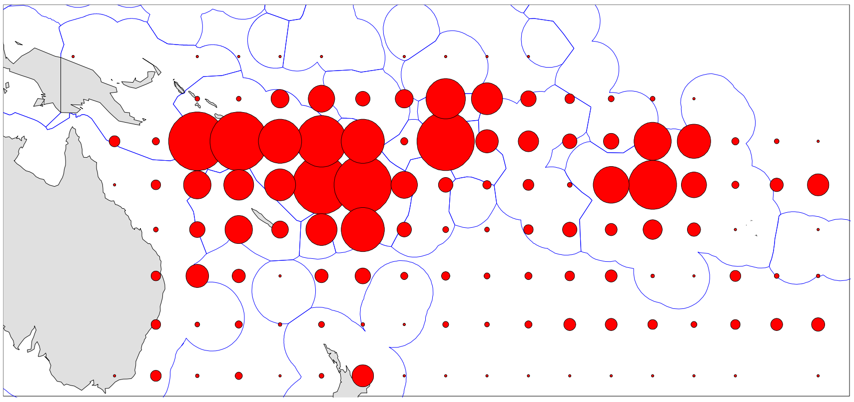


Figure 5.4.2 Distribution of effort for south Pacific albacore-target DOMESTIC longline fleets

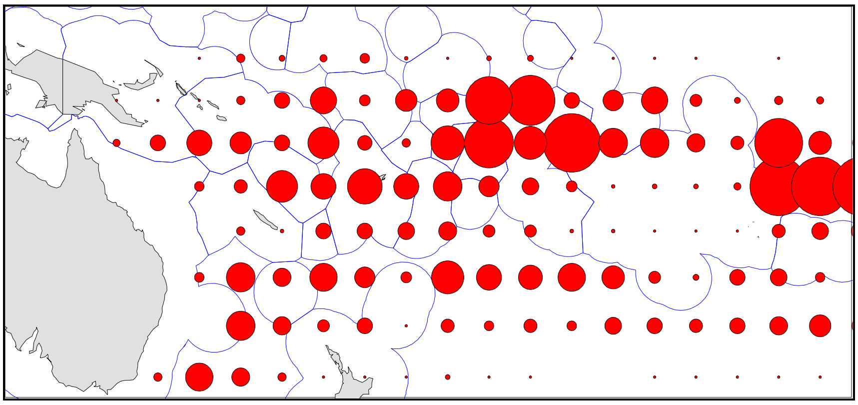


Figure 5.4.3 Distribution of effort for south Pacific albacore-target FOREIGN longline fleets

Figure 5.4.4 shows quarterly species composition by area for the period 2010–2018 and 2019. 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. The decline in bigeye catches in the tropical central and eastern areas is evident when comparing the 2010-2018 quarterly averages (Figure 5.4.4 –left) with the 2019 catches (Figure 5.4.4 –right), particularly the 1st and 4th quarters.

The 2019 data are considered preliminary for some fleets, but nonetheless provide some insights into the fishery. For example, it is interesting to note the change in species composition for the cell/area bounded by 0°–5°S, 150°-170°W (predominately high seas north of Cook Islands and between Phoenix and Line Groups, but also including parts of these EEZs); there were relatively high catches in this area during the 3rd quarter 2019, with approximately equal amounts of albacore, bigeye and yellowfin tuna, but much lower catches in this area during the 4th quarter with a higher proportion of bigeye tuna.

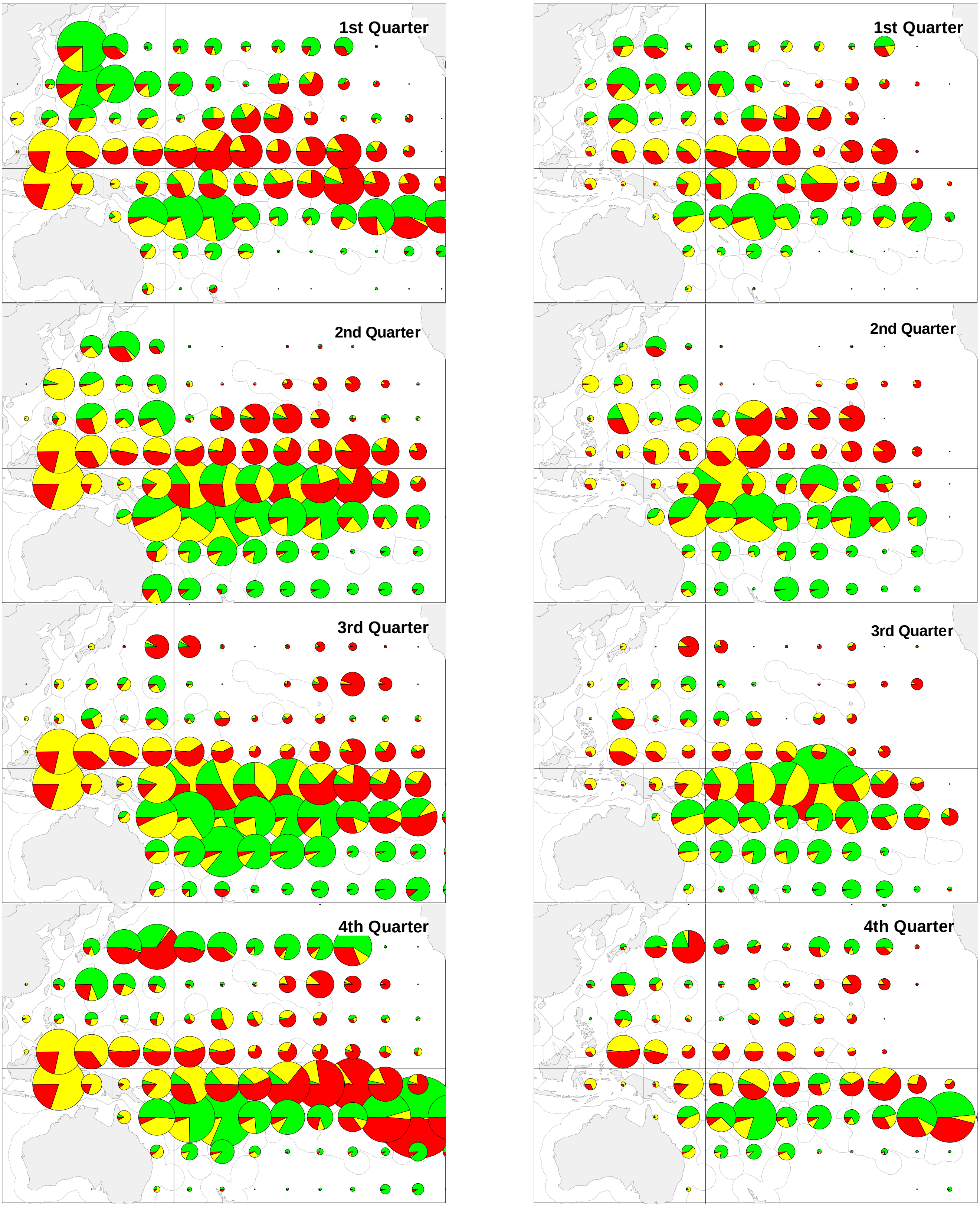


Figure 5.4.4 Quarterly distribution of longline tuna catch by species, 2010-2018 (left) and 2019 (right)
(Yellow–yellowfin; Red–bigeye; Green–albacore)
(Note that catches from some distant-water fleets targeting albacore in the North Pacific may not be fully covered; excludes the Vietnam HL/LL fishery)

5.5 Prices, catch value and overall economic conditions

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

Yellowfin prices across all markets in 2019 declined significantly except for the Japan fresh yellowfin import prices at selected ports which was seen to have increased by 3% to ¥897/kg. The average price of imported fresh yellowfin from Oceania, which was at its highest (¥1,116/kg) in 2018 saw a significant decline by 13% in 2019 to average ¥972/kg. Similarly, a further decline was seen with the Yaizu longline caught prices and the frozen prices at selected Japanese ports declined to ¥588/kg (-20%) and to ¥633/kg (-21%) respectively.

US import prices for fresh yellowfin in 2019 marginally declined 2% to $9.96/kg relative to 2018. In US dollar terms, a significant decline was also seen with the yellowfin prices across all markets although a marginal increase (4%) was seen with the Japan fresh yellowfin import prices at selected ports. The Yaizu longline caught yellowfin declined 19% to average to $5.39/kg with fresh imports from Oceania at $8.92 (-12%) and frozen yellowfin at Japan selected ports at $5.80/kg (-20%).

Import volumes for fresh yellowfin into Japan and the US have seen a significant decline over the period to May 2020 by 36% and 33% respectively and this is largely caused by the Covid-19 pandemic in which has resulted in some vessels supplying fresh markets are being forced to stop operations.

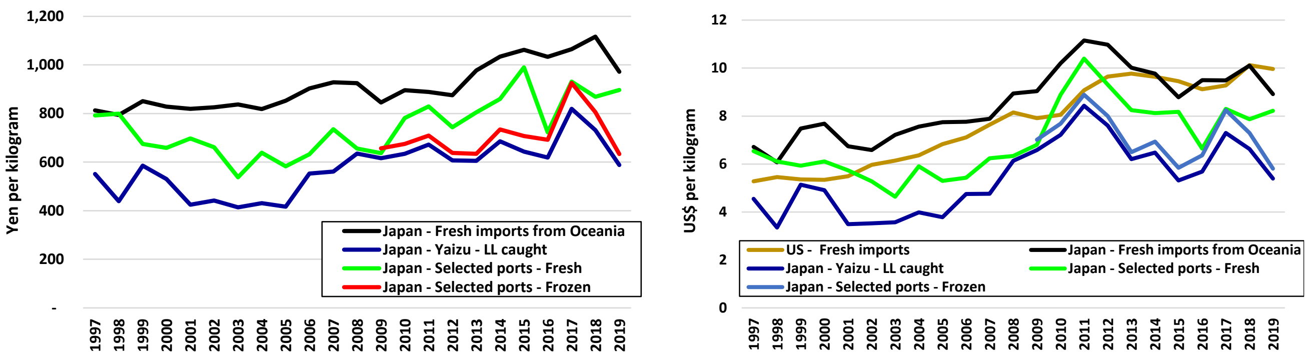


Figure 5.5.1 Japan and US Yellowfin in Yen (LHS) and US dollars (RHS)

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

Japan fresh bigeye import prices in 2019, from all markets were declining including the Japan selected ports frozen longline prices. The Japan imported fresh bigeye prices from Oceania and at selected ports in 2019 was averaged ¥1,048/kg (-13%) and ¥1,275/kg (-10%) respectively relative to 2018. Frozen prices at selected ports also decreased to ¥976/kg, a decline of 9% from the previous year.

The price of fresh bigeye imports into the US remained high as $9.70/kg although a slight decline of 1% on 2018. In US dollar terms, the 2019 fresh prices from Oceania declined by 12% to $9.61 and the fresh prices at selected ports declined by 9% to 11.70/kg. Frozen prices in US dollar terms also declined by 7% to $8.95/kg.

Over the first five months of 2020, however, US fresh bigeye imports prices from the world have been increasing to as high as $10.40/kg in May, a 7% increase relative to the same period last year.

Import volumes for fresh bigeye into Japan and the US have also seen a significant decline over the first five months in 2020 by 29% and 43% respectively relative to the same period in 2019 and this is largely caused by the Covid-19 pandemic.

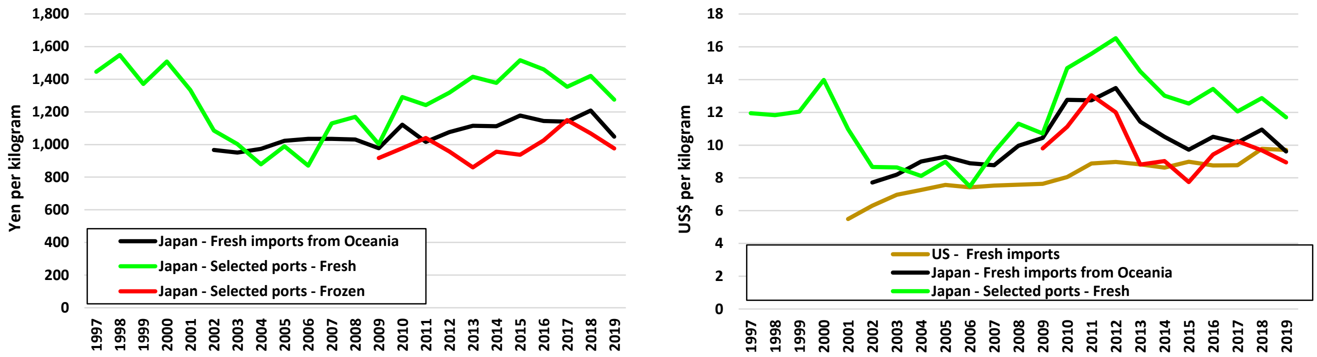


Figure 5.5.2 Japan and US bigeye prices in Yen (LHS) and US dollars (RHS)

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

The albacore prices from all across the markets have been on an upward trend with the Thai frozen import prices (c&f) rising 18% in 2019 to average $3.96/kg which is the highest on record. Albacore prices in 2020 have come of their recent highs but remained at relatively high levels with Thai imports averaging $3.74/kg during May.

Import volumes for frozen albacore into Thailand over the period to May 2020 was increased by 16% compared to the same period in 2019. This may be due to, at least in part, the disruptions in longline caught yellowfin and bigeye markets resulting in some vessels shifting to targeting albacore.

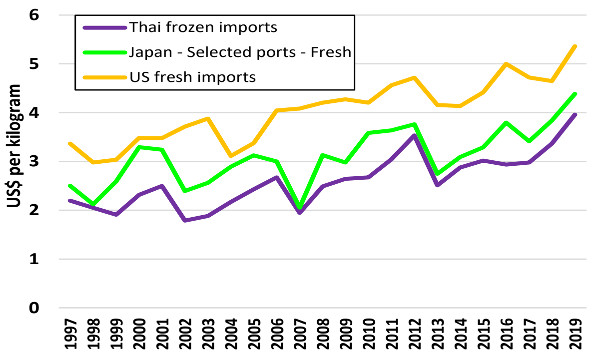


Figure 5.5.3 Albacore prices in US dollars

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

Japanese selected ports prices in USD for fresh albacore also increased by 14% in 2019 to average $4.38/kg (following a 13% rise the previous year) while the US imports average $5.36/kg, an increase of 15%.

Swordfish and striped marlin

The Japan fresh swordfish price at selected ports averaged at $10.04/kg in 2019, a rise of 13% (+12% in JPY terms) compared to 2018 while the US fresh swordfish price was moderately improved by 2% to $7.47/kg. The Japan fresh striped marlin price however was seen to be significantly declined by 19% (-20% in JPY terms) to $5.16/kg (¥562/kg), moving to its lowest level since in 2009.

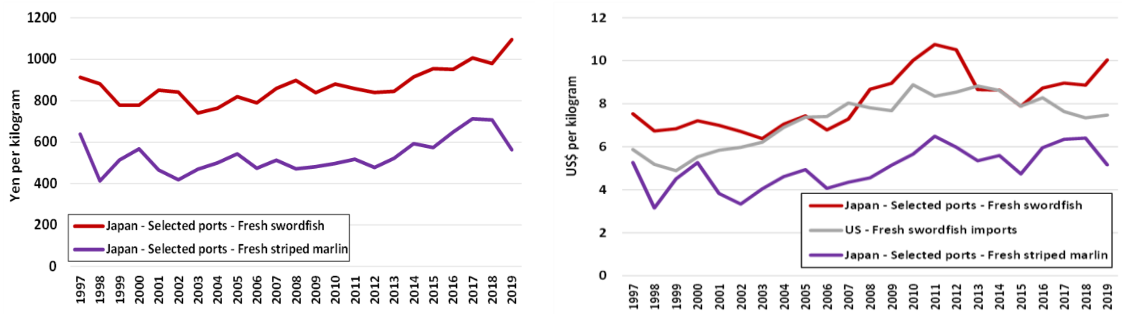


Figure 5.5.4 Japan and US swordfish and striped marlin prices in Yen (LHS) and US dollars (RHS)

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

5.5.2 Catch Value

The estimated delivered value of the longline tuna catch in the WCPFC area for 2019 is $1.61 billion. This represents a decline of $125 million (7%) on the estimated value of the catch in 2018.[10]

The value of all target species except albacore saw a significant decline with the yellowfin and bigeye catch value declined by $116 million (14%) and $73 million (11%) respectively, while the albacore catch value rose by $63 million (22%).

These declines where driven primarily by lower longline caught tuna prices for yellowfin and bigeye in 2019 relative to 2018 while the increase in the value of the albacore catch was driven by an 18% price increase.

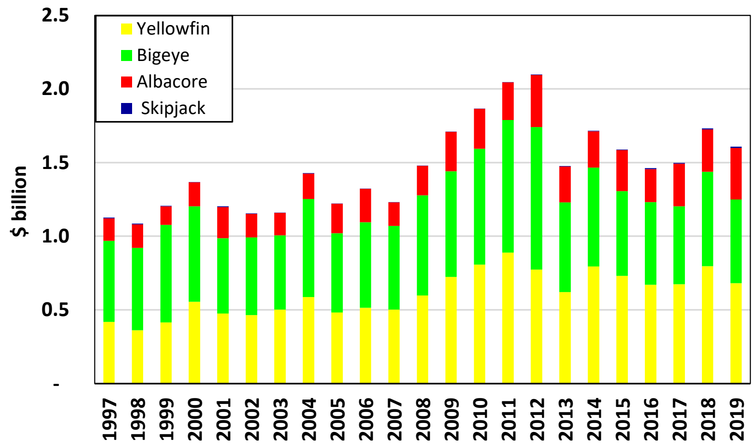


Figure 5.5.5 Value of the WCPFC-CA longline fishery tuna catch by species

[10] 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.

5.5.3 Economic conditions

Economic conditions in the longline fishery are examined for two areas, these are referred to as the southern longline fishery, that is, the longline fishery south of 10ºS in the WPCFC-CA and the tropical longline fishery, that is, the longline fishery between 10ºN and 10ºS in the WPCFC-CA excluding the waters of Indonesia, Philippines and Vietnam.

Southern Longline

The southern logline fishery index has been at below average levels since 2010. From 2011 to 2014, the economic conditions were particularly poor as a result of low catch rates and high fuel prices despite exceptionally high fish prices in 2011 and 2012. Economic conditions improved significantly between 2014 and 2017 to be higher than the 20-year average in 2016 and 2017 as catch rates increased and fuel costs declined while prices remained around their long-term average. Despite, relatively high fish prices in 2018 and in particular for 2019, and low fuel prices in 2019, the index declined as a result of falls in the catch rate.

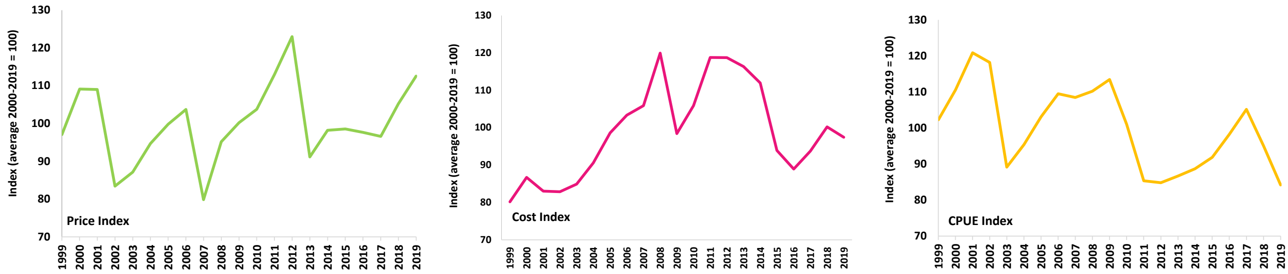


Figure 5.5.6 Southern longline fishery economic conditions component indexes

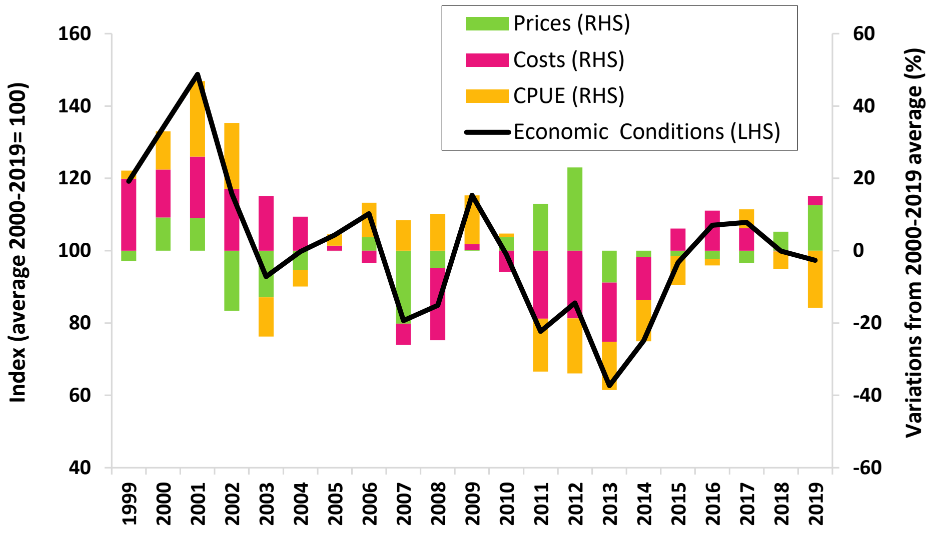


Figure 5.5.7 Southern longline economic conditions index (LHS) and variance of component indices against average (1999-2017) conditions (RHS)

Tropical longline

The index for the tropical longline fishery has been below average levels since 2011 driven primarily by below average catch rates. However, between 2013 and 2016, the index recovered as fuel costs fell and catch rates recovered conditions returned in 2016 to above 20-year average levels for the first time since 2010. Following the economic conditions improvement in 2016, the index continued to deteriorated as fuel prices rose and catch rates fell driving the index back below the 20-year average. Effort fell to 20-year lows in 2017 before rebound sharply in 2018 however, catch rates continued the recent decline that began in 2015 following the sharp increase in 2014. In 2019, the small increases in catch rates and reductions in fuel costs saw the economic conditions remain stable despite a decline in fish prices. .

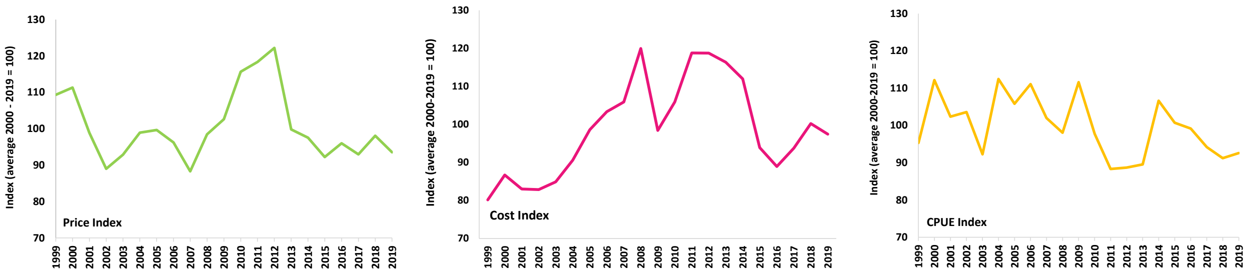


Figure 5.5.8 Tropical longline fishery economic conditions component indexes

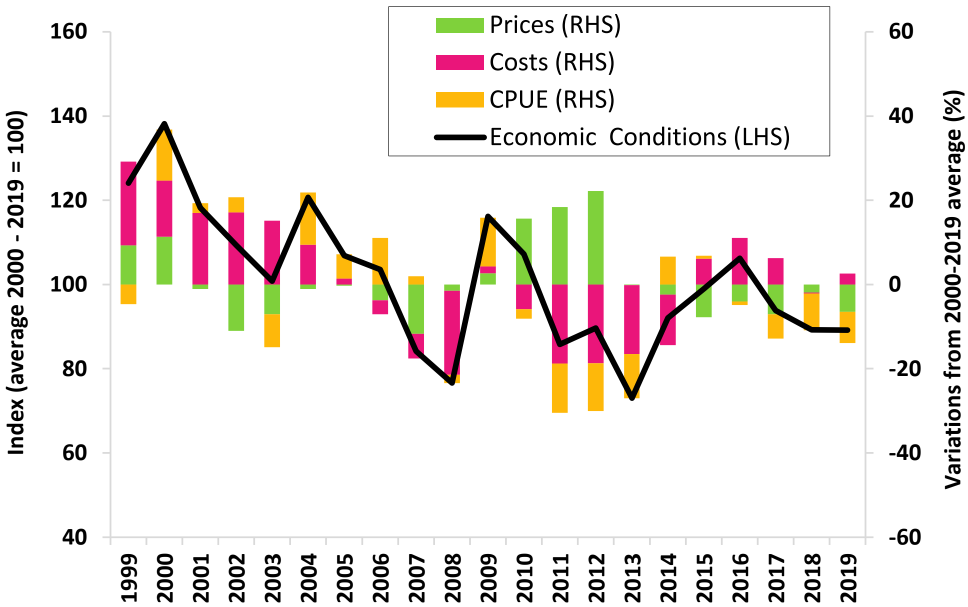


Figure 5.5.9 Tropical longline economic conditions index (LHS) and variance of component indices against average (1999-2017) conditions (RHS)

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 2,000–4,000 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 (albacore for canning), and by expectations concerning likely fishing success.

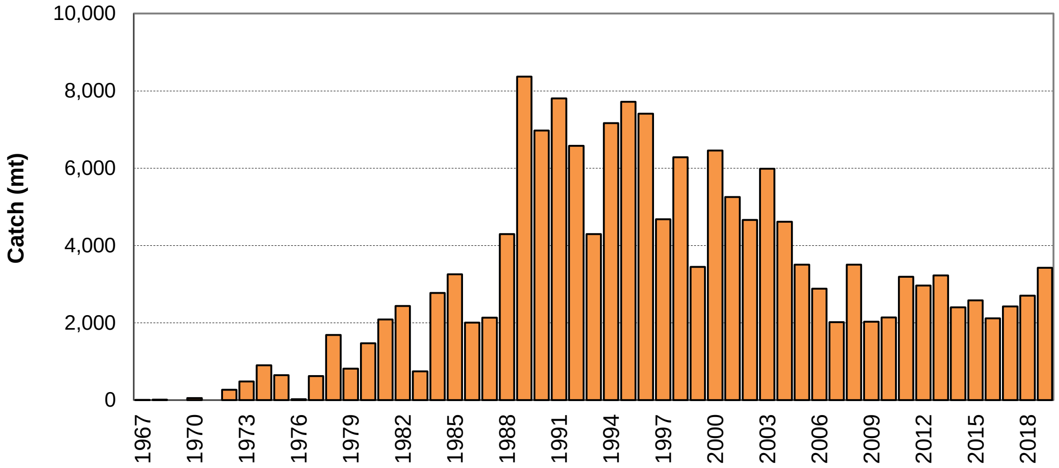


Figure 6.1.1 Troll catch (mt) of albacore in the south Pacific Ocean

6.2 Provisional catch estimates (2019)

The 2019 South Pacific troll albacore catch (3,425 mt) was the highest catch since 2008 (3,502 mt). The New Zealand troll fleet (144 vessels catching 2,272 mt in 2019) and the United States troll fleet (16 vessels catching 475 mt in 2019) accounted for all of the 2019 albacore troll catch, although minor contributions have also come from the Canadian, the Cook Islands and French Polynesian fleets when their fleets were active in the past.

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.

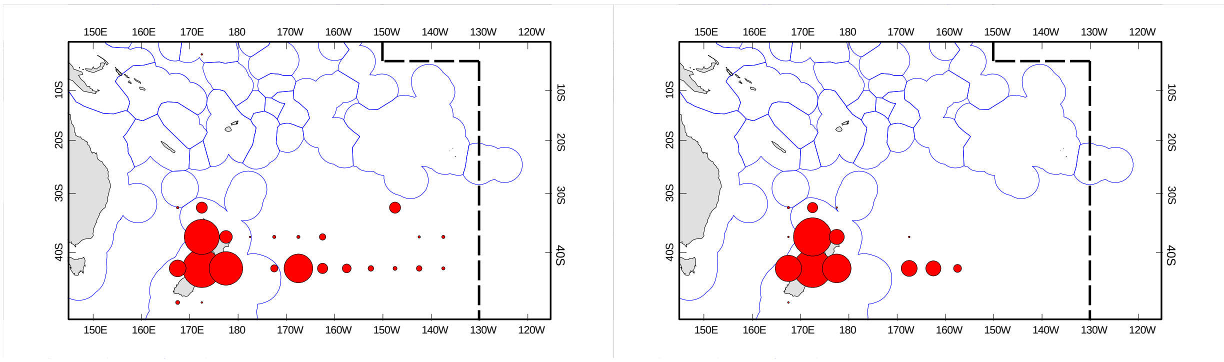


Figure 6.2.1 Distribution of South Pacific troll effort during 2018 (left) and 2019 (right)

7 OTHER FISHERIES

There are a number of other, mainly small-scale, fisheries in the WCP–CA that target the key tuna species, including the 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

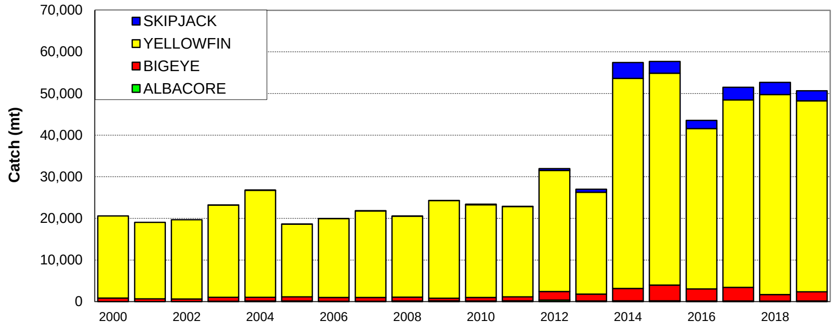


Figure 7.1.1 WCP–CA large-fish Handline catch (mt) by species

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 can be comprised of both small craft and larger vessels (> 24m or > 20GT). 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 dominate 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).

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

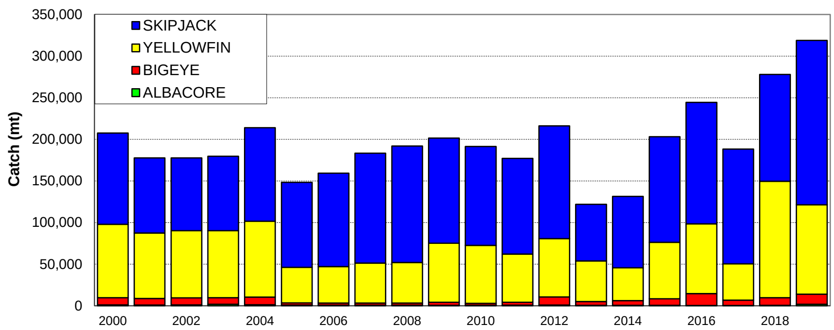


Figure 7.2.1 WCP–CA troll / hook-and-line catch (mt) by species

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 catch 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 large increase in 2019 is mainly due to the provisional nature of the Indonesia estimate. The species composition tends to fluctuate with some years having a high proportion of small yellowfin tuna (e.g. in 2018 the small yellowfin tuna catch was estimated to be 53% 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.

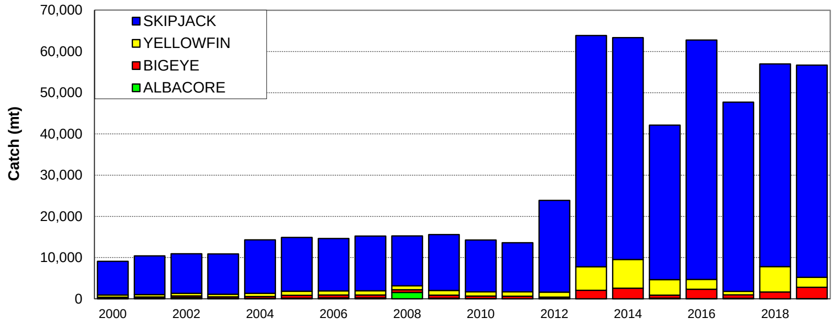


Figure 7.3.1 WCP–CA small-scale gillnet catch (mt) by species

The available annual catch estimates (Figure 7.3.1) are probably only representative from 2013 onwards, when Indonesia first separated out the gillnet catch by species from their “other/unclassified gear” tuna catch estimates. The total tuna catch from the drift gillnet fishery has ranged from less than 40,000 mt to 64,000 mt over the seven years.

8. SUMMARY OF CATCH BY SPECIES

8.1 SKIPJACK

Total skipjack catches in the WCP–CA have increased steadily since 1970, 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.

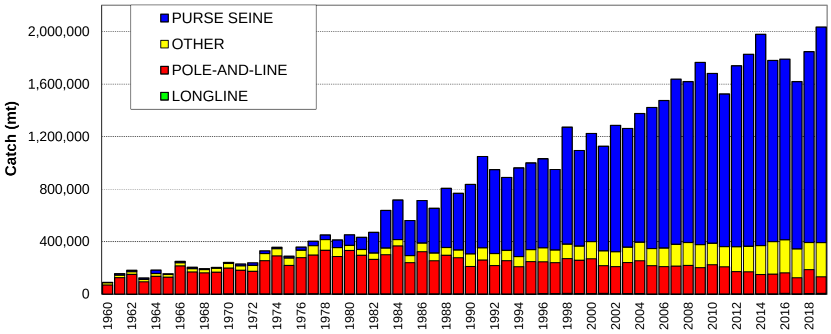


Figure 8.1.1 WCP–CA skipjack catch (mt) by gear

The 2019 WCP–CA skipjack catch of 2,034,230 mt was a record and around 45,000 mt higher than the previous record in 2014 (1,978,927 mt). Catch in the **purse-seine** fishery for 2019 (1,641,920 mt – 81%) was also a record and typically drives the trends in overall skipjack catch. The **pole-and-line** catch for 2019 (126,273 mt – 6%) was a reduction on the 2018 catch level and amongst lowest catches since 1963, mainly due to a reduction in the Indonesian catch. The various "**artisanal**" gears in the domestic fisheries including Indonesia, Philippines and Japan took 258,660 mt in 2019 (13% of the total catch) which was the highest ever recorded. The **longline** fishery accounted for less than 1% of the total catch.

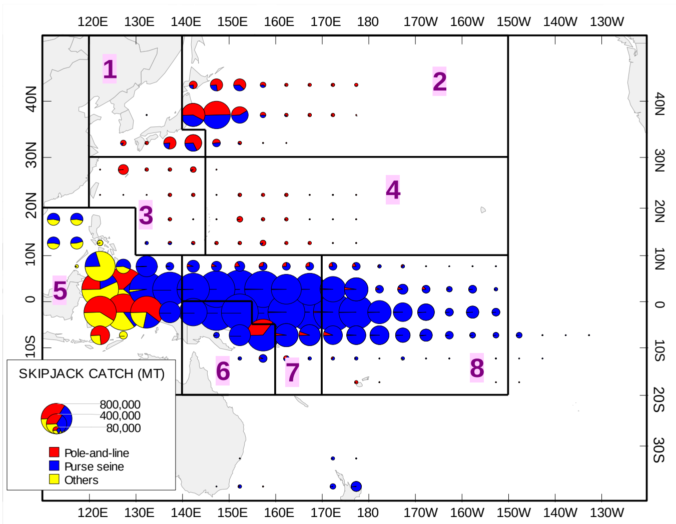


Figure 8.1.2 Distribution of skipjack tuna catch, 1990–2019.

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 2014). 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 2019 is similar to most years since 2013, although different to 2018 (Figure 8.1.4). Interestingly, there was a mode of large skipjack (65-75 cm) in the Indonesia pole-and-line and purse seine catch in 2019 (Figure 8.1.4 – yellow).

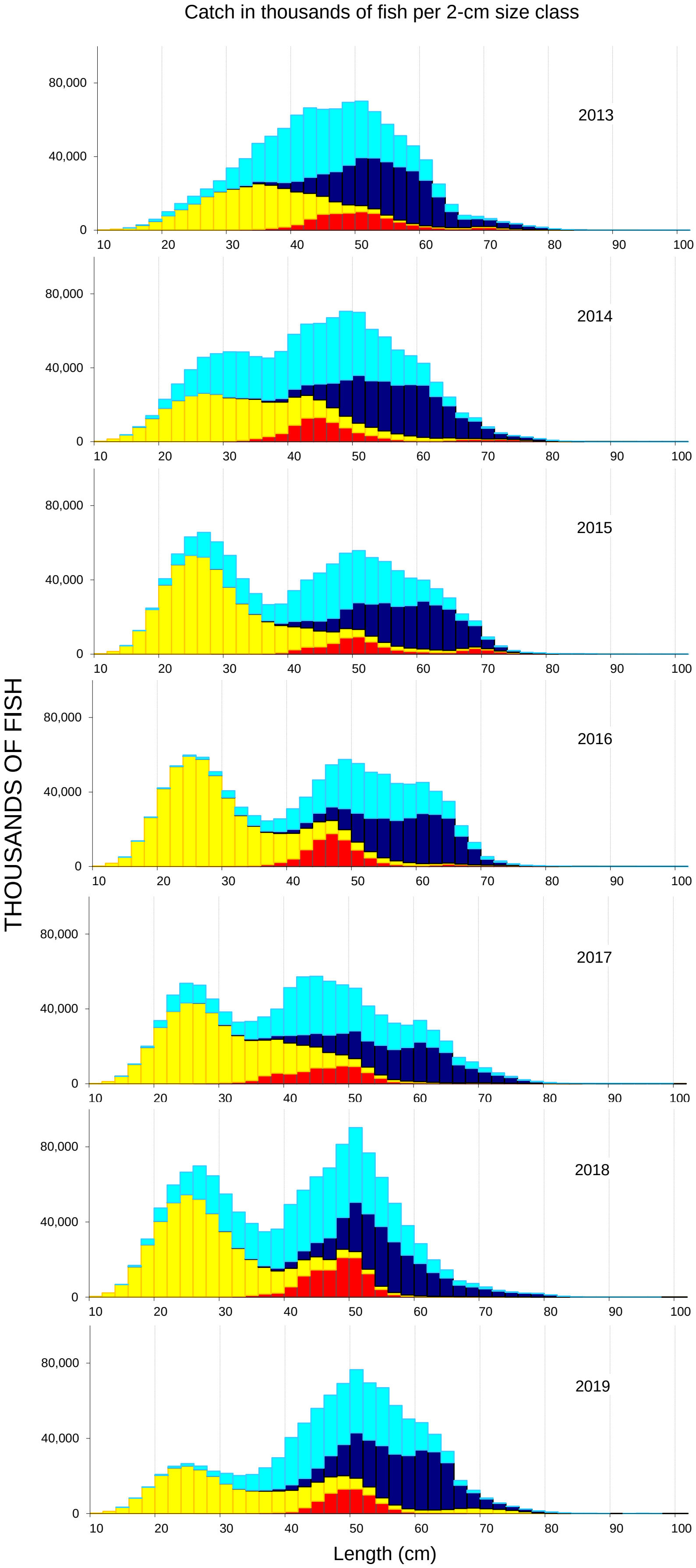


Figure 8.1.3 Annual catches (no. of fish) of skipjack tuna in the WCPO by size and gear type, 2013–2019.
(red–pole-and-line; yellow–Phil-Indo archipelagic fisheries; light blue–purse seine associated; dark blue–purse seine unassociated)

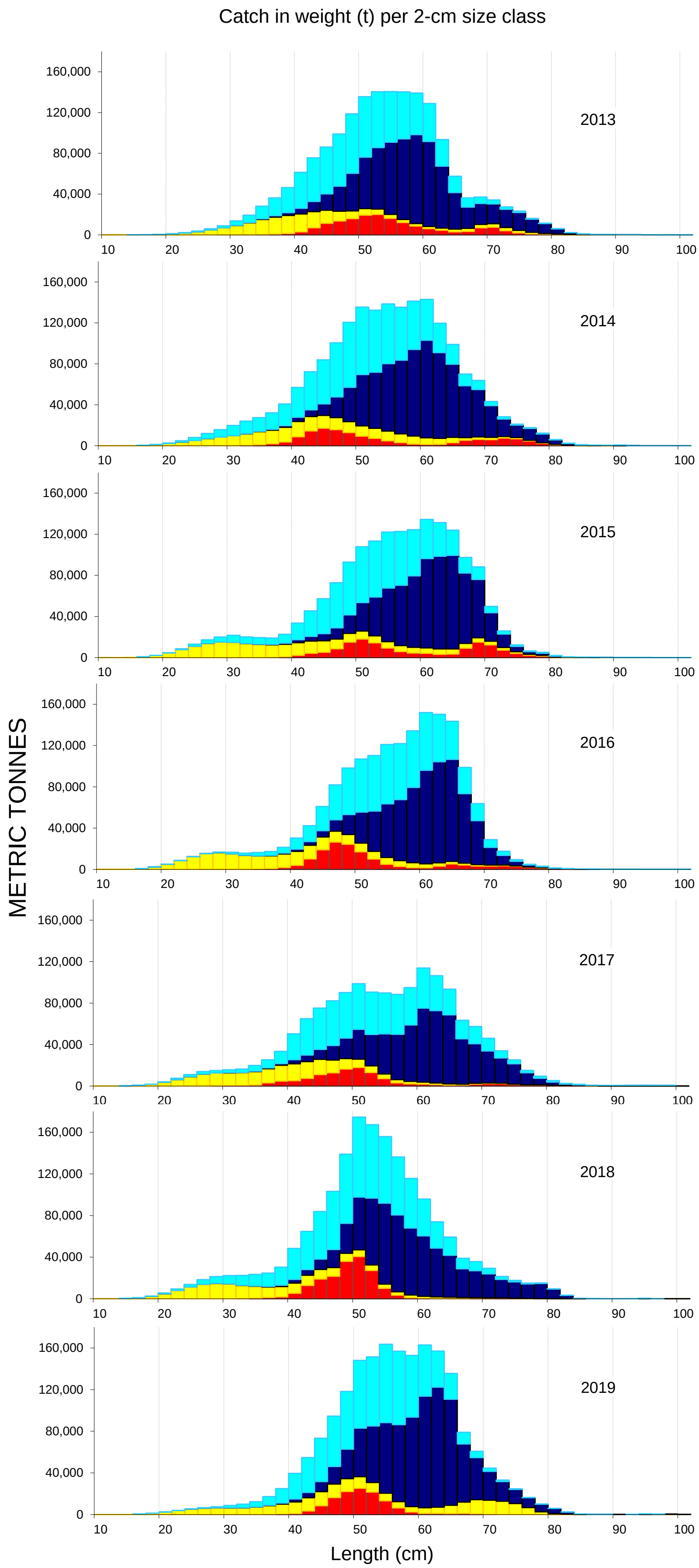


Figure 8.1.4 Annual catches (MT) of skipjack tuna in the WCPO by size and gear type, 2013–2019.
(red–pole-and-line; yellow–Phil-Indo archipelagic fisheries; light blue–purse seine associated; dark blue–purse seine unassociated)

8.2 YELLOWFIN

The total yellowfin 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 2019 yellowfin catch (**669,362 mt**) was the third highest on record, at around 44,000 mt less than the previous record in 2017. The high catches are related to some extent to recent high catch levels from the "other" category (primarily small-scale fisheries in Indonesia – provisional 2019 estimate for "Other" is 160,238 mt – 24% of the total catch).

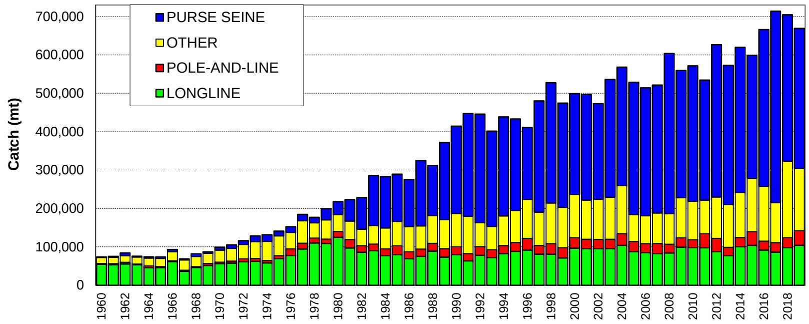


Figure 8.2.1 WCP–CA yellowfin catch (mt) by gear

The WCP–CA **longline** catch for 2019 (104,440 mt–16%) was the highest since 1980 (125,113 mt – the record catch year), but only 6,000 mt higher than the 2018 catch; notable increases in yellowfin catch in 2019 were by the Korean and Solomon Islands fleets. Since the late 1990s, the **purse-seine** catch of yellowfin tuna (364,571 mt in 2019–54%) has accounted for about 3-5 times the **longline** yellowfin catch.

The **pole-and-line** fisheries took 37,563 mt during 2019 (~6% of the total yellowfin catch) which is the highest on record and mainly due to the catches from the Indonesian pole-and-line fishery.

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 1990–2019. 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.

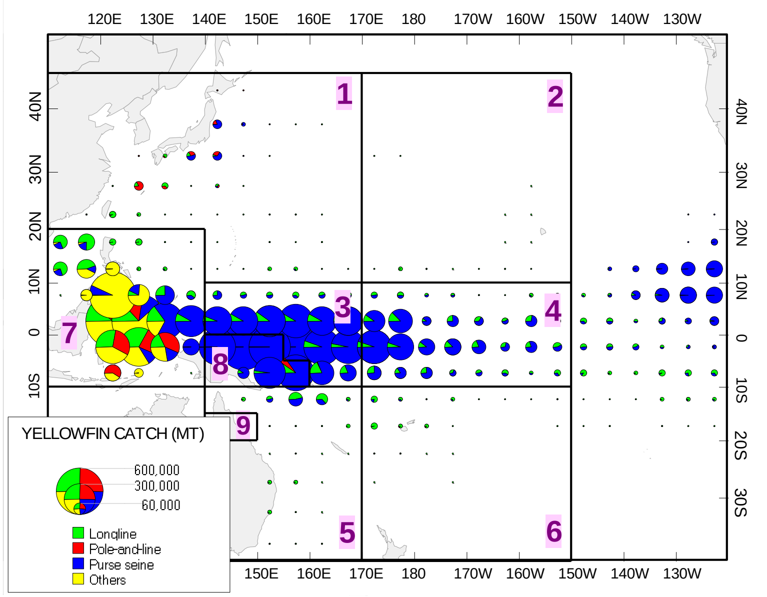


Figure 8.2.2 Distribution of yellowfin tuna catch in the WCP–CA, 1990–2019.

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; where generally larger yellowfin were targeted in the unassociated set category for the last two years (2018 and 2019) than for the previous five years (2013–2017; Figure 8.2.4). Note there are two modes of small fish (< 50 cm) and one mode of large fish (>100 cm from the handline gear) in the Indonesia/Philippines domestic fisheries over the past six years. Figures 3.4.7 and 3.4.8, and Section 3.6 also provide some insights into the distribution of purse-seine yellowfin catch by area and size.

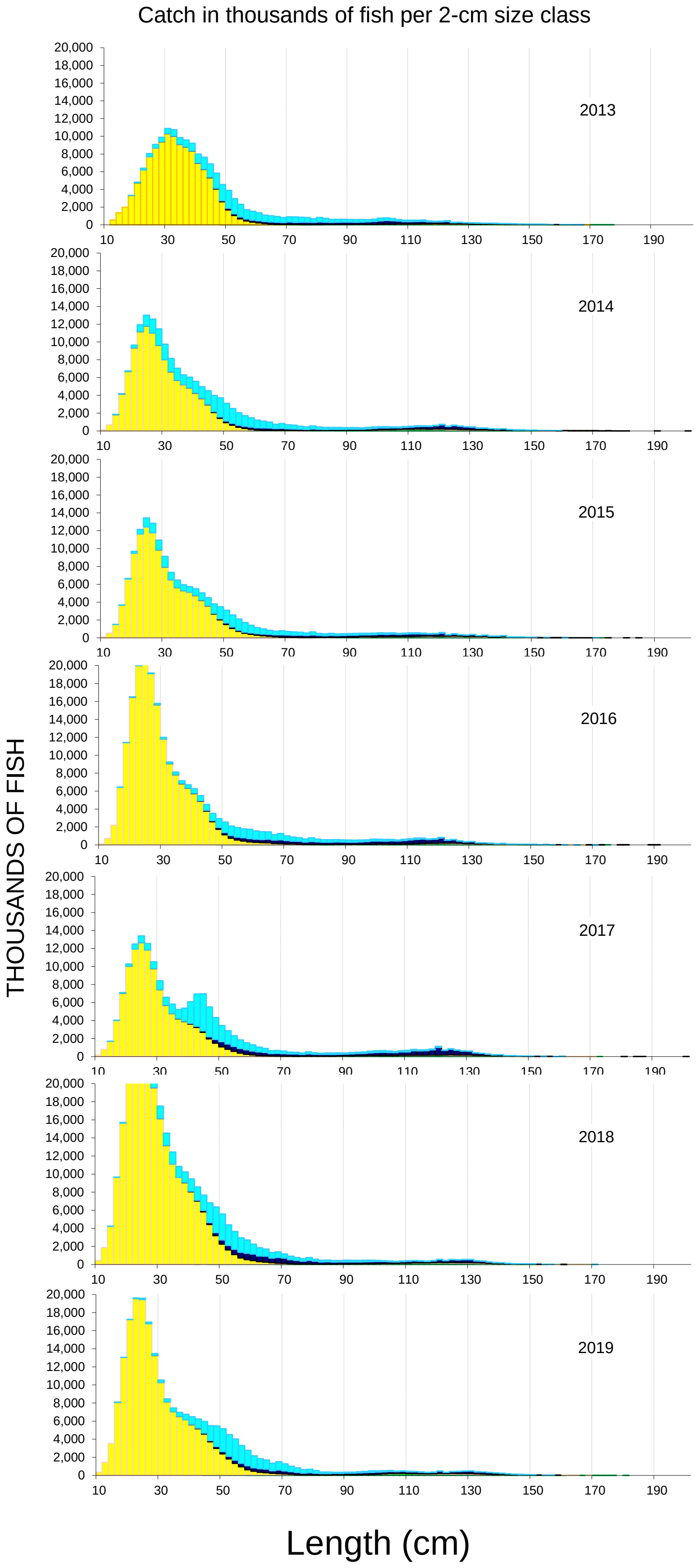


Figure 8.2.3 Annual catches (no. of fish) of yellowfin tuna in the WCPO by size and gear type, 2013–2019.
(green–longline; yellow–Phil-Indo archipelagic fisheries; light blue–purse seine associated; dark blue–purse seine unassociated)

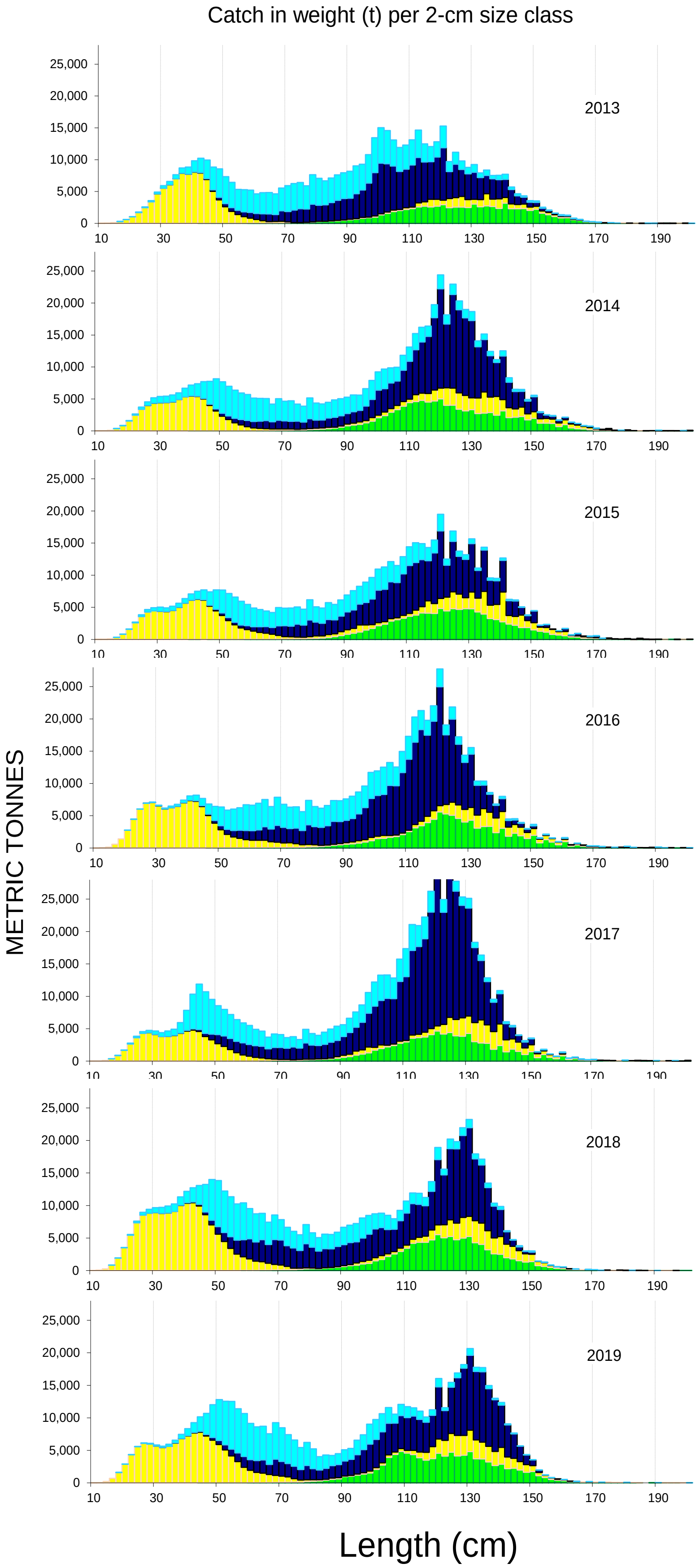


Figure 8.2.4 Annual catches (MT) of yellowfin tuna in the WCPO by size and gear type, 2013–2019.
(green–longline; yellow–Phil-Indo archipelagic fisheries; light blue–purse seine associated; dark blue–purse seine unassociated)

8.3 BIGEYE

The provisional **WCP-CA bigeye catch** (135,680 mt) for 2019 was lower than the recent ten-year average and amongst the lowest over the past two decades. The **WCP-CA longline** bigeye catch (68,371 mt) was slightly lower than the recent ten-year average. The provisional **WCP–CA purse seine** bigeye catch for 2019 was estimated to be 50,819 mt which was the lowest since 2003 (Figure 8.3.1), and mainly attributed to a reduced proportion of associated sets and a lower composition of bigeye tuna in those associated sets. In 2013, the WCP-CA purse-seine bigeye catch exceeded the longline catch for the first time, but the longline fishery catch in subsequent years was mostly higher than the purse seine fishery. The purse seine and longline fisheries accounted for 88% of the total WCP-CA bigeye catch in 2019.

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, Indonesian[11], 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.

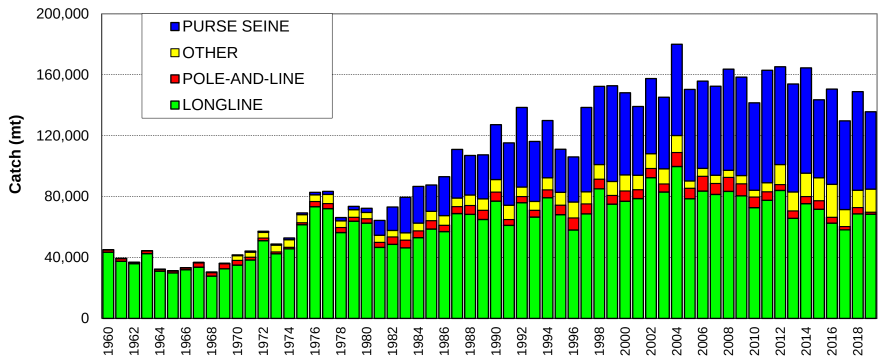


Figure 8.3.1 WCP–CA bigeye catch (mt) by gear

Figure 8.3.2 shows the spatial distribution of bigeye catch in the Pacific for the period 1990–2019. 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.

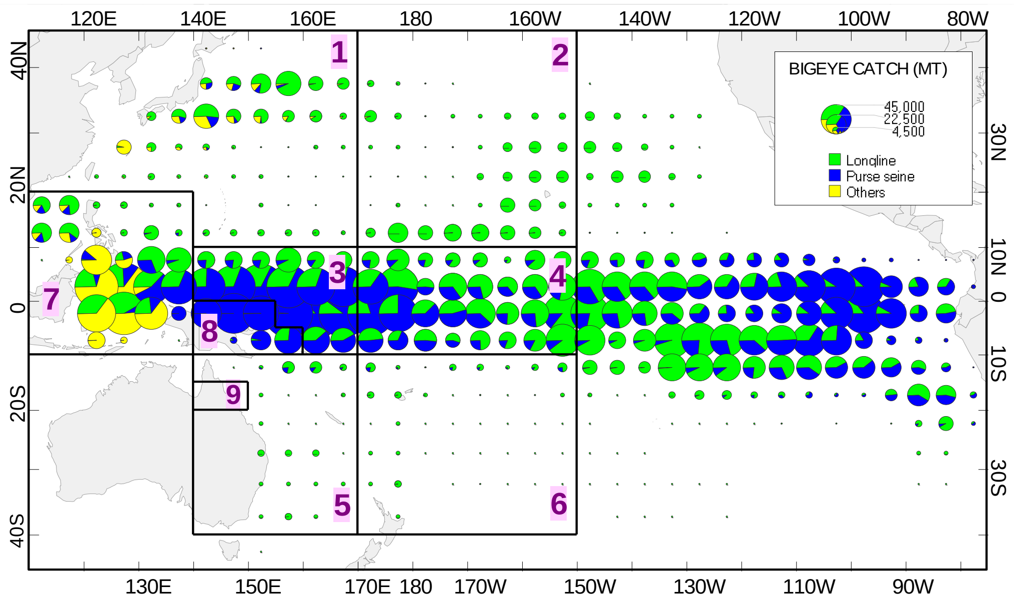


Figure 8.3.2 Distribution of bigeye tuna catch, 1990–2019.
The nine-region spatial stratification used in stock assessment for the WCP–CA is shown.

[11] Indonesia revised the proportion of catch by species for their domestic fisheries which has resulted in differences in species composition by gear type since 2000 compared to what has been reported in previous years. 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 is in contrast to 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.

There are several examples where a year class represented by the mode of fish in the size range of about 25-30 cm in the Philippines/Indonesian domestic fisheries, appears to progress to a mode of 50-60 cm in the purse seine associated in the following year, for example from 2018 to 2019 (Figure 8.3.3).

The graphs for 2019 show potentially four distinct modes (i) at 20-25 cm for the Philippines/Indonesia domestic fisheries, (ii) around 55-60 cm for the Philippines/Indonesia domestic fisheries and the purse seine associated fishery, (iii) around 80 cm for the purse seine associated fishery, and (iii) a broad mode at around 130-135 cm for the longline fishery.

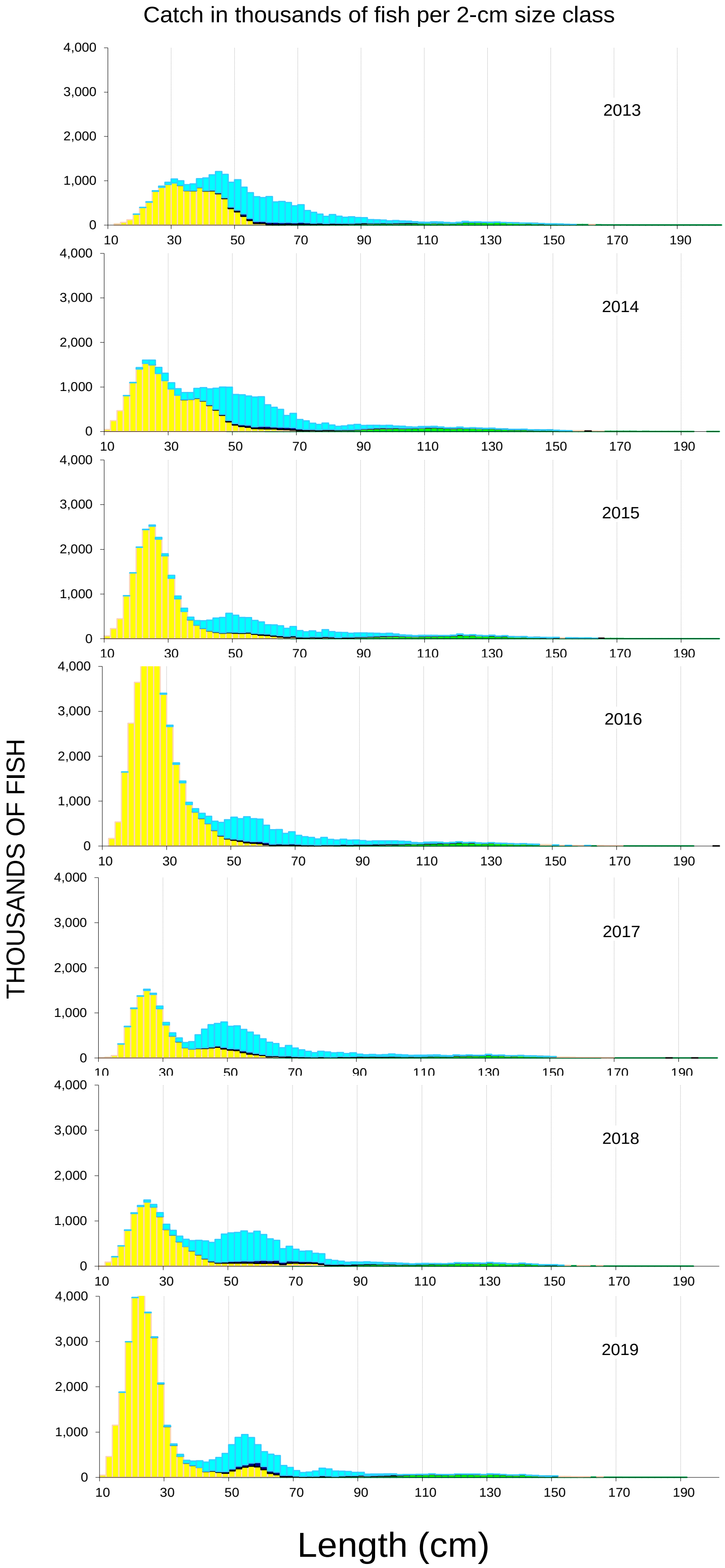


Figure 8.3.3 Annual catches (no. of fish) of bigeye tuna in the WCPO by size and gear type, 2013–2019.
(green–longline; yellow–Phil-Indo archipelagic fisheries; light blue–purse seine associated; dark blue–purse seine unassociated)

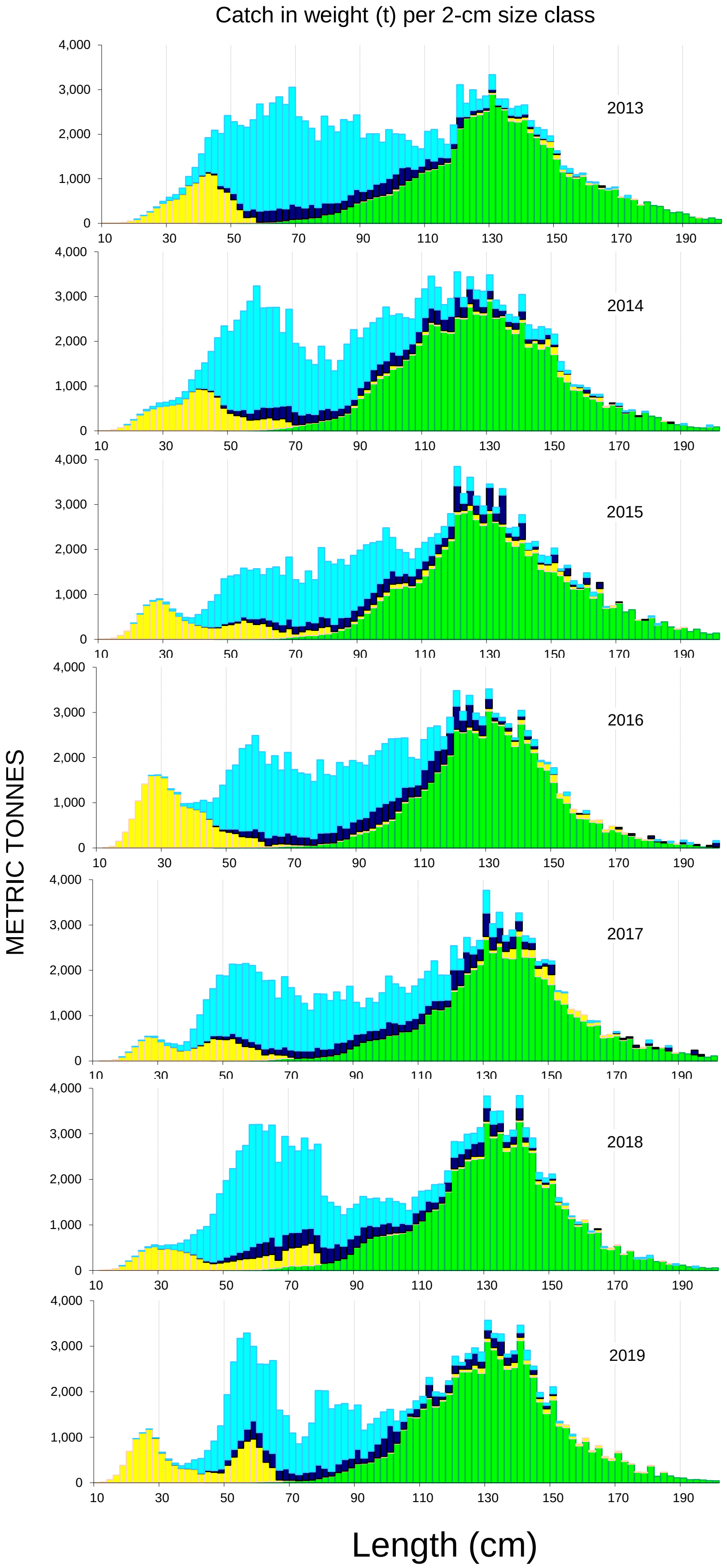


Figure 8.3.4 Annual catches (MT) of bigeye tuna in the WCPO by size and gear type, 2013–2019.
(green–longline; yellow–Phil-Indo archipelagic fisheries; light blue–purse seine associated; dark blue–purse seine unassociated)

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 **south Pacific albacore** catch in 2019 (86,706 mt), is amongst the highest for this fishery, with the record catch taken in 2017 (93,415 mt).

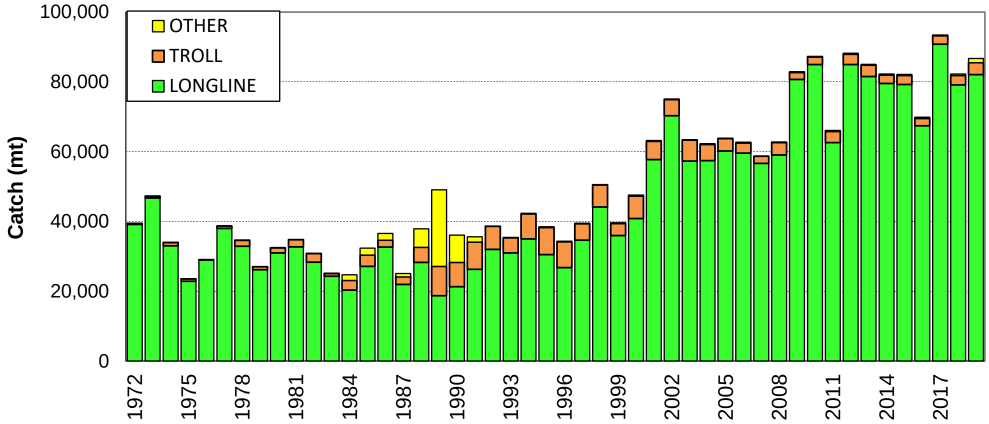


Figure 8.4.1 South Pacific albacore catch (mt) by gear ("Other" is primarily catch by the driftnet fishery.)

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), while the **troll** catch, for a season spanning November – April has generally been in the range of 3,000–8,000 mt (Figure 65), but has averaged <3,000 mt in recent years. The **WCP–CA** albacore catch includes catches from fisheries in the North Pacific Ocean west of 150°W (longline, pole-and-line and troll fisheries) and typically contributes around 80% of the Pacific catch of albacore (provisional Pacific Ocean albacore tuna catch for 2019 is 148,350 mt). The **WCP–CA albacore catch** for 2019 (121,787 mt) was 26,000 mt lower than the record (147,793 mt in 2002).

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 SCTZ**.** Less than 20% of the overall south Pacific albacore catch is usually taken east of 150°W.

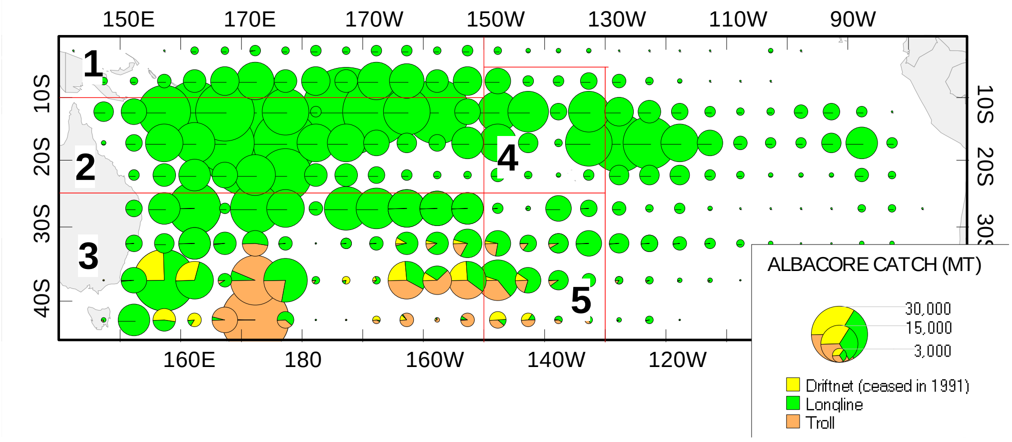


Figure 8.4.2 Distribution of South Pacific albacore tuna catch, 1988–2019.
The five-region spatial stratification used in stock assessment is shown.

The longline fishery takes adult albacore in the narrow size range of 90–105 cm and the troll fishery takes juvenile fish in the range of 45–80cm (Figure 8.4.3 and Figure 8.4.4). Juvenile albacore also appear 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 longline catch for 2019 was very similar to 2018 (and other years shown here).

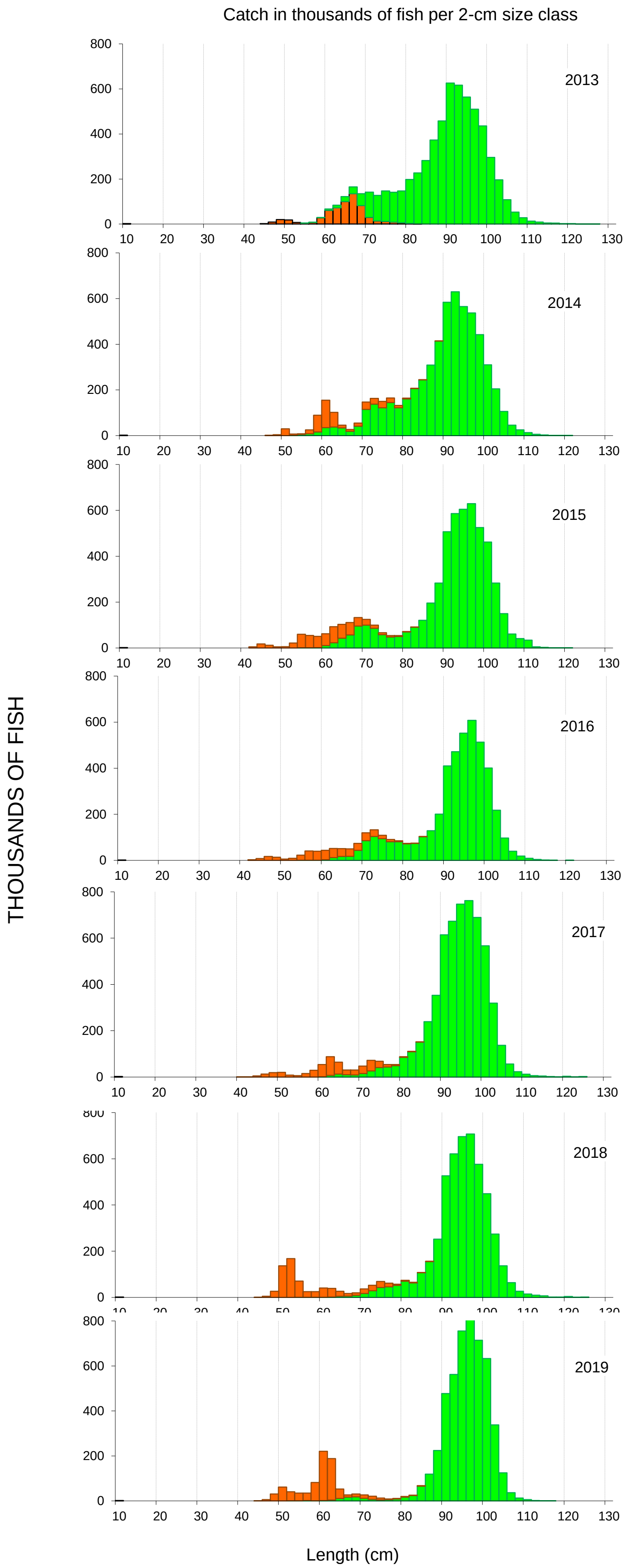


Figure 8.4.3 Annual catches (no. of fish) of albacore tuna in the South Pacific Ocean by size and gear type, 2013–2019. **(green–longline; orange–troll)**

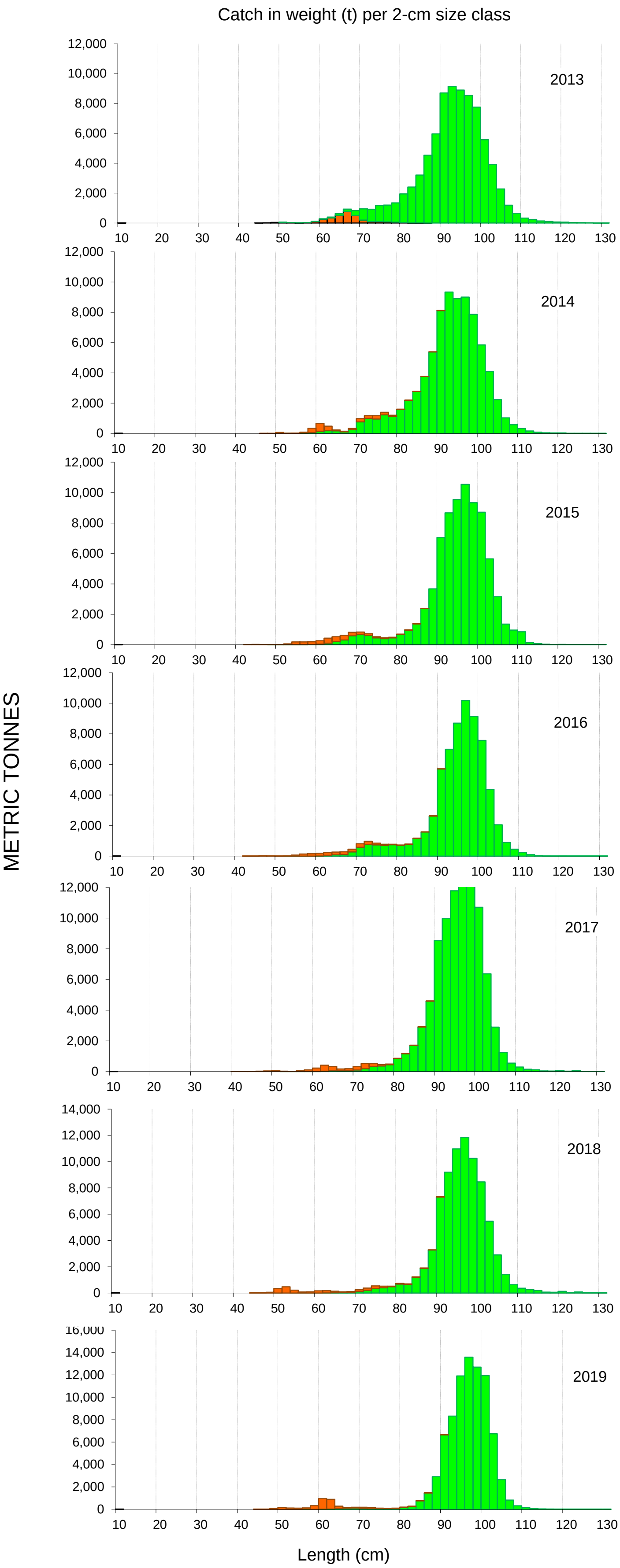


Figure 8.4.4 Annual catches (MT) of albacore tuna in the South Pacific Ocean by size and gear type, 2013–2019. **(green–longline; orange–troll);**

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 Spanish longline fleet (accounting for most of the OTHER category in Figure 8.5.1) targeting swordfish 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 2019 catch estimates for the South Pacific (18,682 mt) declined further from the record 2015 catch, mainly due to a reduction in distant-water Asian fleet catches, although 2019 estimates for some fleets were provisional at the time of writing this paper. The catch of swordfish for the WCP-CA south of the equator (Figure 8.5.2) in 2019 was 5,937 mt, a continuation in the decline of annual catches since 2012.

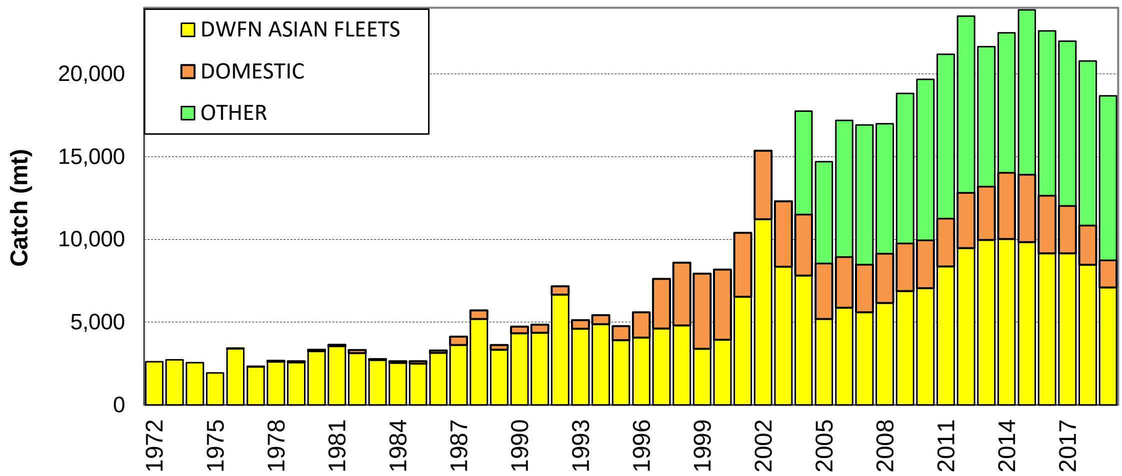


Figure 8.5.1 South Pacific longline swordfish catch (mt) by fleet

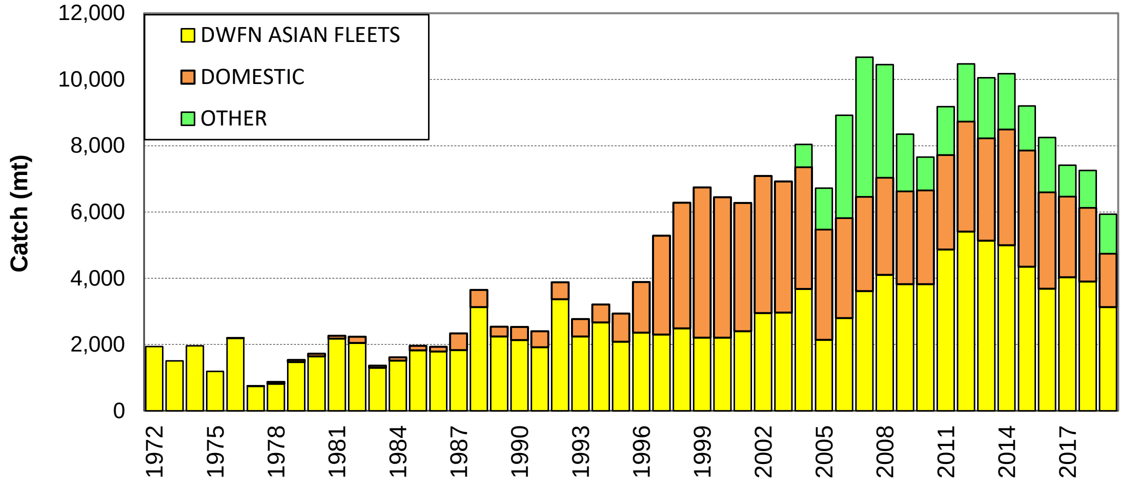


Figure 8.5.2 WCP–CA (south of equator) longline swordfish catch (mt) by fleet

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 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 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.

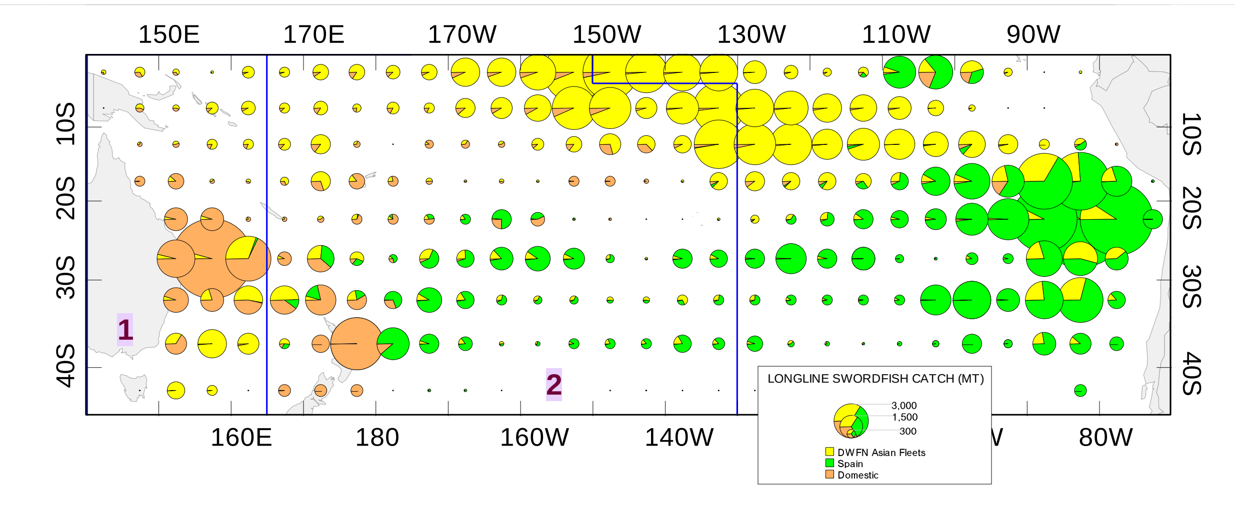


Figure 8.5.3 Distribution of South Pacific longline swordfish catch, 1995–2019.

The swordfish catch throughout the South Pacific Ocean are generally in the range of 110–250 cm, and 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 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).

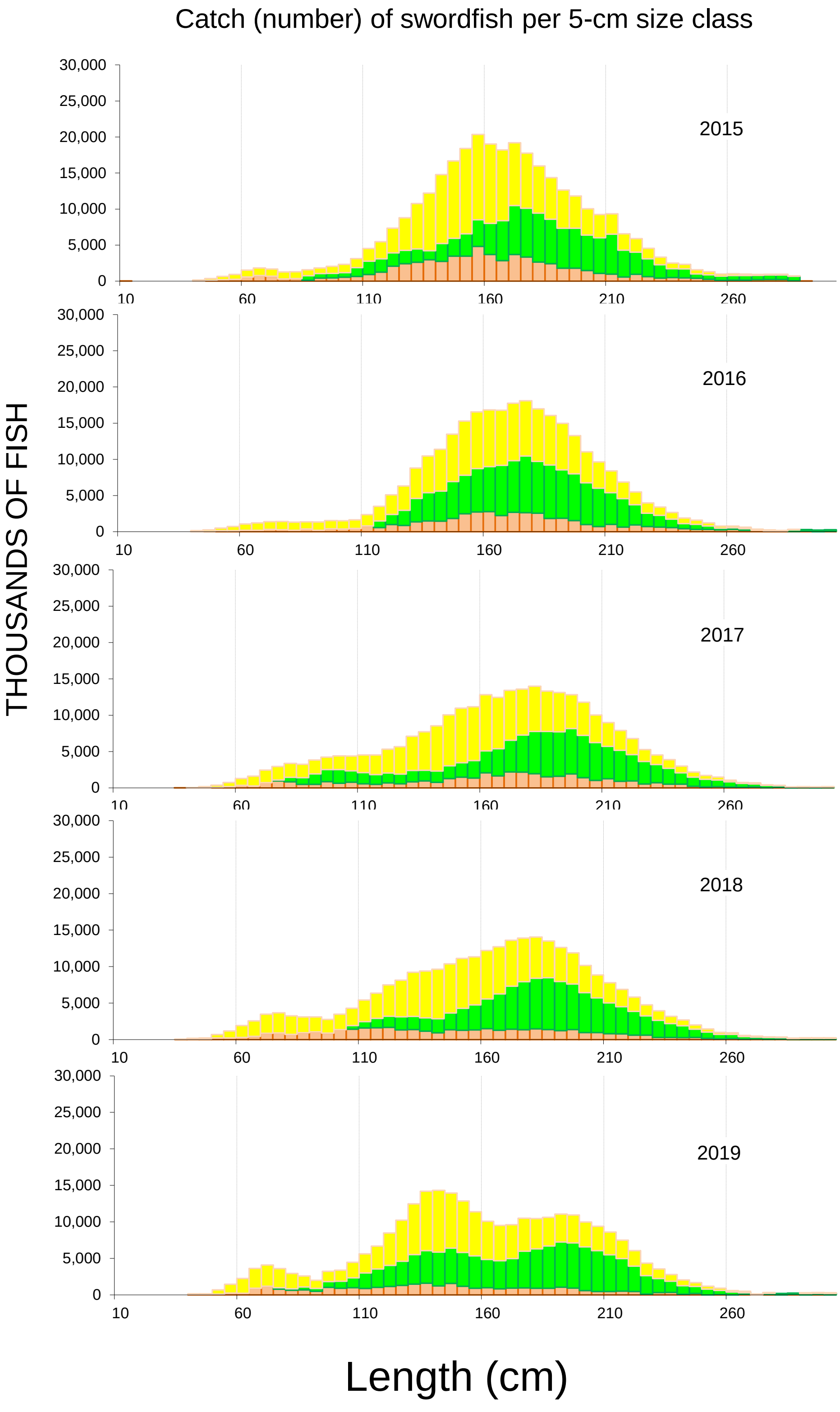


Figure 8.5.4 Annual catches (number of fish) of swordfish in the WCP–CA (south of the equator) by size and fleet, 2015–2019. **(green–Spanish fleet catch; yellow–distant-water Asian fleet catch; orange– Domestic fleets)**

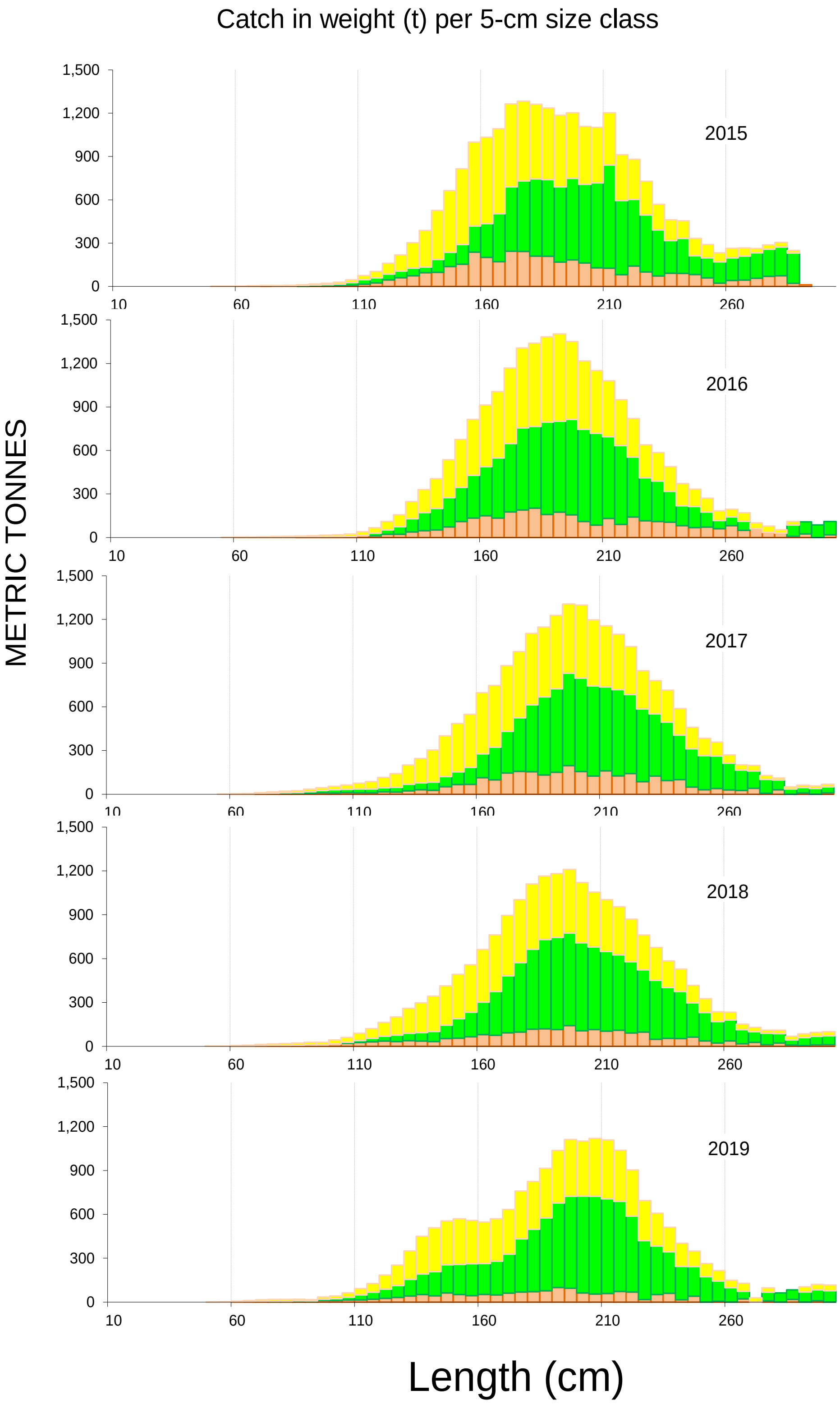


Figure 8.5.5 Annual catches (metric tonnes) of swordfish in the WCP–CA (south of the equator) by size and fleet, 2015–2019. **(green–Spanish fleet catch; yellow–distant-water Asian fleet catch; orange–Domestic fleets)**

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** (15,856 mt) for 2019 was similar to catches in recent years, but lower than the recent ten-year average (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).

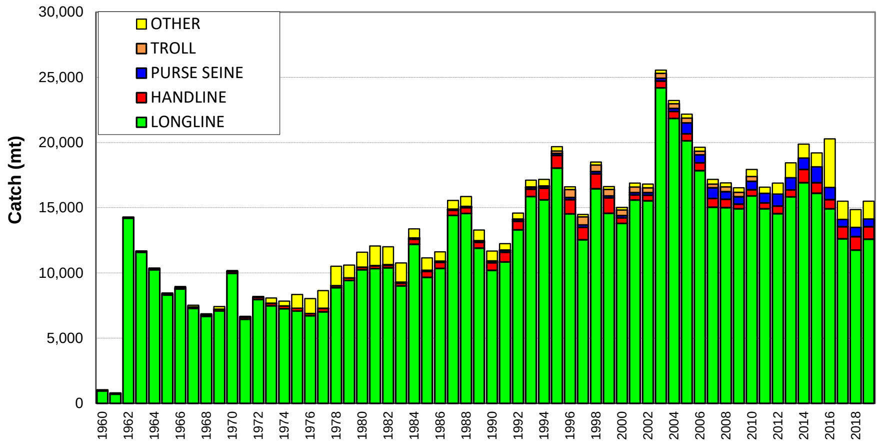


Figure 8.6.1 WCP–CA blue marlin catch (mt) by gear

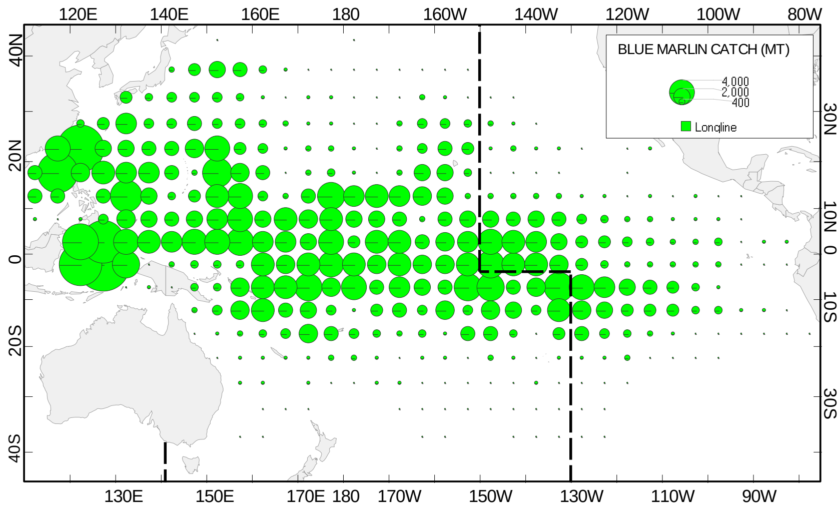


Figure 8.6.2 Distribution of longline Blue marlin catch in the Pacific Ocean, 1990–2019.

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** (1,748 mt) for 2019 was similar to recent years, but slightly lower than the recent ten-year average (Figure 8.6.3). 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.

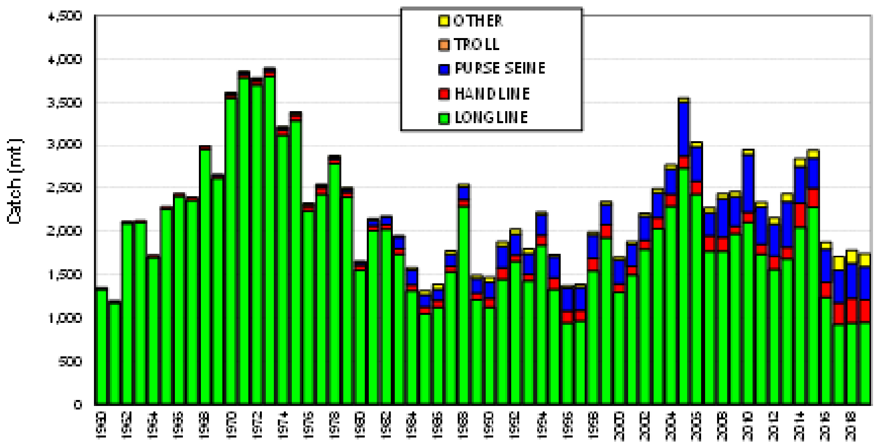


Figure 8.6.3 WCP–CA black marlin catch (mt) by gear

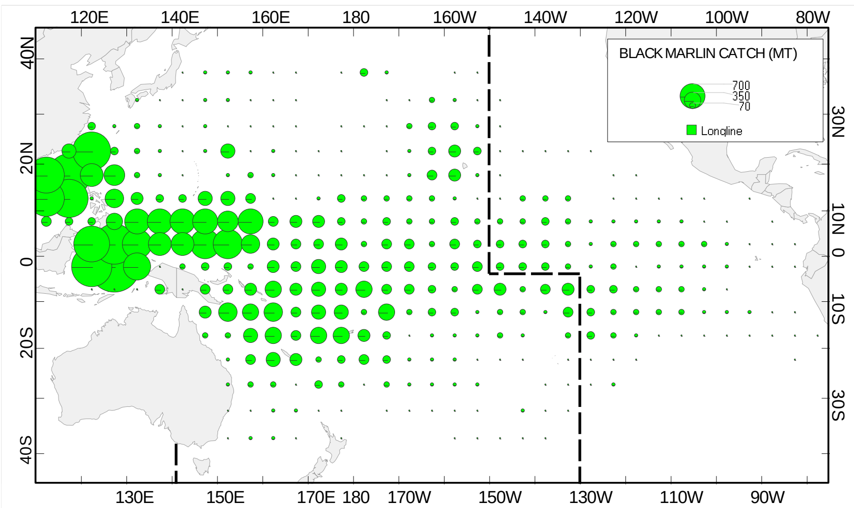


Figure 8.6.4 Distribution of longline Black marlin catch in the Pacific Ocean, 1990–2019.

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** (3,629 mt) for 2019 was slightly higher than 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.

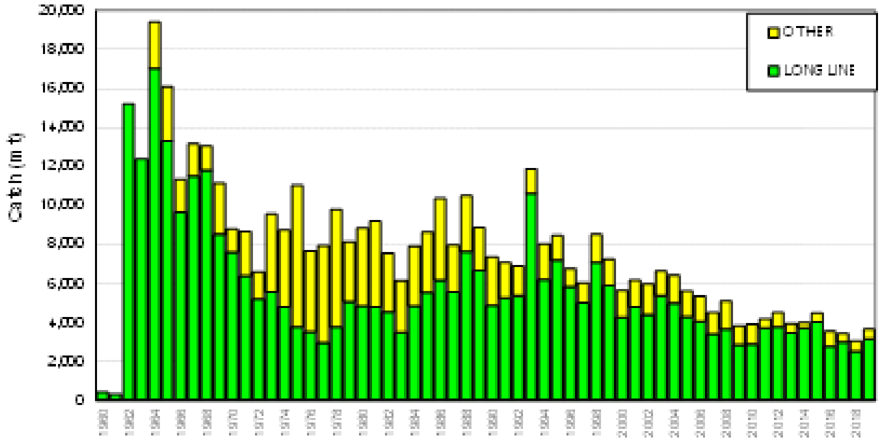


Figure 8.6.5 WCP–CA striped marlin catch (mt) by gear

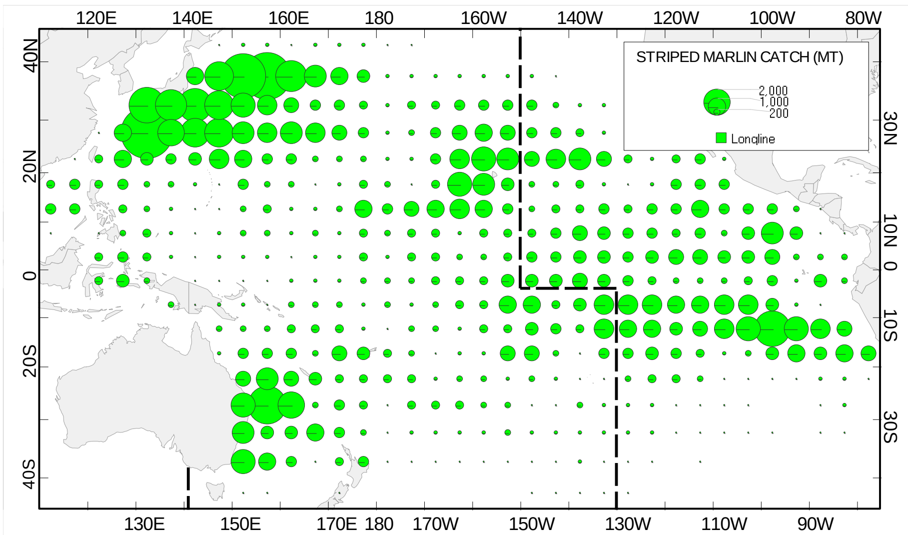


Figure 8.6.6 Distribution of longline Striped marlin catch in the Pacific Ocean, 1990–2019.

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[12] and the IATTC[13]. **North Pacific swordfish catch** (13,504 mt) for 2019 was slightly lower than catches in recent years (Figure 8.6.7). 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.

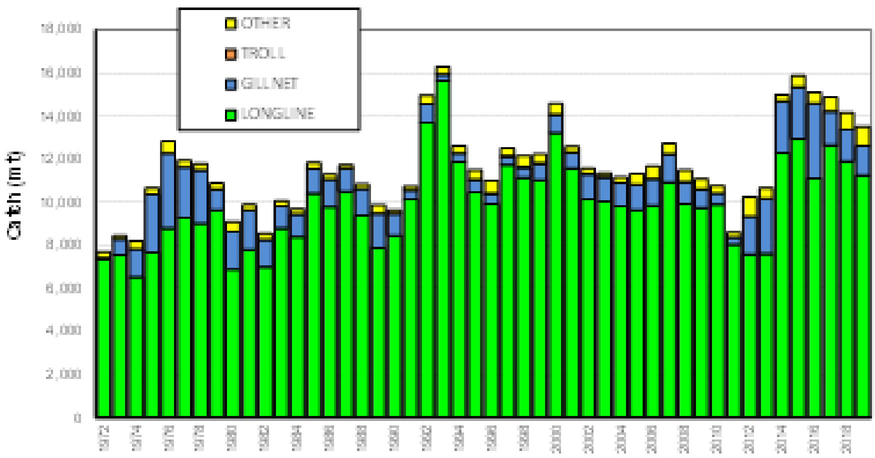


Figure 8.6.7 North Pacific Swordfish catch (mt) by gear

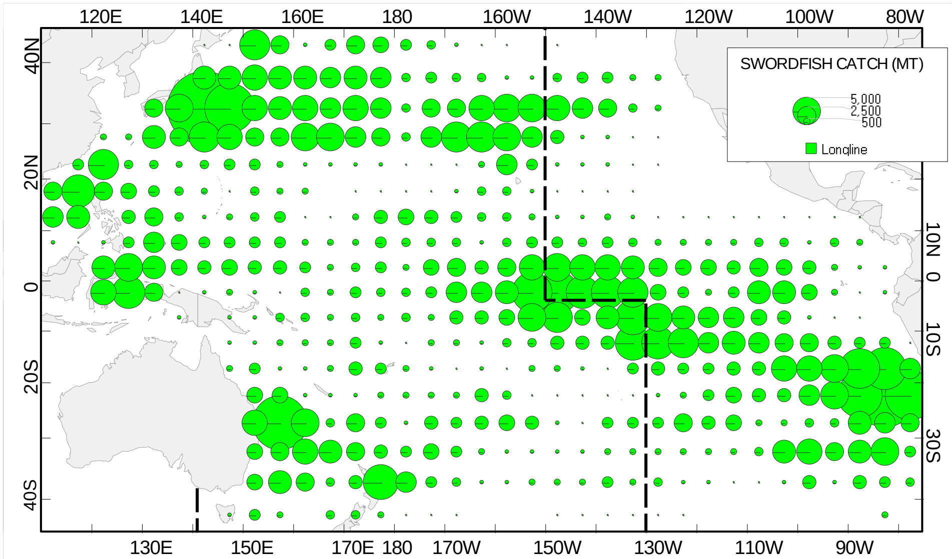


Figure 8.6.8 Distribution of longline Swordfish catch in the Pacific Ocean, 1990–2019.

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

[13] IATTC – Inter-American Tropical Tuna Commission

8.7 NORTH PACIFIC ALBACORE

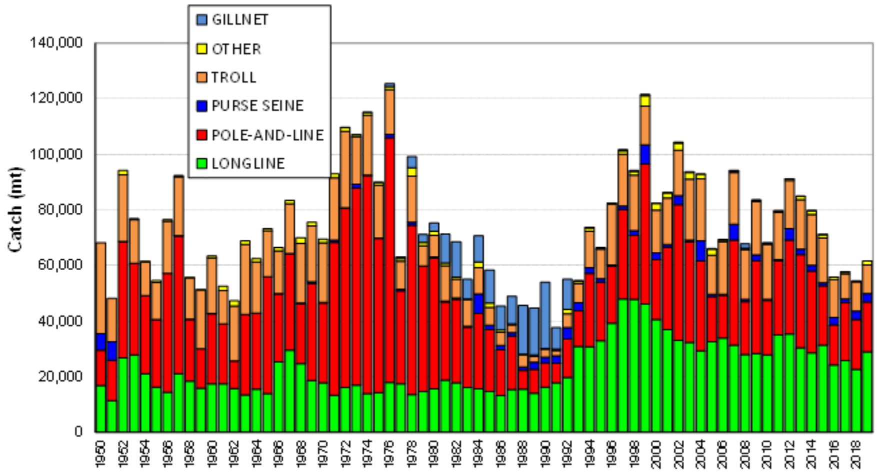


Figure 8.7.1 WCP–CA North Pacific Albacore catch (mt) by gear

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. **North Pacific albacore catch** (61,644 mt) for 2019 was slightly higher than catches in recent years (Figure 8.7.1), but clearly lower than the recent ten-year average.

8.8 NORTH PACIFIC BLUEFIN

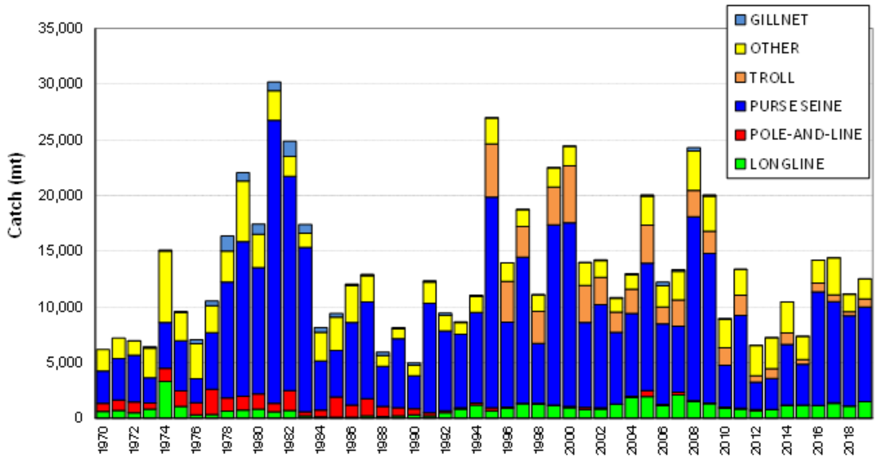


Figure 8.8.1 North Pacific Bluefin catch (mt) by gear

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. **North Pacific bluefin tuna catch** (12,512 mt) for 2019 is higher than the recent ten-year average (Figure 8.8.1), but clearly lower than the long-term average catch.

REFERENCES

OFP (2020). Estimates of annual catches in the WCPFC Statistical Area. Information Paper ST–IP–1. Sixteenth Regular Session of the Scientific Committee of the WCPFC (SC16). Online Meeting, 11–20 August 2020.

APPENDIX - ADDITIONAL INFORMATION

Table A1. Proportion of Longline SWORDFISH catch in the area north of 20°S in the WCPFC Convention Area south of the equator, 2000-2019. Source of data: AGGREGATE CATCH DATABASE; Excludes the Indonesian estimated SWORDFISH catches.

Year	WCPFC Area south of equator (MT)	North of 20°S in the WCPFC Area south of equator	
		MT	%
2000	5,263	1,923	37%
2001	5,949	2,180	37%
2002	8,668	3,843	44%
2003	6,516	3,192	49%
2004	7,634	3,663	48%
2005	6,672	2,354	35%
2006	8,848	3,369	38%
2007	9,455	2,940	31%
2008	8,838	4,137	47%
2009	7,495	4,282	57%
2010	6,259	3,468	55%
2011	8,461	4,971	59%
2012	8,792	4,900	56%
2013	8,237	4,595	56%
2014	8,535	4,793	56%
2015	8,226	4,198	51%
2016	6,746	3,482	52%
2017	6,820	3,853	56%
2018	7,062	3,928	56%
2019	5,721	3,086	54%
Average	7,510	3,658	49%

Table A2. Proportion of Longline SWORDFISH catch by 10° latitude band in the WCPFC Convention Area south of the equator, 2000-2019. Source of data: AGGREGATE CATCH DATABASE; Excludes the Indonesian estimated SWORDFISH catches.

Year	SWORDFISH CATCH - WCFPC Area south of equator									
	METRIC TONNES					%				
	0°-10°S	10°S-20°S	20°S-30°S	30°S-40°S	40°S-50°S	0°-10°S	10°S-20°S	20°S-30°S	30°S-40°S	40°S-50°S
2000	1,508	415	1,683	1,460	197	29%	8%	32%	28%	4%
2001	1,565	615	1,964	1,575	229	26%	10%	33%	26%	4%
2002	2,512	1,331	2,331	2,284	210	29%	15%	27%	26%	2%
2003	2,002	1,190	1,779	1,335	209	31%	18%	27%	20%	3%
2004	2,747	916	1,935	1,851	186	36%	12%	25%	24%	2%
2005	1,604	750	2,851	1,359	109	24%	11%	43%	20%	2%
2006	2,631	738	3,316	2,097	66	30%	8%	37%	24%	1%
2007	2,410	530	3,313	3,144	57	25%	6%	35%	33%	1%
2008	3,225	912	2,109	2,553	38	36%	10%	24%	29%	0%
2009	2,756	1,526	1,459	1,642	112	37%	20%	19%	22%	1%
2010	2,285	1,183	1,223	1,506	62	36%	19%	20%	24%	1%
2011	3,548	1,423	1,442	1,924	125	42%	17%	17%	23%	1%
2012	3,520	1,380	1,526	2,205	161	40%	16%	17%	25%	2%
2013	3,060	1,534	1,658	1,769	215	37%	19%	20%	21%	3%
2014	3,535	1,259	2,054	1,477	210	41%	15%	24%	17%	2%
2015	3,174	1,024	2,222	1,487	319	39%	12%	27%	18%	4%
2016	2,008	1,473	1,584	1,446	234	30%	22%	23%	21%	3%
2017	2,227	1,626	1,618	1,200	150	33%	24%	24%	18%	2%
2018	2,868	1,060	1,446	1,519	169	41%	15%	20%	22%	2%
2019	1,527	1,559	1,292	1,243	101	27%	27%	23%	22%	2%
Average	2,536	1,122	1,940	1,754	158	34%	15%	26%	23%	2%

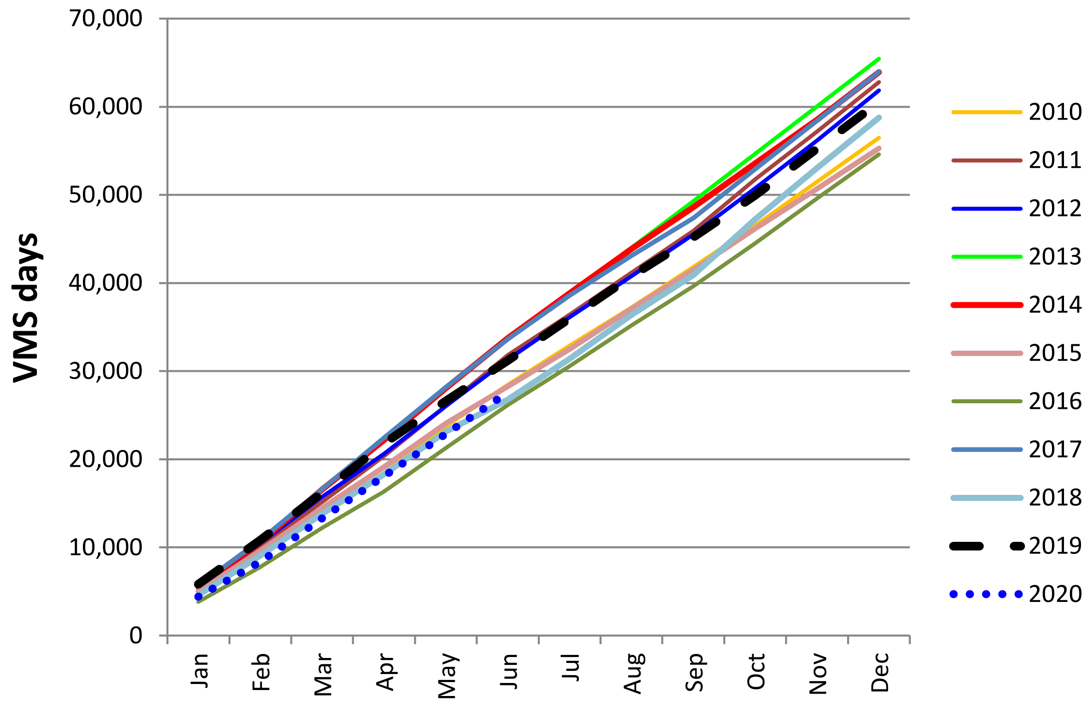


Figure A1. Cumulative tropical purse seine effort by month, 2009-2020, as measured by VMS
(excludes days in port and an estimation of days in transit; updated 11th August 2020)

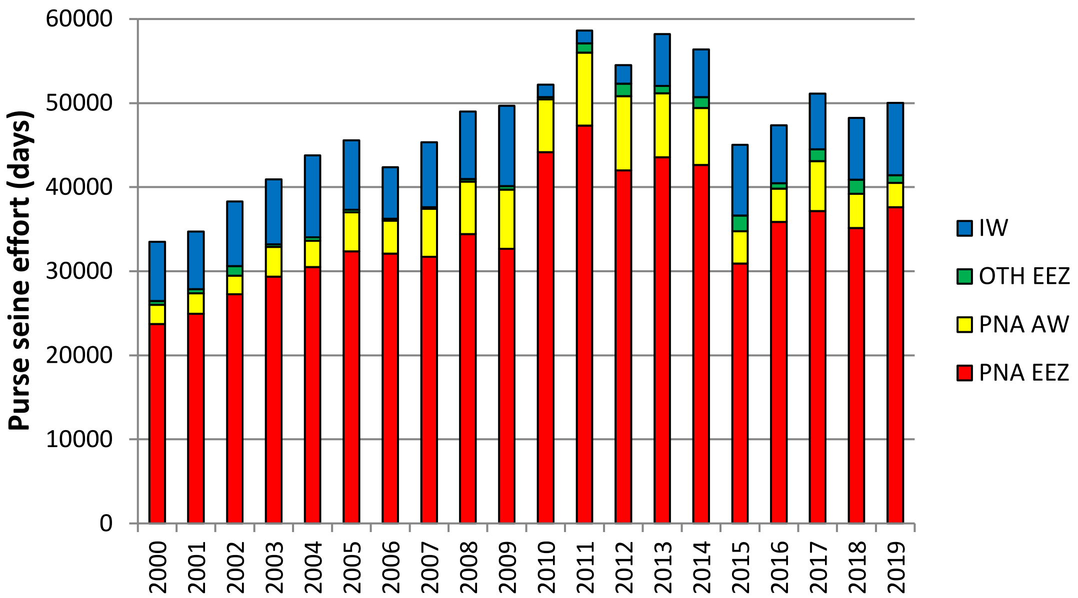


Figure A2. Purse seine effort (days fishing and searching) in the WCPFC Convention Area between 20°N and 20°S, excluding domestic purse seine effort in Philippines and Indonesia. Estimates are based on raised logsheet data.

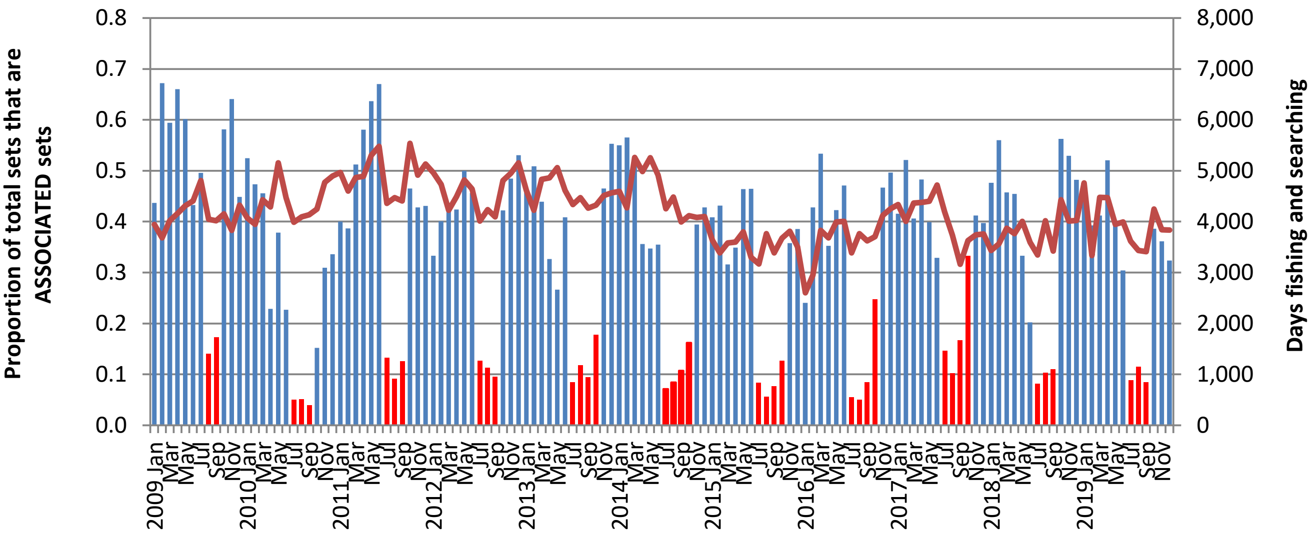


Figure A3. Proportion of the total purse seine fishing activity comprising associated sets, as indicated by logsheet data. Red bars indicate the FAD closure months. Total effort in days is shown by the plotted line. Activities in the domestic purse seine fisheries of Indonesia and Philippines are excluded.

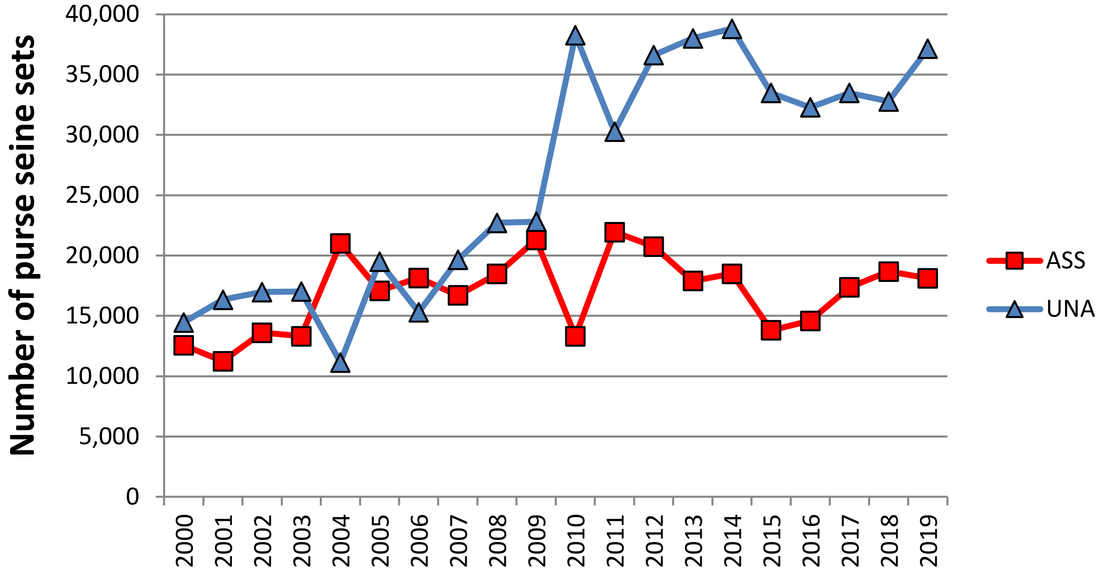
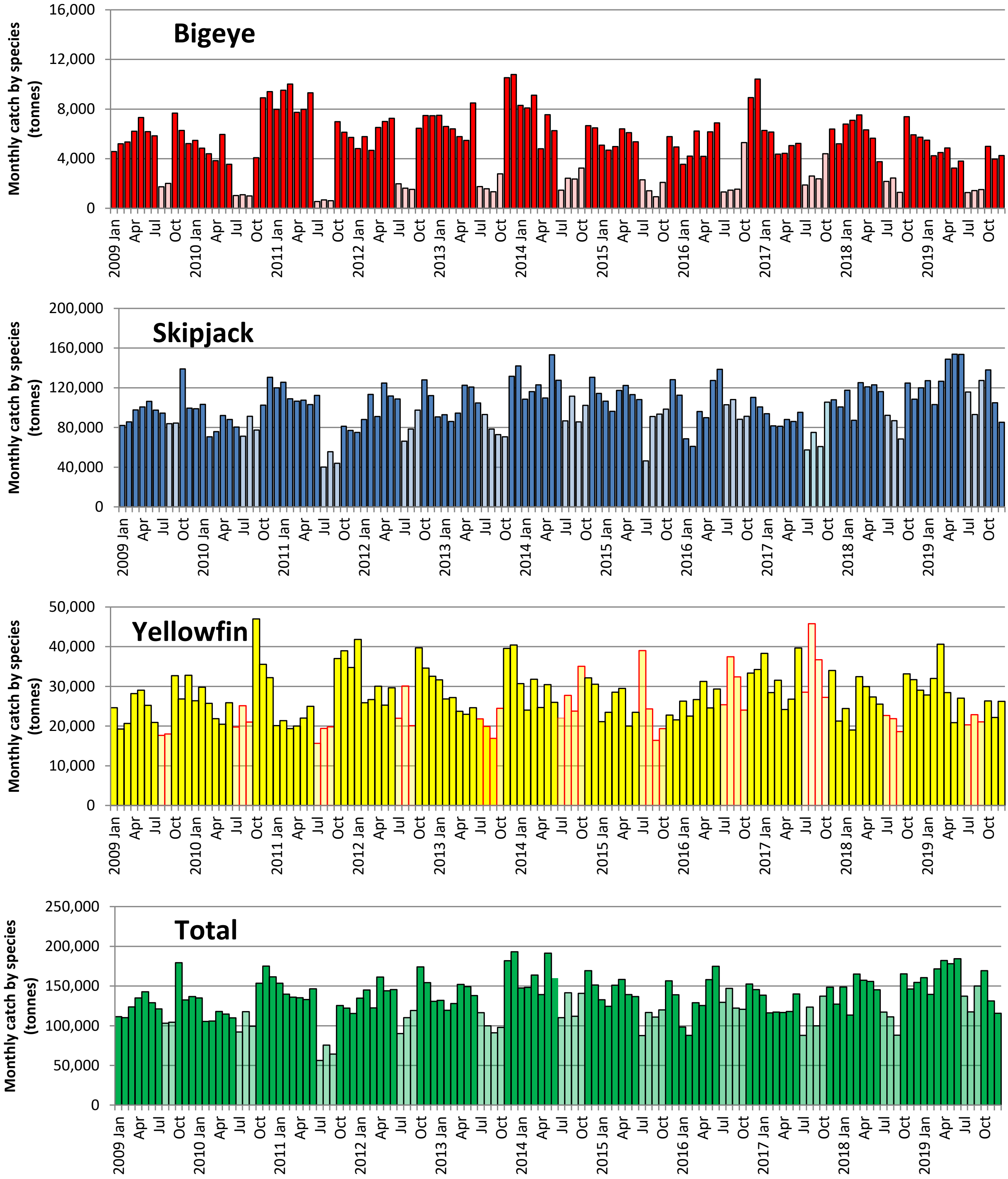


Figure A4. Number of associated (ASS) and unassociated (UNA) sets made in the WCPO tropical purse seine fishery, 2000 – 2019. Activities in the domestic purse seine fisheries of Indonesia and Philippines are excluded. Associated sets include animal-associated sets.



FigureA5. Monthly catch by species (raised logsheet data with species composition adjusted using observer sampling with grab sample bias correction). FAD closure months are shaded in lighter colour. Data excludes the domestic fisheries of Indonesia and Philippines.

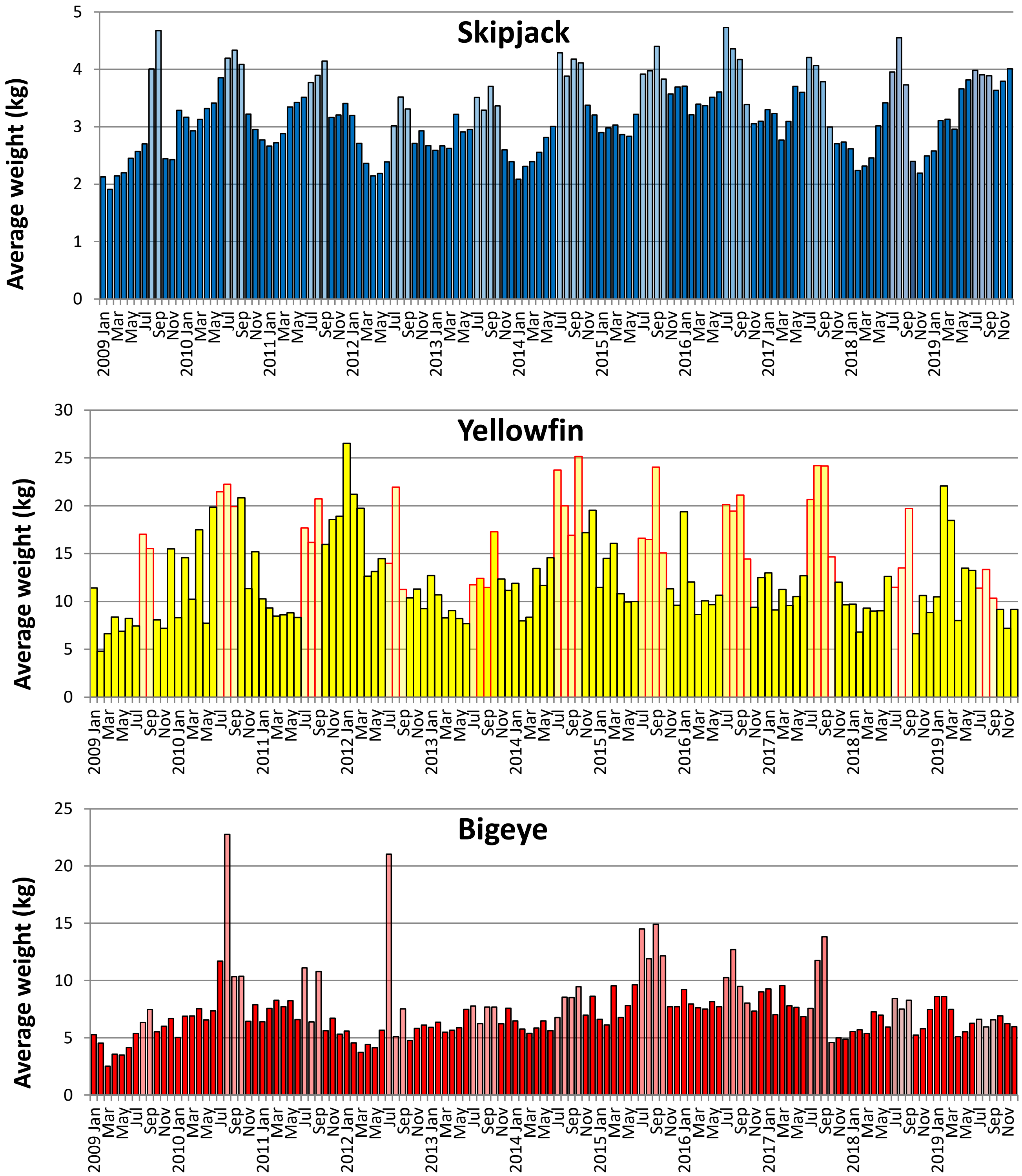


Figure A6. Monthly average weight of bigeye, skipjack and yellowfin tuna, estimated from observer sampling data, 2009-2019.

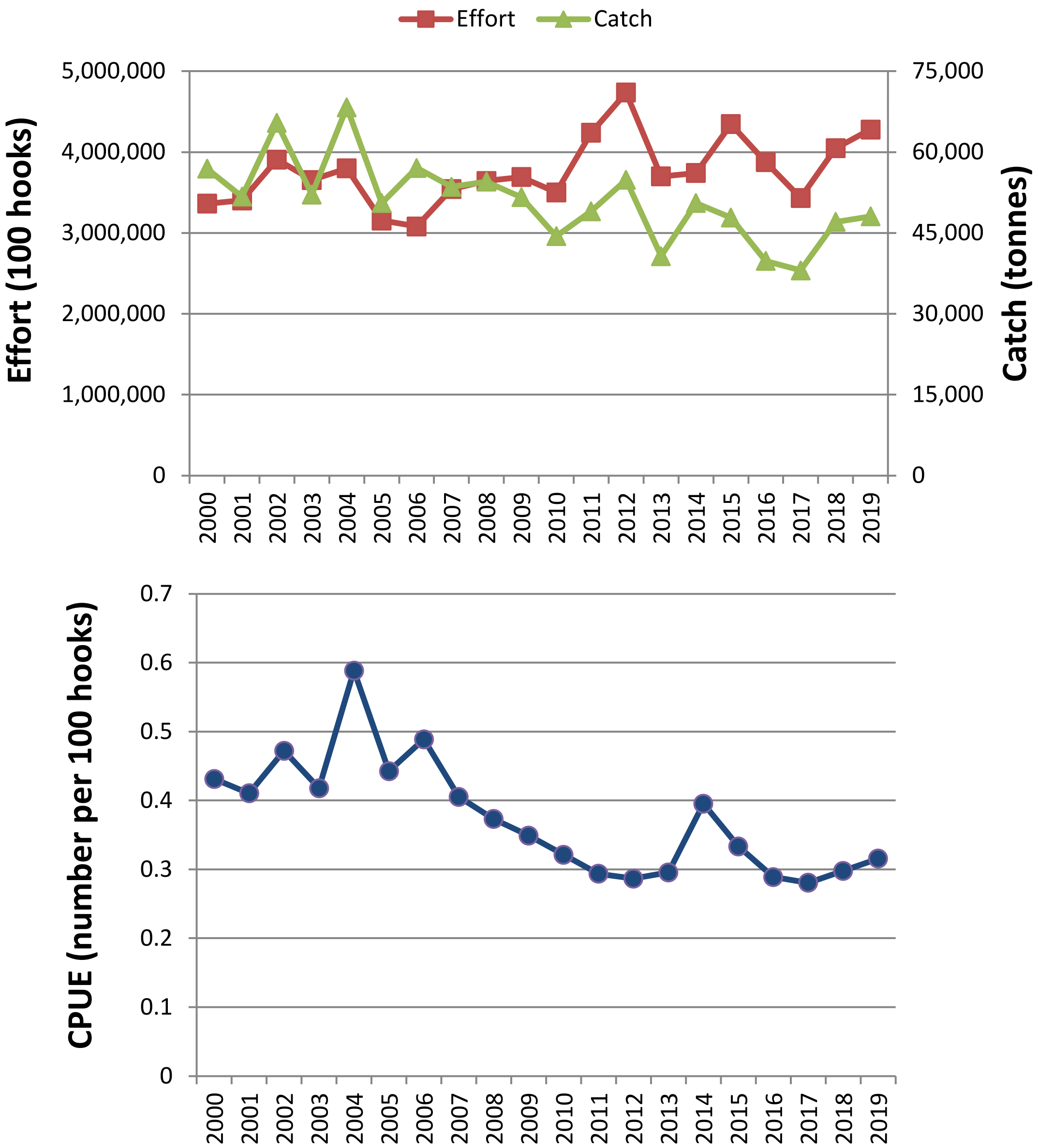


Figure A7. Estimates of longline effort and bigeye catch (upper panel) and bigeye nominal CPUE (lower panel) for the CORE area of the tropical WCPFC longline fishery (130°E - 150°W, 20°N - 10°S).
2019 data are provisional.

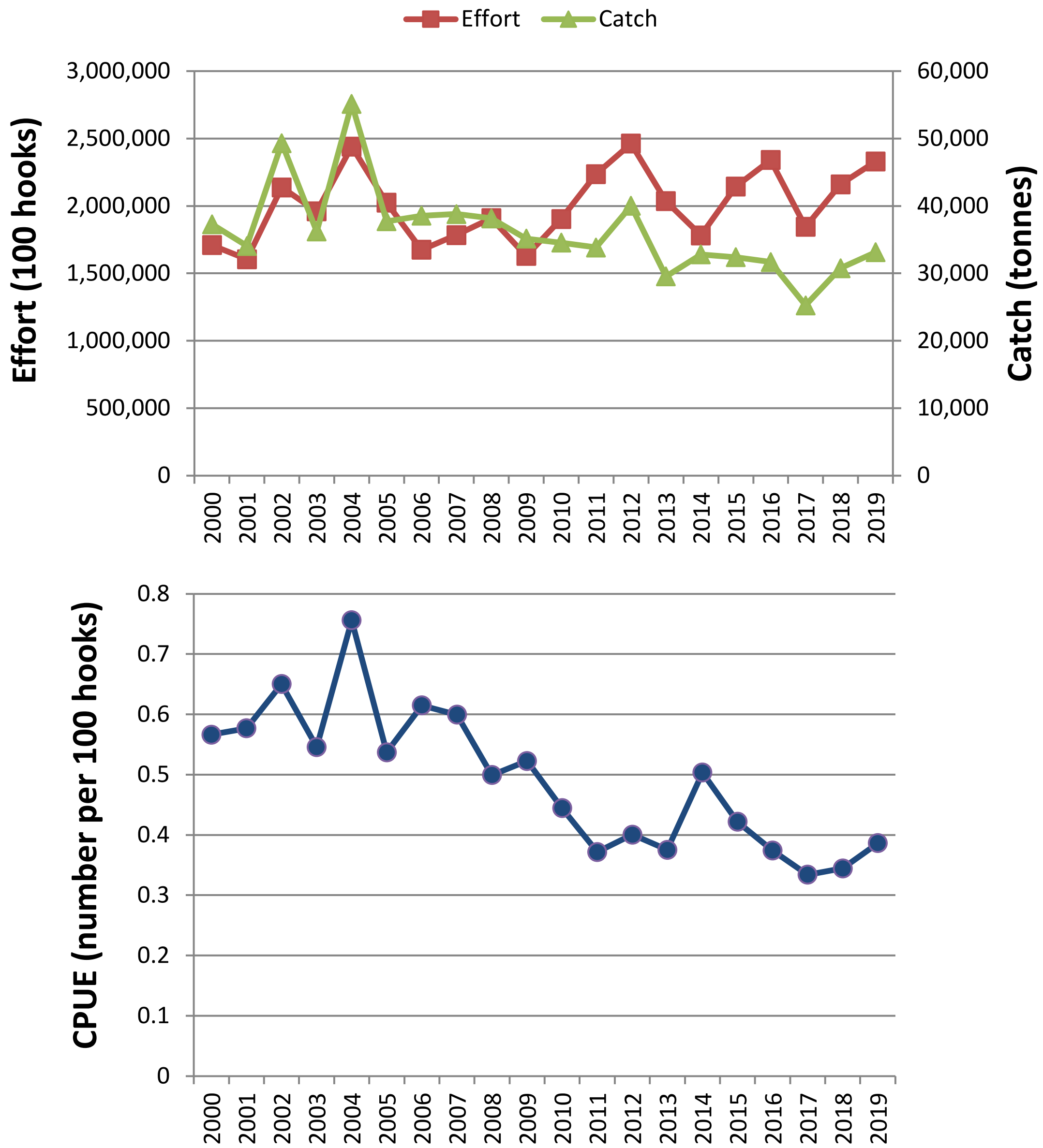


Figure A8. Estimates of longline effort and bigeye catch (upper panel) and bigeye nominal CPUE (lower panel) for the EASTERN area of the tropical WCPFC longline fishery (170°E - 150°W, 20°N - 10°S). 2019 data are provisional.

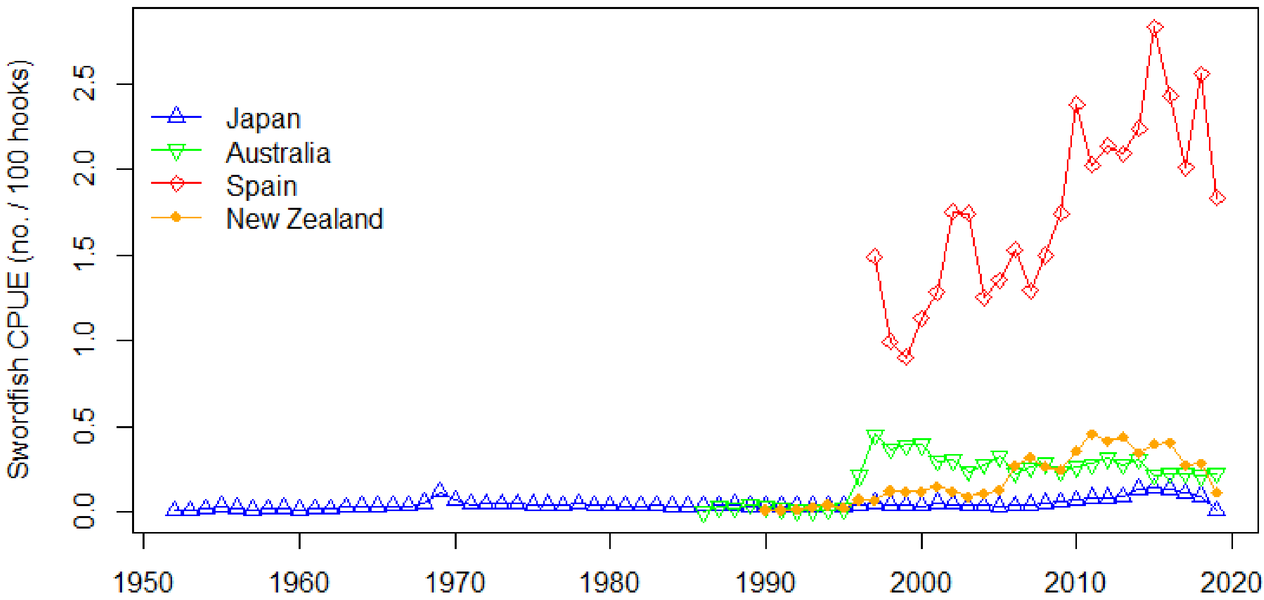


Figure A9. Trends in SWORDFISH nominal CPUE (number of fish per 100 hooks) over time for key LONGLINE fleets in the south Pacific Ocean.

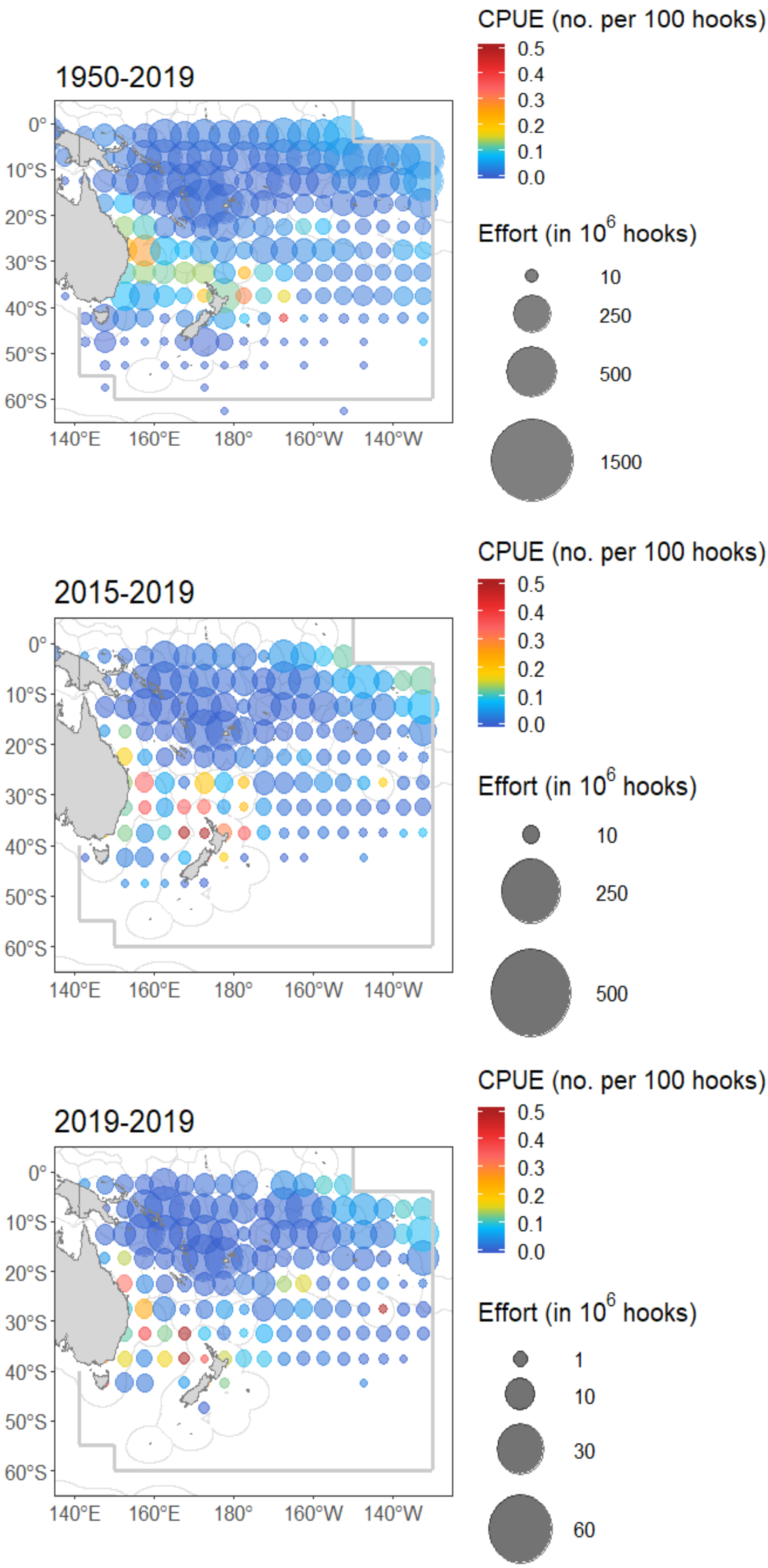


Figure A10. Distribution of South Pacific SWORDFISH longline CPUE and effort for the period 1950-2019 (top), 2015-2019 (middle) and 2019 (bottom).

Table A3. Purse seine tuna catch and effort by set type and species in the WCPFC Convention Area between 20°N and 20°S, excluding domestic purse seine effort in Philippines, Indonesia and Vietnam.

YEAR	VESSELS		DAYS	UNASSOCIATED SCHOOLS								ASSOCIATED SCHOOLS								TOTAL				
	YB	LOG			SKIPJACK		YELLOWFIN		BIGEYE		TOTAL		SKIPJACK		YELLOWFIN		BIGEYE		TOTAL		SKJ	YFT	BET	TOTAL
				SETS	MT	%	MT	%	MT	%	MT	SETS	MT	%	MT	%	MT	%	MT	SETS	MT	MT	MT	MT
2000	210	200	33,487	14,470	306,121	76%	92,316	23%	3,212	1%	401,649	12,572	329,626	64%	133,252	26%	50,169	10%	513,047	27,043	635,747	225,568	53,381	914,696
2001	195	192	34,738	16,349	361,960	74%	124,238	25%	4,472	1%	490,670	11,244	260,399	62%	118,878	29%	38,489	9%	417,766	27,594	622,359	243,116	42,961	908,435
2002	199	204	38,317	16,977	401,132	83%	77,047	16%	3,779	1%	481,958	13,613	375,082	66%	150,133	26%	46,754	8%	571,969	30,590	776,214	227,180	50,533	1,053,927
2003	200	208	40,942	17,014	387,854	74%	129,532	25%	7,234	1%	524,621	13,318	297,038	63%	136,046	29%	37,400	8%	470,483	30,332	684,892	265,578	44,634	995,104
2004	215	210	43,792	11,134	196,242	75%	61,499	24%	2,805	1%	260,546	20,998	545,902	68%	203,661	25%	53,907	7%	803,470	32,133	742,144	265,160	56,712	1,064,016
2005	221	198	45,605	19,481	420,531	77%	120,214	22%	5,411	1%	546,156	17,093	423,657	66%	173,349	27%	48,762	8%	645,768	36,575	844,188	293,563	54,173	1,191,924
2006	214	199	42,356	15,312	320,697	76%	99,676	24%	4,184	1%	424,557	18,133	572,216	72%	179,550	22%	48,054	6%	799,820	33,445	892,913	279,226	52,238	1,224,377
2007	237	229	45,314	19,637	435,042	78%	119,544	21%	5,044	1%	559,630	16,682	583,927	73%	163,582	21%	51,105	6%	798,614	36,319	1,018,969	283,126	56,149	1,358,244
2008	248	240	49,453	22,972	431,483	69%	191,575	31%	5,083	1%	628,140	18,672	545,686	71%	170,322	22%	56,847	7%	772,855	41,645	977,169	361,897	61,929	1,400,996
2009	261	251	50,408	22,916	485,502	82%	100,164	17%	4,968	1%	590,634	21,671	684,629	73%	195,774	21%	58,632	6%	939,036	44,587	1,170,131	295,938	63,600	1,529,669
2010	276	265	52,417	38,240	686,612	76%	214,723	24%	8,666	1%	910,001	13,292	417,344	72%	116,038	20%	44,926	8%	578,307	51,533	1,103,956	330,761	53,592	1,488,308
2011	279	269	58,605	30,074	424,055	75%	135,078	24%	3,419	1%	562,551	21,900	612,912	73%	158,402	19%	69,784	8%	841,097	51,975	1,036,966	293,480	73,202	1,403,648
2012	285	284	54,352	36,076	612,666	73%	215,172	26%	8,447	1%	836,286	20,554	598,024	75%	143,243	18%	54,123	7%	795,390	56,631	1,210,690	358,415	62,571	1,631,676
2013	297	291	55,698	38,338	647,371	79%	158,642	20%	9,066	1%	815,078	18,498	562,967	72%	161,485	21%	59,946	8%	784,398	56,836	1,210,337	320,126	69,012	1,599,476
2014	308	306	53,788	38,226	730,190	77%	205,640	22%	9,992	1%	945,822	18,687	639,274	77%	133,182	16%	56,782	7%	829,239	56,913	1,369,464	338,822	66,775	1,775,061
2015	306	301	42,493	33,486	679,283	78%	181,913	21%	10,708	1%	871,903	13,801	554,813	79%	107,619	15%	39,403	6%	701,834	47,287	1,234,095	289,532	50,111	1,573,738
2016	293	275	44,708	32,287	644,526	73%	227,340	26%	11,326	1%	883,193	14,591	539,090	76%	120,139	17%	48,860	7%	708,090	46,879	1,183,616	347,480	60,187	1,591,283
2017	282	281	48,416	33,487	511,991	66%	258,957	33%	9,792	1%	780,740	17,363	521,873	76%	123,538	18%	44,586	7%	689,997	50,851	1,033,864	382,496	54,377	1,470,737
2018	272	272	45,479	32,774	616,092	75%	193,624	24%	11,391	1%	821,107	18,684	674,685	80%	121,992	14%	50,726	6%	847,402	51,458	1,290,777	315,615	62,117	1,668,509
2019	288	274	47,364	37,152	847,984	80%	201,151	19%	9,078	1%	1,058,213	18,124	629,520	81%	114,603	15%	34,510	4%	778,632	55,276	1,477,504	315,753	43,587	1,836,845

Notes:

1. Estimates are based on aggregate data and raised logsheet data with species composition adjusted using observer sampling with grab sample bias correction. Note that these estimates may differ from the annual catch estimates provided by CCMs.
2. Estimates exclude domestic purse seine catch/effort in Philippines, Indonesia and Vietnam.
3. Two sources of estimates of vessel numbers are provided (i) those provided by CCMs with their annual catch estimates (and therefore appear in the WCPFC Yearbook) and (ii) estimates of vessel numbers from unraised operational data available to SPC.
4. The estimate of Japanese purse seine vessels fishing in the tropical fishery (20°N–20°S) has been determined by only considering vessel numbers in the categories >200 GRT.
5. There are several instances where vessel numbers from unraised logbook data are higher than the vessel numbers provided by the CCM. The reasons for these occurrences include: (i) situations where one vessel became inactive during the calendar year and was replaced by a new vessel – the vessel number from the operational data is based on a count of the total distinct vessels fishing throughout the year; (ii) instances where there are inconsistencies in the charter/flag assignment between the vessel numbers provided by CCMs and the operational logsheet data (e.g. Philippine-flagged vessels chartered to PNG – this will require follow-up and clarification with relevant CCMs).
6. ASSOCIATED covers sets on Drifting FAD, Log and Anchored FAD. Catch/effort for sets on ANIMALS is not shown separately but are included in the TOTAL.
7. Includes Catch and Effort in Archipelagic Waters.

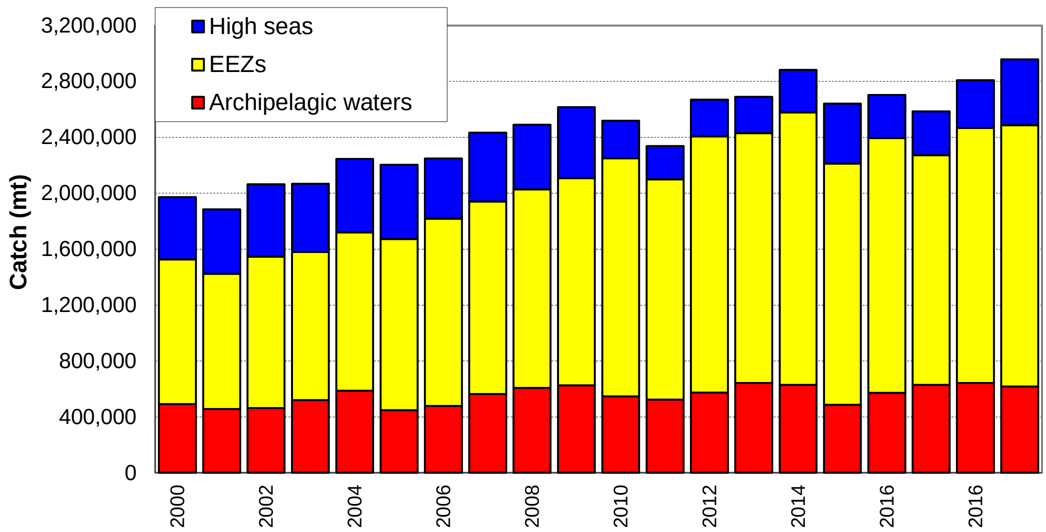


Figure A11. Catch estimates (mt) of the tropical tuna species (albacore, bigeye, skipjack and yellowfin) in the WCP–CA, by archipelagic waters (AWs), national waters (EEZs, excluded AWs) and the high seas for all gear types combined.

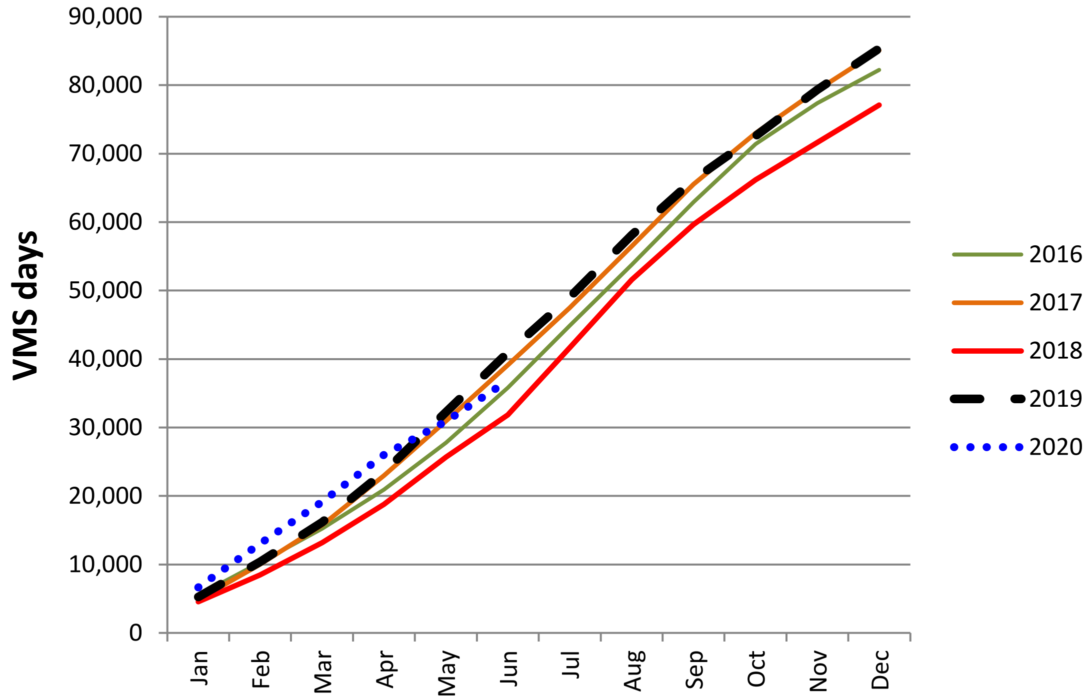


Figure A12. Cumulative South Pacific Albacore longline fishery effort by month, 2016-2020, as measured by VMS

(WCPFC Area south of 10°S; VMS at-sea days; only includes VMS data for domestic, domestic-based foreign and distant-water fleets where VMS data have been provided with high coverage consistently over recent years)