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OVERVIEW OF TUNA FISHERIES IN THE WESTERN AND CENTRAL PACIFIC OCEAN, INCLUDING ECONOMIC CONDITIONS – 2012

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Paper prepared by

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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 (2012) and covering the most recent version of catch estimates by gear and species.

The provisional total WCP–CA tuna catch for 2012 was estimated at **2,613,528 mt**, the highest on record, eclipsing the previous record in 2009 (2,603,346 mt) by 12,000 mt; this catch represents 82% of the total Pacific Ocean catch of 3,205,980 mt, and 59% of the global tuna catch (the provisional estimate for 2012 is 4,456,605 mt, which was the second highest on record).

The **2012 WCP–CA catch of skipjack** (**1,664,309 mt** – 64% of the total catch) was the third highest recorded and around 110,000 mt less than the record catch of 2009 (1,775,462 mt). The **WCP–CA yellowfin catch** for 2012 (**655,668 mt** – 25%) was a clear record and more than 70,000 mt higher than the previous record catch taken in 2008 (581,948 mt) primarily due to relatively high catches in the purse seine fishery and the artisanal fisheries in Indonesia. The **WCP–CA bigeye catch** for 2012 (**161,679** mt – 6%) was the highest since 2004, the record catch year at 183,355 mt. The **2012 WCP–CA albacore catch** (**131,872 mt** - 5%) was the second highest on record (after 2009 at 135,476 mt), and relatively stable compared to the previous three years. The 2012 WCP–CA albacore catch includes catches of north and south Pacific albacore in the WCP–CA, which comprised 78% of the total Pacific Ocean albacore catch of 168,537 mt in 2012. The south Pacific albacore catch in 2012 was 87,012 mt, the second highest on record.

The provisional **2012 purse-seine catch of 1,816,503 mt** was the highest catch on record and more than 30,000 mt higher than the previous record in 2009 (1,785,626 mt). The 2012 purse-seine skipjack catch (1,348,554 mt) was the second highest on record (after the 2009 catch) with a slight decline in the adjusted skipjack tuna catch (74%) compared to recent years. The 2012 purse-seine catch estimate for yellowfin tuna (398,464 mt – 22%) was also the second highest on record, just below the record catch of 2008 (400,908 mt) and following a relatively poor catch year in 2011. The provisional catch estimate for bigeye tuna for 2012 (69,164 mt) was again amongst the highest on record but may be revised once all observer data for 2012 have been received and processed. The high bigeye catch in 2012 coincides with the second highest number of associated sets (WCPFC Database), albeit a 15-20% reduction on the record high in 2012. The number of purse seine vessels in the tropical fishery was an all-time high (294 vessels) and effort (both in terms of days fishing and number of sets) was the second highest (to that expended in the fishery during 2011).

The beginning of 2012 experienced neutral ENSO conditions and other than relatively weak El Nino-type readings in the middle of the year, 2012 was essentially characterised as a neutral ENSO period. In line with these ENSO conditions, **purse-seine** fishing activity extended further east than previous years, with effort split into two main areas, the "typical" area of activity in PNG, FSM and Solomon Islands, and another area of high activity in and around the Gilbert Islands.

The **2012 pole-and-line catch (224,207 mt)** was the lowest annual catch since the late-1960s and continuing the trend in declining catches for three decades. The Japanese distant-water and offshore fleets (78,838 mt in 2012), and the Indonesian fleets (133,306 mt in 2012), account for most of the WCP–CA pole-and-line catch. 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 (in 2012 reduced to only 90 vessels, the lowest on record). 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 and took 11,221 mt in 2012, the highest catch since 1999.

The provisional **WCP–CA longline catch (262,076 mt)** for 2012 was the fifth highest on record, at around 15,000 mt lower than the highest on record attained in 2009 (279,012 mt). The WCP–CA

albacore longline catch (98,854 mt – 37%) for 2012 was the third highest on record, 4,000 mt lower than the record catch of 103,364 mt taken in 2010. The provisional bigeye catch (76,599 mt – 29%) for 2012 was similar to the level in 2011 which is below the average for the past ten years. The yellowfin catch for 2012 (85,245 mt – 32%) was the lowest for four years but similar to the average catch level for this species over the past decade.

The **2012 South Pacific troll albacore catch (2,925 mt)** was similar to the 2011 catch level. The New Zealand troll fleet (168 vessels catching 2,727 mt in 2012) and the United States troll fleet (9 vessels catching 198 mt in 2012) typically account for most of the albacore troll catch, with minor contributions coming from the Canadian, the Cook Islands and French Polynesian fleets when their fleets are active (which was not the case in 2012).

In regards to the **economic condition of the WCP-CA fishery**, there was exceptionally low carry-over of raw material stocks for canning from the end of 2011 as a result of poor fishing conditions and the closure of some PNA EEZs towards the end of year due to shortage of VDS days. Anticipation of periodic surges in demand at the consumer level for final products further exacerbated the demand for adequate raw material supplies which could not be met at the start of the year. As the year progressed, the supply situation was mixed and along with uncertainties of the supply situation from the FAD management measure and the seasonal closures of the purse seine fishery in the Eastern Pacific in the latter half of the year, pressure was upon processors to continuing paying elevated prices. With competition between Thailand canneries and Latin American canneries, who faced shortages in raw material supply and similar uncertainties during the year, elevated prices were sustained and even pushed to new levels.

The supply situation for white-meat raw material was also an issue during the year as it was for the pole and line fishery and prices for albacore and pole-and-line skipjack rose steeply. The sashimi markets for WCP-CA products showed mixed performances with Japan markets underpinned by the long term downtrend in consumption while the US market displayed some improvement.

Prices in the major markets for WCP-CA skipjack catches continued to rise to unprecedented levels in 2012. The Bangkok benchmark averaged $2,074/Mt, up 20 per cent rise over the previous year. The Yaizu average price for skipjack was ¥168 ($2,101/Mt), up 17 per cent (17 per cent) from 2011. The price trend for purse seine caught yellowfin on the other hand was mixed with Bangkok prices up by only 2 per cent to US$2,478 while the Yaizu prices averaged ¥264/Kg (US$3,304/Mt) or 14 per cent (14 per cent in US Dollar terms) down on 2011.

The estimated delivered value of the entire purse seine tuna catch in the WCP-CA area for 2012 is $4,054 million, 42 per cent higher than 2011 driven by increases in both skipjack and yellowfin values. Yellowfin values increased by 38 per cent and skipjack 44 per cent.

The average pole and line price at Yaizu in 2012 averaged ¥265 ($3,321) against an average of ¥189 (US$2,369) in 2011, a substantial improvement of 40% in Japanese Yen terms (similar in US dollar terms). The estimated delivered value of the total catch in the WCP-CA pole and line fishery for 2012 is US$586 million, a slight decline of less than 1 per cent on 2011 caused by the 19 per cent decline in catch that more than offset the increase in price.

Japan longline caught yellowfin prices (ex-vessel) landed at Yaizu port declined by 10 per cent (similar in US$ terms) to ¥607/kg ($7.61/Kg). Japan fresh yellowfin import price (c.i.f.) from Oceania also fell, down 2 per cent to ¥875/kg ($10.97/Kg). In the US market, fresh import prices of yellowfin averaged US$9.64/Kg (fas) compared with US$9.07 in 2011, a rise of 6 per cent.

Frozen bigeye prices (ex-vessel) at Japan selected major ports declined by 7 per cent in 2012 to ¥946/kg ($11.86) while fresh bigeye prices (ex-vessel) increased by 6 per cent to ¥1,315/kg ($16.48). Japan fresh bigeye import prices (c.i.f.) from all sources increased by 6 per cent to ¥924/Kg ($11.58) while fresh import prices from Oceania at ¥1,076/Kg ($13.49) was only marginally higher than the previous year's.

Japan fresh bigeye import prices from Oceania on average remained stable relative to 2011 average price. A similar trend also occurred in US fresh bigeye import prices which increased marginally to an average of $8.98/Kg, the highest to date.

The Bangkok albacore market benchmark price averaged $3,286/Mt in 2012, up 18 per cent from the 2011 average and the highest to date. Thai import prices of frozen albacore in 2012 improved by 16 per cent to US$3,534/Mt (US$3.53/kg) from US$3,044/Mt (US$3.04/kg) in 2011. The US import price of fresh albacore improved 3 per cent to US$4.71/kg from US$4.56 in 2011. Prices for fresh landings at Japan major ports increased by 2 per cent to ¥295/Kg ($3.70/kg).

The estimated delivered value of the longline tuna catch (excluding swordfish) in the WCP-CA for 2012 is US$1,962 million, a decline of US$71 million on the estimated value of the catch in 2011. The value of the albacore catch increased by US$70 million, bigeye declined by US$15 million and yellowfin decreased by $127 million.

The total estimated delivered value of the WCP-CA catch in 2012 comes to US$7.2 billion, an increase of 23% on 2011. The purse seine value accounts for 56 per cent of the total value and the longline fishery 27 per cent. By species, skipjack represents 49 per cent of the total value with yellowfin 30 per cent, bigeye tuna 15 per cent and albacore 6 per cent.

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 – 2012. The review draws on the latest catch estimates compiled for the WCP–CA, which can be found in Information Paper WCPFC–SC9 ST IP–1 *(Estimates of annual catches in the WCPFC Statistical Area – OFP, 2013)*. Where relevant, comparisons with previous years' activities have been included, although it should be noted that data for 2012, for some fisheries, are provisional at this stage.

This paper includes sections covering a summary of total target tuna 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 each fishery. In each section, the paper makes some observations on recent developments in each fishery, with emphasis on 2012 catches relative to those of recent years, but refers readers to the SC9 National Fisheries Reports, which offer more detail on recent activities at the fleet level.

This overview acknowledges, but does not currently include detailed information on several WCP–CA fisheries, including the north Pacific albacore troll fishery, the north Pacific swordfish fishery, those fisheries catching north Pacific bluefin tuna and several artisanal fisheries. These fisheries may be covered in future reviews, depending on the availability of more complete data.

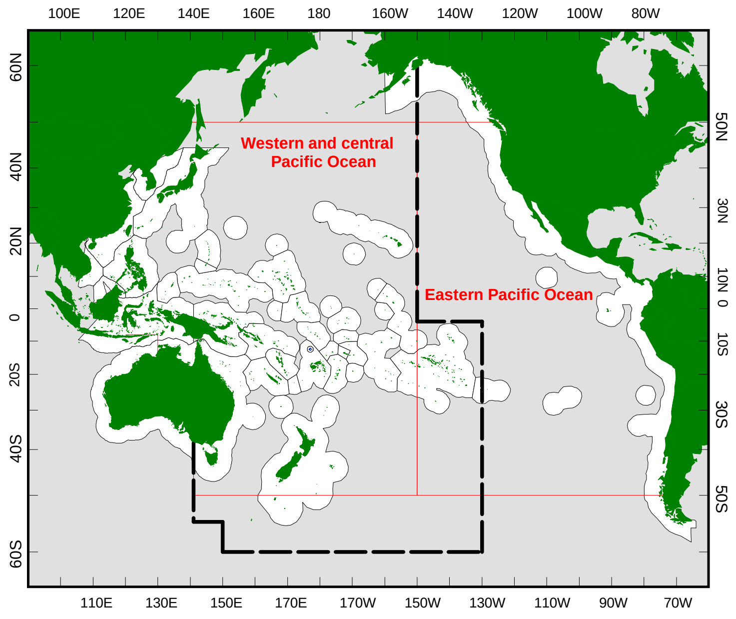

Figure 1. The western and central Pacific Ocean (WCPO), the eastern Pacific Ocean (EPO) and the WCPFC Convention Area (WCP–CA in dashed lines)

2. TOTAL TUNA CATCH FOR 2012

Annual total catches of the four main tuna species (skipjack, yellowfin, bigeye and albacore) in the WCP–CA increased steadily during the 1980s as the purse seine fleet expanded and remained relatively stable during most of the 1990s until the sharp increase in catch during 1998. From 2004 until 2009, there had been a clear increasing trend in total tuna catch, primarily due to increases in purse-seine fishery catches (Figure 2 and Figure 3). The provisional total WCP–CA tuna catch for 2012 was estimated at **2,613,528 mt**, the highest on record eclipsing the previous record in 2009 (2,603,346 mt) by 12,000 mt. During 2012, the purse seine fishery accounted for a record catch of 1,816,503 mt (69% of the total catch), with pole-and-line taking an estimated 224,207 mt (9%), the longline fishery an estimated 262,076 mt (10%), and the remainder (11%) taken by troll gear and a variety of artisanal gears, mostly in eastern Indonesia and the Philippines. The WCP–CA tuna catch (2,615,261 mt) for 2012 represented 82% of the total Pacific Ocean catch of 3,205,980 mt, and 59% of the global tuna catch (the provisional estimate for 2012 is 4,456,605 mt, which was the second highest on record).

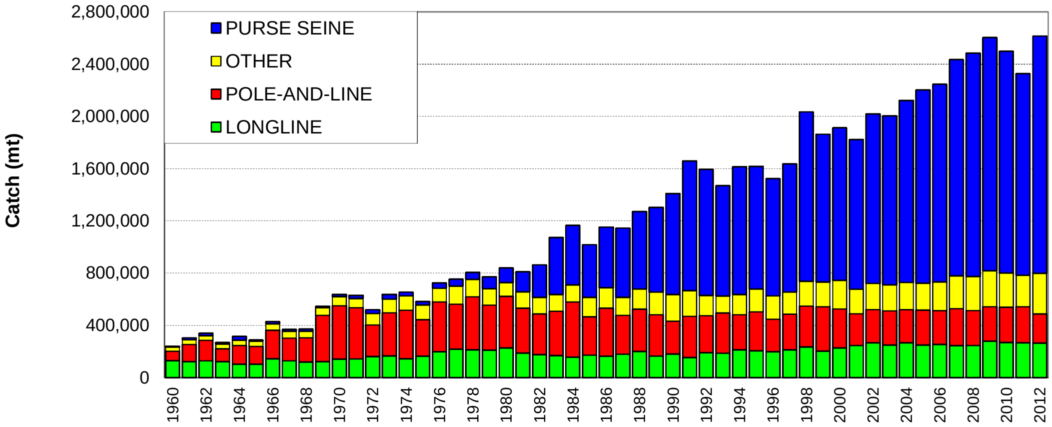

Figure 2. Catch (mt) of albacore, bigeye, skipjack and yellowfin in the WCP–CA, by longline, pole-and-line, purse seine and other gear types

The **2012 WCP–CA catch of skipjack** (**1,664,309 mt** – 64% of the total catch) was the third highest recorded and around 110,000 mt less than the record catch of 2009 (1,775,462 mt). The **WCP–CA yellowfin catch** for 2012 (**655,668 mt** – 25%) was a clear record and more than 70,000 mt higher than the previous record catch taken in 2008 (581,948 mt) primarily due to relatively high catches in the purse seine fishery and the artisanal fisheries in Indonesia. The **WCP–CA bigeye catch** for 2012 (**161,679** mt – 6%) was the highest since 2004, the record catch year at 183,355 mt. The **2012 WCP–CA albacore**[1] **catch** (**131,872 mt -** 5%) was the second highest on record (after 2009 at 135,476 mt), and relatively stable compared to the previous three years.

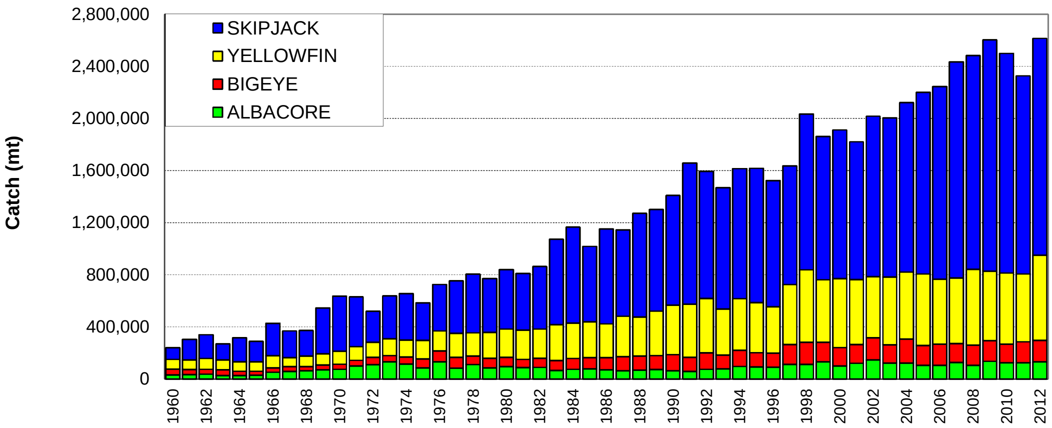

Figure 3. Catch (mt) of albacore, bigeye, skipjack and yellowfin in the WCP–CA.

[1] includes catches of north and south Pacific albacore in the WCP–CA, which comprised 78% of the total Pacific Ocean albacore catch of 168,537 mt in 2012; the section 7.4 "Summary of Catch by Species - Albacore" is concerned only with catches of south Pacific albacore, which made up approximately 50% of the Pacific albacore catch in 2012.

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 contributing close to 70% of total tuna catch volume (more than 1,600,000 mt in recent years – Figure 2). 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 163 vessels in 1992, declined to a low of 111 vessels in 2006 before increasing again to 139 vessels in 2012[2]. The Pacific Islands fleets have gradually increased in numbers over the past two decades to a level of 94 vessels in 2012 (Figure 5). The remainder of the purse seine fishery includes several fleets which entered the WCPFC tropical fishery in the 2000s (e.g. China, Ecuador, El Salvador, New Zealand and Spain). The total number of purse seine vessels was relatively stable over the period 1990-2006 (in the range of around 180–220 vessels), but over the last five years, the number of vessels has gradually increased, attaining a record level of 297 vessels[3] in 2012.

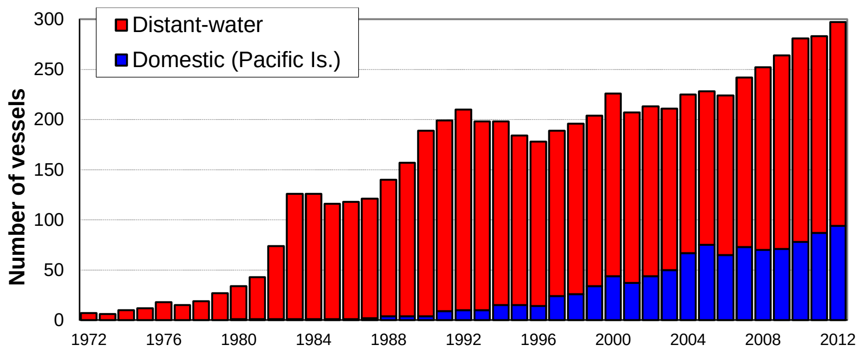

Figure 5. Number of purse seine vessels operating in the WCP–CA
(this does not include the Japanese Coastal purse seine fleet and the Indonesian, Philippine and Vietnamese domestic purse-seine/ringnet fleets which account for over 1,000 vessels)

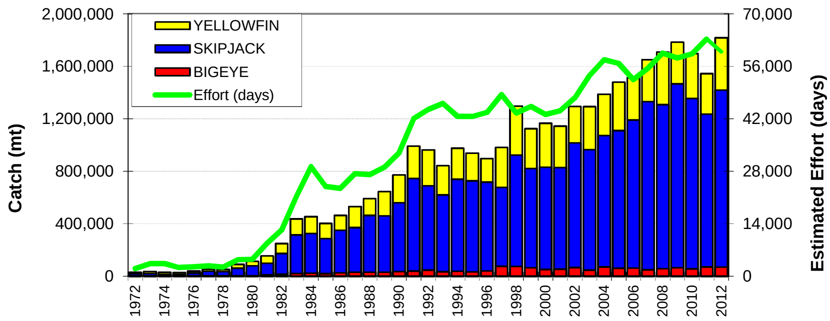

Figure 4. Purse seine catch (mt) of bigeye, skipjack and yellowfin and estimated fishing effort (days fishing and searching) in the WCP–CA

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 (Figure 4). 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[4] 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 catches now maintained well above 1,000,000 mt;

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[2] The number of vessels by fleet in 1992 was Japan (38), Korea (36), Chinese-Taipei (45) and USA (44) and in 2012 the number of active vessels by fleet was Japan (38), Korea (28), Chinese Taipei (34) and USA (39). In 2012, there was an additional 40 vessels in the category less than 200 GRT which are a part of the Japanese offshore purse seine fleet but not included here.

[3] There are a large number of ringnet and small purse seine vessels in the Indonesian, Japanese Coastal and Philippines domestic fisheries which are not included in this total.

[4] Recent studies using observer data (e.g. Lawson, 2007, Lawson, 2010, Lawson, 2012, Lawson, 2013, Hampton and Williams, 2012) show that the logsheet-reported catch, mainly for associated sets, should contain higher quantities of yellowfin and bigeye tuna that have been misreported as skipjack tuna. Observer data have been used to provide more reliable estimates of the purse-seine species catch (Lawson, 2012) which now represent the official catch estimates compiled for the WCP–CA (OFP, 2013) and have been included throughout this paper.

- Annual yellowfin catches fluctuating considerably between 300,000 and 400,000 mt. The proportion of large yellowfin in the catch is generally higher during El Niño years and lower during La Niña years;
- Increased bigeye tuna purse seine catch estimates, coinciding with the introduction of drifting FADs (since 1997). Significant bigeye catch years have been 1997 (75,603 mt), 1998 (74,049 mt), 2004 (70,929 mt) and 2012 (70,737 mt) which correspond to years with a relatively high proportion of associated sets and/or strong bigeye recruitment.

Total estimated effort tends to track the increase in the catch over time (Figure 4), with years of exceptional catches apparent when the effort line intersects the histogram bar (i.e. in 1998 and 2006-2010 and 2012). The provisional purse seine effort in 2012 was the second highest on record slightly less than the 2012 record.

3.2 Provisional catch estimates, fleet size and effort (2012)

The provisional **2012 purse-seine catch of 1,816,503 mt** was the highest catch on record and more than 30,000 mt higher than the previous record in 2009 (1,785,626 mt). The 2012 purse-seine skipjack catch (1,348,554 mt) was the second highest on record (after the 2009 catch) with a slight decline in the adjusted skipjack tuna catch (74%) compared to recent years. The 2012 purse-seine catch estimate for yellowfin tuna (398,464 mt – 22%) was also the second highest on record, just below the record catch of 2008 (400,908 mt) and following a relatively poor catch year in 2011. The provisional catch estimate for bigeye tuna for 2012 (69,164 mt) was again amongst the highest on record but may be revised once all observer data for 2012 have been received and processed[5]. The high bigeye catch in 2012 coincides with the second highest number of associated sets (WCPFC Database), albeit a 15-20% reduction on the record high in 2011.

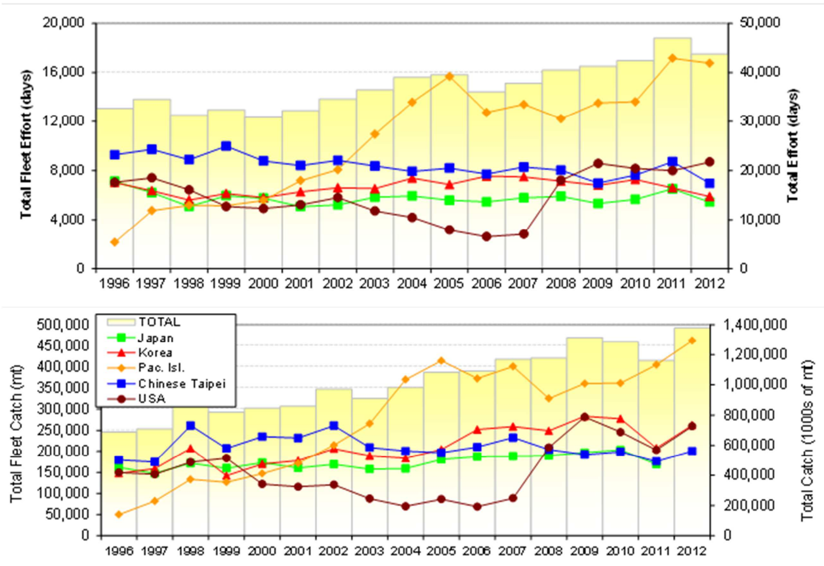


Figure 6. Trends in annual effort (top) and catch (bottom) estimates for the top five purse seine fleets operating in the tropical WCP–CA, 1996–2012.

Figure 6 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-fleet 2012 total effort was lower than in 2011, but there was a clear increase in the total catch in 2012, suggesting higher catch rates. The combined Pacific-Islands fleet has been clearly the highest producer in the tropical purse seine fishery since 2003. 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 at its highest level in 2012. 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 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 significant 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. The increase in vessel numbers in the US purse seine fleet is reflected in the sharp increase in their catch and effort since 2007 (the US catch has been on par with the Korea purse seine fleet over the past four years, although effort by the Korean purse seine fleet in the past two years was clearly lower than the US effort).

The total number of Pacific-island domestic vessels has gradually increased over the past two decades, attaining its highest level in 2012 (94 vessels). The combined Pacific-islands purse seine fleet cover vessels fishing under the FSM Arrangement, bilateral agreements and domestically-based vessels and comprise vessels from the Federated States of Micronesia (FSM; 9 vessels), the Kiribati (9 vessels), Marshall Islands (10 vessels), PNG (Papua New Guinea; 51 vessels including their chartered vessels), Solomon Islands (8 vessels), Tuvalu (1 vessel) and Vanuatu (6 vessels).

The domestic Philippine purse-seine and ring-net fleets operate in Philippine and northern Indonesian waters, and prior to 2010, the high seas pocket between Palau, Indonesia, FSM and PNG; this fleet accounted for between 190,000-250,000 mt annually in the period 2004-2009. The high seas pocket closure (2010-October 2012) resulted in a considerable decline in the domestic Philippine purse-seine catch, but with an increase in activities by Philippine-flagged vessels fishing in PNG under bilateral arrangements. The domestic Indonesian purse-seine fleet takes a catch similar to the Philippines domestic fishery but generally has not fished in high seas areas; these two domestic fisheries accounted for about 13-20% of the WCP-CA total purse seine catch prior to 2010, but since the high seas closure, now take about 8-12% of the WCP-CA total purse seine catch.

Figure 7 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 have predominated during recent years but were not as high in 2012 (65% of all sets for these fleets) as in 2010 (76%). The proportion (25%) of sets on drifting FADs in 2012 was amongst the highest over the past decade (the number of drifting FAD sets was the second highest ever), but the number and proportion (7%) of sets on logs continues to be amongst the lowest level since the early 1980s. 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 2012 = 36%: Figure 7–right) will be higher than the percentage of sets for drifting FADs (for 2012 = 25%: Figure 7–left). Pilling et al. (2013) provide a more detailed breakdown of catch and effort by set type in 2009-2012 using available logsheet and observer data.

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 8). Figure 9 (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.

At the start of 2006, a weak La Niña-state presided, but soon dissipated and a weak El Niño event then presided over the remainder of 2006. During the first half of 2007, the WCP–CA was in an ENSO-neutral state, but then moved into a prolonged La Niña state, which persisted throughout 2008 and into 2009. There was a transition in the middle of 2009 to an El Niño period which then presided into the first quarter of 2010. Conditions in the WCP-CA then switched back to a strong La Niña state over the latter months of 2010 and into the first half of 2011. It weakened, and then strengthened toward the end of 2011. The beginning of 2012 experienced a return to neutral ENSO conditions and other than relatively weak El Nino-type readings in the middle of the year, 2012 was essentially characterised as a neutral ENSO period.

In line with the prevailing ENSO conditions, fishing activity during 2012 extended further east than previous years, particularly compared to 2011 which began with a strong La Niña and effort concentrated in the western regions of the tropical WCPO (i.e. the waters of the PNG, FSM and Solomon Islands). However, some effort was also seen toward the southeast of the region in 2012. Effort in 2012 (Figure 9 – left) appears to be split in two main areas, the "typical" area of activity in PNG, FSM and Solomon Islands, and another area of high activity in and around the Gilbert Islands. The forecast for 2013 appears to be a move to La Nina conditions.

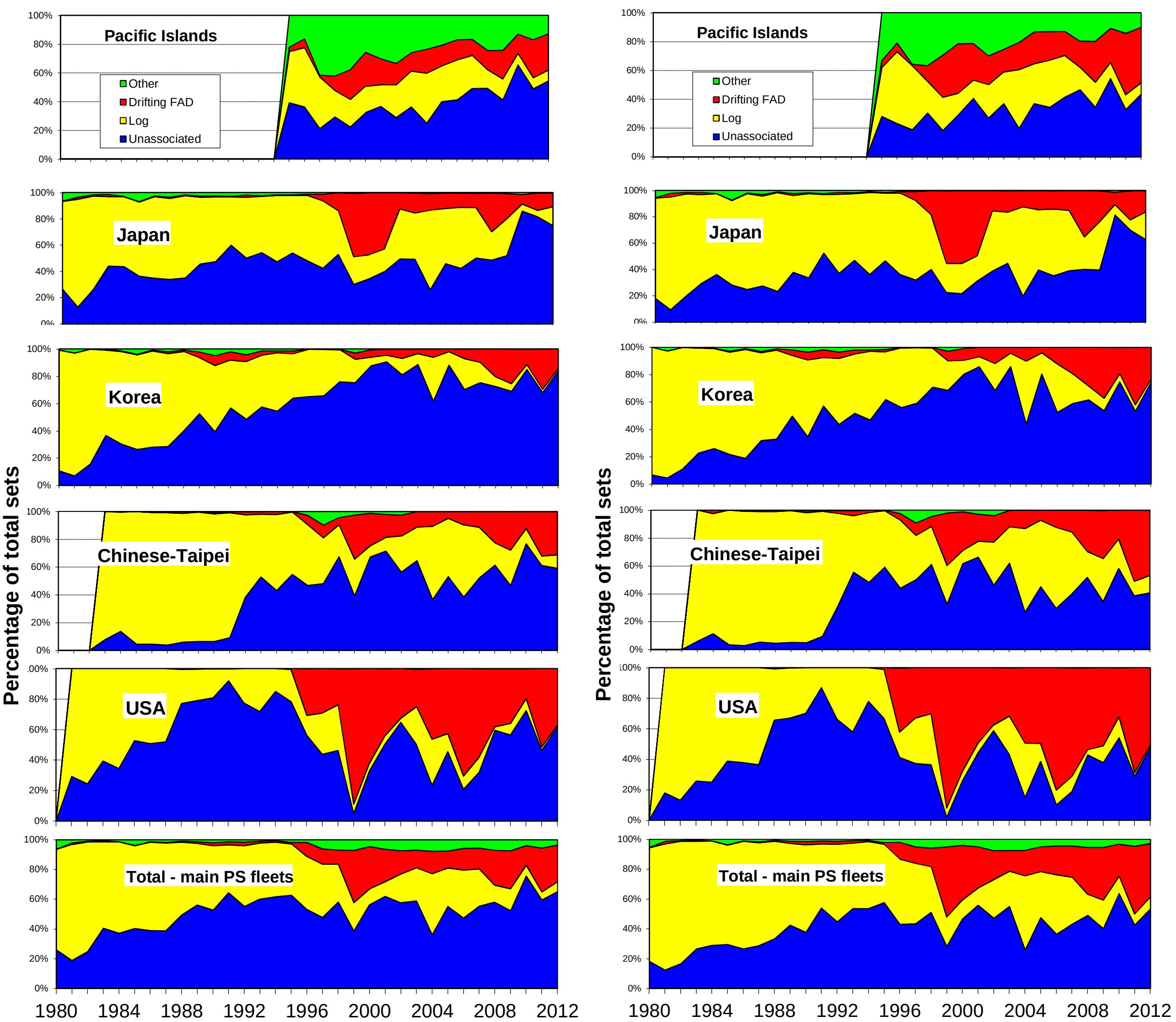


Figure 7. Time series showing the percentage of total sets (left) and total catch (right), by school type for the major purse-seine fleets operating in the WCP–CA.

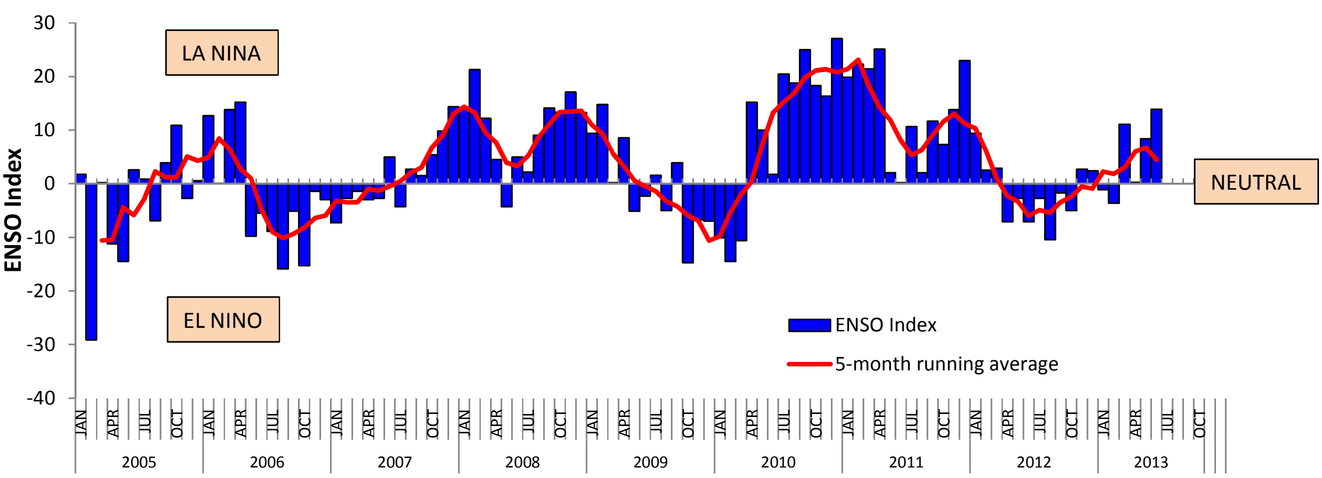


Figure 8. Trends in El Nino Southern Oscillation Index (ENSO), 2005-2013

3.4 Distribution of fishing effort and catch

The distribution of effort by set type (Figure 9–right) for the past seven years shows that El Niño conditions in 2006 coincided with a higher proportion of log-associated sets east of 160°E than in 2008, 2010 and 2011 (significant La Nina years), when drifting FADs were used to better aggregate schools of tuna in the absence of logs and/or where unassociated schools were not as available in this area. As mentioned previously, despite the FAD closure for certain periods in each year since 2010, there remains a significant amount of drifting FAD sets made in recent years (Figure 9–right), particularly to the east of 160°E. As would be expected, the FAD closure in recent years produced an increase in unassociated sets, but in 2010, this set type appears to have dominated in the non-FAD closure months as well, due to prevailing environmental conditions which were conducive to sets on free-swimming schools. It is interesting to note the relatively high proportion of unassociated sets in the eastern areas (e.g. Gilbert Islands) in 2012.

Figures 10 through 14 show the distribution of purse seine effort for the five major purse seine fleets during 2011 and 2012. All fleets clearly shifted some of their activities further eastwards in 2012 compared to 2011, no doubt related to the weakening of the strong La Niña of 2011 and weak El Nino-type conditions prevailing. The US fleet was the most eastern of these fleets during 2012, with effort extended into the Phoenix Islands, the Cook Islands, Tokelau and the adjacent eastern high seas areas.

Figure 15 shows the distribution of catch by species for the past seven years, Figure 16 shows the distribution of skipjack and yellowfin catch by set type for the same period, and Figure 17 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; for example, during the period (2006-2008), unassociated sets clearly accounted for a far greater proportion of the total yellowfin catch in the area to the east of 160°E than they did for the total skipjack catch. Higher proportions of yellowfin in the overall catch (by weight) 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. There was some evidence of this in 2012 (which has some El Nino characteristics), with significant catches of large yellowfin taken in the fishery (Figure 15, Figure 16–right and Figure 58). In contrast, associated sets usually account for a higher proportion of the skipjack catch (than yellowfin), in the respective total catch of each species (Figure 16–left).

The estimated bigeye catch in the area to the west of 160°E tends to be taken by a mixture of anchored and drifting FADs and logs, and is dominated by drifting FAD sets in the area to the east of 160°E (Figure 17). The only anomaly appears to be significant bigeye catches from unassociated sets in the area 0°–10°S, 150°-160°E during 2010, perhaps related to prevailing environmental conditions. Most of the large catch of bigeye in recent years comes from drifting FAD sets to the east of 160°E.

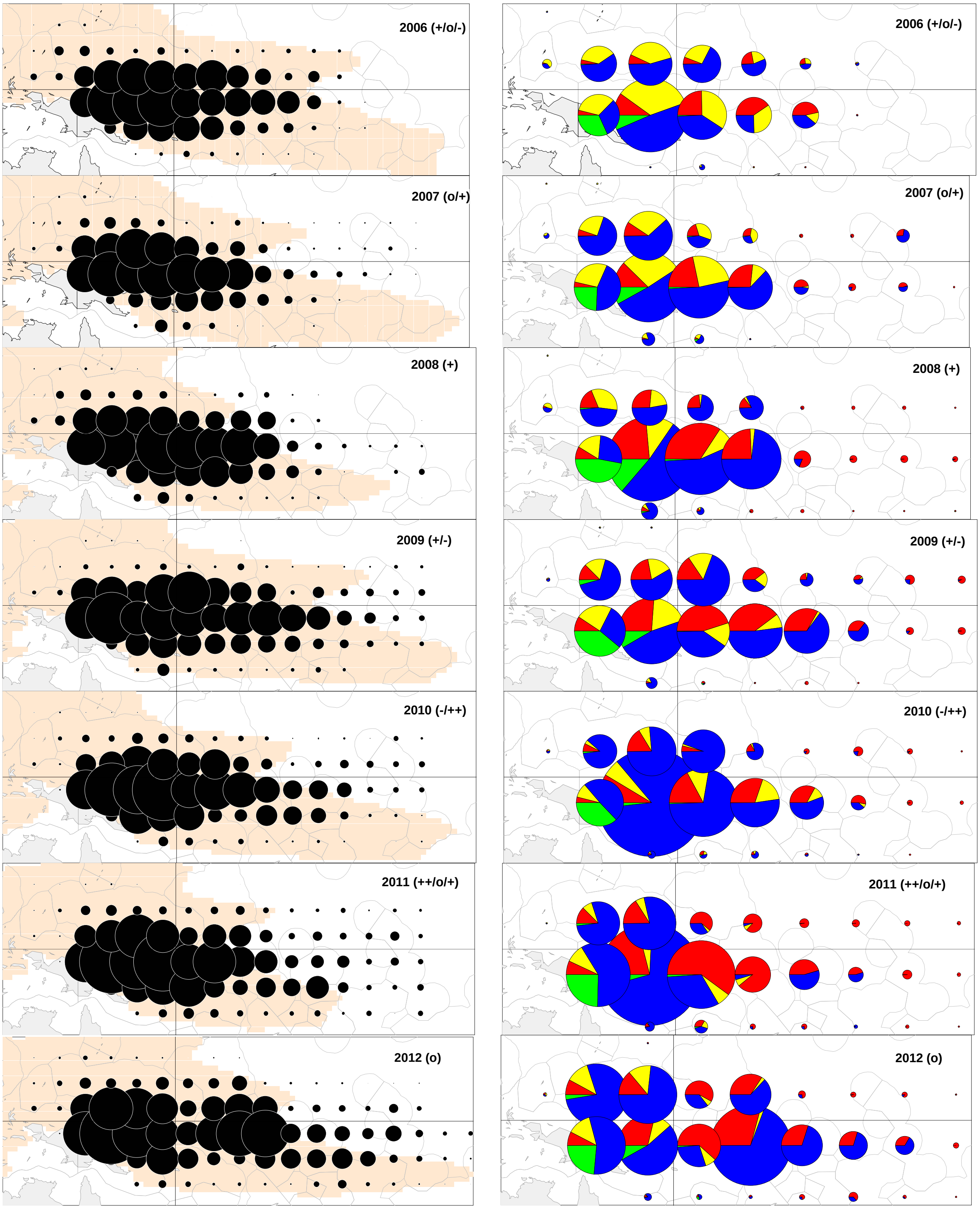


Figure 9. Distribution of purse-seine effort (days fishing – left; sets by set type – right), 2006–2012. (Blue–Unassociated; Yellow–Log; Red–Drifting FAD; Green–Anchored FAD).

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

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

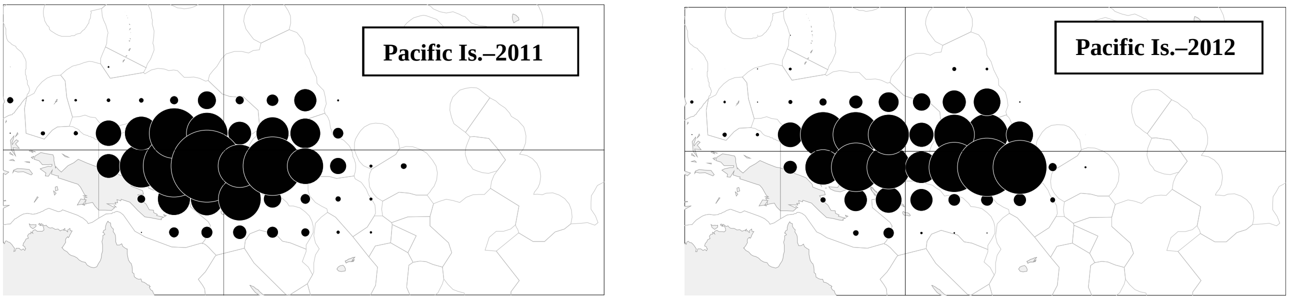


Figure 10. Distribution of effort by Pacific Islands fleets during 2011 and 2012
lines for the equator (0° latitude) and 160°E longitude included.

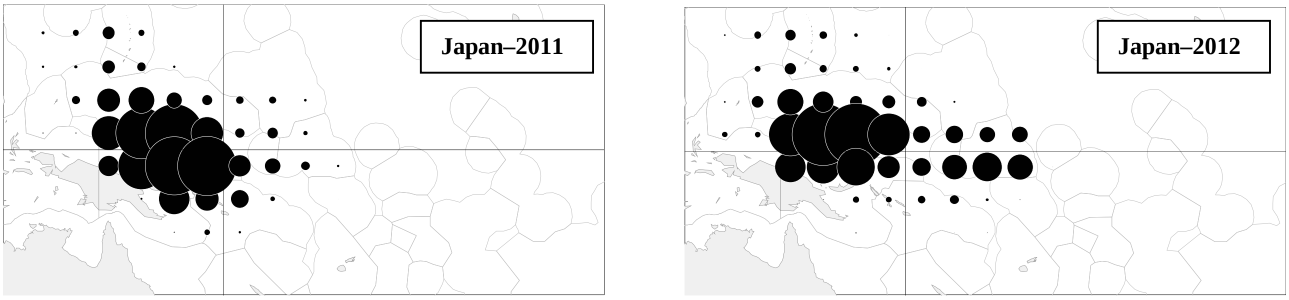


Figure 11. Distribution of effort by the Japanese purse seine fleet during 2011 and 2012
lines for the equator (0° latitude) and 160°E longitude included.

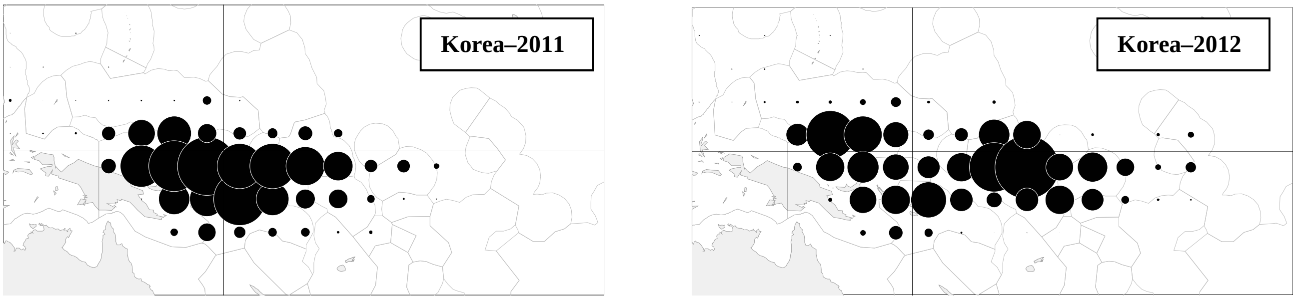


Figure 12. Distribution of effort by the Korean purse seine fleet during 2011 and 2012
lines for the equator (0° latitude) and 160°E longitude included.

Figure 13. Distribution of effort by the Chinese-Taipei purse seine fleet during 2011 and 2012
lines for the equator (0° latitude) and 160°E longitude included.

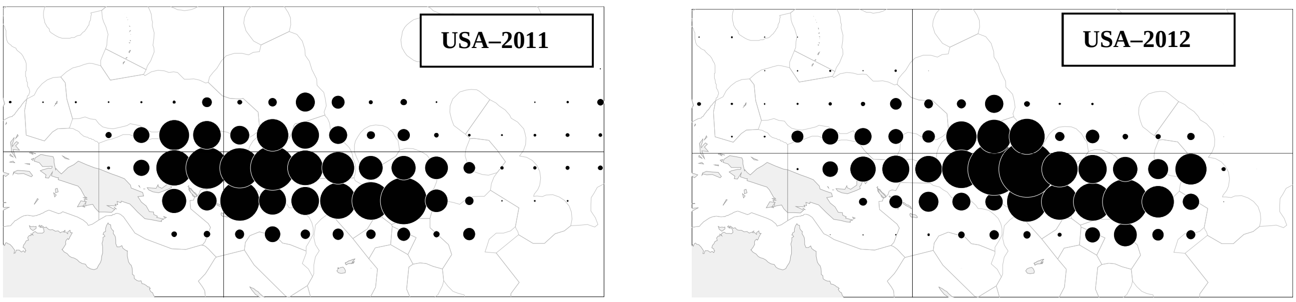


Figure 14. Distribution of effort by the US purse seine fleet during 2011 and 2012
lines for the equator (0° latitude) and 160°E longitude included.

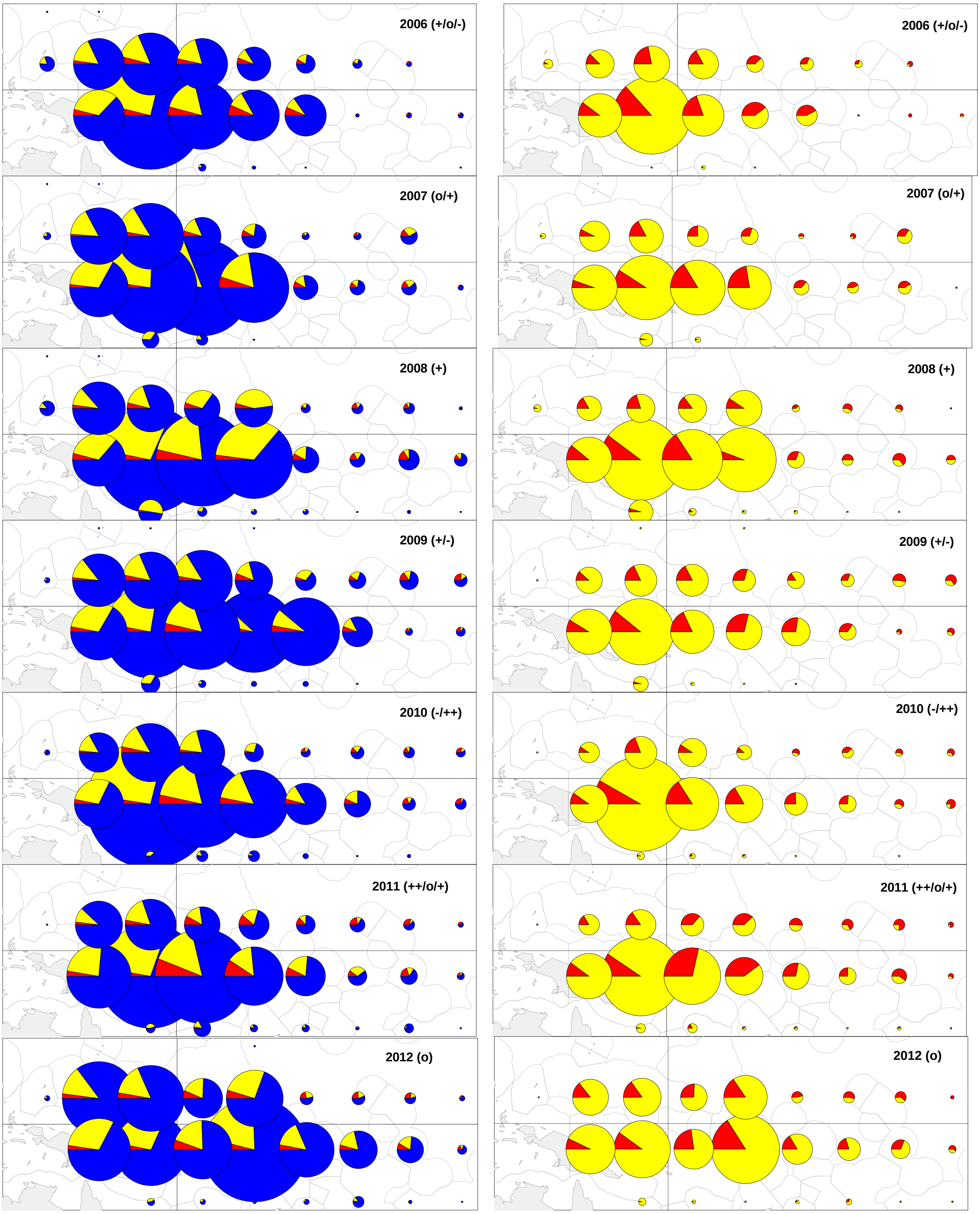


Figure 15. Distribution of purse-seine skipjack/yellowfin/bigeye tuna catch (left) and purse-seine yellowfin/bigeye tuna catch only (right), 2006–2012 (Blue–Skipjack; Yellow–Yellowfin; Red–Bigeye).

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

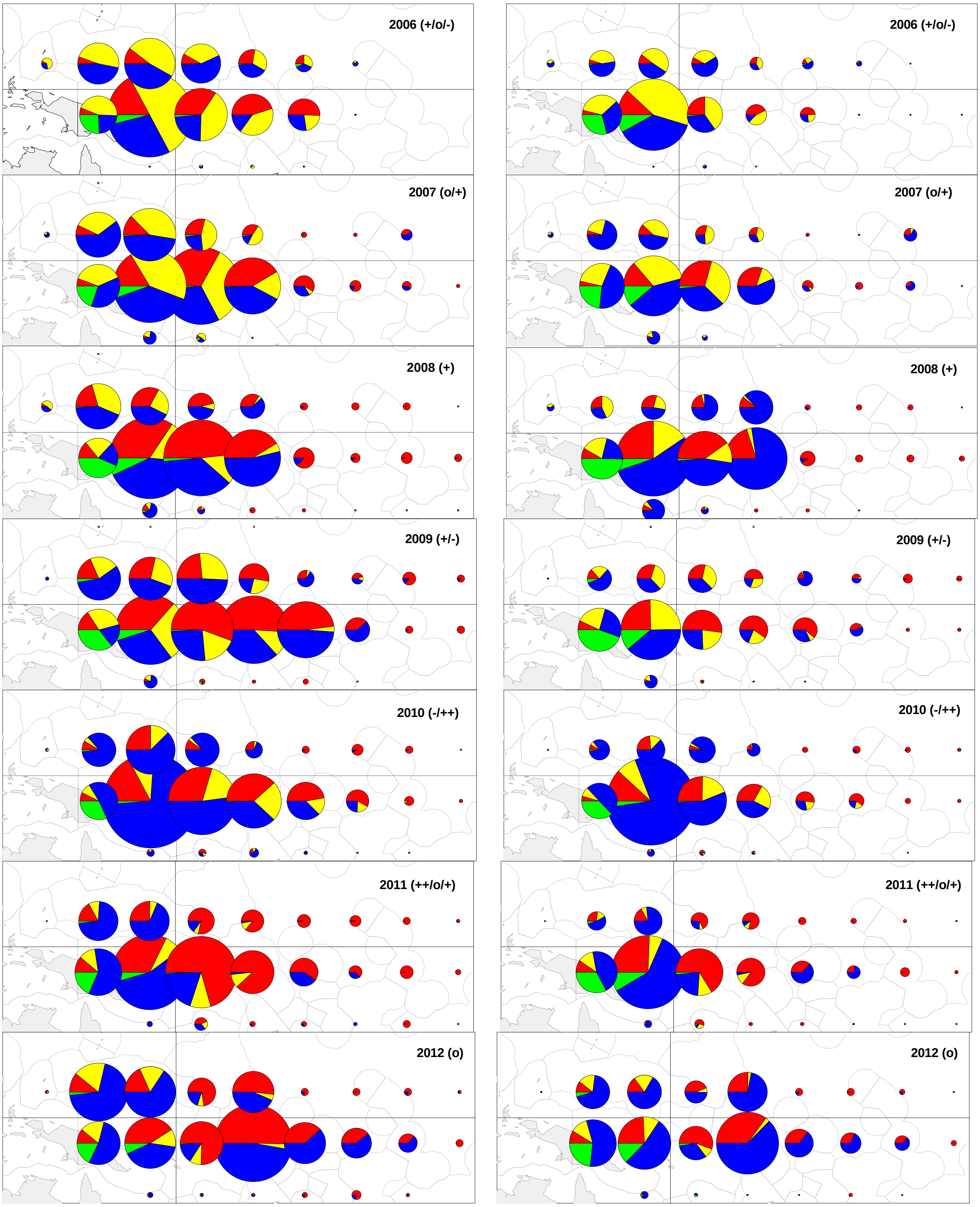


Figure 16. Distribution of skipjack (left) and yellowfin (right) tuna catch by set type, 2006–2012 (Blue–Unassociated; Yellow–Log; Red–Drifting FAD; Green–Anchored FAD).

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

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

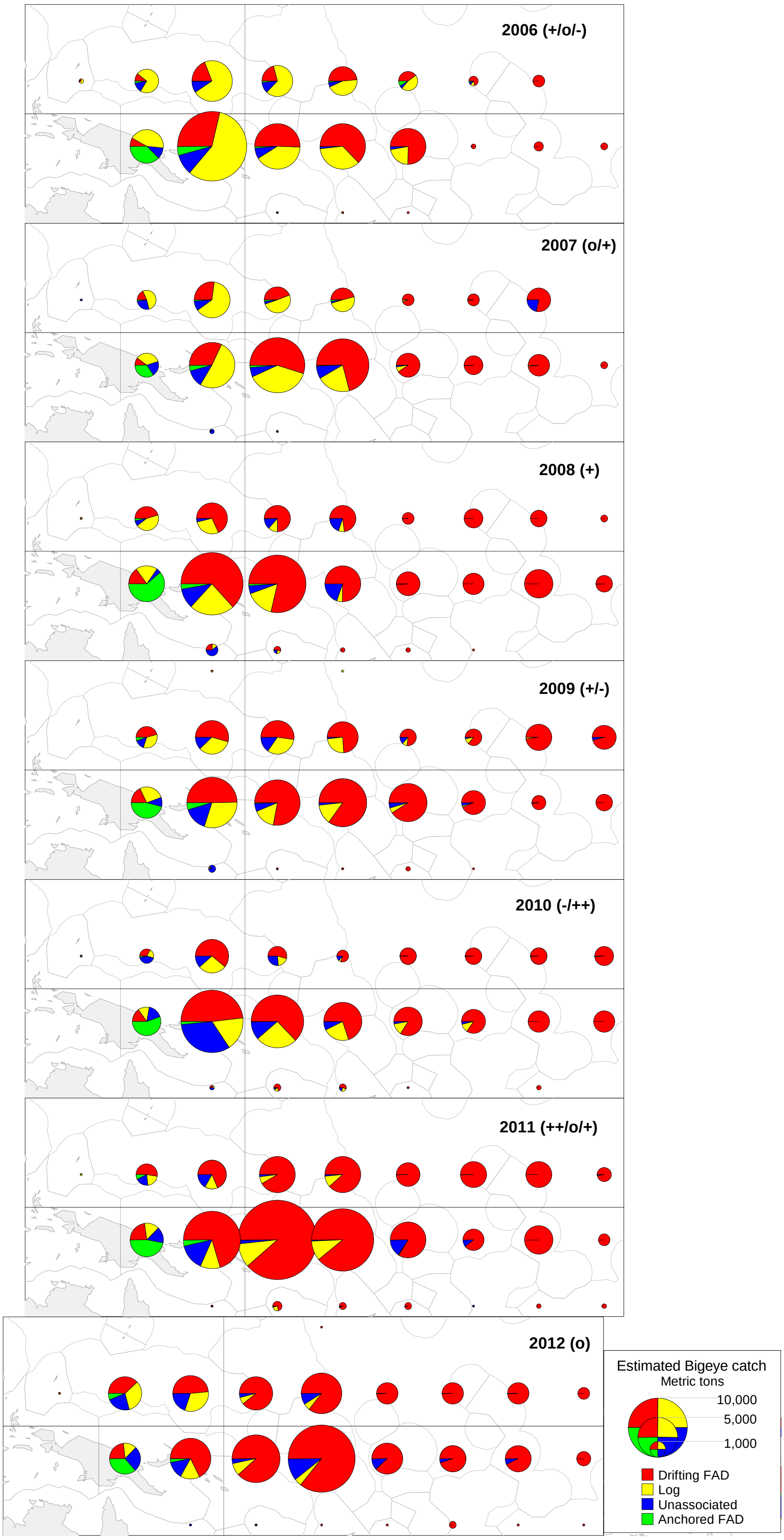


Figure 17. Distribution of estimated bigeye tuna catch by set type, 2006–2012 (Blue–Unassociated; Yellow–Log; Red–Drifting FAD; Green–Anchored FAD).
ENSO periods are denoted by "+": La Niña; "-": El Niño; "o": transitional period.

3.5 Catch per unit of effort

Figure 18 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.

Purse seine skipjack CPUE for all set types increased in 2012, particularly for free-school and drifting FAD sets, with very high CPUE for some fleets (e.g. Japan and Korea free-school and drifting-FAD skipjack CPUE). Over the entire time series, the trend for skipjack CPUE has been generally upwards, although in recent years (2010-2011) there was clear drop in CPUE, in part related to effort restrictions and conditions in the fishery; there was a clear rebound in the skipjack CPUE in 2012 consistent with the long-term trend.

The purse seine yellowfin CPUE also increased for at least one fleet in 2012 (i.e. Korea), but not as clear an increase for the other main fleets as was the case with the 2012 skipjack CPUE; significant increases in yellowfin catch in 2012 by other fleets, not shown in Figure 18, contributed to the high total yellowfin catch. The long-term time series for yellowfin CPUE shows more inter-annual variability and overall, a flatter trend in 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 power has increased.

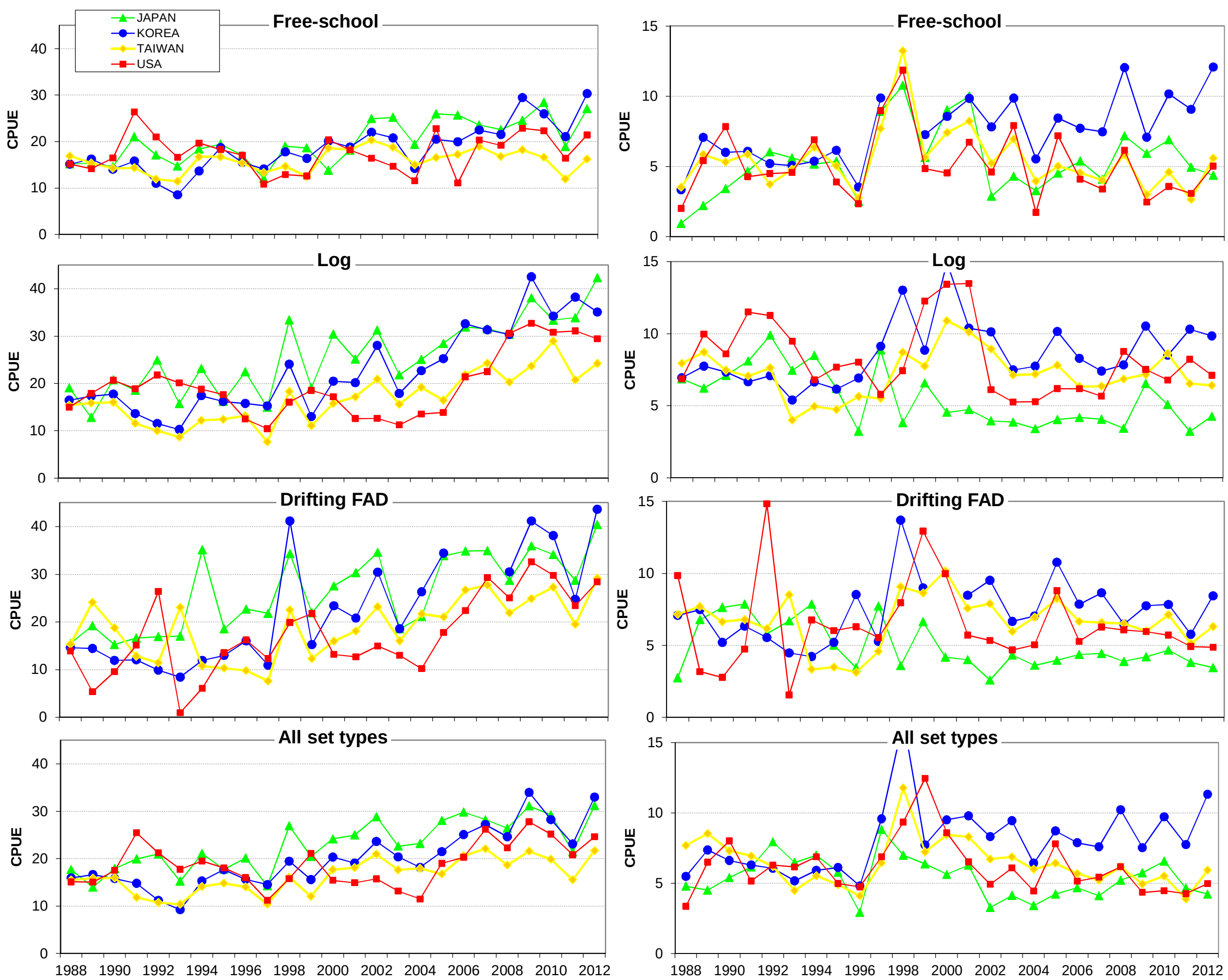


Figure 18. Skipjack tuna CPUE (mt per day–left) and yellowfin tuna CPUE (mt per day–right) by set-type, and all set types combined, for selected purse-seine fleets fishing in the tropical WCP–CA.
Effort and CPUE were partitioned by set type according to the proportions of total sets attributed to each set type.

As noted, yellowfin purse-seine CPUE shows strong inter-annual variability and there are more differences in CPUE among the fleets. 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. ENSO variability is also believed to impact the size of yellowfin and other tuna stocks through impacts on recruitment.

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 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 19). 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 2012 bigeye tuna CPUE for all set types was relatively stable in recent years with no apparent trend for the past ten years.

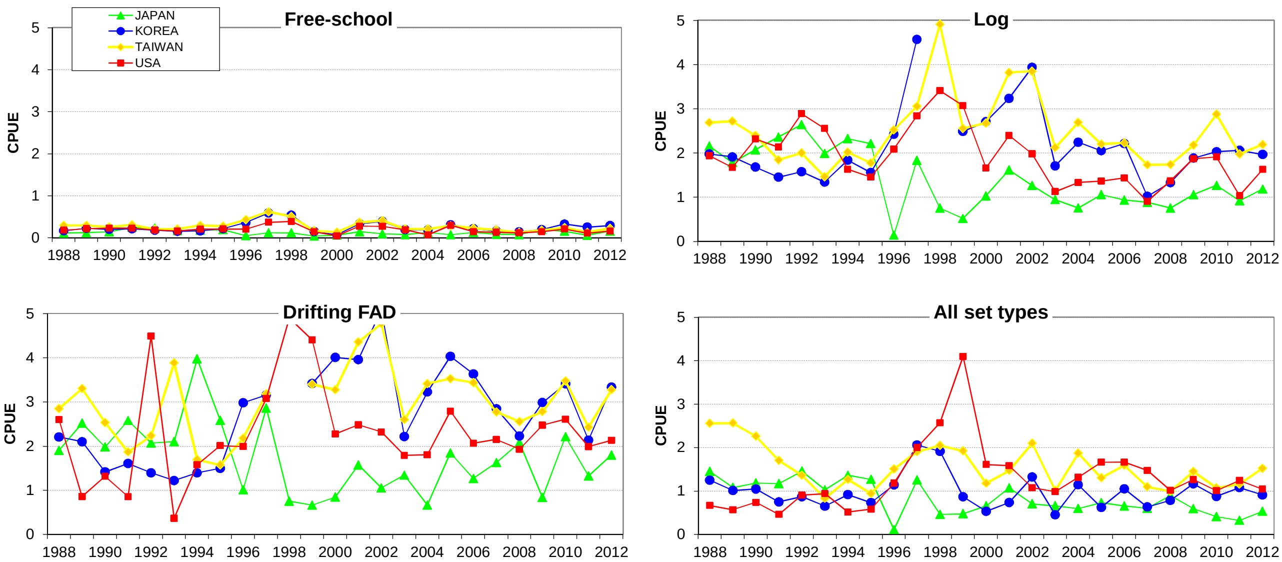


Figure 19. **Estimated bigeye tuna CPUE (mt per day) by major set-type categories (free-school, log and drifting FAD sets) and all set types combined for Japanese, Korean, Chinese-Taipei and US purse seiners fishing in the tropical WCP–CA.**

Effort and CPUE were partitioned by set type according to the proportions of total sets attributed to each set type.

Figure 20 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. Total tuna CPUE increased during 2005 and fluctuated around 30 mt per day for the remainder of the period. Average trip length (from VMS data) generally compares well to average trip length (from logsheet data), but as logsheet coverage declines (e.g. late 2012/early 2013), estimates from these two sources tend to diverge since available logsheets are probably not representative. The logsheet catch/effort data used to determine total tuna CPUE are not complete for late 2012/early 2013, but if average trip length (as determined by VMS data) is an indicator, then total tuna CPUE appears to be steady during the second half of 2012 into 2013, with higher than average total tuna CPUE that were nowhere near the low levels experienced in 2011.

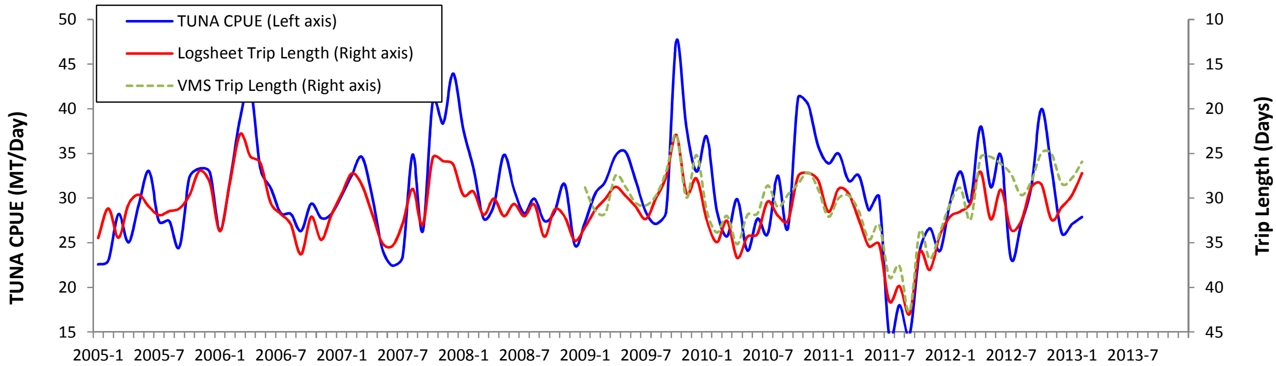


Figure 20. Monthly purse-seine tuna CPUE (mt/day) and average trip length (Logsheet days and VMS days, excluding port visits and transit), 2005–2013.

3.6 Seasonality

Figure 21 shows the seasonal average CPUE for skipjack (left) and yellowfin (right) in the purse seine fishery for the period 2000–2012, and Figure 22 shows the distribution of effort by quarter for the period 2000-2011 in comparison to effort by quarter in 2012. Over the period 2000–2011, 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 for 2000-2011, which was at its lowest during the first six months, but higher thereafter. This situation corresponds to the seasonal extension east 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 monthly skipjack CPUE for 2012 oscillated between the average and slightly higher than average catch rates of skipjack for the past decade (Figure 21–left). Interestingly, the skipjack CPUE was generally higher than the average during the 2012 FAD closure months. The monthly yellowfin CPUE for 2012 was mostly at or close to the long-term monthly averages (Figure 21 – right).

The neutral ENSO/weak El Nino conditions in 2012 provided a quarterly pattern in the distribution of the warm pool (i.e. surface water >28.5°C on average) consistent with the long-term average (2000-2011 – contrast the shading representing sea surface temperature in each quarter in Figure 22). The purse-seine catch in 2012 from the 2nd quarter onwards became concentrated in two main areas, the western areas of the tropical WCP-CA (PNG, FSM and the Solomons), and a concentrated central area covering the waters of the Gilbert Group (Kiribati) and Tuvalu. Note the relatively higher bigeye catches in the central area in the 4th quarter 2012 (Figure 22–bottom right).

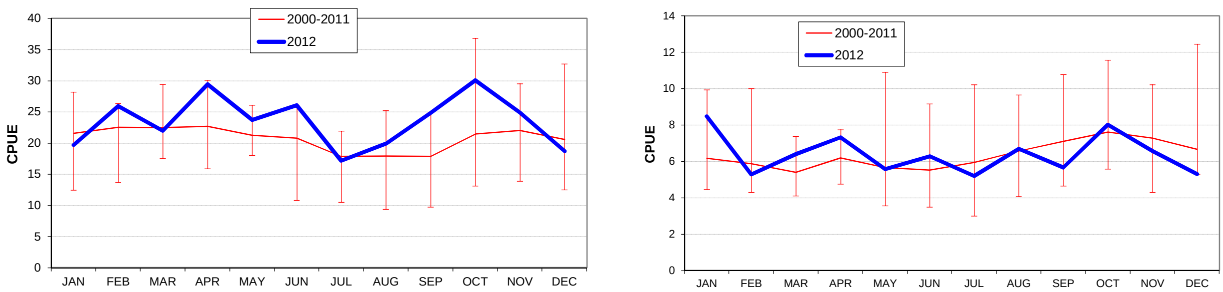


Figure 21. Average monthly skipjack (left) and yellowfin (right) tuna CPUE (mt per day) for purse seiners fishing in the tropical WCP–CA, 2000–2012.

Red line represents the period 2000–2011 and the blue line represents 2012.
The bars represent the range (i.e. minimum and maximum) of monthly values for the period 2000–2011.

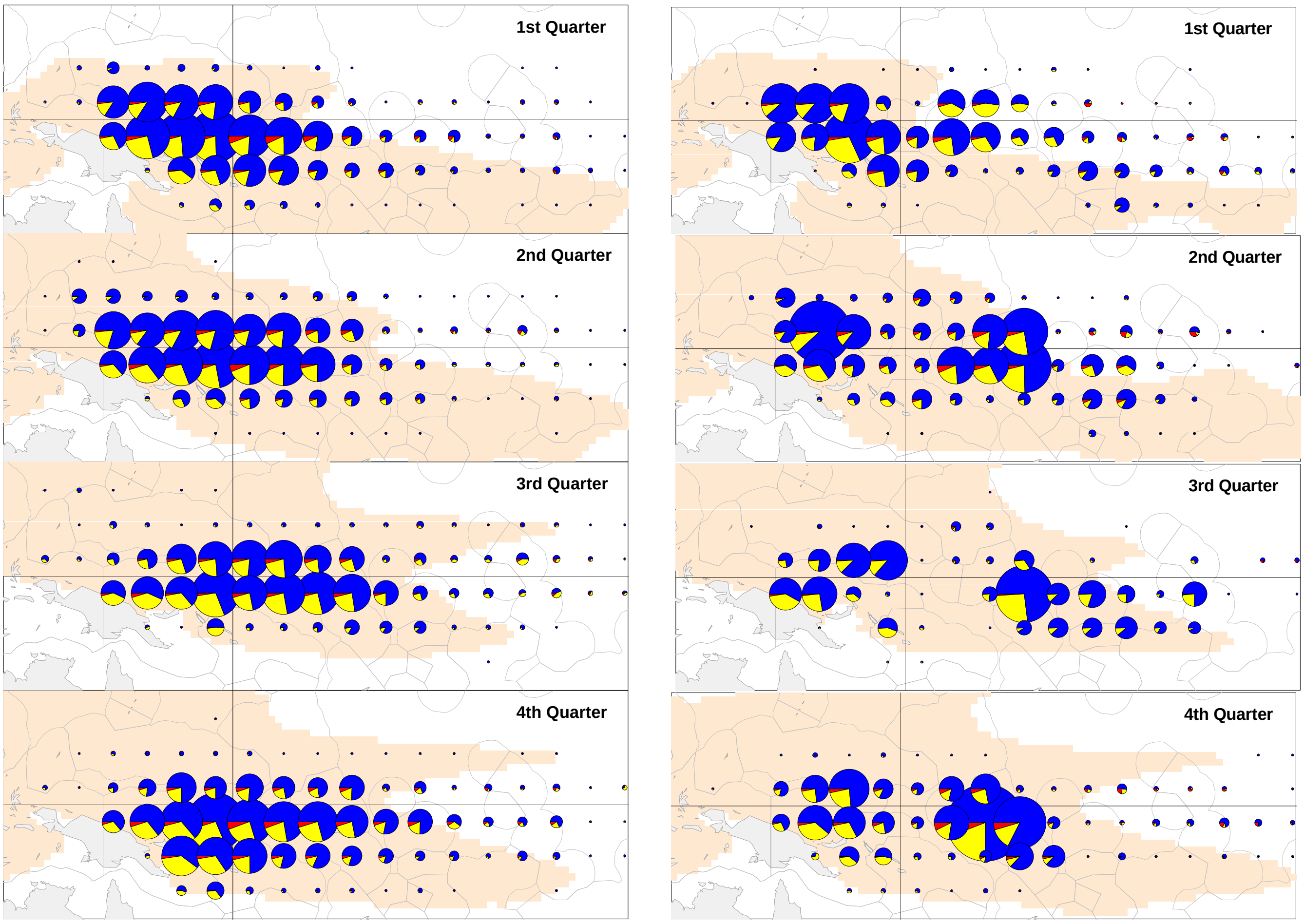


Figure 22. **Quarterly distribution of purse-seine catch by species for 2000–2011 (left) and 2012 (right).**
(Blue–Skipjack; Yellow–Yellowfin; Red–Bigeye)
Pink shading represents the extent of average sea surface temperature > 28.5°C by quarter for the period 2000–2011 (left) and 2012 (right)

3.7 Economic overview of the purse seine fishery

3.7.1 Price trends – Skipjack

Prices in the major markets for WCPO skipjack catches rose in 2012 as the variability in fishing conditions in both the WCPO and Eastern Pacific Ocean and the uncertainties on the impacts of seasonal closures of FAD fishing in the WCPO and purse seine fisheries in the Eastern Pacific exerted pressure on Thailand and Latin American tuna canneries to ensure adequate raw material supplies. The overall increase in prices in 2012 occurred despite: increases in WCPO CPUE for skipjack that resulted in skipjack supplies exceeding those of the previous year; the broadly subdued demand for canned products especially in the important EU and US markets, and; only moderate increases in fuel costs over the year.

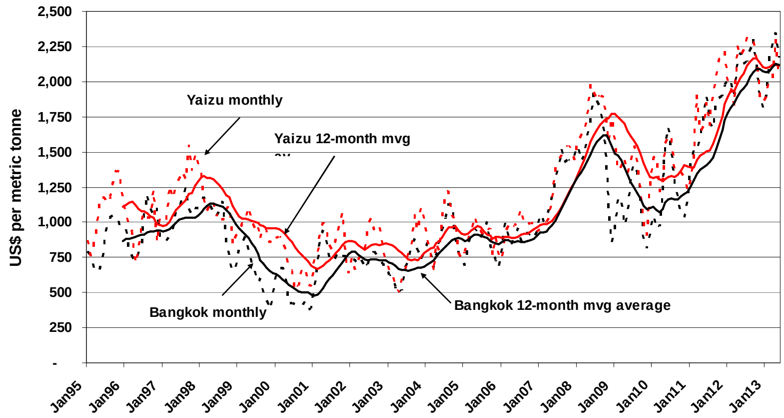


Figure 23. Skipjack prices, Bangkok (4-7.5lbs, c&f) and Yaizu (ex-vessel) monthly and 12 month moving average

The Bangkok benchmark skipjack prices (4-7.5lbs) over the first six months of 2012, despite volatility early in the year, rose from $1,950/Mt in December 2011 to a peak of $2,230/Mt in May but lowered slightly to US$2,125/Mt in June. Over this period, supplies of skipjack from the WCPO to Thai canneries were broadly mixed with the major factor sustaining the uptrend in prices being the competition from Latin American canneries. Earlier in the year Latin American prices were lower than those in Thailand but then rose and stabilised at elevated levels causing diversion of raw materials from WCPO to Ecuador and in turn pressuring Thai prices. Over the second half of 2012, when the FAD closure and the seasonal closures of the ETP purse seine fishery were in place, similar trends persisted with relatively slow fishing conditions in both oceans. Against this backdrop, Thai prices rose further to a new peak of US$2,400 in October before declining in the remaining two months of the year as fishing conditions improved. Ecuador prices on the other hand sustained at $2,400/Mt. Over the year as a whole, the Bangkok benchmark averaged US$2,074/Mt, a 20 per cent increase over 2011 which in turn was 42 per cent higher than in 2010.

Yaizu average price trends follow closely those of the Bangkok benchmark in both Yen and US Dollar terms but with the margin of change over time differing due to the influence of relative exchange rates. The Yaizu average price for skipjack in 2012 was ¥168 (US$2,101/Mt), up 17 per cent from ¥143/Kg ($1,791) in 2011[6]. Yaizu prices over the first six months peaked at ¥184/Kg (US$2,260/Mt) in April but retreated over the next few months and not until July did the April peak was reached again (Figure 23).

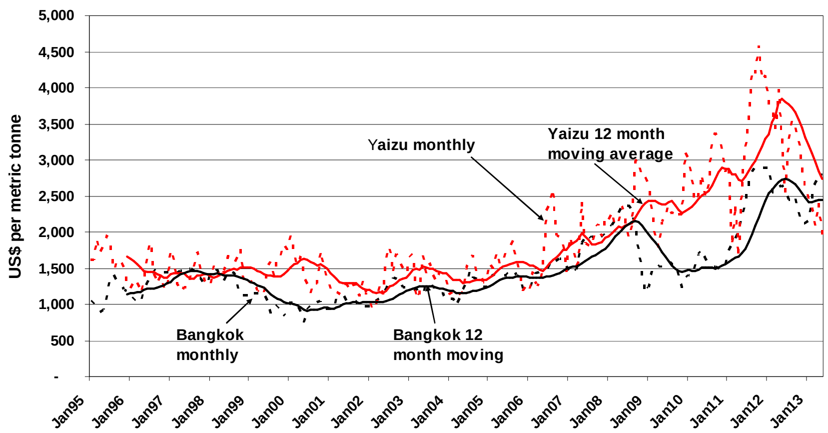


Figure 24. Yellowfin prices, Bangkok (20lbs and up, c&f) and Yaizu (ex-vessel) monthly and 12 month moving average

[6] Where prices are obtained in currencies other than US$ they are converted using inter-bank exchange rates as given by www.oanda.com/convert/fxhistory

Bangkok skipjack prices over the first half of 2013 picked up from a low of $1,900/Mt in January to a high of $2,300/Mt in April because of poor fishing in the WCPO. With reported turnaround in fishing conditions since May, prices have softened again to $2,100/Mt in May and down further to below $1,900/Mt in July. The recovery in prices will depend on how supplies perform during the four-month WCPO FAD closure which has commenced in July, as well as on fishing conditions in the ETP where adverse conditions have been reported lately.

3.7.2 Price trends – Yellowfin

The price trends for purse seine caught yellowfin in 2012, unlike the trends for skipjack, overall were on a gradual decline. The Bangkok yellowfin prices (20lbs+, c&f) trended down from the record high of $2,900/Mt that had been sustained from the last quarter of 2011 to January 2012 to $2,125 in December. Nonetheless, the Bangkok price averaged around US$2,478 or 2 per cent higher than in 2011. Japan Yaizu prices on the other hand followed a similar downtrend but averaged only ¥264/Kg ($3,304) as against ¥306/Kg (US$3,825/Mt) in 2011, 14 per cent lower in both the Japanese Yen and US Dollar terms. An important aspect of the Yaizu prices for yellowfin is that part of the unloading is destined for lower end sashimi use at supermarkets and hence the relatively larger margin between the prices (in US Dollar terms) in this market and those of Bangkok.

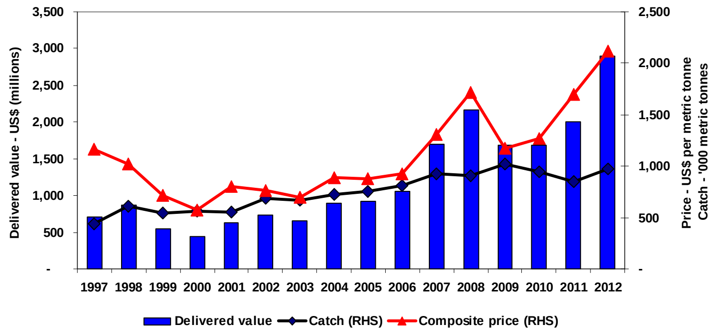


Figure 25. Skipjack in the WCPFC purse seine fishery – Catch, delivered value of catch and composite price

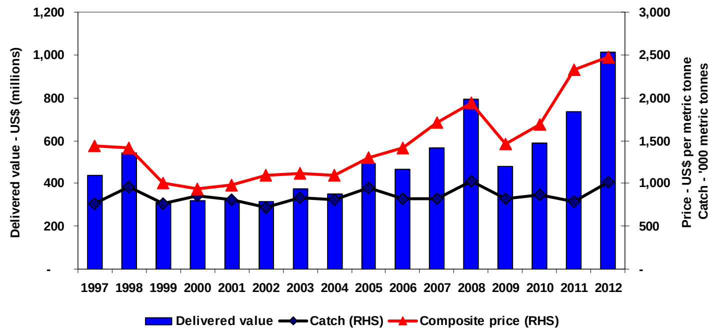


Figure 26. Yellowfin in the WCPFC purse seine fishery – Catch, delivered value of catch and composite price

During the course of 2012, Bangkok yellowfin prices declined from a high at the end of 2011 at $2,900/Mt to a low of $2,125/Mt in December 2012, averaging US$2,478/Mt over the year. Yellowfin prices were broadly stable over the first and second quarters averaging $2,539/Mt but declined by 14 per cent during the last quarter to an average of $2,175/Mt.

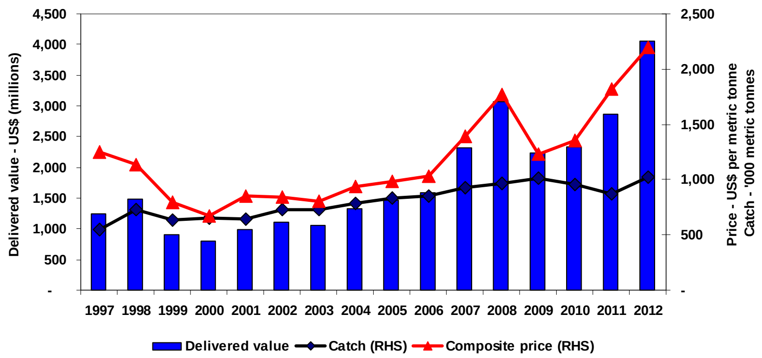


Figure 27. All tuna in the WCPFC purse seine fishery – Catch, delivered value of catch and composite price

During the first half of 2013, Bangkok yellowfin purse seine prices averaged US$2,592/Mt, higher than the latter half of 2012 by almost 12 per cent but slightly lower than the first half of 2012 by almost 2 per cent.

3.7.3 Value of the Purse-seine Catch

As a means of examining the effect of the changes in prices and catch levels, estimates of the “delivered” value of the purse seine fishery tuna catch in the WCPFC Area from 1997 to 2012 were obtained (Figures 25-27). 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.[7] The estimated delivered value of the entire purse seine tuna catch in the WCPFC area for 2012 is US$4,054 million compared with US$2,863 million in 2011. This represents an increase of US$1,190 million or 42 per cent on the estimated delivered value of the catch in 2011. This increase was driven by a US$884 million (44 per cent) increase in delivered value of the skipjack catch (which is estimated to be worth US$2,893 million in 2012 resulting from a 25 per cent increase in the composite price and the increase of 15 per cent in catch) and a US$277 million (38 per cent) increase in the value of the purse seine yellowfin (with estimated worth of US$1,012 million resulting from a 7 per cent increase in composite price and an increase in catch of 29 per cent).[8]

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, Hawaii and Fiji
- a seasonal albacore/skipjack fishery east of Japan (largely an extension of the Japan home-water fishery).

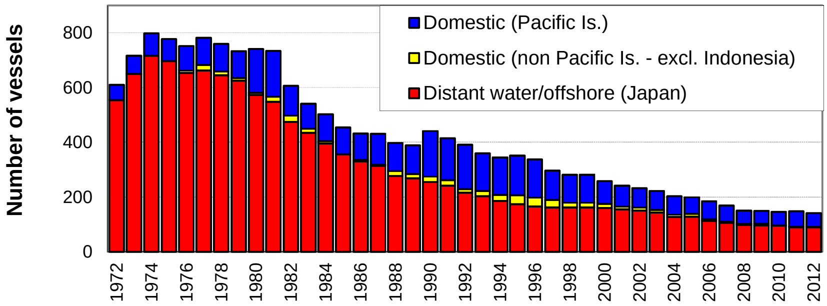


Figure 28. Pole-and-line vessels operating in the WCP–CA
(excludes pole-and-line vessels from the Japanese Coastal and Indonesian domestic fisheries)

Economic factors and technological advances in the purse seine fishery (primarily targeting the same species, skipjack) have seen a gradual decline in the number of vessels in the pole-and-line fishery (Figure 28) and in the annual pole-and-line catch during the past 15–20 years (Figure 29). 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, but an increasing number of vessels have turned to longline fishing. Provisional statistics suggest that the Indonesian pole-and-line fleet has also declined over recent years. However, there is at least one initiative underway to revitalize the domestic pole-and-line fisheries in the Pacific Islands and increased interest in pole-and-line fish associated with certification/ecolabelling.

4.2 Catch estimates (2012)

The 2012 pole-and-line catch (224,207 mt) was the lowest annual catch since the late-1960s and continuing the trend in declining catches for three decades.

[7] The delivered value of each year's catch was 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.

[8] Further details of the value of tuna catches in WCPFC Convention Area can be obtained from the Forum Fisheries Agency website (www.ffa.int/node/862).

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. The Japanese distant-water and offshore fleets (78,838 mt in 2012), and the Indonesian fleets[9] (133,306 mt in 2012), account for most of the WCP–CA pole-and-line catch. 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 (in 2012 reduced to only 90 vessels, the lowest on record). 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 and took 11,221 mt in 2012, the highest catch since 1999.

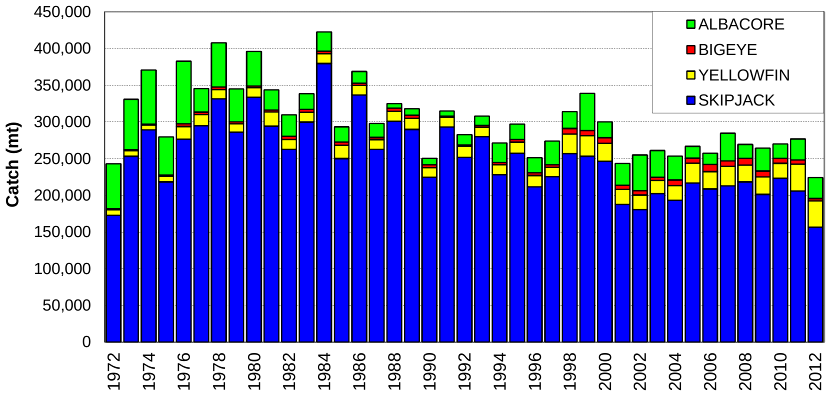


Figure 29. Pole-and-line catch in the WCP–CA

Figure 30 shows the average distribution of pole-and-line effort for the period 1995–2012. 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 Hawaii is not shown in this figure because spatial data are not available.

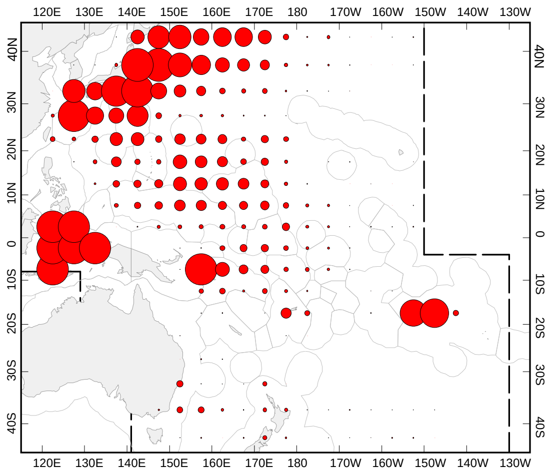


Figure 30. Average distribution of WCP–CA pole-and-line effort (1995–2012).

[9] Indonesia has recently revised the proportion of catch taken by gear type for their domestic fisheries. .

4.3 Economic overview of the pole-and-line fishery

4.3.1 Market conditions

Japan skipjack pole and line fishing is seasonal with the period of southern skipjack pole and line fishing normally between November and June and then both near shore albacore and eastern offshore skipjack mainly during the period from July to October. During 2012, the supply situation for pole and line skipjack was tight and the Yaizu price of pole and line caught skipjack in waters off Japan averaged ¥274/kg (US$3,430/Mt), a significant increase of 40% compared to 2011. The Yaizu price of pole and line caught skipjack in waters south of Japan also increased significantly by a similar margin to ¥259 ($2,321) from ¥185/kg (US$3,243/Mt) during 2011. Overall, the pole and line price at Yaizu in 2012 averaged ¥265 (US$3,321) as against an average of ¥189 (US$2,369) in 2011, a rise of 40% in Japanese Yen and US Dollar terms.

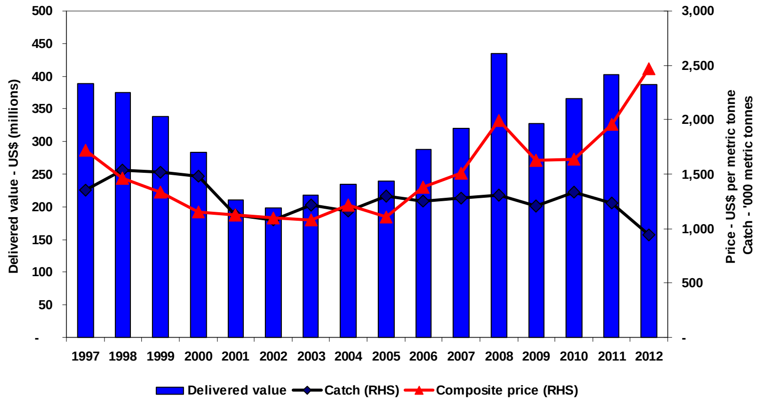


Figure 30. Skipjack in the WCPFC pole and line fishery – Catch, delivered value of catch and composite price

Japan average pole and line price over the first half of 2013 at ¥238/Kg ($2.51/Kg) is 17 per cent lower than the comparable period last year. Both the southern and near shore / eastern offshore fisheries appear to have experienced better conditions than the previous year. The southern pole and line skipjack price averaged ¥240/Kg (down 22 per cent) and near shore / eastern offshore pole and line price averaged ¥219/Kg (down 26 per cent).

4.3.2 Value of the pole-and-line catch

As a means of examining the effect of the changes in price and catch levels over the period 1997-2012, a rough estimate of the annual delivered value of the tuna catch in the pole and line fishery in the WCP-CA is provided in Figures 30 and 31. The estimated delivered value of the total catch in the WCPFC pole and line fishery for 2012 is US$586 million.[10] This is a decrease of $5 million on 2011 (0.8 per cent) caused by offsetting movements in composite price (up 23 per cent) and catch (down 19 per cent).

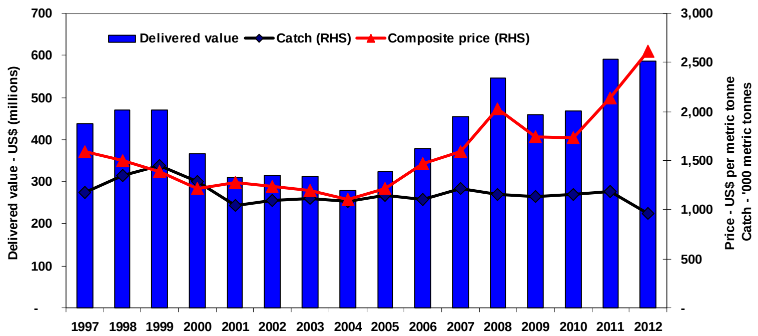


Figure 31. Skipjack in the WCPFC pole and line fishery – Catch, delivered value of catch and composite price

The estimated delivered value of the skipjack catch in the WCPFC pole and line fishery for 2011 is US$387 million. This represents a moderate decline of 4 per cent ($15 million) compared to the estimated value of the

[10] 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.

catch in 2011 and results from a 24 per cent (49,000 Mt) decline in catch that more than offsets the 26 per cent increase in price.

The estimated delivered value of the albacore catch is $101 million, a $14 million (16 per cent) increase on the previous year, purely from the increase in pole and line albacore price as the estimated catch remained unchanged from the previous year.

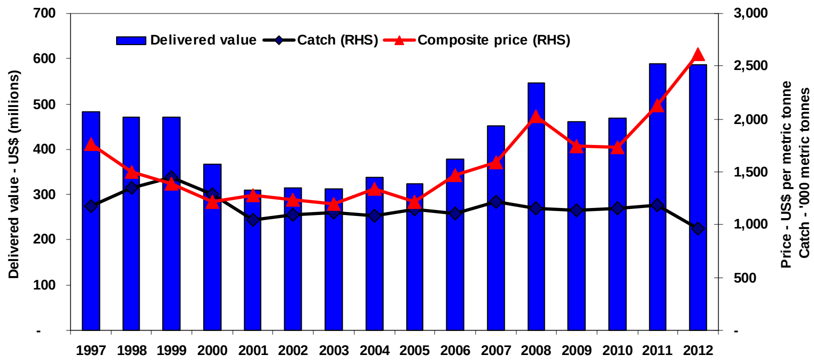


Figure 32. All tuna in the WCPFC pole and line fishery – Catch, delivered value of catch and composite price

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, 2012), 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 last 30 years (Figure 33), 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.

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.

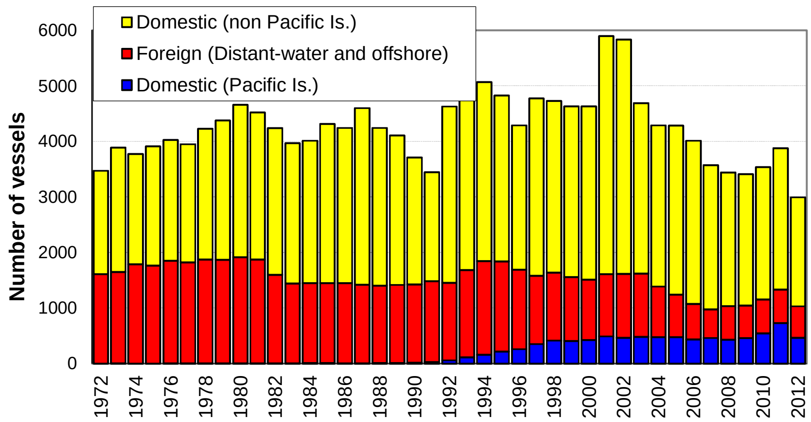


Figure 33. Longline vessels operating in the WCP–CA
(Available data does not make the distinction between foreign "distant-water" and "offshore")

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, New Caledonia, Samoa, Solomon Islands, Tonga 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.

- **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. The Portuguese fleet (one vessel) started fishing in 2011.
- **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 Australia, Japan, New Zealand and Hawaii. 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.
- **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 more recently PNG use handline and small vertical longline gears, usually fishing around the numerous arrays of anchored FADs in home waters (these types of vessels are not included in Figure 33). The commercial handline fleets target large yellowfin tuna which comprise the majority of their overall catch (> 90%). Information on the domestic Vietnamese longline fleet has only recently been compiled and will be included in future versions of this paper.

The WCP–CA longline tuna catch steadily increased from the early years of the fishery (i.e. the early 1950s) to 1980 (227,707 mt), but declined to 157,072 mt in 1984 (Figure 34). 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–37%; BET–30%;YFT–32% in 2012) differs from the period of the late 1970s and early 1980s, when yellowfin tuna were the main target species (e.g. ALB–19%;BET–27%;YFT–54% in 1980).

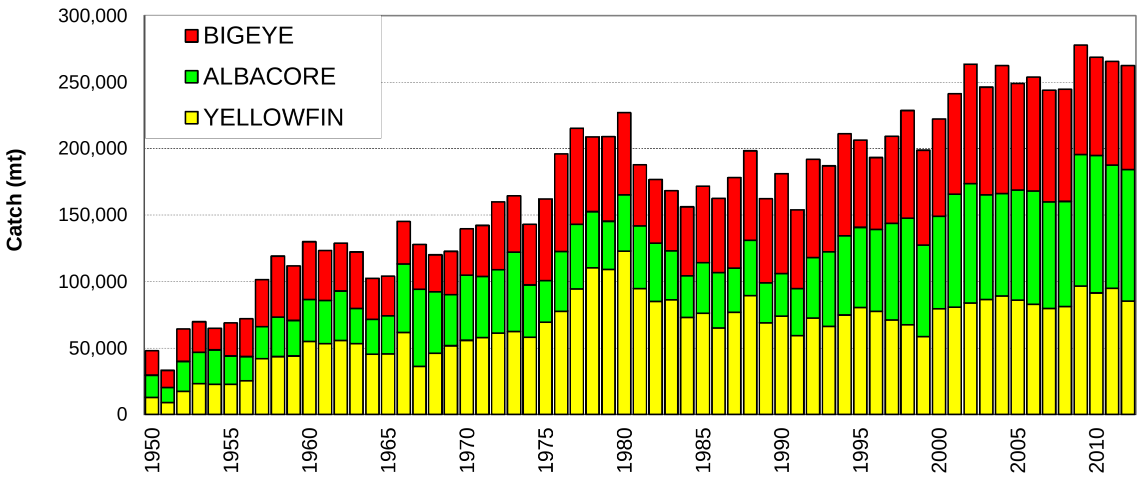


Figure 34. Longline catch (mt) of target tunas in the WCP–CA

5.2 Provisional catch estimates and fleet sizes (2012)

The provisional WCP–CA longline catch (262,076 mt) for 2012 was the fifth highest on record, at around 15,000 mt lower than the highest on record attained in 2009 (279,012 mt). The WCP–CA albacore longline catch (98,854 mt – 37%) for 2012 was the third highest on record, 4,000 mt lower than the record (103,364 mt in 2010). The provisional bigeye catch (76,599 mt – 29%) for 2012 was similar to the level in 2011 which is below the average for the past ten years. The yellowfin catch for 2012 (85,245 mt – 32%) was the lowest for four years but similar to the average catch level for this species over the past decade.

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 continue 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 variations 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 7,683 mt in 2012) and vessel numbers (366 in 2004 to 124 in 2012). The Chinese-Taipei distant-water longline fleet bigeye catch declined from 16,888 mt in 2004 to 7,503 mt (in 2012), mainly related to a substantial drop in vessel numbers (137 vessels in 2004 reduced to 87 vessels in 2009). The Korean distant-water longline fleet experienced smaller declines in bigeye and yellowfin catches in recent years, but with a more significant drop in vessel numbers – from 184 vessels active in 2002 reduced to 108 vessels in 2008, but back to 126 vessels in 2012.

With domestic fleet sizes continuing to increase as foreign-offshore and distant-water fleets decrease (Figure 33), 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 WCPFC–SC9 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, more so than 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 on. 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.

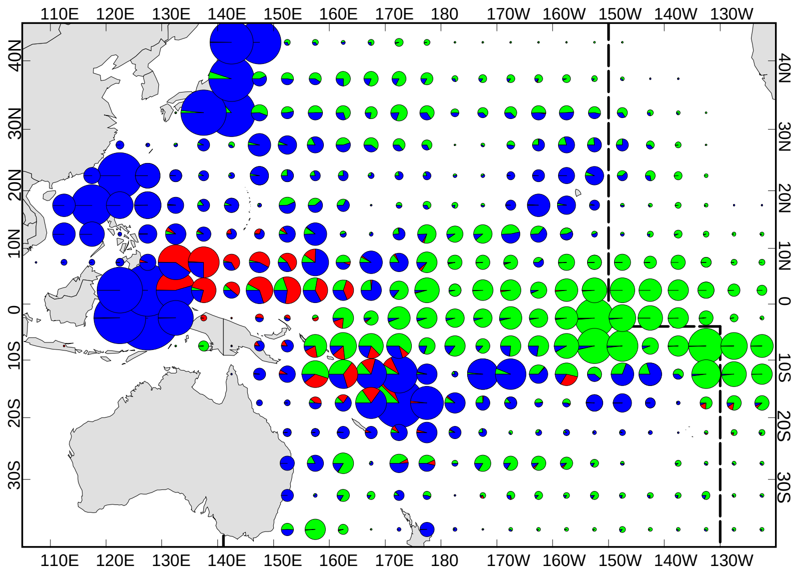


Figure 35. Distribution of longline effort for distant-water fleets (green), foreign-offshore fleets (red) and domestic fleets (blue) for the period 2000–2012.
(Note that distant-water effort for Chinese-Taipei and other fleets targeting albacore in the North Pacific is poorly covered)

This paper does not attempt to present or 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 35 shows the distribution of effort by category of fleet for the period 2000–2012.

Effort by the **large-vessel, distant-water fleets** of Japan, Korea and Chinese-Taipei account 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.

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 growth in **domestic fleets** in the South Pacific over the past decade has been noted; the most prominent examples are the increases in the Samoan, Fijian and French Polynesian fleets, and more recently the Solomon Islands chartered vessels (Figure 36).

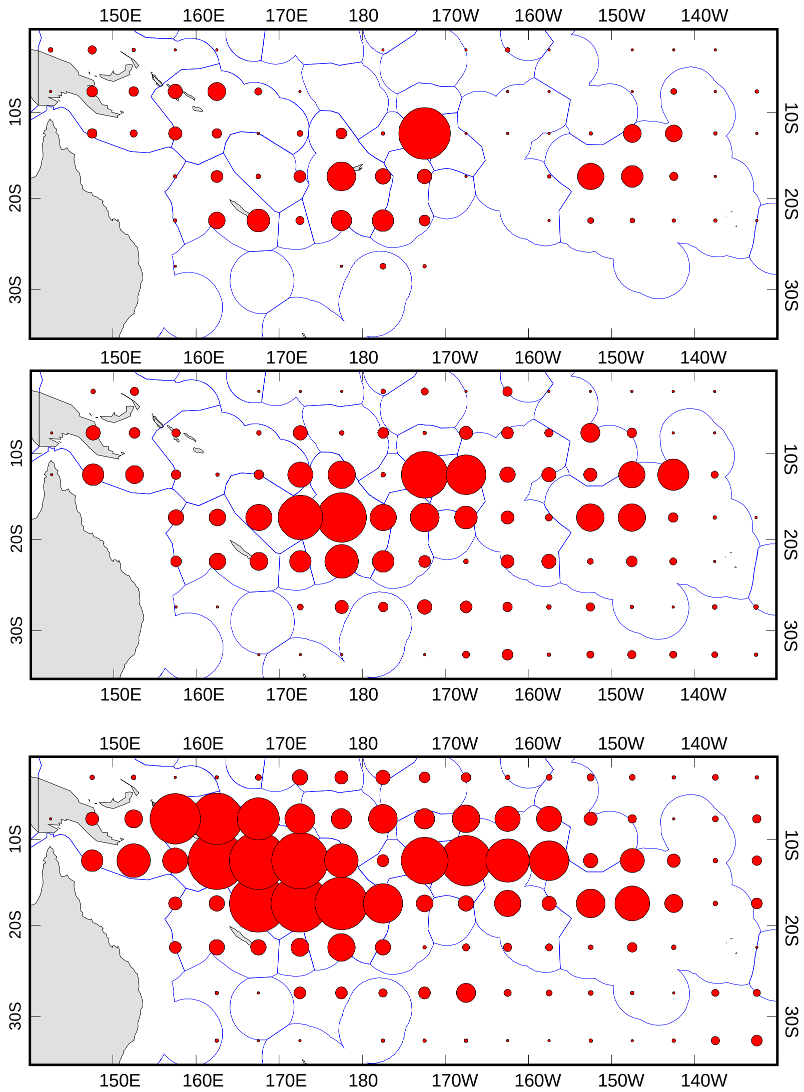
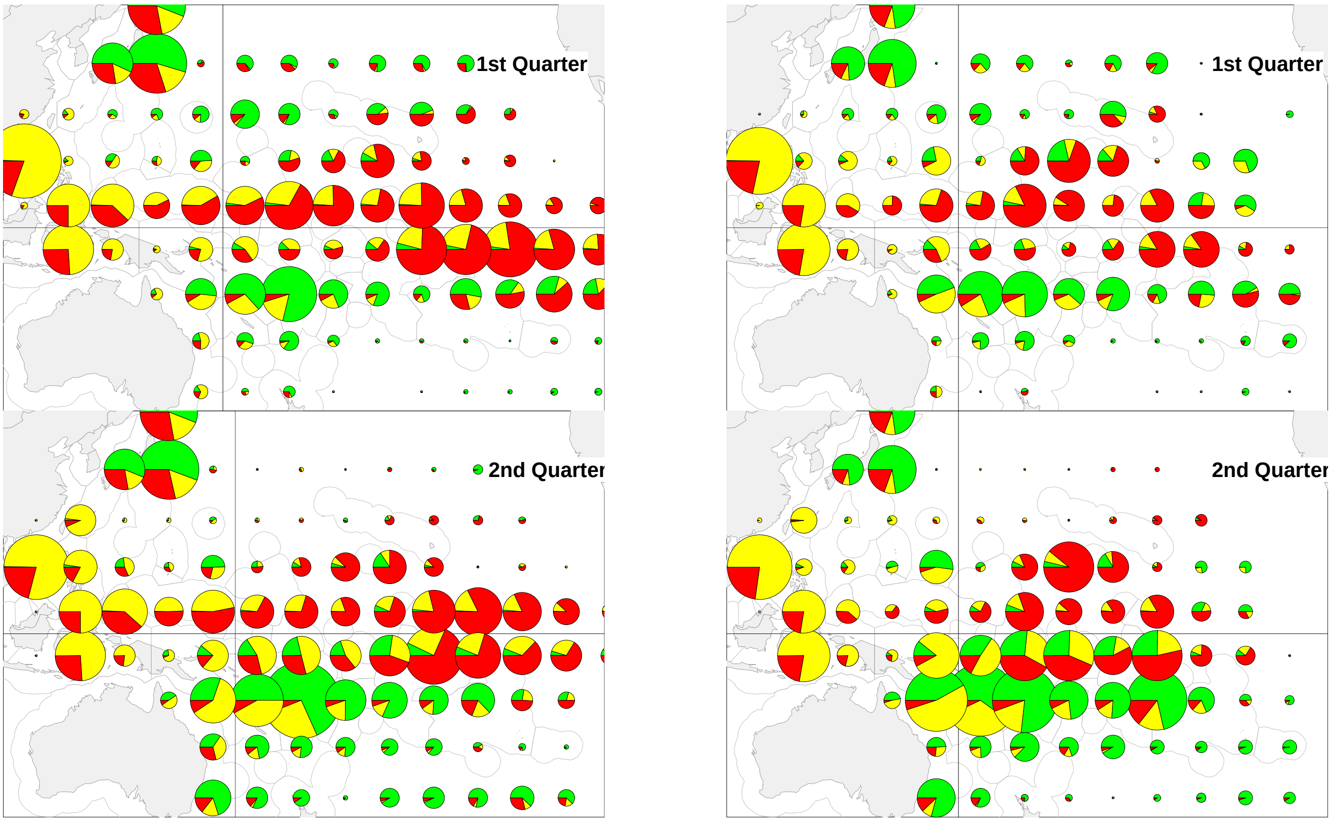


Figure 36. Distribution of south Pacific-island fleet longline effort for 1999 (top), 2003 (middle) and 2012 (bottom). Note that 2012 includes estimated effort for charter vessels.

Figure 37 shows quarterly species composition by area for the period 2000–2011 and 2012. 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 over recent years is evident when comparing the 2000-2011 quarterly averages (Figure 37–left) with the 2012 catches (Figure 37–right).



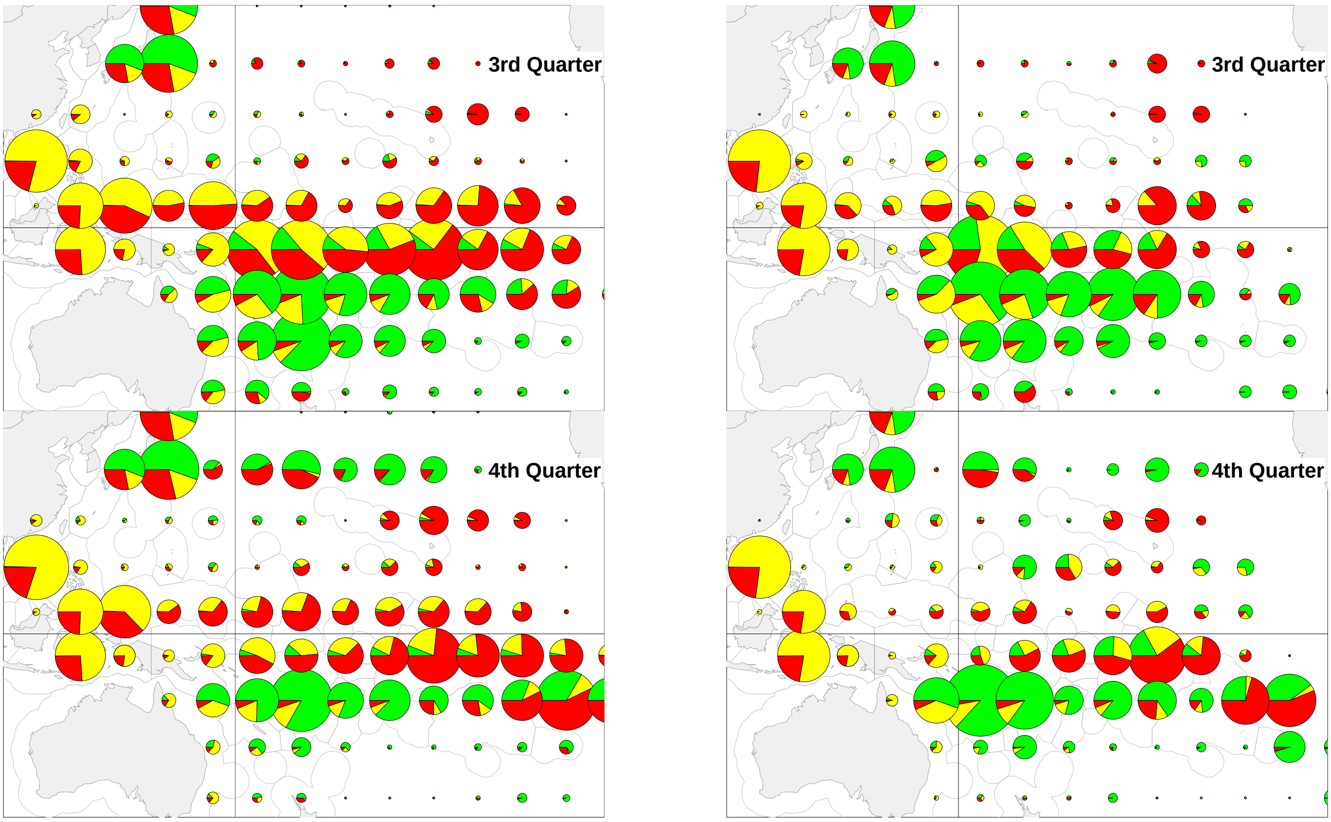


Figure 37. Quarterly distribution of longline tuna catch by species, 2000-2011 (left) and 2012 (right*)*
(Yellow–yellowfin; Red–bigeye; Green–albacore)
(Note that catches from some distant-water fleets targeting albacore in the North Pacific may not be fully covered)

5.5 Economic overview of the longline fishery

5.5.1 Price trends – Yellowfin

Japan imports[11] of fresh yellowfin have steadily declined over the years, reflective of the changing consumption pattern with the younger generation and also the tight supply conditions. In 2001 Japan imports of fresh yellowfin totaled 36,000Mt however after steady declines over the years, total imports in 2012 came to just more than 12,000Mt, the lowest on record. It is noted however that imports of other sashimi product forms – loins and fillets - have risen in recent years. Japan fresh yellowfin imports sourced from Oceania increased moderately by 3 per cent to 3,232Mt in 2012 following a more pronounced increase of 20 per cent in 2011 but the overall trend over the years has also been on a steady decline. Imports in 2012 were lower by 63 per cent compared to the high of 8,800Mt in 2001.

In 2012 longline caught yellowfin prices (ex-vessel) landed at Yaizu port declined by 10 per cent (10 per cent also in US$ terms) to ¥607/kg ($7.61/Kg). Japan fresh yellowfin import price (c.i.f.) from Oceania fell by a lower margin of 2 per cent to ¥875/kg ($10.97/Kg) but the price of fresh imports from all sources improved by 5 per cent (similar in US Dollar terms).

In the US market, fresh yellowfin import volumes increased marginally by 1 per cent to 15,829Mt but increased in value terms by 8 per cent to US$153 million. In 2011 sashimi grade fresh yellowfin imports declined by 2 per cent to 15,267Mt. It appears the level of fresh yellowfin imports have been broadly sustained since 2010 after being adversely affected by the adverse economic conditions in prior years. The slight improvement in the volume of fresh yellowfin imports in 2012 was despite the higher prices for the product that averaged US$9.64/Kg

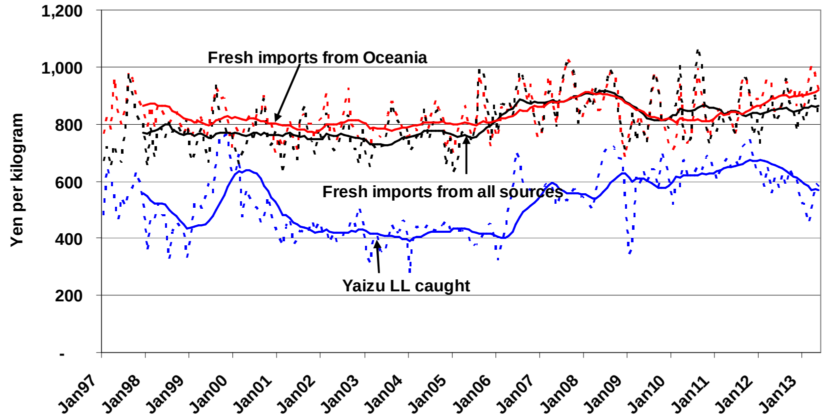


Figure 38. Yellowfin prices on Japanese markets; fresh imports (c.i.f.), fresh imports from Oceania (c.i.f.) and Yaizu longline caught (ex-vessel)

(Monthly price given by dashed lines, 12 month moving average price given by solid line)

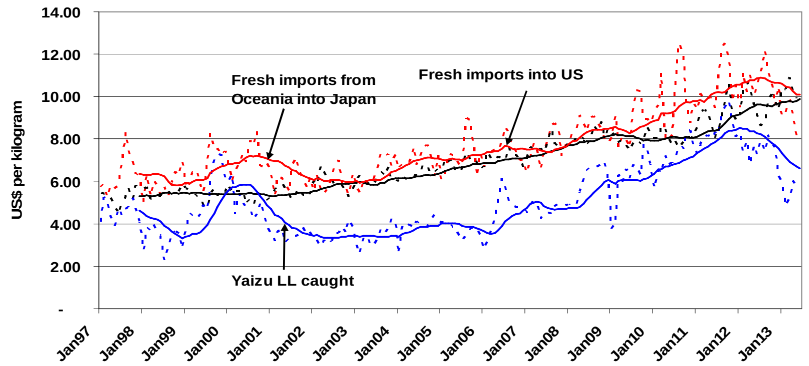


Figure 39. Yellowfin prices in US$: US fresh imports, Japanese fresh imports from Oceania (c.i.f.) and Yaizu longline caught (ex-vessel)

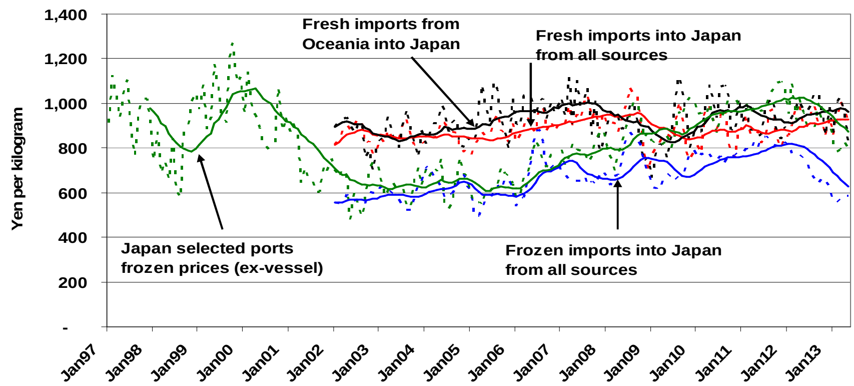


Figure 40. Bigeye prices on Japanese markets; fresh imports (c.i.f.), fresh imports from Oceania (c.i.f.) and frozen imports (ex-vessel)

[11] Imports of tuna into Japan are defined according to Japan's definition of imports: "That is, tuna which is caught by vessels of foreign nationality in the seas outside of territorial waters (including Japan's and other countries' exclusive economic zones) and carried into Japan, or tuna which is caught by vessels of Japanese nationality and first landed in other countries, and then brought into Japan. Those other than the above (i.e., tuna caught by vessels of Japanese nationality on high seas, etc.) are regarded as Japanese products)".

(fas) as against US$9.07 in 2011, a rise of 6 per cent.

The prices for sashimi and non-canned yellowfin products during the first half of 2013 have moderately improved compared to the same period in 2012. The Japan fresh import prices at ¥931/Kg ($9.86/Kg) is 4 per cent higher as import volume has lowered by 5 per cent and; in the US market import prices averaged $10.34/Kg, an improvement of 3 per cent as imports have marginally lowered by 1 per cent.

5.5.2 Price trends – Bigeye

Frozen bigeye prices (ex-vessel) at Japan selected major ports declined by 7 per cent in 2012 to ¥946/kg ($11.86) while fresh bigeye prices (ex-vessel) increased by 6 per cent to ¥1,315/kg ($16.48). Japan fresh bigeye import prices (c.i.f.) from all sources increased by 6 per cent to ¥924/Kg ($11.58) while fresh import prices from Oceania at ¥1,076/Kg ($13.49) was only marginally higher than the previous year's.

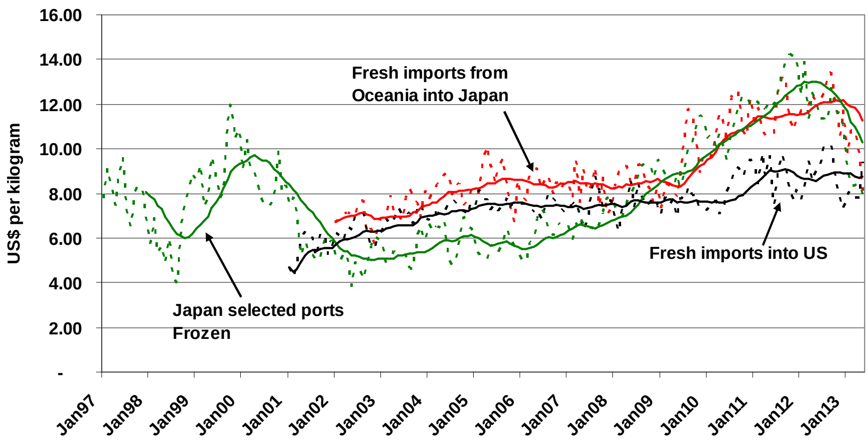


Figure 41. Bigeye prices in US$: US fresh imports, Japanese fresh imports from Oceania (c.i.f.) and Japanese frozen imports from Oceania (c.i.f.)

Import volumes of fresh bigeye from all sources rose by 9 per cent in 2012 to 13,296Mt (despite the increase of 6 per cent in average prices) of which 2,541Mt was sourced from the Oceania region. Fresh imports in total, as in the case for yellowfin, has reduced substantially over the years with imports total in 2012 having reduced by 40 per cent since 2002 when 22,000Mt was recorded. Fresh imports from Oceania moderately rose by 4 per cent in 2012 (against the stable prices relative to 2011) following a rebounce of 41 per cent the preceding year. Nonetheless, the longterm trend has seen the 2012 imports from this source reduced by 66 per cent from the 7,188Mt in 2002.

US fresh bigeye import volumes in 2012 at 3,724Mt represented an increase of 24 per cent that reverses the previous year's 25 per cent decline. This was against the backdrop of stable prices at $8.98/Kg relative to 2011. The 2012 average price is the highest to date.

The Japan fresh bigeye import prices during the first half of 2013 averaged Y937/Kg ($9.85/Kg), a rise of 1 per cent as the imported volume declined by 13 per cent. The US import price averaged $8.31/Kg), a decline of 5 per cent as the volume of imports rose 3 per cent.

5.5.4 Price trends – Albacore

The Bangkok albacore market benchmark price (10kg and up, c&f) averaged $3,286/Mt in 2012, up 18 per cent from the 2011 average and the highest to date that reflects continuing poor landings through most part of the year although this started to reverse in the latter part of the year. Prices during 2012 sustained at the relatively high levels recorded in the last quarter of 2011

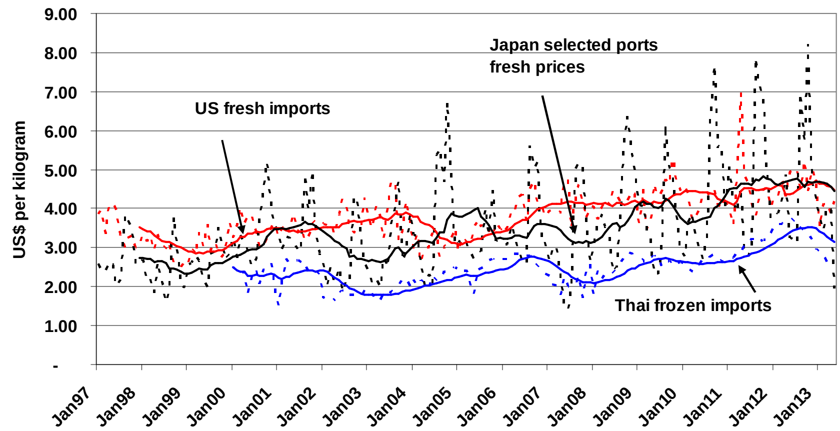


Figure 42. Albacore prices in US$: US fresh imports (f.a.s), fresh landings at selected Japanese ports and Thai frozen imports (c.i.f.)

and reached peak in April at $3,625/Mt.

Over the first half of 2013, however, Bangkok albacore prices have significantly retreated, reflective of abundant supplies, and averaged only $2,669 that is 23 per cent lower than the comparative period last year.
Thai imports of frozen albacore in 2012 rose 24 per cent to 53,516Mt following a decline of 12 per cent and an increase of 24 per cent in 2011 and 2010 respectively. Average prices in 2012 improved by 16 per cent to US$3,534/Mt (US$3.53/kg) from US$3,044/Mt (US$3.04/kg) in 2011.

The US import volume of fresh albacore in 2012 totalled 747Mt, a 12 per cent increase on 2011 that is lower than the increase of 29 per cent in 2011. This increase in imports was despite the increase in fresh albacore price of 3 per cent to US$4.71/kg from US$4.56 in 2011. Prices for fresh albacore landings at Japan major ports increased by 2 per cent to ¥295/Kg ($3.70/kg) while the volume of landings increased by 23 per cent to 42,096Mt in 2012. The previous year's trends saw prices declining by 7 per cent while landings increased by 13 per cent.

5.5.5 Price trends – Swordfish

The US swordfish market weighted average price (fresh and frozen, f.a.s.) averaged $8.54/Kg in 2012, up 2 per cent from 2011. Against the moderate price increase, the volume of imports rose by 7 per cent while in value terms the increase was 10 per cent. Although the long-term trend of swordfish prices in the US market has been up from around $5.00/Kg to more than $8.00/Kg, there have been apparent stagnancies in between years (Figure 43).

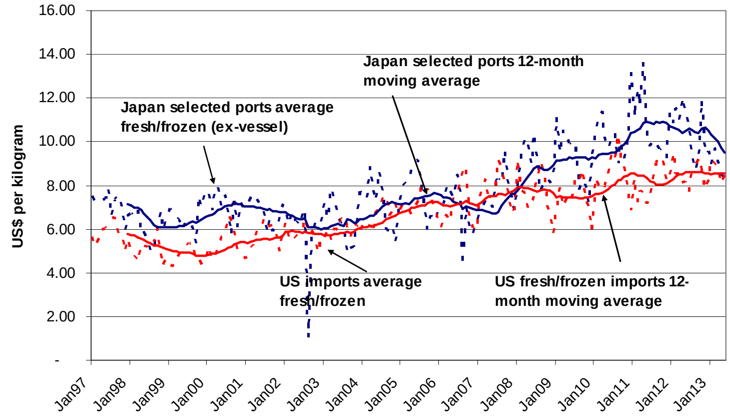


Figure 43. US imports (fas) Swordfish fresh and frozen price trends

A broadly similar trend is shown for the Japan market based on landings data at Japan selected major ports although clear declines have occurred in the last several years (Figure 43). The weighted ex-vessel average price for swordfish at Japan selected ports in 2012 was ¥830/Kg ($10.40), a 3 per cent decline from the previous year's while the landed volume rose by 34 per cent to almost 4,000Mt.

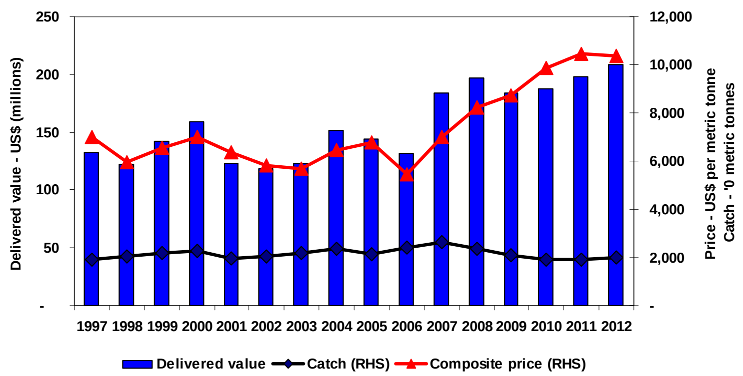


Figure 44. Swordfish in the WCPFC-CA longline fishery – Catch, value and price

For purposes of estimating the annual value of swordfish taken in the WCP-CA, the Japan selected ports fresh and frozen market prices (ex-vessel) are used with the assumption that all DW longline fleets of Japan and Taiwan along with all Korean longline catches are frozen and the remaining catches constitute fresh deliveries.[12]

The estimated delivered value of the longline swordfish catch in the WCP-CA for 2012 is US$208 million. This represents a moderate increase of 5 per cent ($10 million) compared to the estimated value of the catch in 2011 and results from a 6 per cent increase in catch (120Mt to 20,127Mt) that more than offset the 1 per cent decline in the composite price.

In the first half of 2013, the US fresh import prices averaged $8.56/Kg, a slight increase of 1 per cent as imports rose 11 per cent compared to the same period last year. The Japan market, based on landings at Japan major ports, has deteriorated with a decline in prices of 22 per cent to ¥570/Kg ($6.00/Kg) despite a decline in landings of 5 per cent.

[12] The Japan market prices are used given the larger portion of swordfish catch in the WCP-CA is accounted for by Japanese fleets. This approach differs from the one used last year when US market prices were used in the valuation.

5.5.6 Value of the longline catch (excluding swordfish)

As a means of examining the effect of changes in price and catch levels since 1997, an estimate of the "delivered" value of the longline fishery tuna catch in the WCPFC Area from 1997 to 2012 was obtained (Figures 45–48). 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. [13]

The estimated delivered value of the longline tuna catch in the WCPFC area for 2012 is US$1,962 million. This represents a decline of US$71 million on the estimated value of the catch in 2011. The value of the albacore catch increased by US$70 million (25 per cent) while the value of the bigeye catch declined by US$36 million (4 per cent) and the value of the yellowfin catch decreased by $126 million (15 per cent).

The albacore catch was estimated to be worth US$352 million in 2012 with the 25 per cent increase resulting from the 16 per cent increase in the composite price and the 7 per cent increase in catch. The bigeye catch was estimated to be worth US$850 million in 2012, a decrease of 4 per cent compared to 2011 accounted for by 2 per cent drops in catch and composite price. The estimated delivered value of the yellowfin catch was $736 million in 2012, a decline of 15 per cent accounted for by decreases in both catch and price of 10 and 5 per cent respectively.

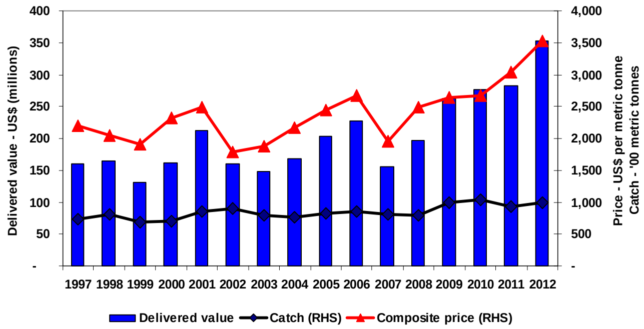


Figure 45. Albacore in the WCPFC longline fishery – Catch, delivered value of catch and composite price

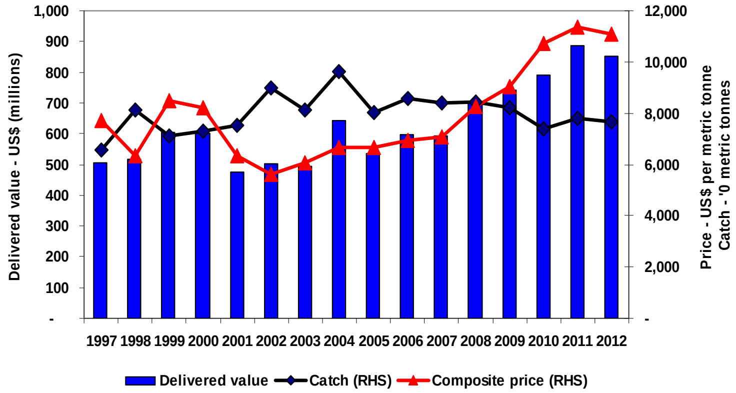


Figure 46. Bigeye in the WCPFC longline fishery – Catch, delivered value of catch and composite price

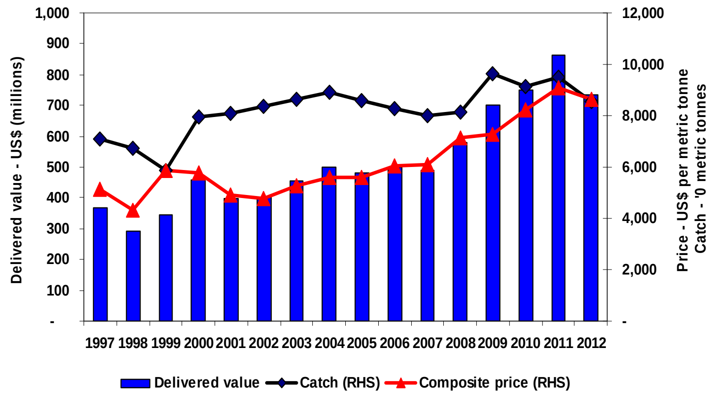


Figure 47. Yellowfin in the WCPFC longline fishery – Catch, delivered value of catch and composite price

[13] 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 US$1.50/kg throughout the period 1995-2005. 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.

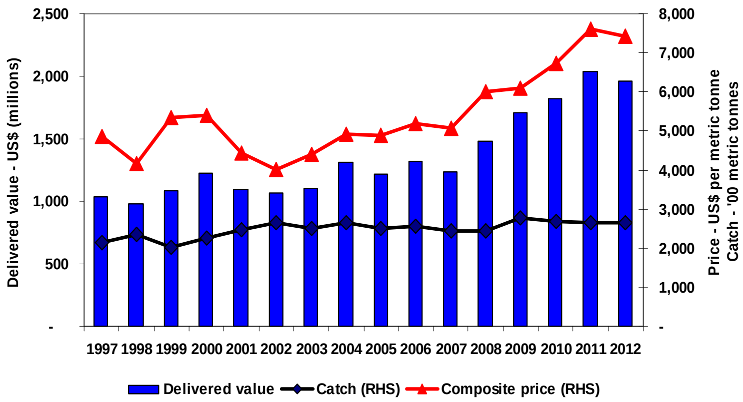


Figure 48. All tuna in the WCPFC longline fishery – Catch, delivered value of catch and composite price

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). In recent years, catches have declined to range from 2,000–4,000 mt, low catch levels which have not been experienced since prior to 1988 (Figure 49). 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.

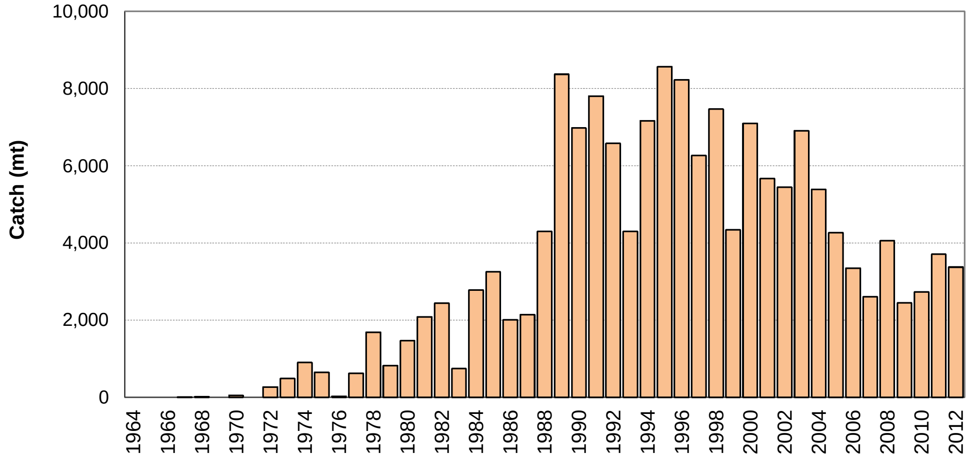


Figure 49. Troll catch (mt) of albacore in the south Pacific Ocean

6.2 Provisional catch estimates (2012)

The 2012 South Pacific troll albacore catch (2,925 mt) was similar to the 2011 catch level. The New Zealand troll fleet (168 vessels catching 2,727 mt in 2012) and the United States troll fleet (9 vessels catching 198 mt in 2012) typically account for most of the albacore troll catch, with minor contributions coming from the Canadian, the Cook Islands and French Polynesian fleets when their fleets are active (which was not the case in 2012).

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 50.

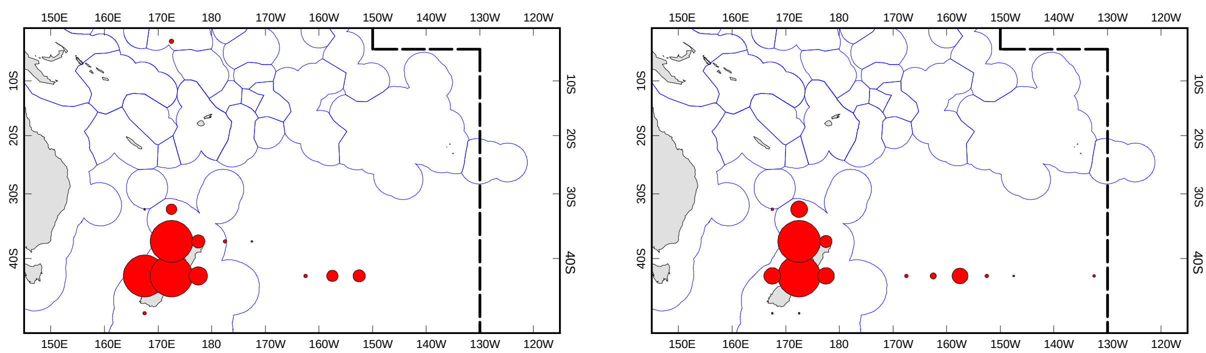


Figure 50. Distribution of South Pacific troll effort during 2011 (left) and 2012 (right)

7. SUMMARY OF CATCH BY SPECIES

7.1 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 exceeded 1.5 million mt in the last five years (Figure 51). 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 2009 and 2012 WCP-CA pole-and-line catches were the lowest since 1965). 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 make up 20–28% of the total skipjack catch in WCP–CA).

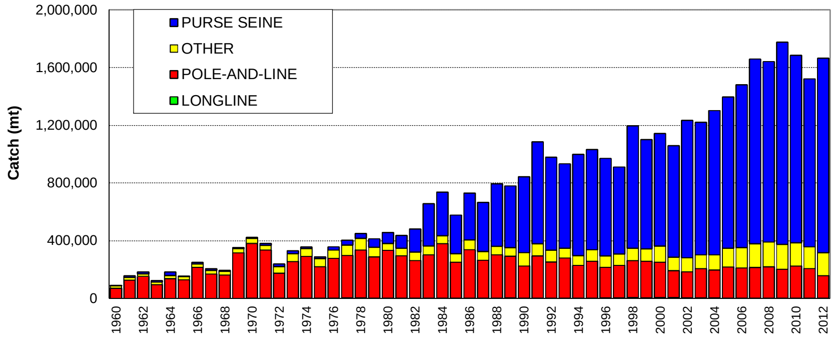


Figure 51. WCP–CA skipjack catch (mt) by gear

The 2012 WCP–CA skipjack catch of 1,664,309 mt was the third highest catch, around 110,000 mt lower that the record in 2009. As has been the case in recent years, the main determinant in the overall catch of skipjack is catch taken in the **purse seine** fishery (1,348,554 mt in 2012 – 81%). A declining proportion of the catch was taken by the **pole-and-line** gear (156,579 mt – 9%) and the "**unclassified**" gears in the domestic fisheries of Indonesia, Philippines and Japan (133,901 mt – 8%). The **longline** fishery accounted for less than 1% of the total catch.

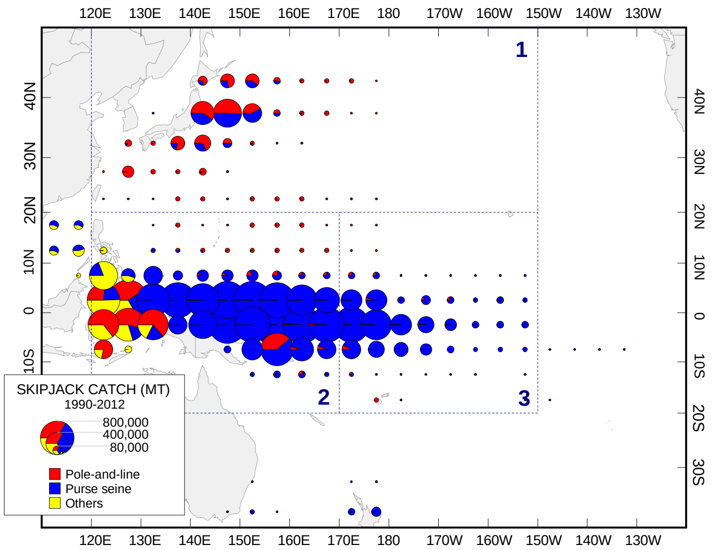


Figure 52. Distribution of skipjack tuna catch, 1990–2012.

The three-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 52). 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) account for most of the skipjack catch in the 20–40 cm size range (Figure 53). The dominant mode of the WCP–CA skipjack catch (by weight) typically falls in the size range between 40–60 cm, corresponding to 1–2+ year-old fish (Figure 53). There was a greater proportion of medium-large (60–80 cm) skipjack caught in the purse seine fishery in years 2005 and 2010 (unassociated, free swimming school sets account for most of the large skipjack). In contrast, the WCP–CA skipjack purse-seine catch in 2007 and 2009 comprised of more younger fish from associated schools. The overall purse-seine skipjack size distribution in 2012 is similar to that of 2007 and 2009 (i.e. relatively smaller fish than other years), with most of the catch roughly shared between unassociated and associated schools but with a noticeable mode of large fish (70+ cm) from unassociated schools.

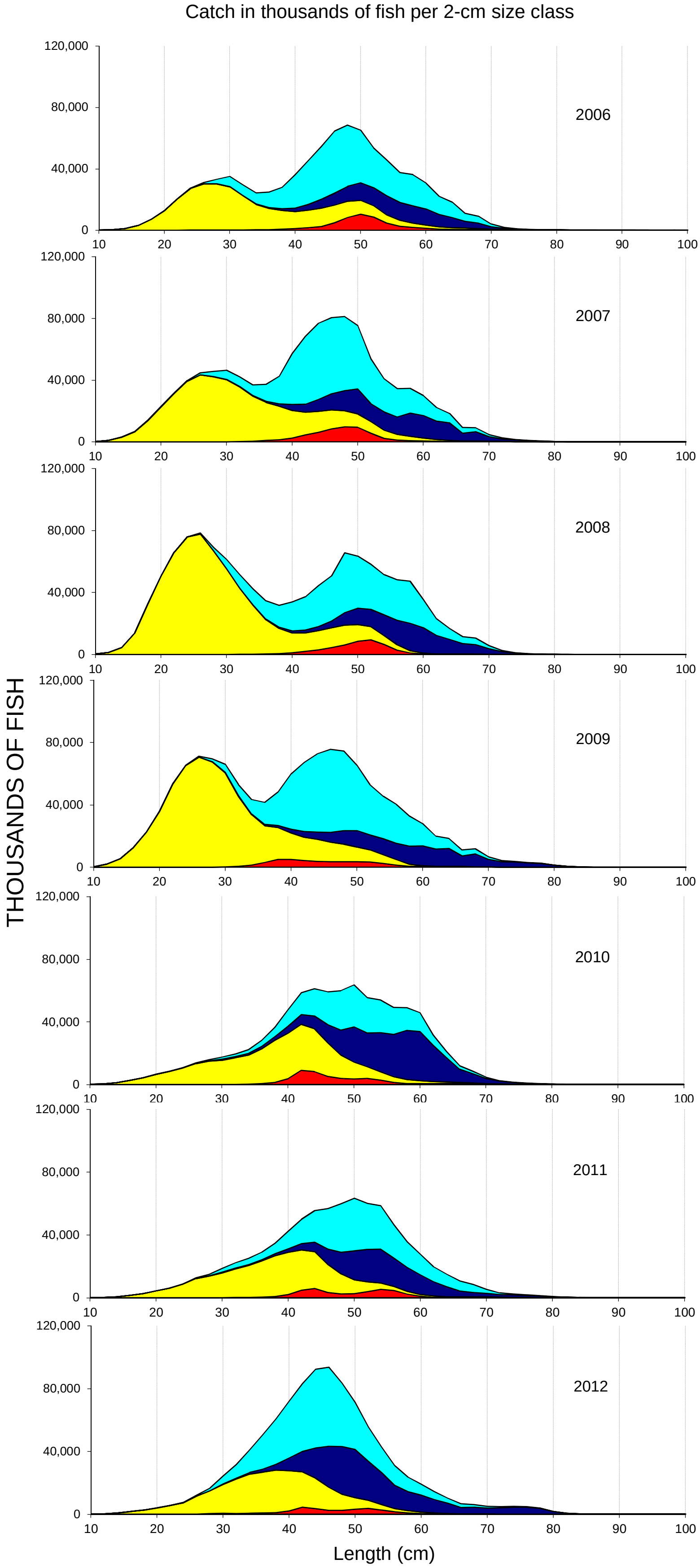


Figure 53. Annual catches (numbers of fish) of skipjack tuna in the WCPO by size and gear type, 2006–2012.

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

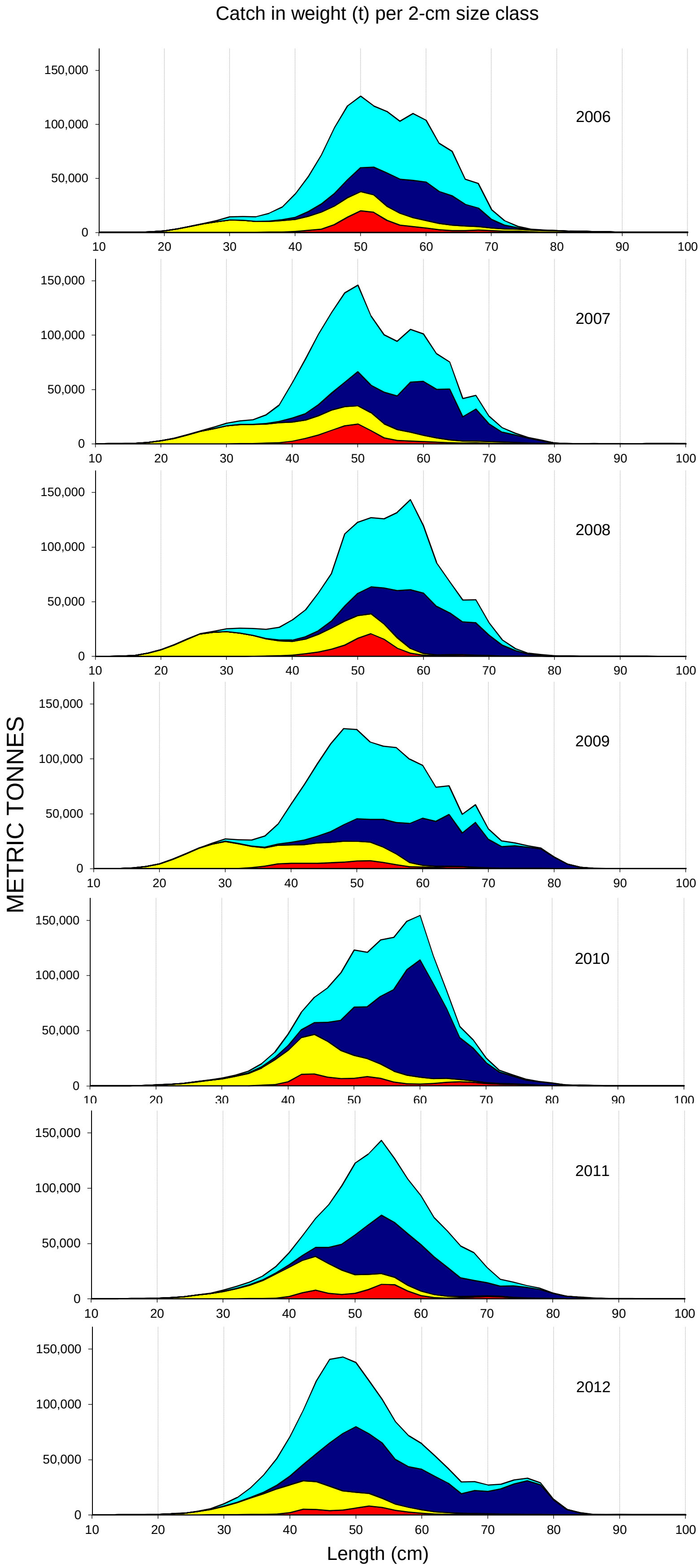


Figure 54. Annual catches (metric tonnes) of skipjack tuna in the WCPO by size and gear type, 2006–2012.

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

7.2 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 55), mainly due to increased catches in the purse seine fishery. The 2012 yellowfin catch (655,688 mt) was the highest on record and attributed to a near record catch in the **purse-seine** fishery (398,464 mt – 61% of the total yellowfin tuna catch) and increased catches from the Indonesia artisanal fisheries (up 70,000 mt on previous years, but warrants further review). In recent years, the yellowfin **longline** catch has ranged from 79,000–96,000 mt, which remains below catches taken in the late 1970s to early 1980s (90,000–120,000 mt), presumably related to changes in targeting practices by some of the large fleets, the gradual reduction in the number of distant-water vessels and the impact of the purse seine fishery. The WCP–CA **longline** catch for 2012 (85,245 mt–13%) was clearly lower than 2011 catch level but around the average catch level over the period 2000–2010. Since the late 1990s, the **purse-seine** catch of yellowfin tuna has accounted for about 3-5 times the **longline** yellowfin catch.

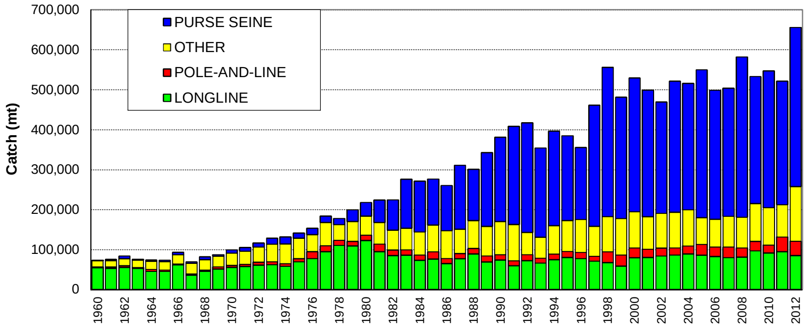


Figure 55. WCP–CA yellowfin catch (mt) by gear

The **pole-and-line** fisheries took 35,815 mt during 2012 (5% of the total yellowfin catch) which was the second highest on record and attributed to increases in the domestic Indonesian catches. The **'other'** category accounted for ~130,000 mt (12%). 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[14] and eastern Indonesia[15]. Figure 56 shows the distribution of yellowfin catch by gear type for the period 1990–2012. 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.

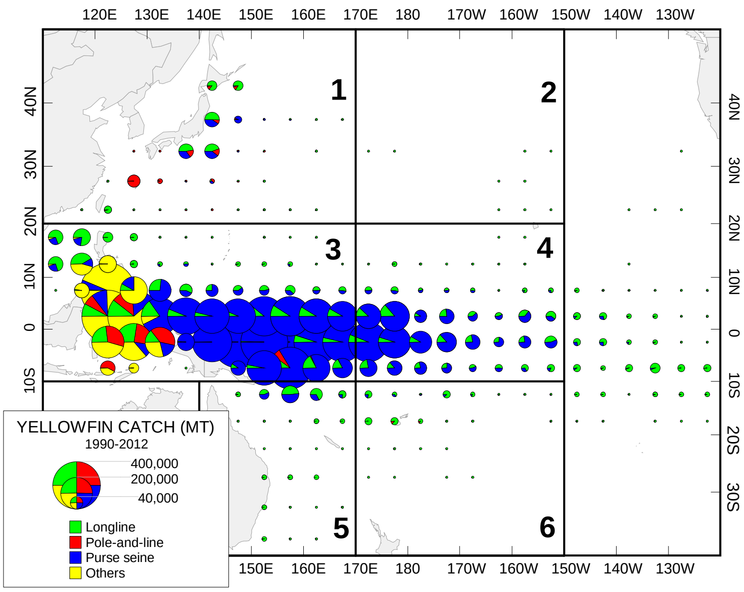


Figure 56. Distribution of yellowfin tuna catch in the WCP–CA, 1990–2012.
The six-region spatial stratification used in stock assessment is shown.

Relatively high catches of yellowfin occurred in the EPO during 2001–2003 (400,000+ mt), but then declined to 178,000 mt in 2006. The EPO yellowfin catch has since recovered to a level of around 210,000-250,000 mt over recent years (noting 2012 is a provisional estimate).

[14] In May 2012, Philippines adjusted their municipal fisheries hook-and-line yellowfin tuna catch estimate, which was set to 43,000 t. in recent years, down to 13,000 t. in 2012.

[15] Indonesia has recently 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.

The domestic surface fisheries of the Philippines and Indonesia (archipelagic waters) take large numbers of small yellowfin in the range of 20–50 cm (Figure 57), 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. Significant catches of large yellowfin tuna in the purse seine unassociated sets is evident in 2008, 2010 and 2012, where exceptional catches of large yellowfin in the size range 120–130 cm were experienced (see Figure 58 – 2008, 2010 and 2012). Inter-annual variability in the size of yellowfin taken exists in all fisheries. The strong mode of large (120–135cm) yellowfin from (purse-seine) unassociated-sets in 2010 corresponds to good catches experienced during the early months of El Nino which transitioned into the strong La Niña event by the 3rd and 4th quarters (Figure 16–right and Figure 22–right). Lower catches of yellowfin occurred during 2009 and 2011 (compared to 2008, 2010 and 2012), and this appears to be primarily due to lower than normal catches of large fish from unassociated schools (rather than catches of small fish from associated set types). Most of the 2012 purse-seine yellowfin catch appeared to be large (130+ cm) fish from unassociated, free-swimming schools.

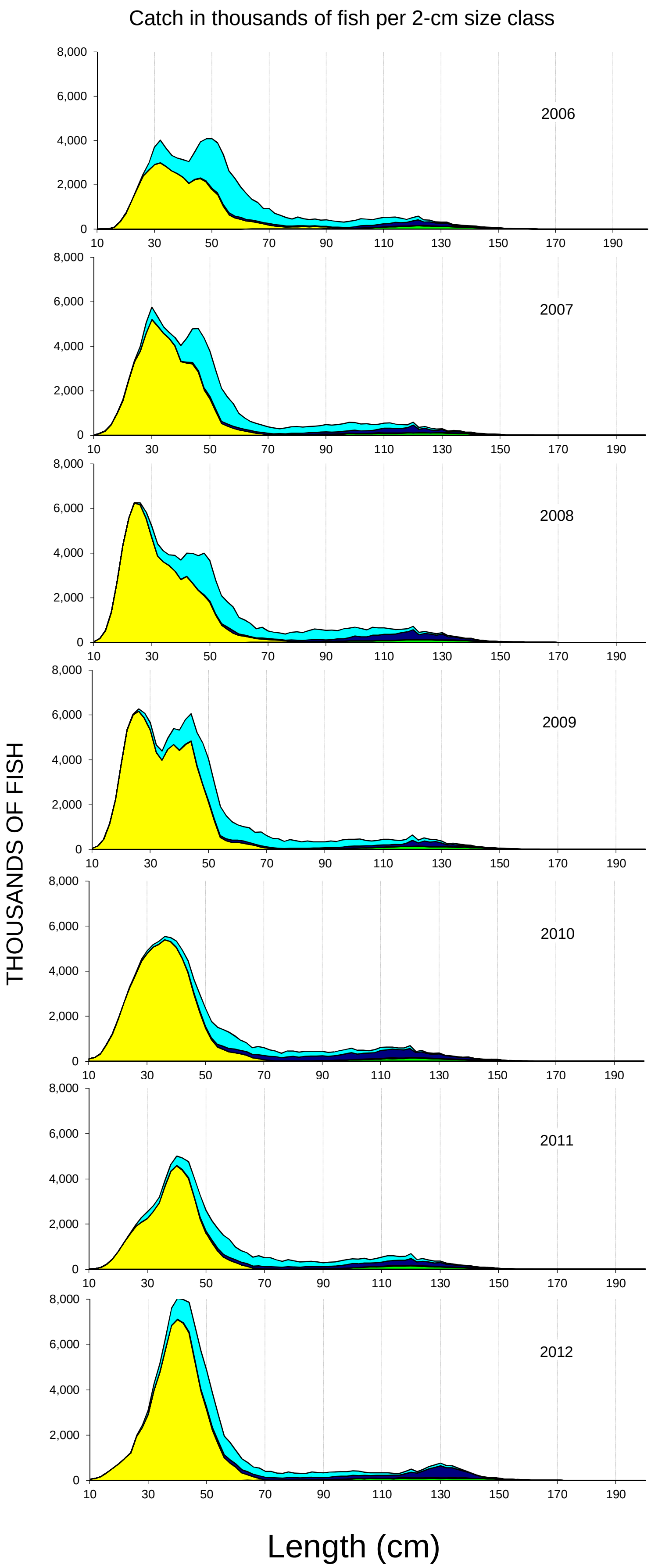


Figure 57. Annual catches (in number of fish) of yellowfin tuna in the WCPO by size and gear type, 2006–2012.

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

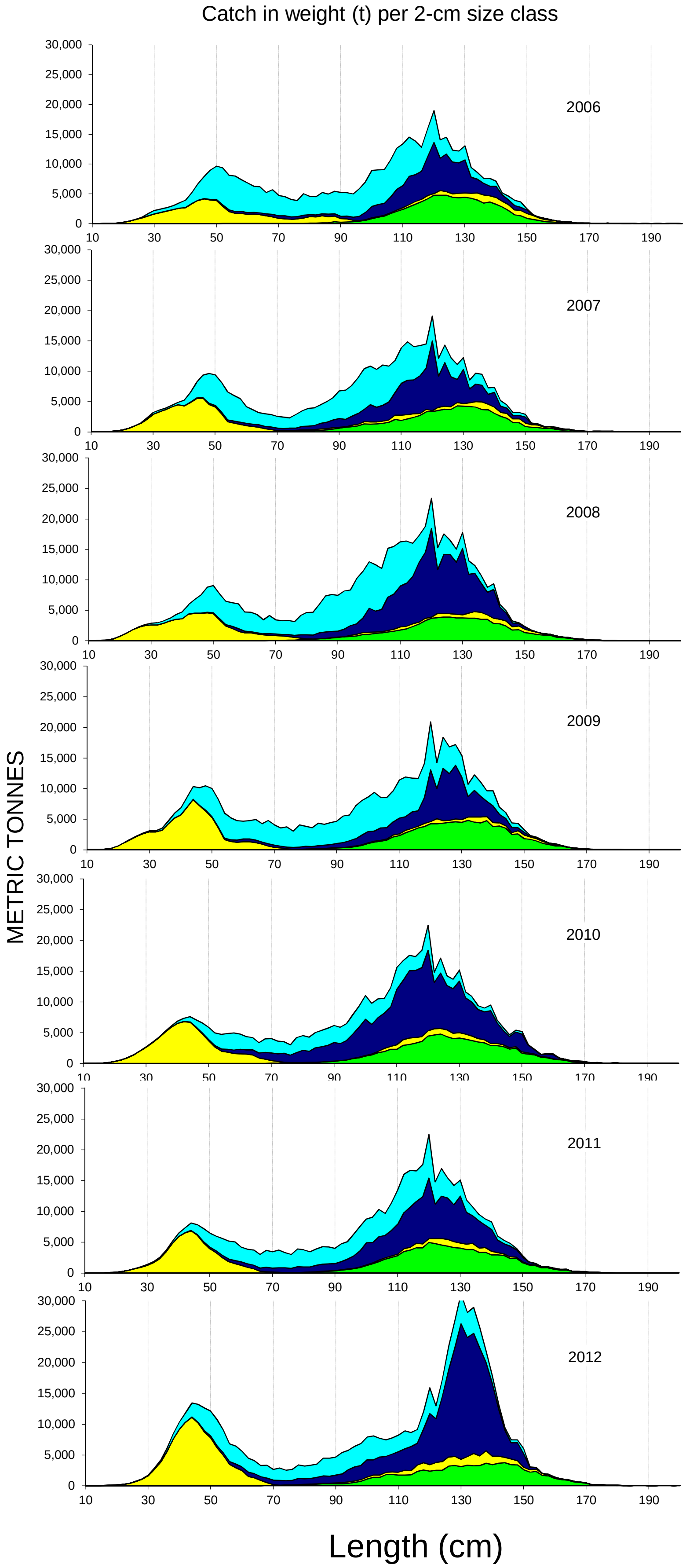


Figure 58. Annual catches (in metric tonnes) of yellowfin tuna in the WCPO by size and gear type, 2006–2012.

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

7.3 BIGEYE

Since 1980, the Pacific-wide total catch of bigeye (all gears) has varied between 120,000 and 290,000 mt (Figure 59), with Japanese longline vessels generally contributing over 80% of the catch until the early 1990s. The provisional 2012 bigeye catch for the **Pacific Ocean** (256,185 mt) was higher than the past two years and close to the average for the past ten years.

The **purse-seine** catch in the **EPO** (68,597 mt in 2012) continues to account for a significant proportion (71%) of the total EPO bigeye catch. The provisional 2011 EPO longline bigeye catch estimate (28,938 mt; 2012 estimate not yet available) is amongst the lowest experienced since 1960, reflecting to the reduction in effort by the Asian fleets. However, the EPO catch estimates are acknowledged to be preliminary[16] and may increase when more data become available.

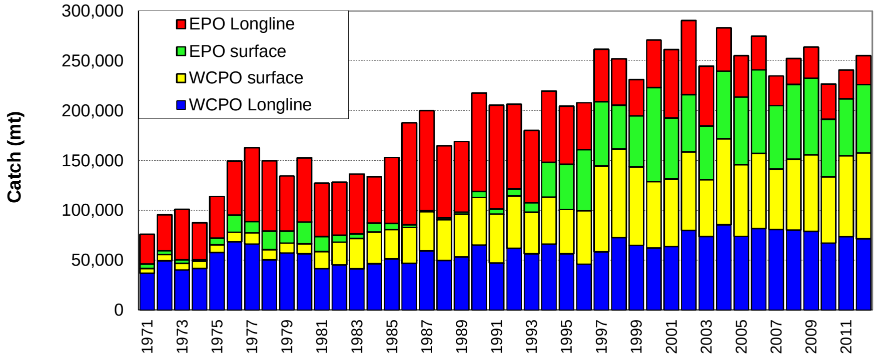


Figure 59. Pacific bigeye catch (mt) by gear
(excludes catches by "other" gears)

The **WCP–CA longline** bigeye catches for the period 2002-2009 exceeded 80,000 mt, although catches since 2010 have dropped below 80,000 mt. (2010–73,882 mt, 2011–77,964 mt and 2012–76,599 mt). The provisional **WCP–CA purse seine** bigeye catch for 2012 was estimated to be 69,164 mt (42%) and was the fifth highest on record (Figure 60).

The **WCP–CA pole-and-line** fishery has generally accounted for between 3,000–10,000 mt (2-6%) of bigeye catch annually over the past decade. The "**other**" category, representing various gears in the Philippine, Indonesian[17] and Japanese domestic fisheries, has accounted for an estimated 4,000–12,000 mt (3–7% of the total WCP–CA bigeye catch) in recent years.

Figure 61 shows the spatial distribution of bigeye catch in the Pacific for the period 1990–2012. 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.

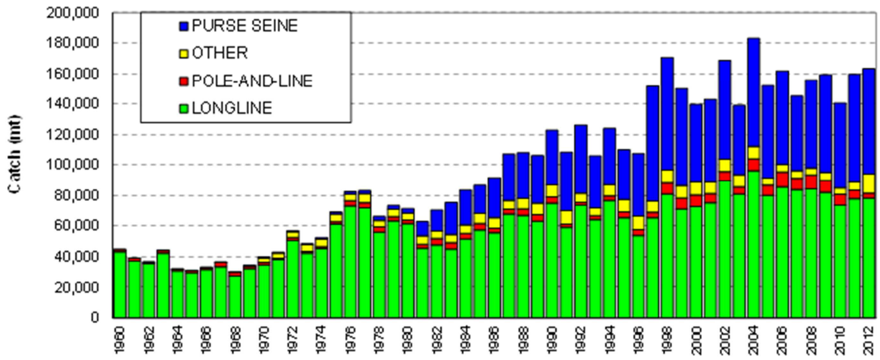


Figure 60. WCP–CA bigeye catch (mt) by gear

[16] Catch estimates for the EPO longline fishery for 2011-2012 and the EPO purse seine fishery for 2011-2012 are preliminary

[17] Indonesia has recently 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.

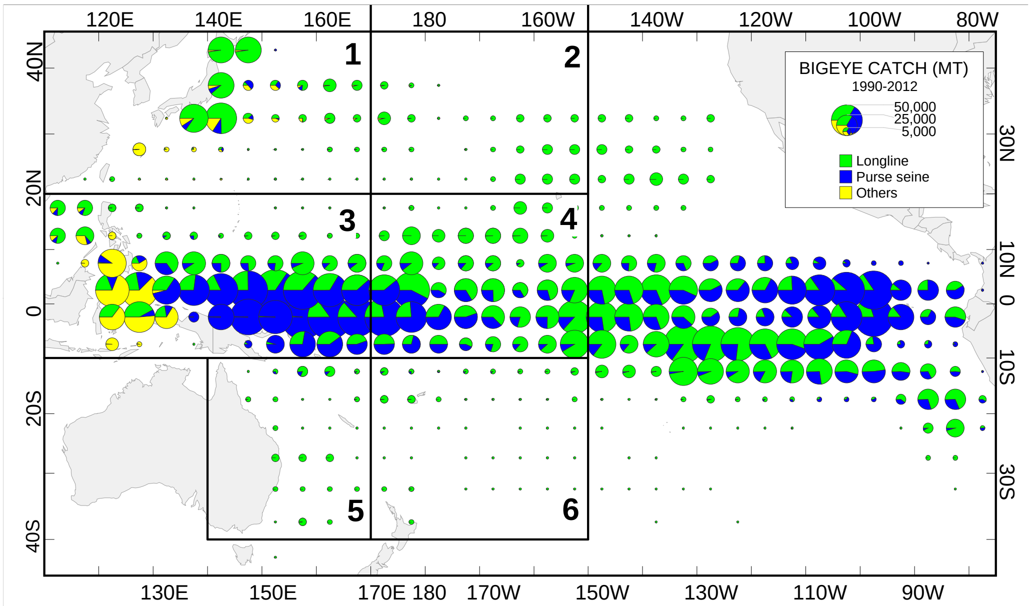


Figure 61. Distribution of bigeye tuna catch, 1990–2012.

The six-region spatial stratification used in stock assessment for the WCP–CA is shown.

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 62). The longline fishery clearly accounts for most of the catch (by weight) of large bigeye in the WCP–CA (Figure 62). 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 80–160 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 main mode of associated-set bigeye tuna are generally in the range of 45–60 cm.

A strong year class represented by the mode of fish in the size range of about 25 cm in the Philippines/Indonesian domestic fisheries in 2008, appears to progress to a mode of 45-50 cm in the purse seine associated and Philippines/Indonesian domestic surface fisheries in 2009 and then possibly again in the associated-set catch in 2010 as 60-70cm fish (Figure 62).

In contrast to other years, the majority of the associated-set purse seine catch in 2011 appears to come from larger fish (i.e. 80-120cm), with a pulse of recruitment evident in the size data (WCPFC Databases), and perhaps a change in catchability due to the areas fished and conditions in the fishery. These age classes (i.e. those predominant in 2011) are possibly represented as the large fish (130-150cm) taken in unassociated sets during 2012 (Figure 63).

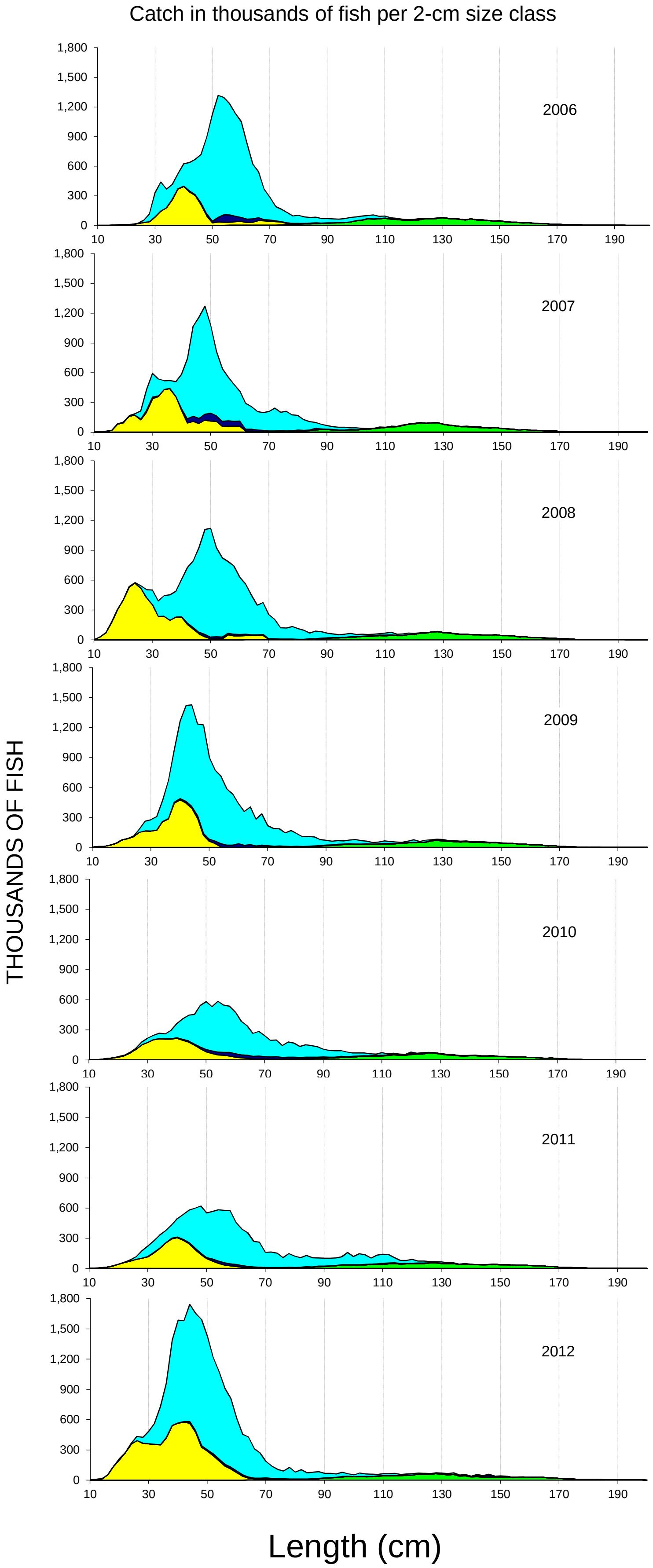


Figure 62. Annual catches (numbers of fish) of bigeye tuna in the WCPO by size and gear type, 2006–2012.

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

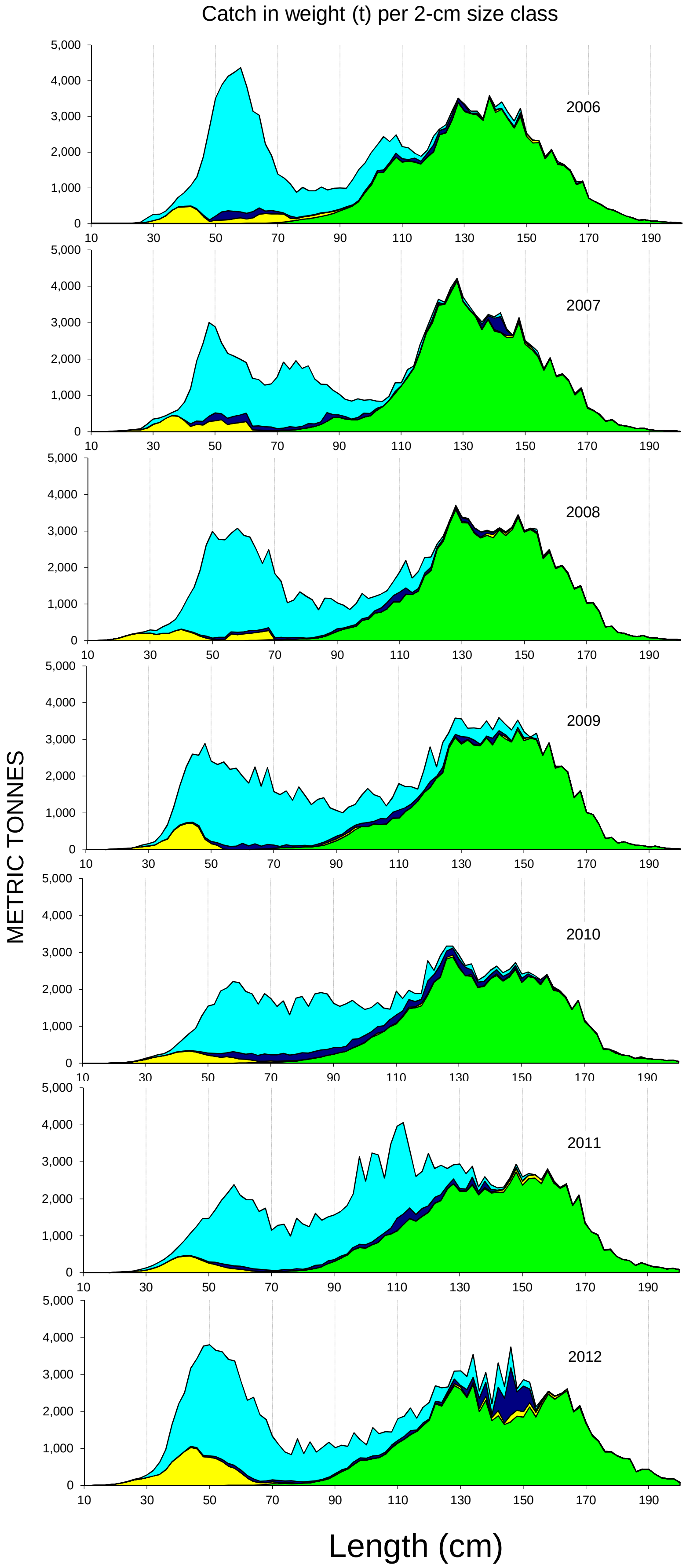


Figure 63. Annual catches (metric tonnes) of bigeye tuna in the WCPO by size and gear type, 2006–2012.
(green–longline; yellow–Phil-Indo archipelagic fisheries; light blue–purse seine associated; dark blue–purse seine unassociated)

7.4 SOUTH PACIFIC ALBACORE

Prior to 2001, south Pacific albacore catches were generally in the range 25,000–44,000 mt, although a significant peak was attained 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 2012 (87,012 mt) was the second highest on record (about 2,000 mt lower than the record catch in 2010 of 88,942 mt).

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 64), 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 80–90% of the Pacific catch of albacore. The WCP–CA albacore catch for 2012 (131,872 mt) was slighter lower than catches in recent years and around 16,000 mt lower that the record (147,793 mt in 2002).

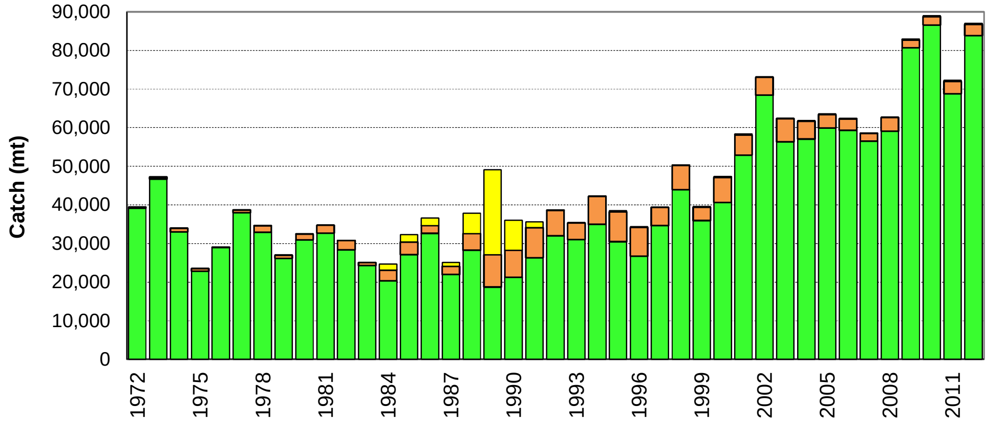


Figure 64. South Pacific albacore catch (mt) by gear ("Other" is primarily catch by the driftnet fishery.)

The longline catch of albacore is distributed over a large area of the south Pacific (Figure 65), but concentrated in the west. The Chinese-Taipei distant-water longline fleet catch is taken in all four 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.

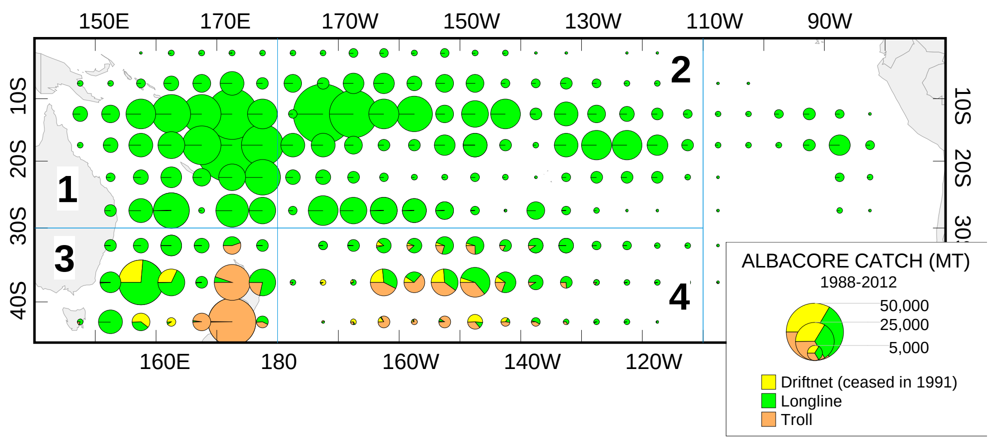


Figure 65. Distribution of South Pacific albacore tuna catch, 1988–2012.
The four-region spatial stratification used in stock assessment is shown.

The longline fishery take adult albacore in the narrow size range of 90–105cm and the troll fishery takes juvenile fish in the range of 45–80cm (Figure 66 and Figure 67). Juvenile albacore also appear in the longline catch from time to time (e.g. fish in the range 60–70cm sampled from the longline catch).

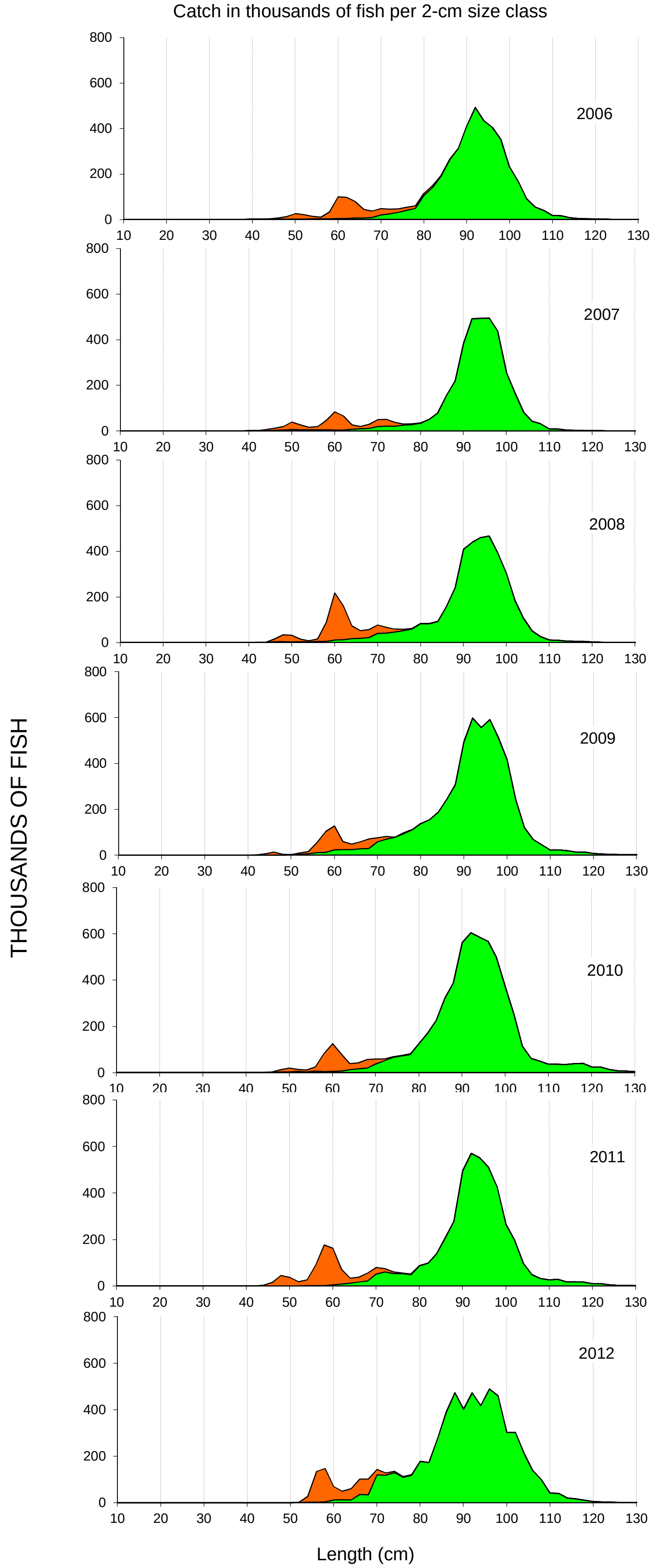


Figure 66. Annual catches (number of fish) of albacore tuna in the South Pacific Ocean by size and gear type, 2006–2012. **(green–longline; orange–troll)**

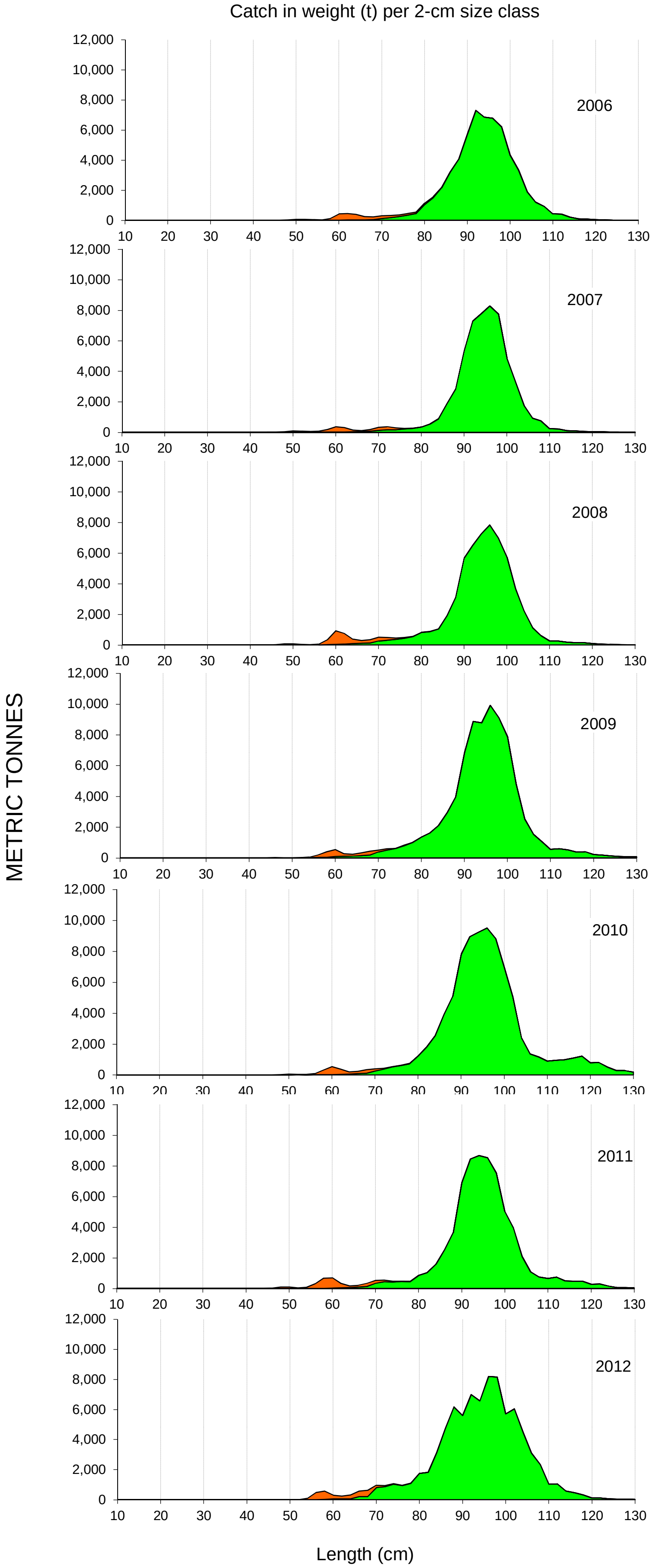


Figure 67. Annual catches (metric tonnes) of albacore tuna in the South Pacific Ocean by size and gear type, 2006–2012. **(green–longline; orange–troll);**

7.5 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 68), 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 targeting swordfish entered the fishery in 2004 and resulted in total swordfish catches increasing significantly to a new level of around 15,000 mt, which continued onto 20,000 mt by 2012, with contributions from the distant-water Asian fleet catches. These estimates do not include catches from the South American fleets catching swordfish.

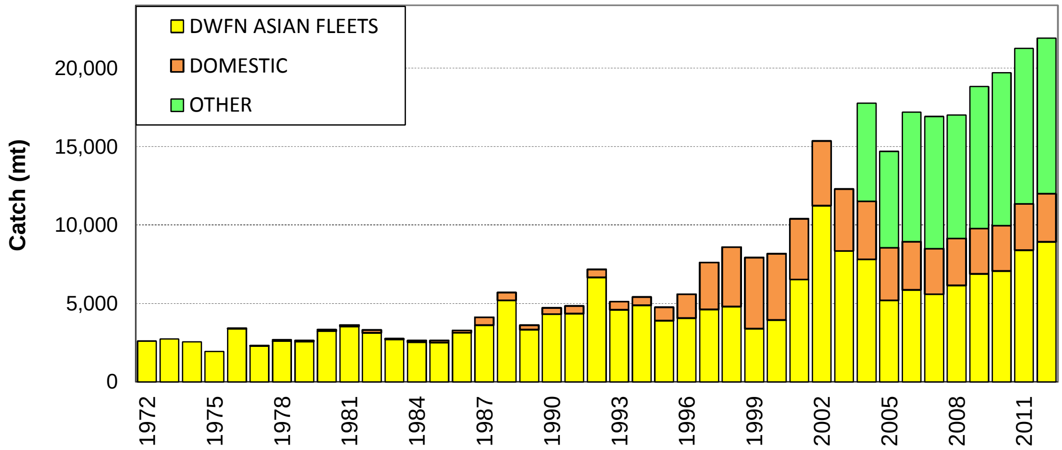


Figure 68. South Pacific longline swordfish catch (mt) by fleet

The longline catch of swordfish is distributed over a large area of the south Pacific (Figure 69–data covering entire south Pacific for 2011/2012 yet to be provided for some fleets). 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.

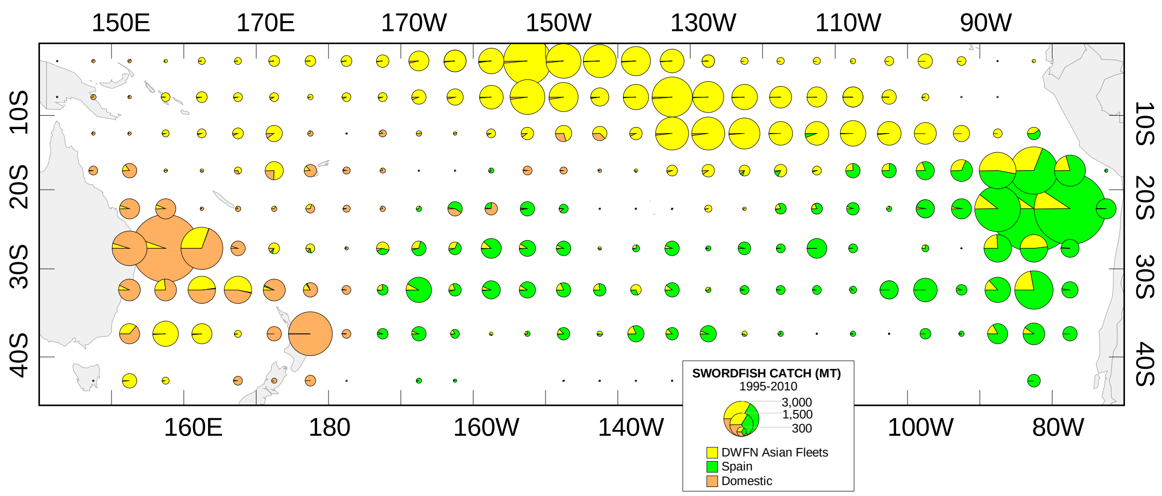


Figure 69. Distribution of South Pacific longline swordfish catch, 1995–2010.

The swordfish catch throughout the South Pacific Ocean are generally in the range of 110–170cm (lower jaw-fork length – Figures 70 and 71). 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 distant-water Asian fleets generally catch larger swordfish than the Spanish fleet, which could be related to area fished. The mode at 240-250 cm in the 2012 catch (Figure 71) may be due to low data coverage at this stage.

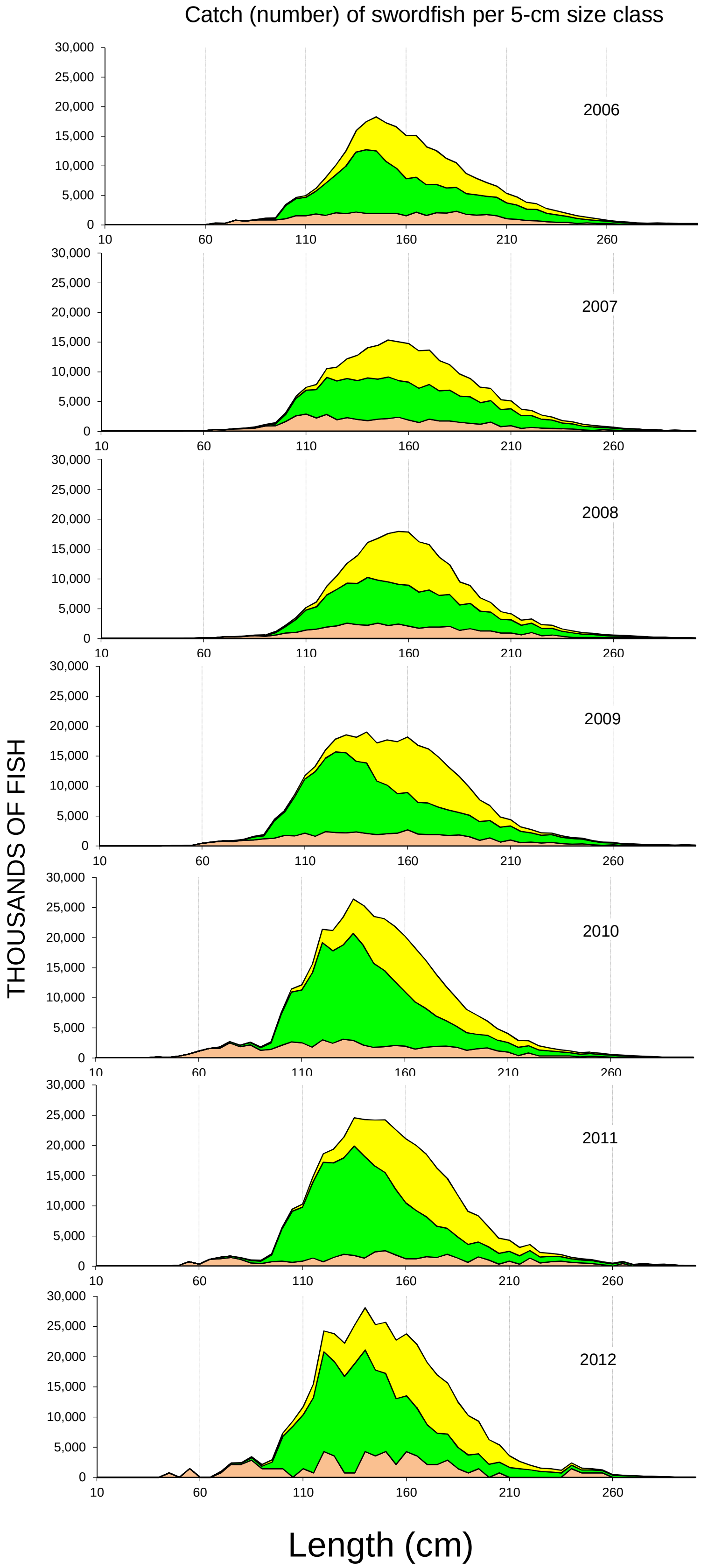


Figure 70. Annual catches (number of fish) of swordfish in the South Pacific Ocean by size and fleet, 2005–2011. **(green–Spanish fleet catch; yellow–distant-water Asian fleet catch; orange– Domestic fleets)**
2012 data are provisional (2012 data for some fleets have yet to be provided, so 2011 data have been carried over).

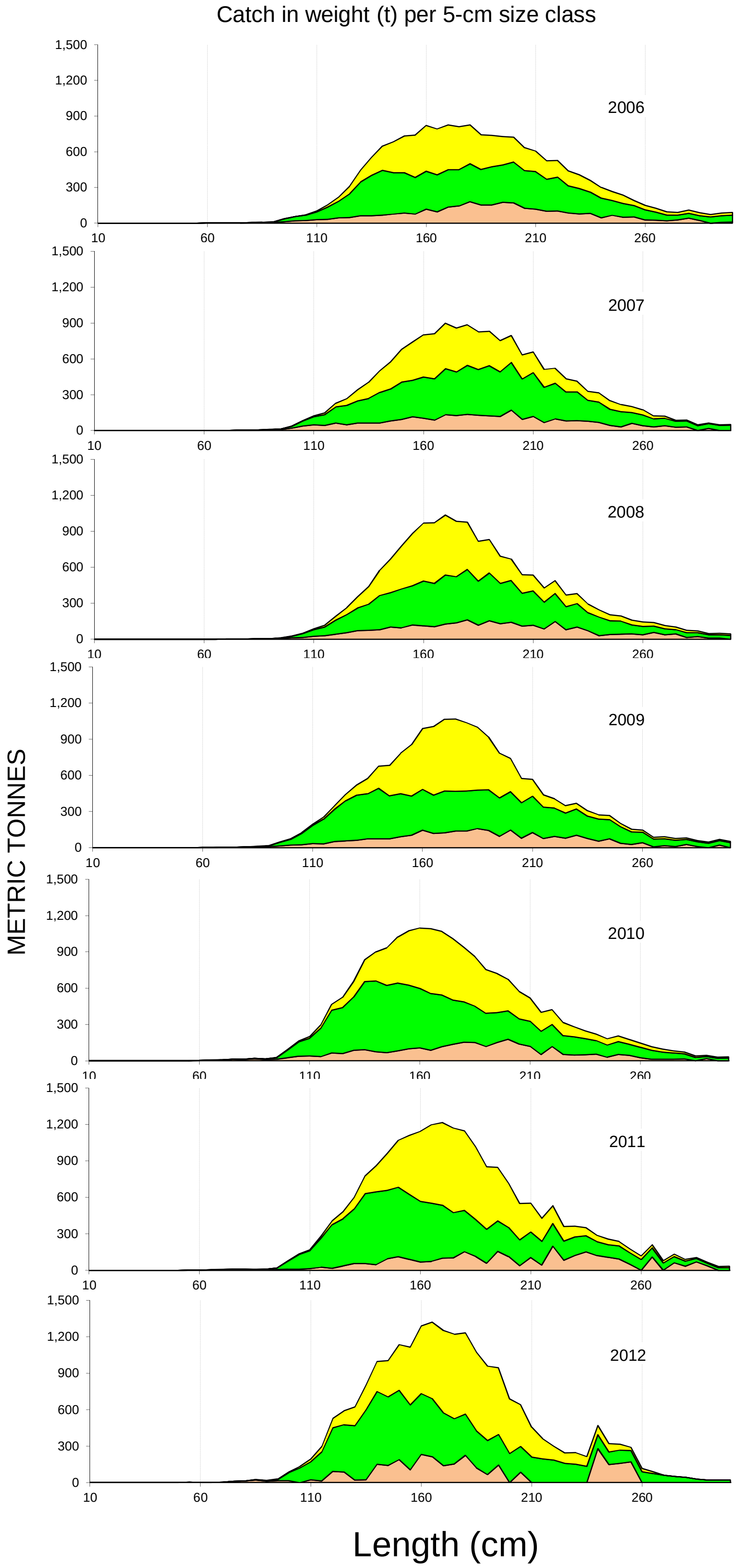


Figure 71. Annual catches (metric tonnes) of swordfish in the South Pacific Ocean by size and fleet, 2006–2012. **(green–Spanish fleet catch; yellow–distant-water Asian fleet catch; orange–Domestic fleets)**
2012 data are provisional (2012 data for some fleets have yet to be provided, so 2011 data have been carried over).

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