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OVERVIEW OF TUNA FISHERIES IN THE WESTERN AND CENTRAL PACIFIC OCEAN, INCLUDING ECONOMIC CONDITIONS – 2013

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OVERVIEW OF TUNA FISHERIES IN THE WESTERN AND CENTRAL PACIFIC OCEAN, INCLUDING ECONOMIC CONDITIONS – 2013

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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 (2013) and covering the most recent version of catch estimates by gear and species.

The provisional **total WCP–CA tuna catch for 2013** was estimated at **2,621,511 mt**, the second highest ever and only 30,000 mt below the record catch in 2012 (2,652,322 mt); this catch represents 80% of the total Pacific Ocean catch of 3,213,733 mt, and 57% of the global tuna catch (the provisional estimate for 2013 is 4,511,238 mt, which was the second highest on record).

The **2013 WCP–CA catch of skipjack** (**1,784,091 mt** – 68% of the total catch) was the highest recorded, eclipsing the previous record of catch in 2009 by 5,000 mt (1,779,307 mt). The **WCP–CA yellowfin catch** for 2013 (**535,656 mt** – 21%) was more than 75,000 mt lower than the record catch of 2012 (612,797 mt) due to relatively poor catches in both the longline and the purse seine fisheries. The **WCP–CA bigeye catch** for 2013 (**158,662** mt – 6%) was lower than in 2012, but relatively stable compared to the average over the past ten years. The **2013 WCP–CA albacore catch** (**143,102 mt -** 5%) was slightly higher than in 2012 and the second highest on record (after 2002 at 147,793 mt). The WCP–CA albacore catch includes catches of north and south Pacific albacore in the WCP–CA, which comprised 81% of the total Pacific Ocean albacore catch of 177,568 mt in 2013. The **south Pacific** albacore catch in 2013 (84,698 mt) was the third highest on record.

The provisional **2013 purse-seine catch of 1,898,090 mt** was the highest catch on record and more than 60,000 mt higher than the previous record in 2012 (1,836,295 mt). The 2013 purse-seine skipjack catch (1,455,786 mt; 77% of total catch) was also the highest on record (about 50,000 mt higher than the previous record in 2009). The 2013 purse-seine catch estimate for yellowfin tuna (355,960 mt) was the fifth highest on record and estimated at only 19% of the total catch, was considered a relatively poor catch year. The provisional catch estimate for bigeye tuna for 2013 (82,151 mt) was clearly highest on record and will be refined as further observer data for 2013 have been received and processed. The record high bigeye tuna catch in 2013 coincides with a continuation of high effort levels and elevated bigeye tuna catch rates for all set types. The number of purse seine vessels in the tropical fishery was an all-time high (297 vessels) and total effort (in terms of fishing days estimated from logbook data and VMS data) was also highest.

In line with the prevailing ENSO conditions, fishing activity during 2013 (La Nina-type conditions) was more concentrated in the west tropical areas (PNG, FSM and Solomon Islands) compared to 2012 (Neutral/weak El Nino conditions). The ENSO forecast for 2014 is for the gradual development of El Nino conditions, and established by the 4th quarter.

The **2013 pole-and-line catch (221,022 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 (112,529 mt in 2013), and the Indonesian fleets (106,705 mt in 2013), account for nearly all of the WCP–CA pole-and-line catch (99% in 2013). 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 2013 reduced to only 79 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 1,198 mt in 2013.

The **provisional WCP–CA longline catch (230,073 mt) for 2013** was the lowest catch since 1999. The WCP–CA albacore longline catch (100,666 mt – 47%) for 2013 was the second highest on record, only 2,000 mt lower than the record (103,466 mt in 2010). The provisional bigeye catch (62,641 mt – 29%) for 2013 was the lowest since 1996. The yellowfin catch for 2013 (65,499 mt – 30%) was the lowest since 1991.

The **2013 South Pacific troll albacore catch (3,226 mt)** was the highest for five years. The New Zealand troll fleet (168 vessels catching 2,836 mt in 2013) and the United States troll fleet (6 vessels catching 390 mt in 2013) accounted for nearly all of the 2013 South Pacific albacore troll catch.

Economic conditions in the tuna fisheries of the WCP-CA during 2013 deteriorated compared with 2012. US$ prices for canning raw materials (both lightmeat and whitemeat) and sashimi products declined significantly while fuel costs remained at elevated levels. These declines in prices combined with the fact that total catch in the purse seine fishery increased only marginally and the longline catch fell significantly resulted in the value of the tuna catch in the WCP-CA falling by around $1 billion to $6.2 billion in 2013.

With regards to canning markets skipjack prices were lower in all major markets supplied from the WCPO in 2013. The Bangkok benchmark price (4-7.5lbs, c&f) was 8% lower while Thai import prices were lower by 2%, prices at Yaizu were 10% lower (in USD terms) as were prices in General Santos and Ecuador (by 7% and 3% respectively).

The Bangkok benchmark skipjack price initially rose from $1,800/Mt in December 2012 to a peak of $2,350/Mt in April 2013, reflective of relatively poor fishing conditions and increased demand by processors. Over the rest of the year, however, prices declined and ended the year at around $1,500/Mt. This trend was in large part due to high inventories of raw material held by processors and slow sales of processed goods, exacerbated by exceptionally good catches following the FAD closure period.

Yellowfin prices on canning markets were mixed with the Bangkok market price (20lbs+, c&f) up 6% to $2,638, Thai import prices declined by 5%, Yaizu down 26% (in USD terms) to $2,283/Mt and General Santos (20lbs+, fob) up 3% to $3,053/Mt.

The estimated delivered value of the purse seine catch in the WCP-CA area for 2013 is $3,947 million, a decrease of $82 million or 2% on 2012. This decrease was driven by the $139 million (14%) decrease in the delivered value of the yellowfin catch (worth $829 million in 2013 resulting from the respective declines in both catch and price of 8% and 7%) that more than offset the increase in the delivered value of skipjack (valued at $2,946 million resulting from a 6% increase in catch against the 4% decline in price).

Albacore prices in 2013 were down significantly; the Bangkok benchmark price (10kg and up, c&f) dropped 28%, Thai frozen imports (c&f) 29%, Japan selected ports fresh (ex-vessel) 27% and US imports fresh (f.a.s.) 12%. This price decline resulted from an oversupply of raw material, attributed to the high catch levels in the Atlantic, the expansion in the number of Chinese mini-longline vessels, the entry into the Pacific of Taiwanese longline vessels from the Indian Ocean as they switched away from bigeye targeting because of deteriorating economic conditions in that fishery, and stagnant demand in the US for canned albacore. These developments took adverse toll on markets and on many Pacific Islands fleets. The albacore catch was estimated to be worth $253 million in 2013, a 29% decrease on 2012 resulting solely from the 29% decrease in price as estimated catch remained steady.

Japan pole and line price at Yaizu port declined by 30% to $2,337/Mt in 2013. The price for skipjack caught in waters off Japan averaged $2,358/Mt (¥236/kg), a decrease of 30%; the price of pole and line caught skipjack in waters south of Japan also decreased, by 27% to $2,380/Mt. The estimated delivered value of the total catch in the WCP-CA pole and line fishery for 2013 is $506 million. This is a decrease of $153 million (23%) on 2012 caused by declines in catch and prices, 9% and 16% respectively.

The main markets for longline caught sashimi products (yellowfin and bigeye) in Japan showed significant declines (in USD terms) during 2013 while in the US market there was a steady trend. Japan fresh yellowfin import prices from all sources declined by 17% and Yaizu port fresh & frozen prices declined by 21%. Japan fresh bigeye import prices from all sources declined by 19% while

Japan selected ports frozen longline bigeye prices dropped by 29%. These price declines are reported to have been driven by the inventory hangover resulting from exceptionally high level of imports of low grade bigeye from the Indian Ocean in 2012 as well as from the depreciation of the Japanese Yen.

The estimated delivered value of the longline tuna catch in the WCP-CA for 2013 is $1,276 million. This represents a substantial decline of $592 million on the estimated value of the catch in 2012. The value of the albacore catch decreased by $102 million (29%) while the value of the bigeye catch declined by $346 million (38%) and the value of the yellowfin catch decreased by $187 million (27%).

The albacore catch was estimated to be worth $253 million in 2013, a 29% decrease on 2012 resulting solely from the 29% decrease in prices as estimated catch remained steady. The bigeye catch was estimated to be worth $560 million in 2013, a decrease of 38% compared to 2012 accounted for by declines in both catch and prices of 21% and 22% respectively. The estimated delivered value of the yellowfin catch was $512 million in 2013, a decline of 27% accounted for by decreases in both catch and price of 18% and 11% respectively.

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 – 2013. The review draws on the latest catch estimates compiled for the WCP–CA, which can be found in Information Paper WCPFC–SC10 ST IP–1 *(Estimates of annual catches in the WCPFC Statistical Area – OFP, 2014)*. Where relevant, comparisons with previous years' activities have been included, although it should be noted that data for 2013, 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 2013 catches relative to those of recent years, but refers readers to the SC10 National Fisheries Reports, which offer more detail on recent activities at the fleet level.

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

This overview 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.

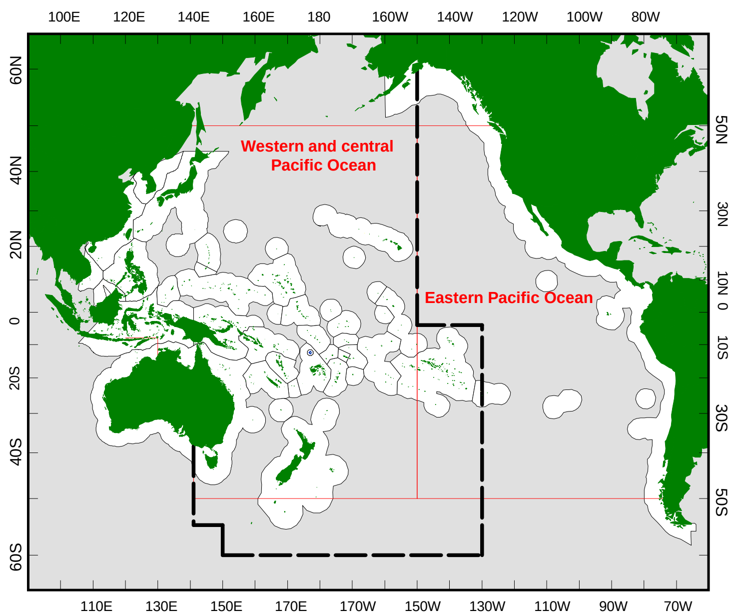

Figure 1. The western and central Pacific Ocean (WCPO), the eastern Pacific Ocean (EPO) and the WCPFC Convention Area (WCP–CA in dashed lines)

2. TOTAL TUNA CATCH FOR 2013

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, noting an exceptional catch during 1998. The increasing trend in total tuna catch continued to 2009, then followed two years (2010-2011) of reduced catches, but returned to a record level in 2012 (Figure 2 and Figure 3). The provisional total WCP–CA tuna catch for 2013 was estimated at **2,621,511 mt**, the second highest ever and only 30,000 mt below the record catch in 2012 (2,652,322 mt). During 2013, the purse seine fishery accounted for a record catch of 1,898,090 mt (73% of the total catch), with pole-and-line taking an estimated 221,022 mt (8%), the longline fishery an estimated 218,942 mt (8%), and the remainder (9%) taken by troll gear and a variety of artisanal gears, mostly in eastern Indonesia and the Philippines. The WCP–CA tuna catch (2,610,380 mt) for 2013 represented 80% of the total Pacific Ocean catch of 3,213,733 mt, and 57% of the global tuna catch (the provisional estimate for 2013 is 4,511,238 mt, which was the second highest on record).

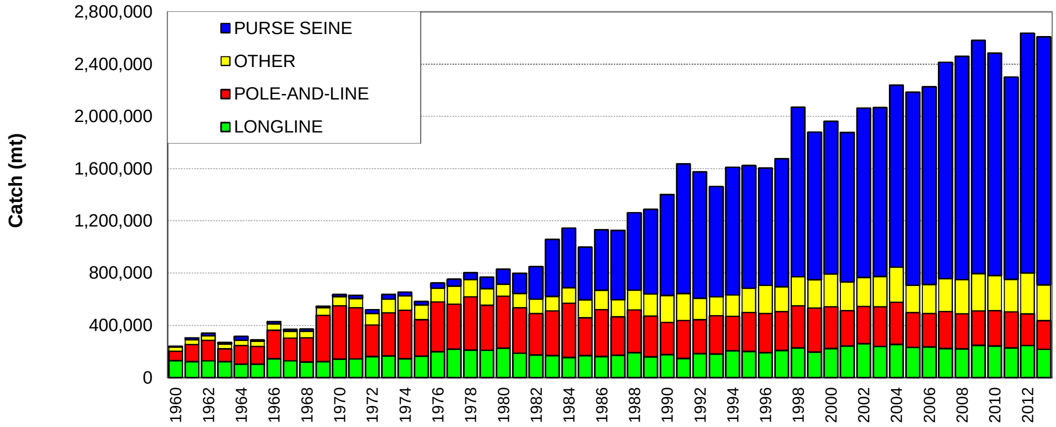

Figure 2. Catch (mt) of albacore, bigeye, skipjack and yellowfin in the WCP–CA, by longline, pole-and-line, purse seine and other gear types

The **2013 WCP–CA catch of skipjack** (**1,784,091 mt** – 68% of the total catch) was the highest recorded, eclipsing the previous record of catch in 2009 by 5,000 mt (1,779,307 mt). The **WCP–CA yellowfin catch** for 2013 (**535,656 mt** – 21%) was more than 75,000 mt lower than the record catch of 2012 (612,797 mt) due to relatively poor catches in both the longline and the purse seine fisheries. The **WCP–CA bigeye catch** for 2013 (**158,662** mt – 6%) was lower than in 2012, but relatively stable compared to the average over the past ten years. The **2013 WCP–CA albacore**[1] **catch** (**143,102 mt** - 5%) was slightly higher than in 2012 and the second highest on record (after 2002 at 147,793 mt).

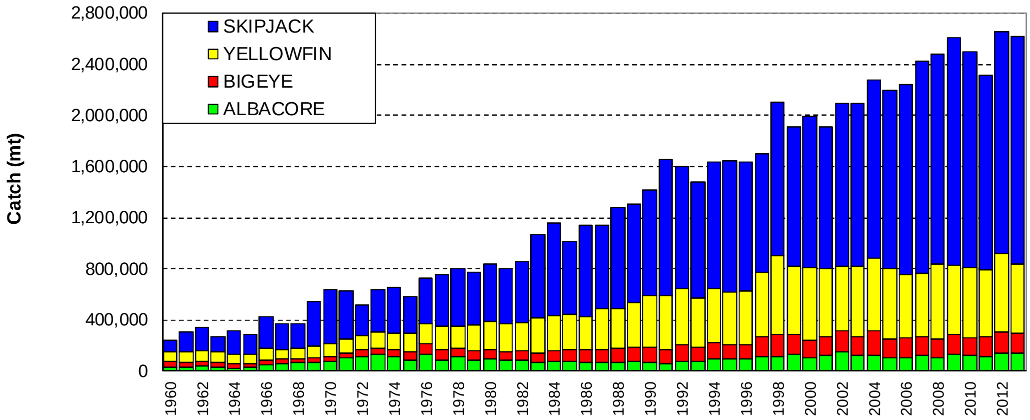

Figure 3. Catch (mt) of albacore, bigeye, skipjack and yellowfin in the WCP–CA.

[1] includes catches of north and south Pacific albacore in the WCP–CA, which comprised 81% of the total Pacific Ocean albacore catch of 177,568 mt in 2013; the section 7.4 "Summary of Catch by Species - Albacore" is concerned only with catches of south Pacific albacore, which made up approximately 48% of the Pacific albacore catch in 2013.

3 WCP–CA PURSE SEINE FISHERY

3.1 Historical Overview

During the mid-1980s, the purse seine fishery (400,000-450,000 mt) accounted for only 40% of the total catch, but has grown in significance to a level now over 70% of total tuna catch volume (more than 1,800,000 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 combined numbered 163 vessels in 1992, but declined to a low of 111 vessels in 2006 (due to reductions in the US fleet), before some rebound in recent years (142 vessels in 2013[2]). The Pacific Islands fleets have gradually increased in numbers over the past two decades to a level of 95 vessels in 2013 (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 seven years, the number of vessels has gradually increased, attaining a record level of 297 vessels[3] in 2013.

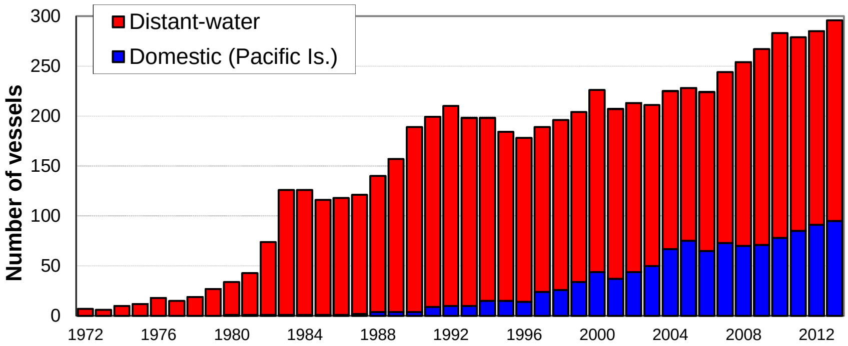

Figure 5. Number of purse seine vessels operating in the WCP–CA
(this does not include the Japanese Coastal purse seine fleet and the Indonesian, Philippine and Vietnamese domestic purse-seine/ringnet fleets which account for over 1,000 vessels)

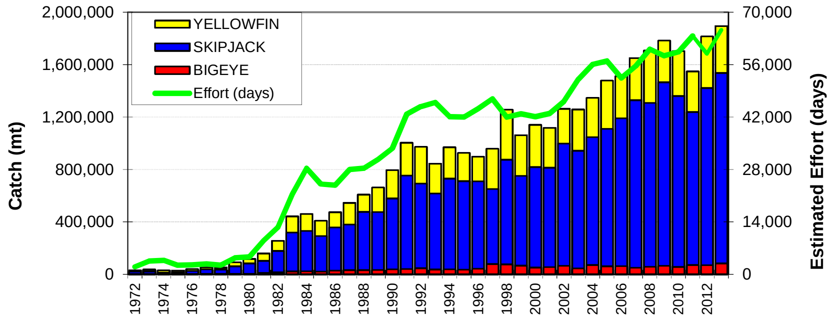

Figure 4. Purse seine catch (mt) of bigeye, skipjack and yellowfin and estimated fishing effort (days fishing and searching) in the WCP–CA

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 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 1,200,000 mt;
- 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, although other factors appear to affect purse seine yellowfin catch;
- Increased bigeye tuna purse seine catch estimates, coinciding with the introduction of drifting FADs (since 1997). Significant bigeye catch years have been 1997 (77,072 mt), 1998 (76,613 mt), 2004 (70,525 mt) and 2012 (70,925 mt) which correspond to years with a relatively high proportion of associated sets and/or strong bigeye recruitment.

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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 2013 the number of active vessels by fleet was Japan (41), Korea (27), Chinese Taipei (34) and USA (40). In 2013, 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.

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 2012-2013). The estimated purse seine effort in 2013 was the highest on record.

3.2 Provisional catch estimates, fleet size and effort (2013)

The provisional **2013 purse-seine catch of 1,898,090 mt** was the highest catch on record and more than 60,000 mt higher than the previous record in 2012 (1,836,295 mt). The 2013 purse-seine skipjack catch (1,455,786 mt; 77% of total catch) was also the highest on record (about 50,000 mt higher than the previous record in 2009). The 2013 purse-seine catch estimate for yellowfin tuna (355,960 mt) was the fifth highest on record and estimated at only 19% of the total catch, was considered a relatively poor catch year. The provisional catch estimate for bigeye tuna for 2013 (82,151 mt) was clearly highest on record and will be refined as further observer data for 2013 have been received and processed. The record high bigeye tuna catch in 2013 coincides with a continuation of high effort levels and elevated bigeye tuna catch rates for all set types.

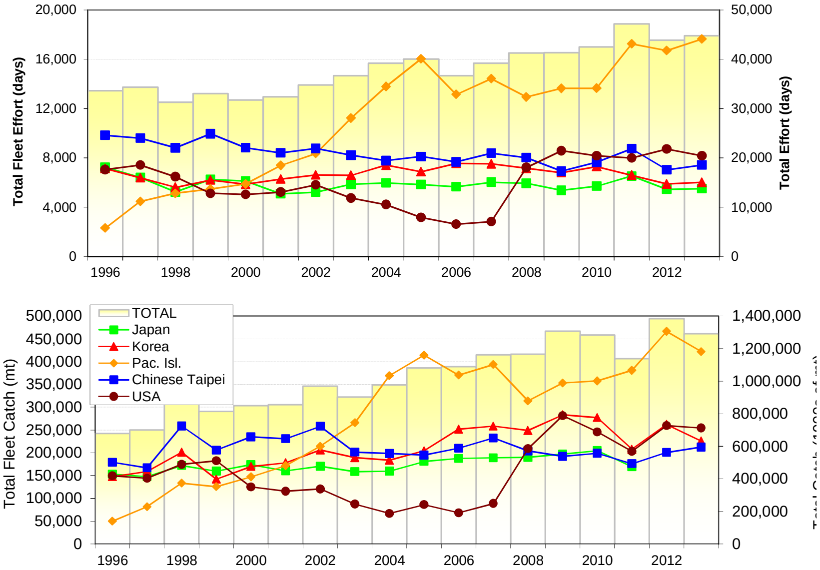

Figure 6. Trends in annual effort (top) and catch (bottom) estimates for the top five purse seine fleets operating in the tropical WCP–CA, 1996–2013.

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 2013 total effort was slightly higher than in 2012, but there was a drop in the total catch in 2013. Since the 2013 catch for all fleets was a record, it suggests higher catches in 2013 from the other fleets not included in Figure 6; for example, the Indonesian purse seine fleet catch in 2013 was more than double their catch in 2012.

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 three years was clearly lower than the US effort, suggesting higher catch rates or potential issues with effort reporting by the Korean fleet).

The total number of Pacific-island domestic vessels has gradually increased over the past two decades, attaining its highest level in 2013 (95 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; 10 vessels), the Kiribati (12 vessels), Marshall Islands (10 vessels), PNG (Papua New Guinea; 51 vessels including their chartered vessels), Solomon Islands (5 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- 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. With an exemption under CMM 2012-01 and CMM 2013-01, the domestic-based Philippine fleet recommenced activities in the high seas pocket between Palau, Indonesia, FSM and PNG during 2013 and reported in detail in the SC10 Philippines National Report (WCPFC Part 1 Report). Prior to 2013, the domestic Indonesian purse-seine fleet accounted for a catch similar level to the Philippines domestic fishery but generally has not fished in high seas areas. During 2013, the Indonesian fleet catch increased substantially (215,582 mt) with increased on-shore processing facilities and more vessels entering the fishery. The domestic fleets of Indonesia and Philippines have usually accounted for about 13-20% of the WCP-CA total purse seine catch, although for the period 2010-2012, it was only 8-12% due to high seas closure (in the case of the Philippines), and lower vessel numbers/catches for the Indonesian fleet.

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 been predominate during recent years but were not as high in 2013 (68% of all sets for these fleets) as in 2010 (76%). The proportion (22%) of sets on drifting FADs in 2013 is consistent with recent years and remains amongst the highest over the past decade (the number of drifting FAD sets was the third highest ever), but the number and proportion (5%) of sets on logs is now at the lowest level ever. 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 2013 = 36%: Figure 7–right) will be higher than the percentage of sets for drifting FADs (for 2013 = 22%: Figure 7–left). In contrast, the catch from unassociated schools in 2013 was 53% of the total catch, but taken from 68% of the total sets. The APPENDIX provides a more detailed breakdown of catch and effort by set type in 2009-2013 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. Weak-moderate La Niña conditions were experienced during 2013.

In line with the prevailing ENSO conditions, fishing activity during 2013 (La Nina-type conditions) was restricted to the west tropical areas compared to 2012 (Neutral/weak El Nino conditions). The distribution of catch/effort during 2013, to some extent, was similar to previous La Nina years (e.g. 2008). Effort in 2013 (Figure 9 – left) is concentrated in the "typical" area of activity in PNG, FSM and Solomon Islands. The ENSO forecast for 2014 is for the gradual development of El Nino conditions, and established by the 4th quarter.

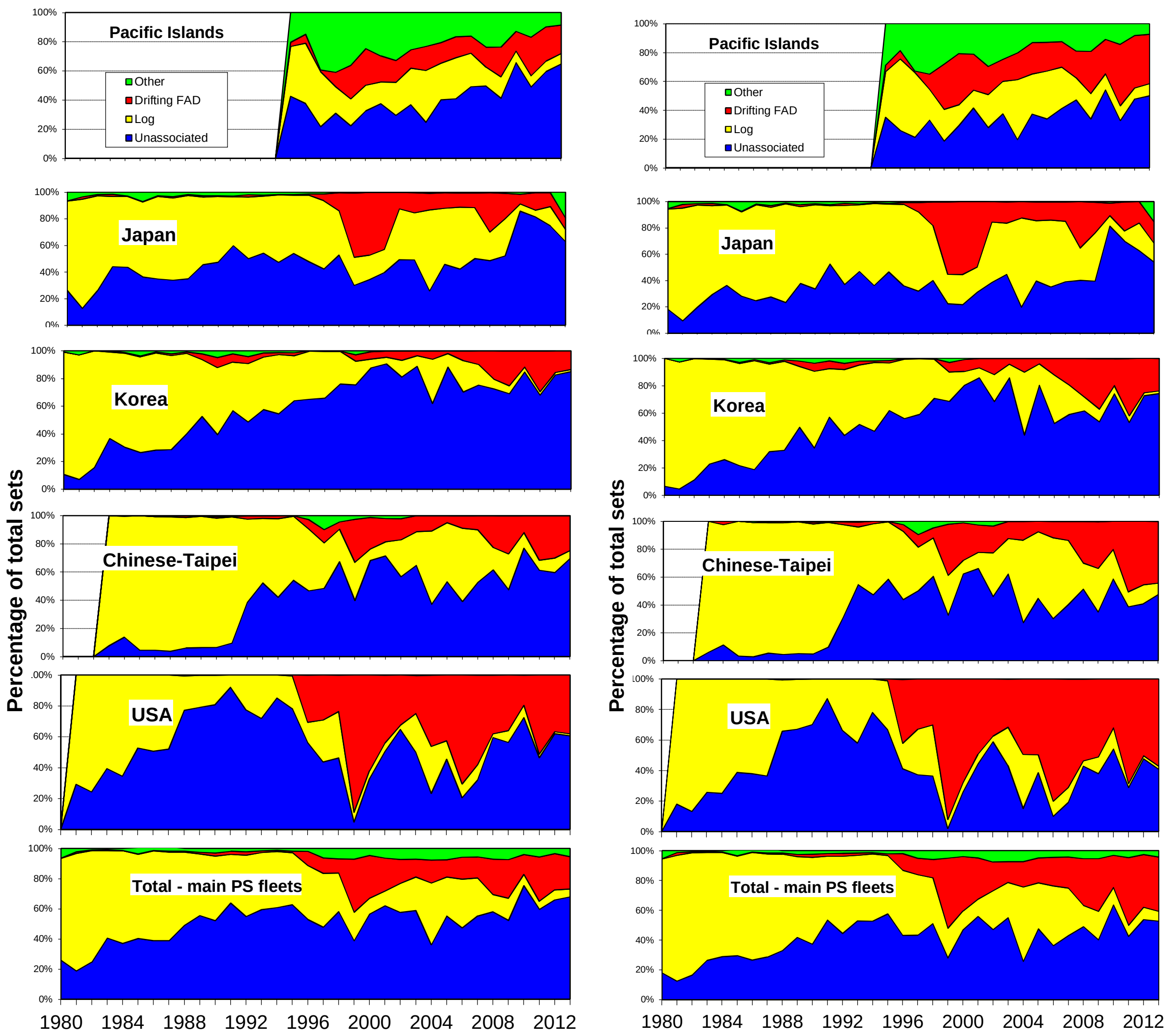

Figure 7. Time series showing the percentage of total sets (left) and total catch (right), by school type for the major purse-seine fleets operating in the WCP–CA.

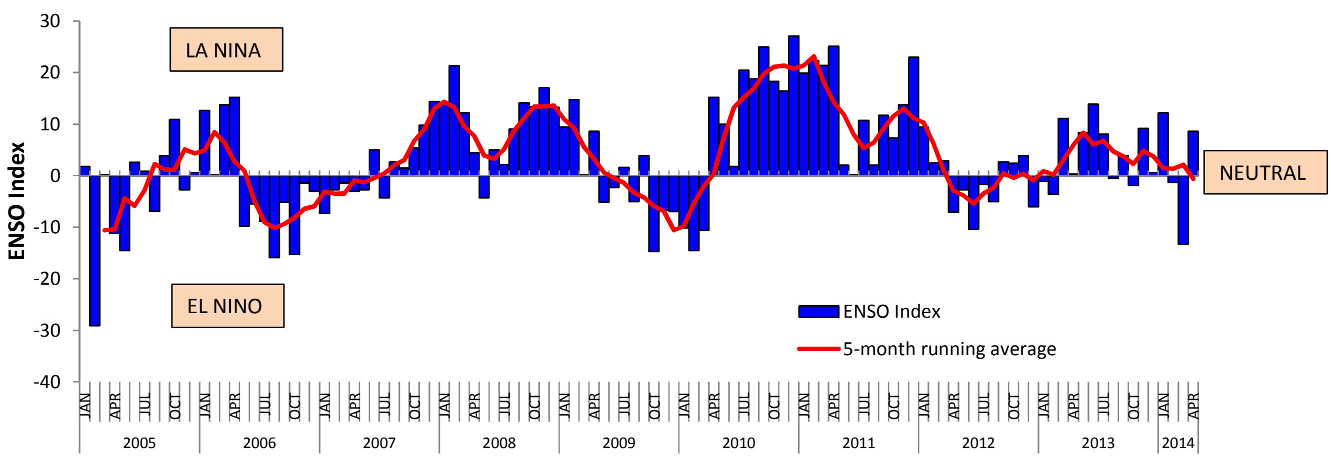

Figure 8. Trends in El Nino Southern Oscillation Index (ENSO), 2005-2014

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. The relatively high proportion of unassociated sets in the eastern areas (e.g. Gilbert Islands) was a feature of the fishery in 2012. The distribution of sets by set type in 2013 was similar to previous years with weak La Nina conditions (e.g. 2008).

Figures 10 through 14 show the distribution of purse seine effort for the five major purse seine fleets during 2012 and 2013. With the weak El Nino-type conditions prevailing in 2012, some of the fishing activity by these fleets had shifted further eastwards in 2012. The move to a weak-moderate La Nina regime in 2013 resulted in activities by most fleets switching back to the main western areas of the fishery (PNG, FSM and Solomon Islands). The US fleet typically fishes in the more eastern areas and this was the case again during 2013, 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. 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). 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 had some El Nino characteristics), with significant catches of large yellowfin taken in the fishery (Figure 15, Figure 16–right and Figure 58), which is in contrast to 2013, with clearly lower yellowfin tuna catches from unassociated sets in the central/eastern areas and probably a primary reason for the clear drop in the overall yellowfin tuna catch. The distribution of catch by species and set type during 2013 was similar to recent "La Nina" years (e.g. 2008) and in contrast to 2012, which had that distinct concentration of catch/effort in the central/eastern tropical areas (e.g. Kiribati Group).

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). Most of the total bigeye tuna catch comes from drifting FAD sets to the east of 160°E, although there appear to have been higher than average bigeye tuna catches across all areas during 2013.

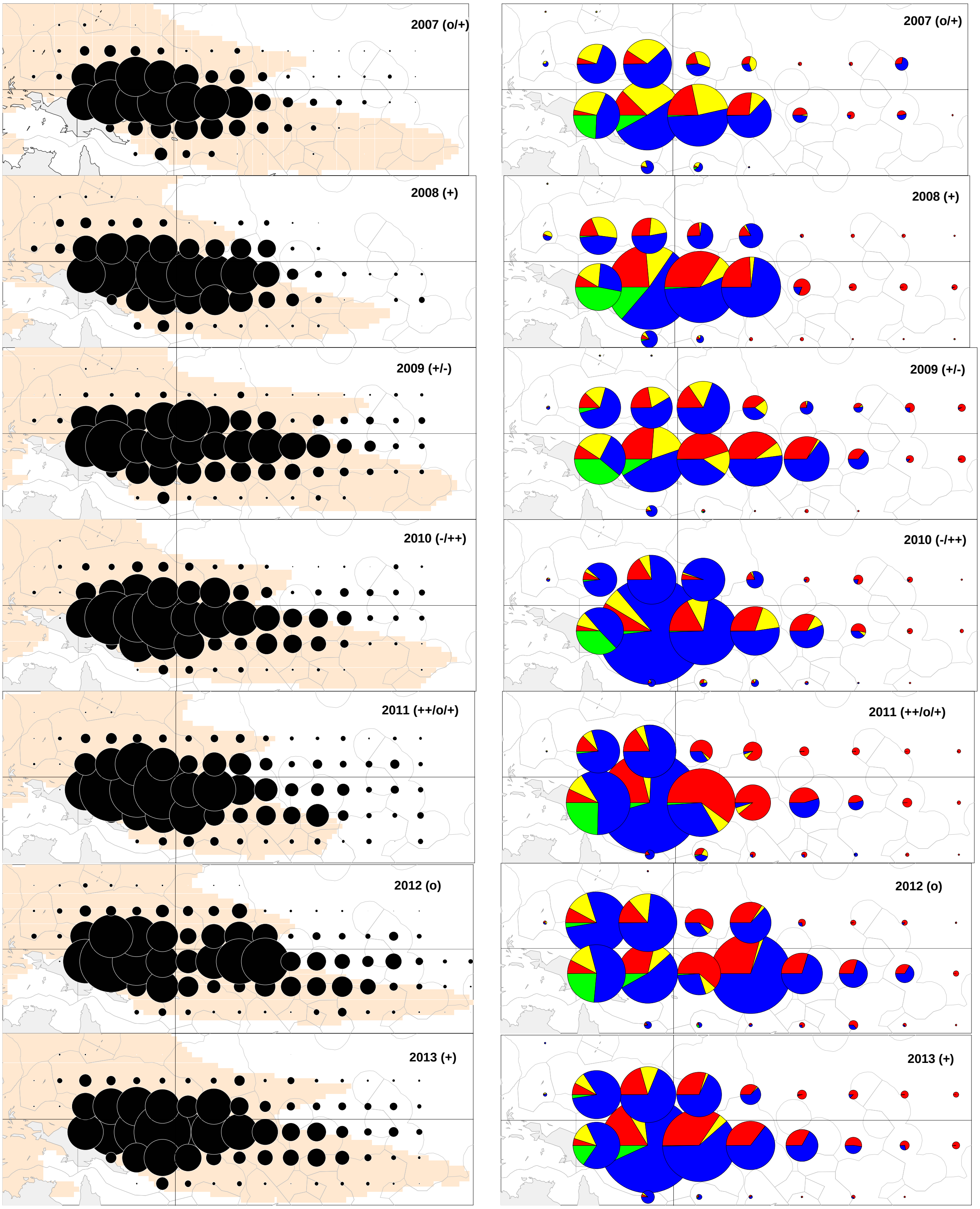

Figure 9. Distribution of purse-seine effort (days fishing – left; sets by set type – right), 2006–2013. (Blue–Unassociated; Yellow–Log; Red–Drifting FAD; Green–Anchored FAD).

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 2012 and 2013
lines for the equator (0° latitude) and 160°E longitude included.

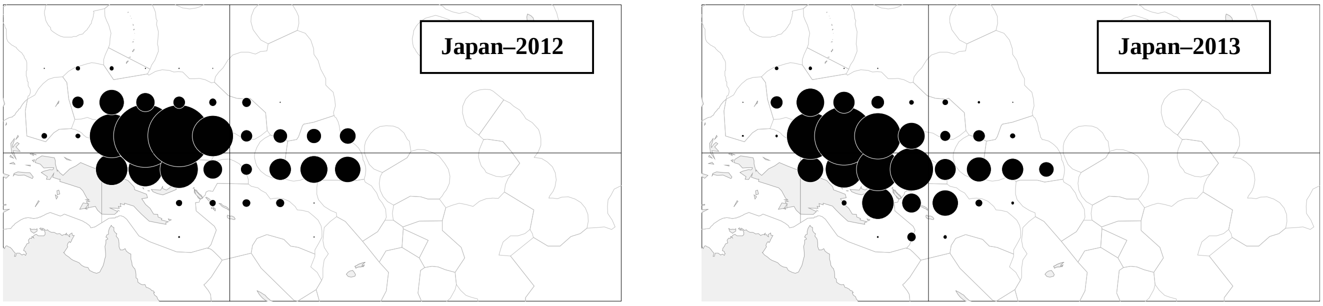

Figure 11. Distribution of effort by the Japanese purse seine fleet during 2012 and 2013
lines for the equator (0° latitude) and 160°E longitude included.

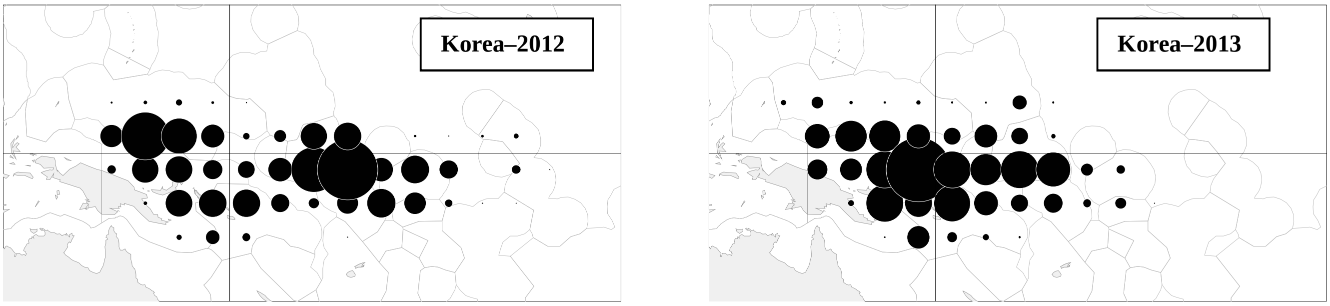

Figure 12. Distribution of effort by the Korean purse seine fleet during 2012 and 2013
lines for the equator (0° latitude) and 160°E longitude included.

Figure 13. Distribution of effort by the Chinese-Taipei purse seine fleet during 2012 and 2013
lines for the equator (0° latitude) and 160°E longitude included.

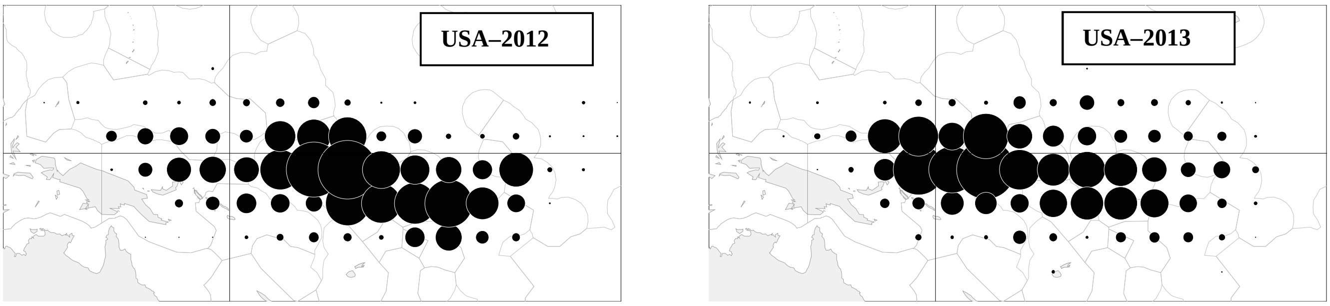

Figure 14. Distribution of effort by the US purse seine fleet during 2012 and 2013
lines for the equator (0° latitude) and 160°E longitude included.

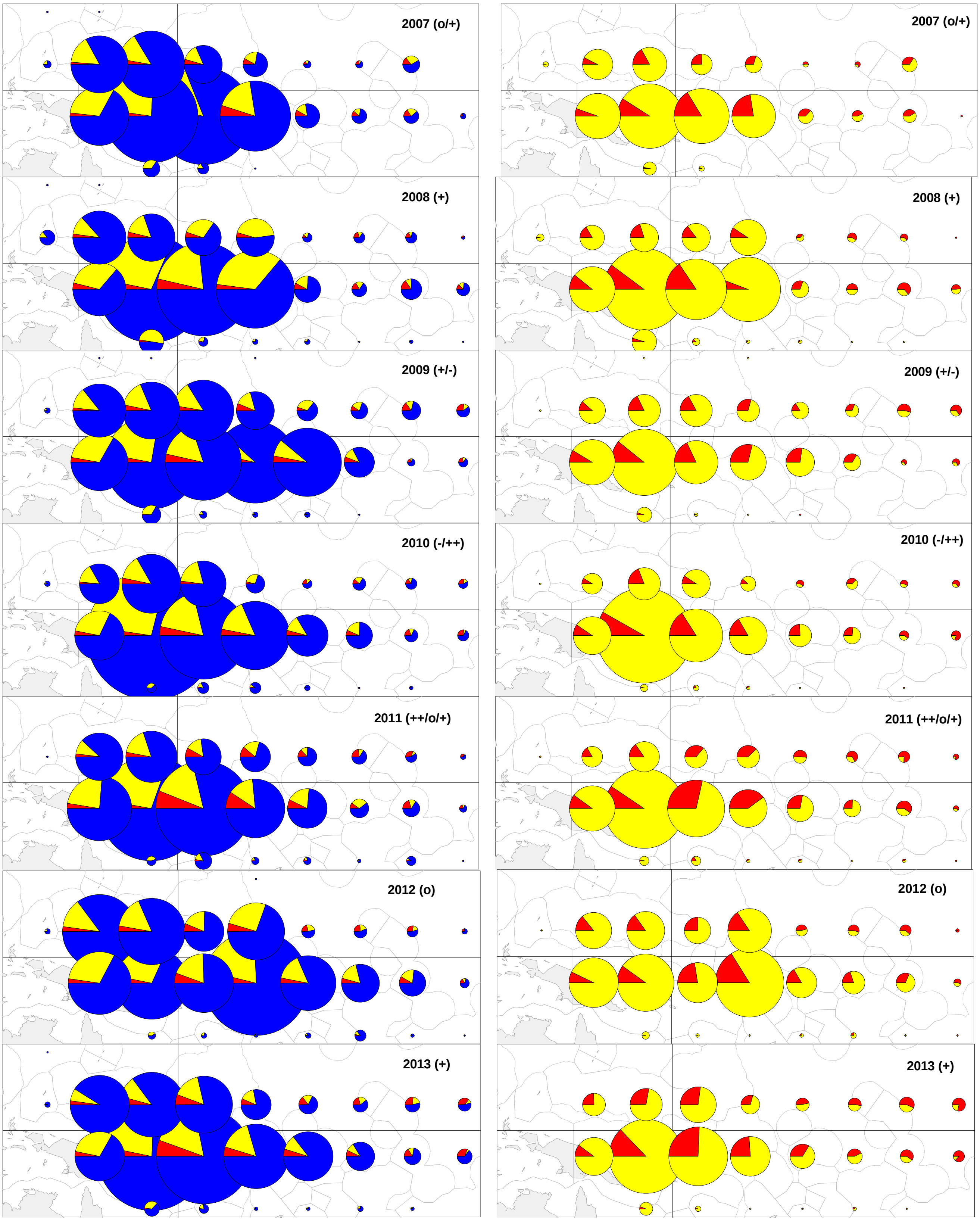

Figure 15. Distribution of purse-seine skipjack/yellowfin/bigeye tuna catch (left) and purse-seine yellowfin/bigeye tuna catch only (right), 2006–2013 (Blue–Skipjack; Yellow–Yellowfin; Red–Bigeye).

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

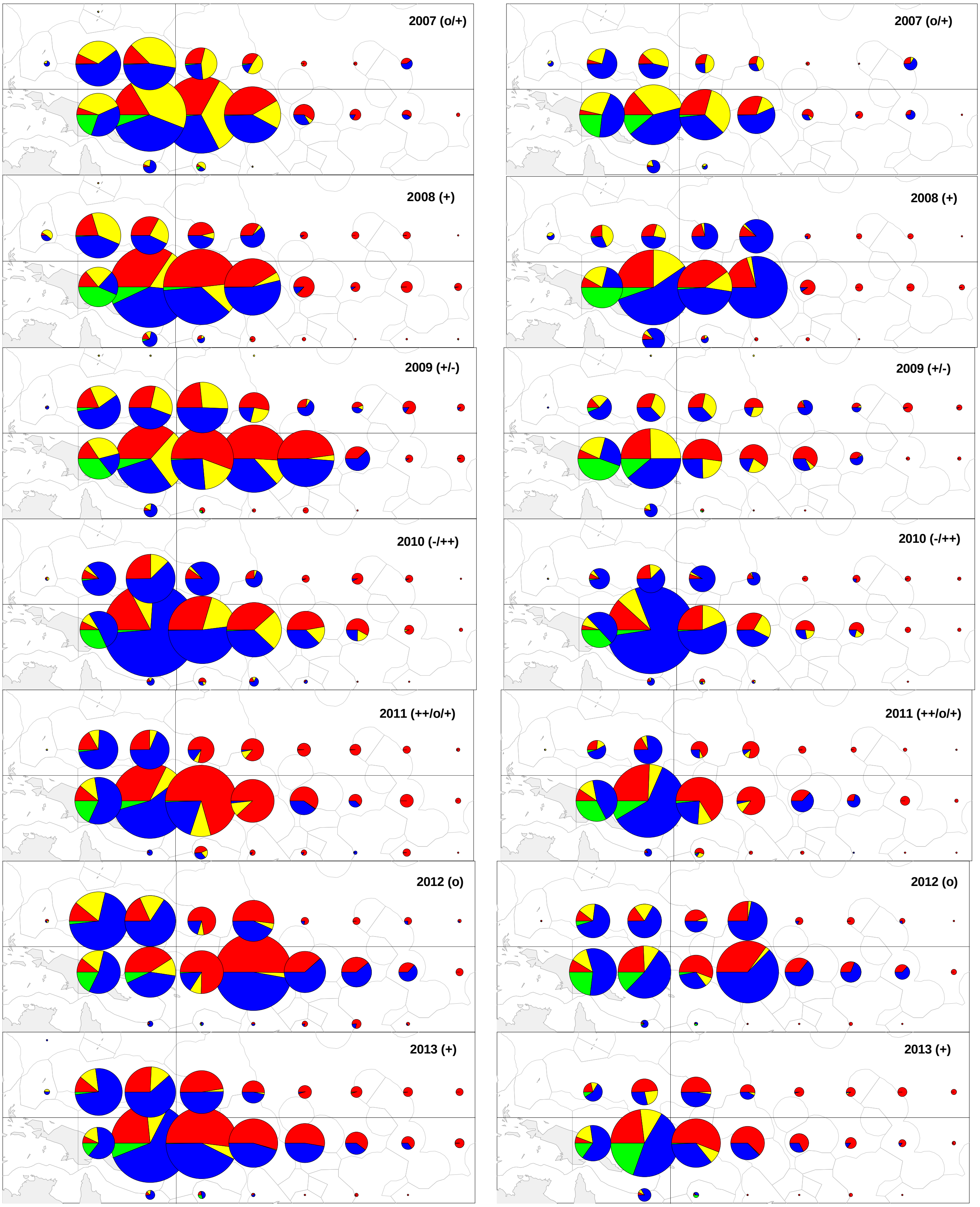

Figure 16. Distribution of skipjack (left) and yellowfin (right) tuna catch by set type, 2006–2013 (Blue–Unassociated; Yellow–Log; Red–Drifting FAD; Green–Anchored FAD).

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

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

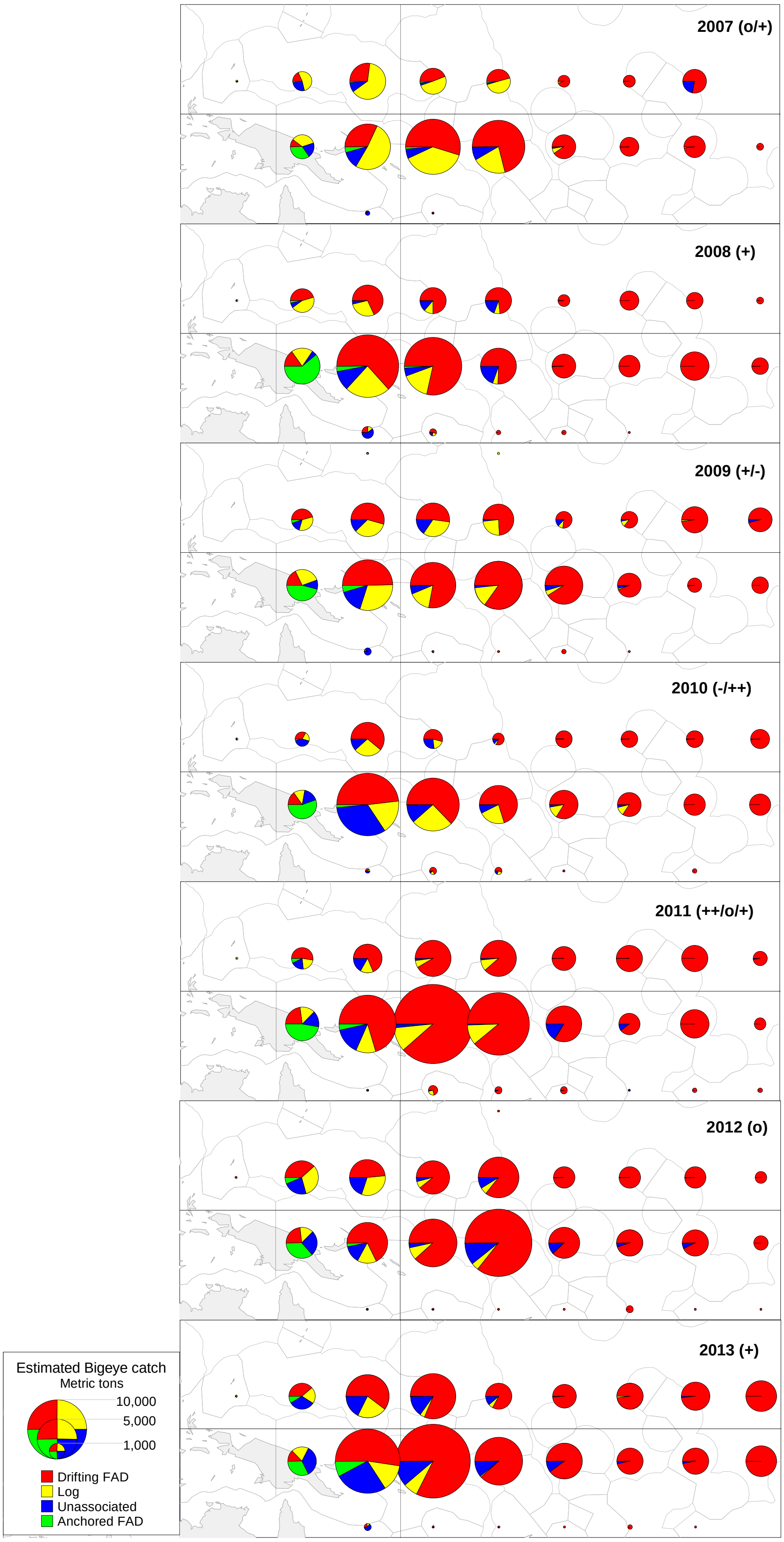

Figure 17. Distribution of estimated bigeye tuna catch by set type, 2006–2013 (Blue–Unassociated; Yellow–Log; Red–Drifting FAD; Green–Anchored FAD).

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.

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.

Overall purse seine skipjack CPUE for 2013 was generally at, or slightly below, the high levels experienced during 2012. The 2013 skipjack catch rates were lower in each set type for the Korean fleet while the catch rates for the US fleet increased in each set type, compared to 2012. Over the entire time series, the trend for skipjack CPUE has been generally upwards, although in 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 overall skipjack CPUE in 2012 and this appears to have been maintained into 2013.

The purse seine yellowfin CPUE clearly declined for free-schools in 2013, with catch rates for some fleets amongst their lowest levels ever, which is in contrast to what appears to be a clear increase in the yellowfin tuna CPUE from drifting FAD sets. This suggests that catches of mostly small juvenile yellowfin from drifting FAD sets were higher than average during 2013, but the catches of large adult yellowfin tuna from unassociated, free-schools were poor during 2013 (i.e. the general absence of the large adult yellowfin tuna in unassociated catches during 2013). 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. The significant drop in yellowfin tuna CPUE for the Japanese fleet in each set type during 2013 cannot be explained at this stage.

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 estimated 2013 bigeye tuna CPUE was higher than recent years and, with the continued high effort levels, resulted in a record purse seine bigeye tuna catch.

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 at 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. early 2014), estimates from these two sources tend to diverge since available logsheets are probably not representative. There was a clear decline in total tuna CPUE during the period August-October, a period with longer trips and apparent difficulties obtaining consistent catches from free-swimming schools. By November 2013 (and now outside the FAD closure period), the total tuna CPUE had clearly rebounded with high catch rates experienced in the fishery. The main reason for the strong rebound appears to be related to a strong skipjack recruitment pulse in the last quarter which provided better catches from drifting FAD sets. The logsheet catch/effort data used to determine total tuna CPUE are not complete for early 2014, but if average trip length (as determined by VMS data) is an indicator, then total tuna CPUE appears to have remained steady at a slightly elevated level during the first 4-5 months of 2014.

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.

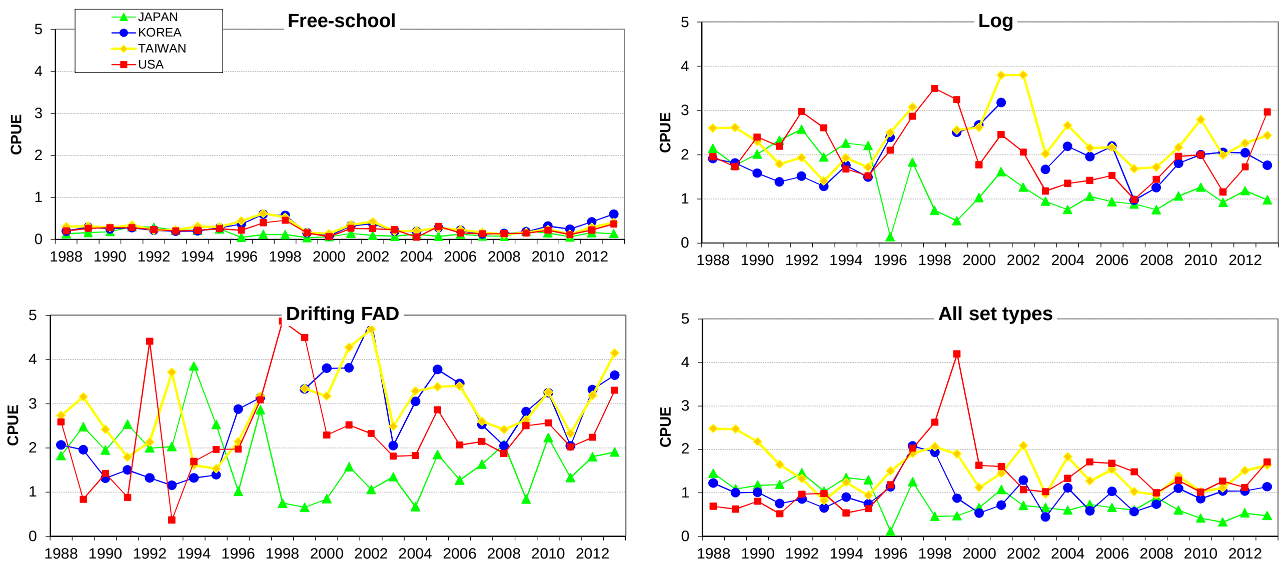

Figure 19. **Estimated bigeye tuna CPUE (mt per day) by major set-type categories (free-school, log and drifting FAD sets) and all set types combined for Japanese, Korean, Chinese-Taipei and US purse seiners fishing in the tropical WCP–CA.**
Effort and CPUE were partitioned by set type according to the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

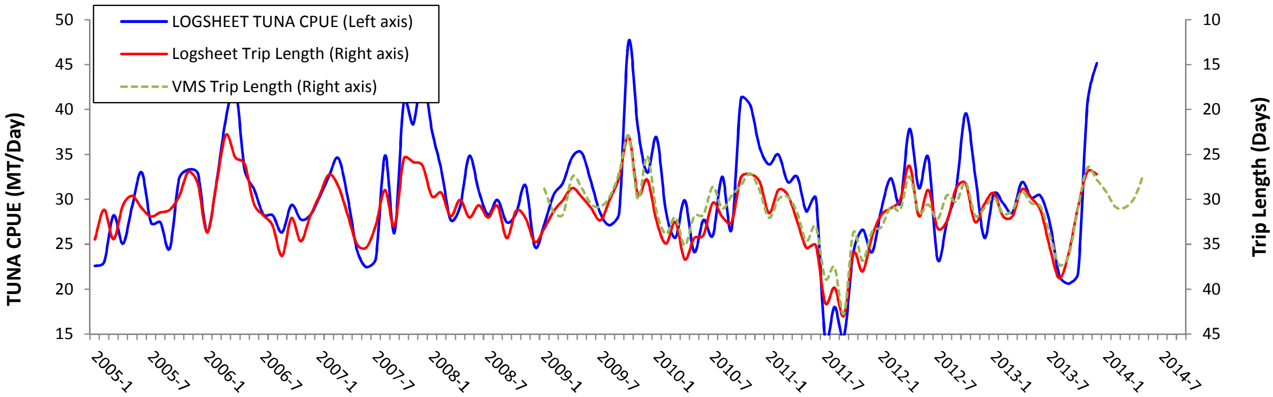

Figure 20. Monthly purse-seine tuna CPUE (mt/day) and average trip length (Logsheet days and VMS days, excluding port visits and transit), 2005–2014.

3.6 Seasonality

Figure 21 shows the seasonal average CPUE for skipjack (left) and yellowfin (right) in the purse seine fishery for the period 2000–2013, and Figure 22 shows the distribution of effort by quarter for the period 2000-2012 in comparison to effort by quarter in 2013. Over the period 2000–2012, 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 2000-2012, 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 2013 was at a similar level to the 2000-2012 average in the 1st Quarter, then clearly higher than the average for the months leading up to the FAD closure period, which for the most part was below the 2000-2012 average, as would be expected with the general absence of catches from FADs; the fishery experienced very high skipjack CPUE last two months of 2013 (Figure 21–left). The monthly yellowfin CPUE for 2013 was generally below the long-term monthly averages and an indication that relatively poor yellowfin catches were experienced in most months with some recovery only in the last two months (Figure 21 – right).

The moderate-weak La Nina conditions in 2013 demonstrated a quarterly pattern in the distribution of the warm pool (i.e. surface water >28.5°C on average) which was very consistent with the long-term average (2000-2012 – contrast the shading representing sea surface temperature in each quarter in Figure 22). Most of the purse-seine catch in the first two quarter of 2013 were taken to the west of 160°E, while most of the purse seine catch during the last two quarters was taken to the east of 160°E; this pattern is typical of most years and in line with the seasonal eastern extension of the fishery in the second half of the year. As in recent years, catches in the third quarter tended to be confined due to the FAD closure, with only small catches of bigeye tuna compared to the other quarters.

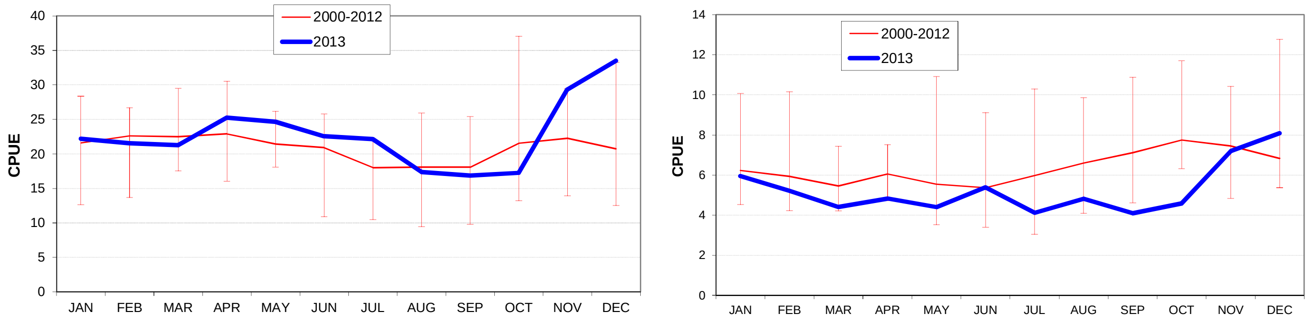

Figure 21. **Average monthly skipjack (left) and yellowfin (right) tuna CPUE (mt per day) for purse seiners fishing in the tropical WCP–CA, 2000–2013.**

Red line represents the period 2000–2012 and the blue line represents 2013.
The bars represent the range (i.e. minimum and maximum) of monthly values for the period 2000–2012.

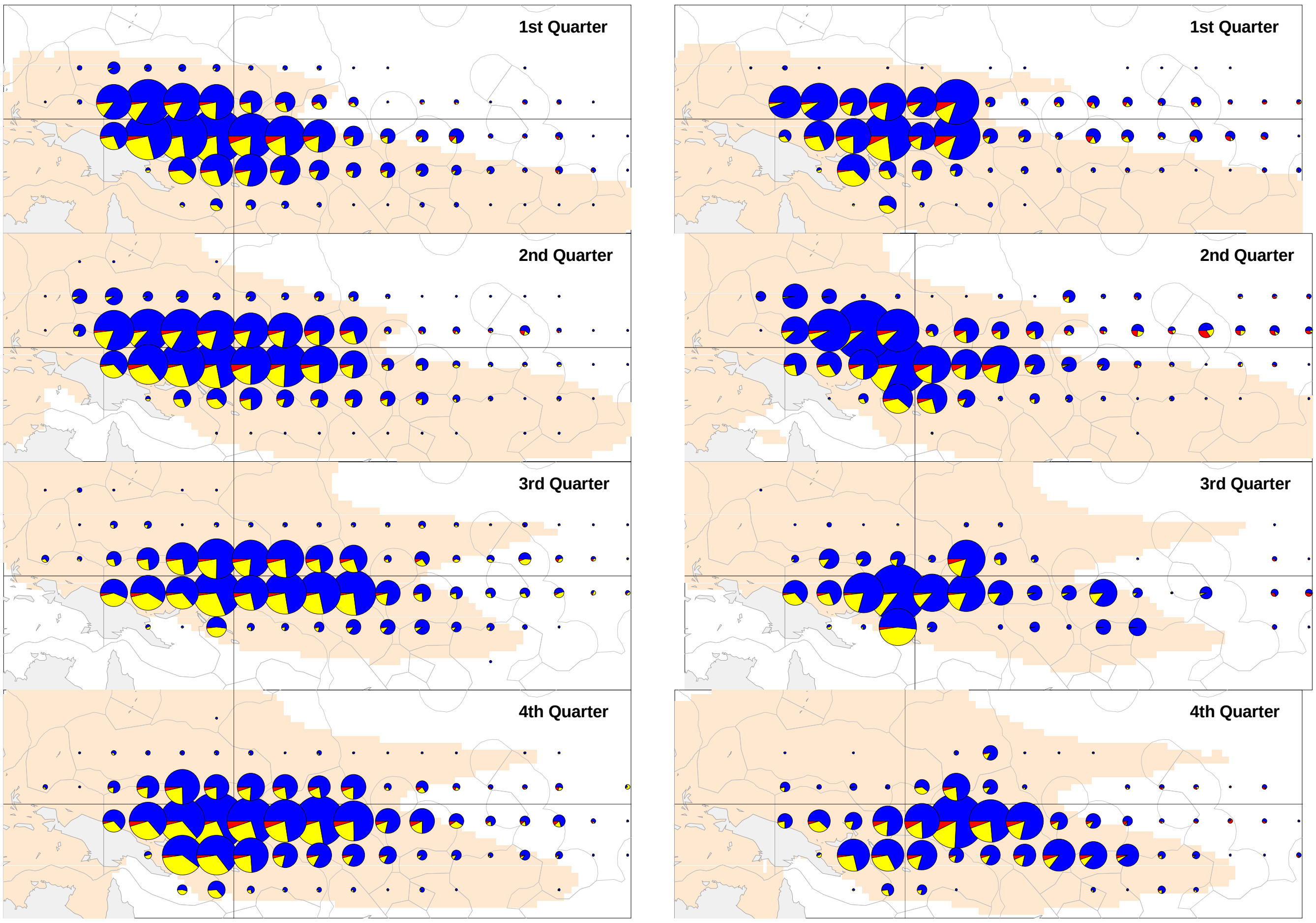

Figure 22. **Quarterly distribution of purse-seine catch by species for 2000–2012 (left) and 2013 (right).**

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

Pink shading represents the extent of average sea surface temperature > 28.5°C by quarter for the period 2000–2012 (left) and 2013 (right)

3.7 Economic overview of the purse seine fishery

3.7.1 Price trends – Skipjack

Prices in the major markets for WCPO skipjack were lower in 2013 compared with 2012. The Bangkok benchmark (4-7.5lbs) was 8% lower while prices at Yaizu were 10%[4] lower (in USD terms) and prices in General Santos and Ecuador were also lower (by 7% and 3% respectively). Thai customs data shows a decline of 2% in the Thai import price.

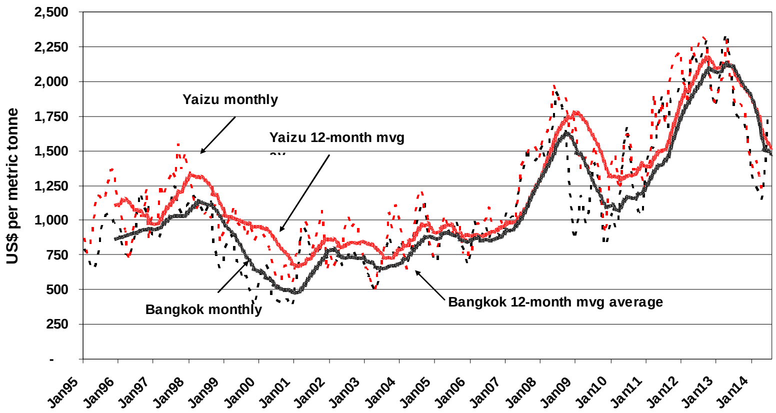

Figure 23. Skipjack prices, Bangkok (4-7.5lbs, c&f) and Yaizu (ex-vessel) monthly and 12 month moving average

The Bangkok benchmark skipjack price (4-7.5lbs) rose from $1,800/Mt in December 2012 to a peak of $2,350/Mt in April 2013. The substantial increase over this period reflected relatively poor fishing conditions as well as increased demand by processors in China, Philippines and Latin America during the period.

Over the rest of 2013, which included the WCPO FAD closure period Bangkok prices declined and ended the year at around $1,500/mt. This decline was due to high inventories of raw material held by processors and slow sales of processed goods exacerbated by exceptionally good catches following the FAD closure. This downward trend in prices continued into the first quarter of 2014, as a result of the previous build-up of raw material inventories. The Bangkok benchmark price bottomed out at $1,150/Mt in April, the lowest since December 2010.

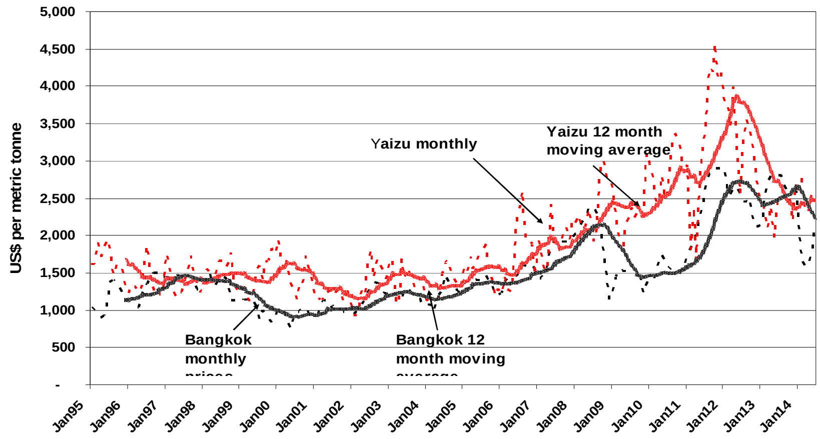

Figure 24. Yellowfin prices, Bangkok (20lbs and up, c&f) and Yaizu (ex-vessel) monthly and 12 month moving average

Since this time the Bangkok market has rebounded significantly with skipjack prices (4-7.5lbs c&f) in mid-July reportedly around $1,800/Mt. Other markets have displayed similar trends; Yaizu prices, for example, reached $1,490/mt in June, 21% up from the low in April. Nonetheless, prices in the first half of 2014 are down significantly on that seen over the same period in 2013. For example, Thai import prices over the period January to May 2013 were 58% higher than over the same period this year.

3.7.2 Price trends – Yellowfin

Yellowfin prices on canning markets were mixed with the Bangkok market price (20lbs+, c&f) up 6%, Thai import prices declined 5%, Yaizu down 26% (in USD terms) and General Santos (20lbs+, fob) up 3%.Bangkok yellowfin prices averaged $2,638/mt in 2013 compared to $2,478 in 2012.. Bangkok prices remained at around $2,600/Mt through the last quarter of 2013 despite declines in the skipjack price but fell rapidly over the first Quarter of 2014 to a low of $1,600 in March/April. As with skipjack prices have since recovered to be around $2,300/Mt in mid-July.

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[4] The JPY depreciated against the USD over the year by 22%

Japan Yaizu prices on the other hand declined significant in 2013 and were down 26% to $2,283 (in JPY terms the decline was muted but nonetheless still significant at 10%). The price decline came largely during the first half, down by 37% on the corresponding period in 2012. During the second half, prices were lower by 17% compared to the corresponding half in 2012. Yaizu port prices over the first half of 2014 averaged $2,513/Mt up by 10% against the corresponding period in 2013 but 1% lower against the 2nd half of 2013.

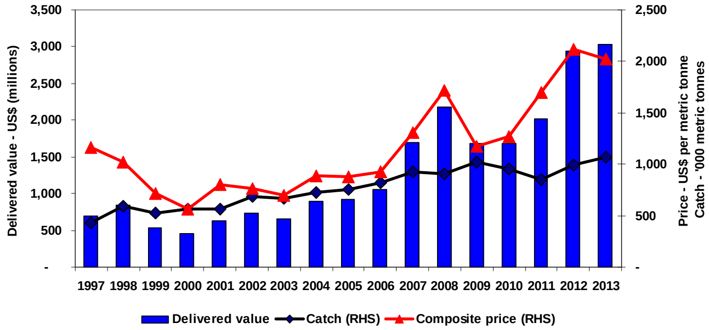

Figure 25. Skipjack in the WCPFC purse seine fishery – Catch, delivered value of catch and composite price

At General Santos, yellowfin prices (20lbs+, fob) averaged $3,053/Mt, a modest 3% lower than $3,159 in 2012. Relatively steady prices prevailed during the first half of the year, averaging $3,122 but lowered during the second half to $2,984/Mt. The price at the end of 2013 was around $2,975/Mt and declined over the first half of 2014 to a low of $1,750 in March before rebounding to $2,250/Mt by July.

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 2013 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.[5]

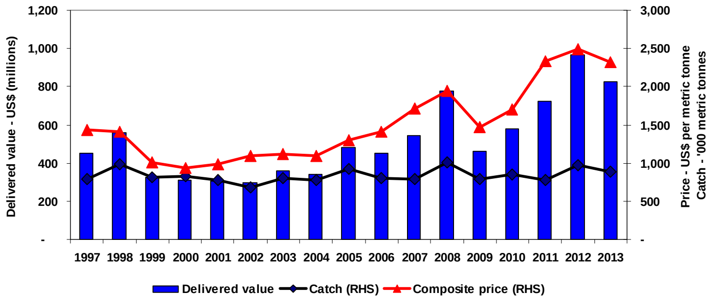

Figure 26. Yellowfin in the WCPFC purse seine fishery – Catch, delivered value of catch and composite price

The estimated delivered value of the entire purse seine tuna catch in the WCP-CA area for 2013 is $3,947 million compared with $4,029 million in 2012. This represents a decrease of $82 million or 2% less than the estimated delivered value of the catch in 2012. This decrease resulted from the $139 million (14%) decrease in the delivered value of the yellowfin catch (worth $829 million in 2013 resulting from the respective declines in both catch and price of 8% and 7%) largely being offset by the increase in the delivered value of skipjack (valued at $2,946 million resulting from a 6% increase in catch against the 4% decline in price).[6]

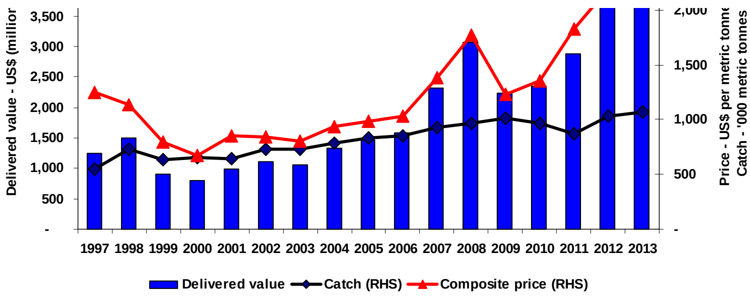

Figure 27. All tuna in the WCPFC purse seine fishery – Catch, delivered value of catch and composite price

[5] 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.

[6] 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).

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).

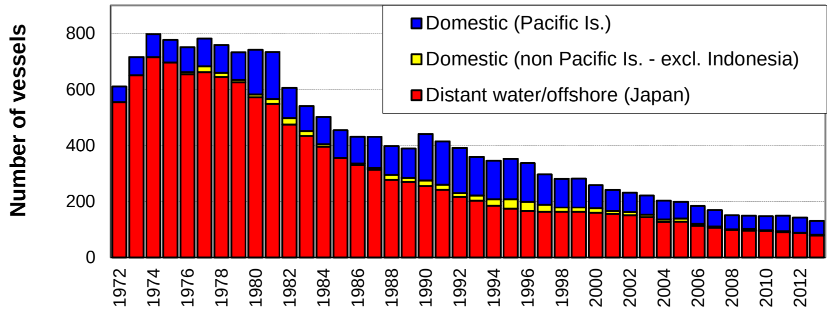

Figure 28. Pole-and-line vessels operating in the WCP–CA
(excludes pole-and-line vessels from the Japanese Coastal and Indonesian domestic fisheries)

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 (45 vessels in 2013), 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 (2013)

The provisional 2013 pole-and-line catch (221,022 mt) was the lowest annual catch since the late-1960s and continuing the trend in declining catches for three decades.

Skipjack tends to account for the majority of the catch (~70-83% in recent years, but typically more than 85% of the total catch in tropical areas) and albacore (8–20% in recent years) is taken by the Japanese coastal and offshore fleets in the temperate waters of the north Pacific. Yellowfin tuna (5–16%) and a small component of bigeye tuna (1–4%) make up the remainder of the catch. There are only five pole-and-line fleets active in the WCPO (French Polynesia, Japan, Indonesian, Kiribati and Solomon Islands).

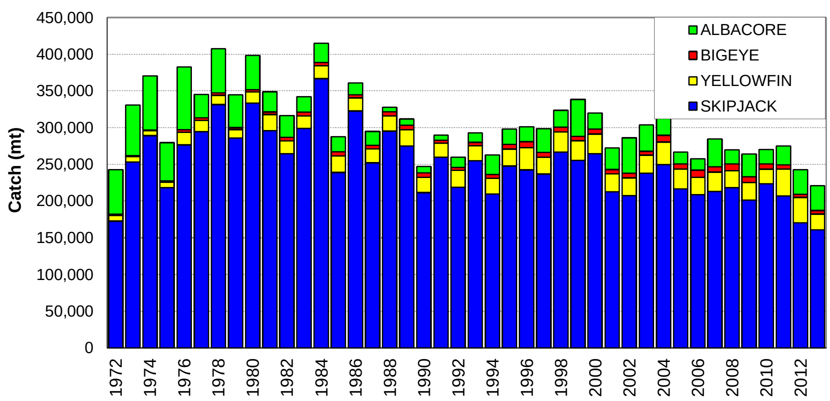

Figure 29. Pole-and-line catch in the WCP–CA

Japanese distant-water and offshore fleets (112,529 mt in 2013), and the Indonesian fleets[7] (106,705 mt in 2013), account for nearly all of the WCP–CA pole-and-line catch (99% in 2013). 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 2013 reduced to only 79 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 1,198 mt in 2013.

Figure 30 shows the average distribution of pole-and-line effort for the period 1995–2013. 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.

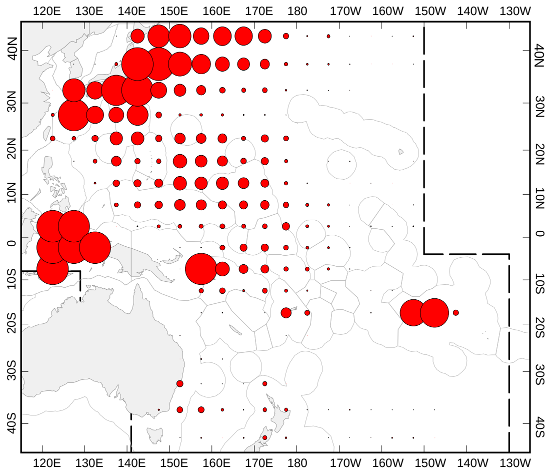

Figure 30. Average distribution of WCP–CA pole-and-line effort (1995–2013).

[7] 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 2013, the supply situation for pole and line skipjack was an improvement on the previous although relatively tight compared to prior years.

The Yaizu price of pole and line caught skipjack in waters off Japan averaged $2,358/Mt (¥236/kg) in 2013, a decrease of 30% (14% in JPY terms) compared to 2012. The Yaizu price of pole and line caught skipjack in waters south of Japan also decreased, by 27% to $2,380/Mt (10% to ¥233). Overall, the pole and line price at Yaizu in 2013 averaged $2,337/Mt as against an average of $3,319 in 2012, a decline of 30%.

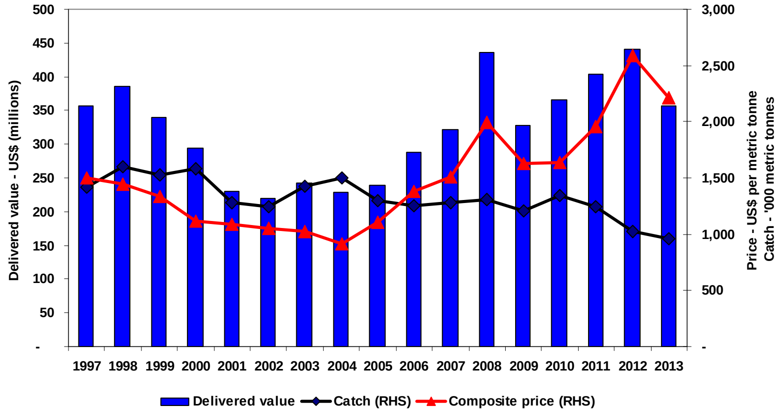

Figure 31. Skipjack in the WCPFC pole and line fishery – Catch, delivered value of catch and composite price

Over the first half of 2014 Yaizu pole and line prices have continued to deteriorate. The overall average at $2,503/Mt is 3% lower than in the latter half of 2013 and 11% lower than the comparable period last year. The southern pole and line component averaged $2,256/Mt that is lower by 10% over the same period last year though 3% higher than the latter half of 2013. The near shore / eastern offshore pole and line price averaged $1,799 lower by 24% against the average during the latter half of 2013 and 23% against prices in the same period last year .

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 1997-2013, 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 31 to 33. The estimated delivered value of the total catch in the WCPFC pole and line fishery for 2013 is $506 million.[8] This is a decrease of $153 million (23%) on 2012 caused by declines in catch and prices, 9% and 16% respectively.

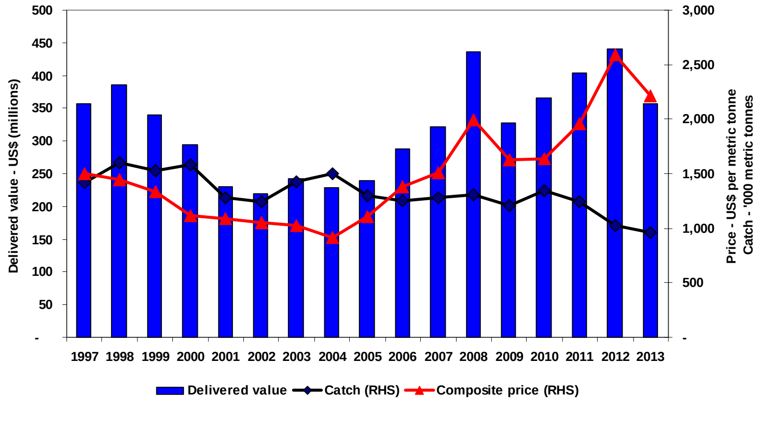

Figure 32. Albacore tuna in the WCPFC pole and line fishery – Catch, delivered value of catch and composite price

[8] Delivered skipjack prices for the Japanese pole and line fleet are based on a weighted average of the Yaizu 'south' and 'other' pole and line caught skipjack prices. Delivered yellowfin price for the Japanese pole and line fleet are based on the Yaizu purse seine caught yellowfin price. All other prices are based on Thai import prices.

The estimated delivered value of the skipjack catch in the WCPFC pole and line fishery for 2013 is $356 million. This represents a decline of 19% ($85 million) compared to the estimated value of the catch in 2012 and results from decreases of 6% (9,780 Mt) in catch a 14% in the composite price. The estimated delivered value of the albacore catch is $85 million, a $35 million (29%) decrease on the previous year as the estimated catch remained stable while albacore price declined by 29%.

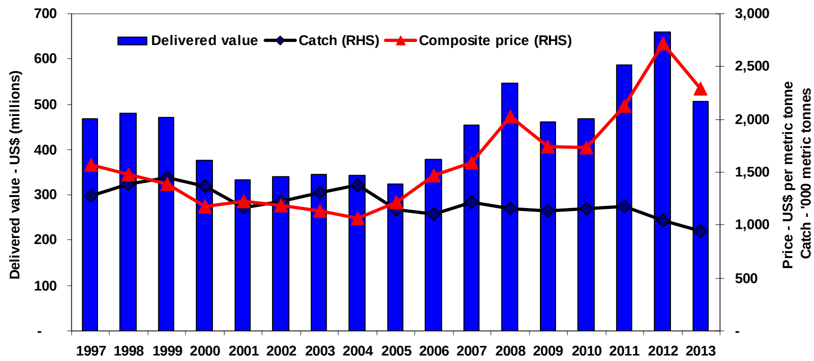

Figure 33. All tuna in the WCPFC pole and line fishery – Catch, delivered value of catch and composite price

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, 2013), 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 34), 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.

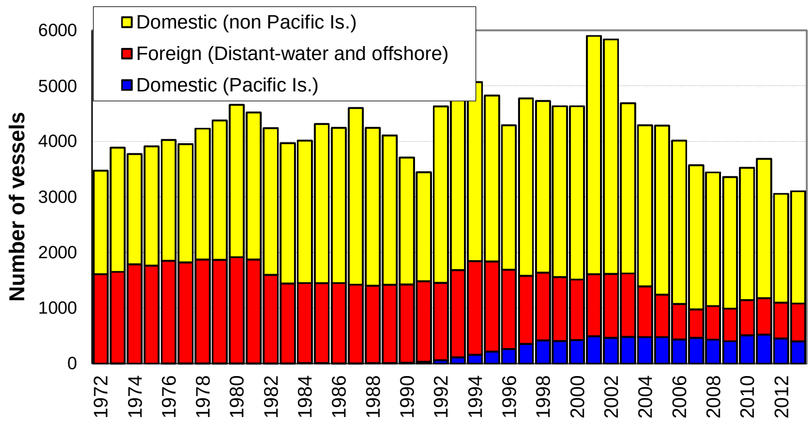

Figure 34. Longline vessels operating in the WCP–CA
(Available data does not make the distinction between foreign "distant-water" and "offshore")

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

- **South Pacific offshore albacore fishery** comprises Pacific-Islands domestic "offshore" vessels, such as those from American Samoa, Cook Islands, Fiji, French Polynesia, Kiribati, New Caledonia, 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, although the latter fleet has not fished recently. Vessel number have stabilised in recent years.

- **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 Vietnam 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 34). The commercial handline fleets target large yellowfin tuna which comprise the majority of their overall catch (> 90%). The domestic Vietnamese longline and handline fleet catches are now included in this paper.

The WCP–CA longline tuna catch steadily increased from the early years of the fishery (i.e. the early 1950s) to 1980 (226,229 mt), but declined to 155,402 mt in 1984 (Figure 35). 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–47%; BET–28%; YFT–30% in 2013) 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).

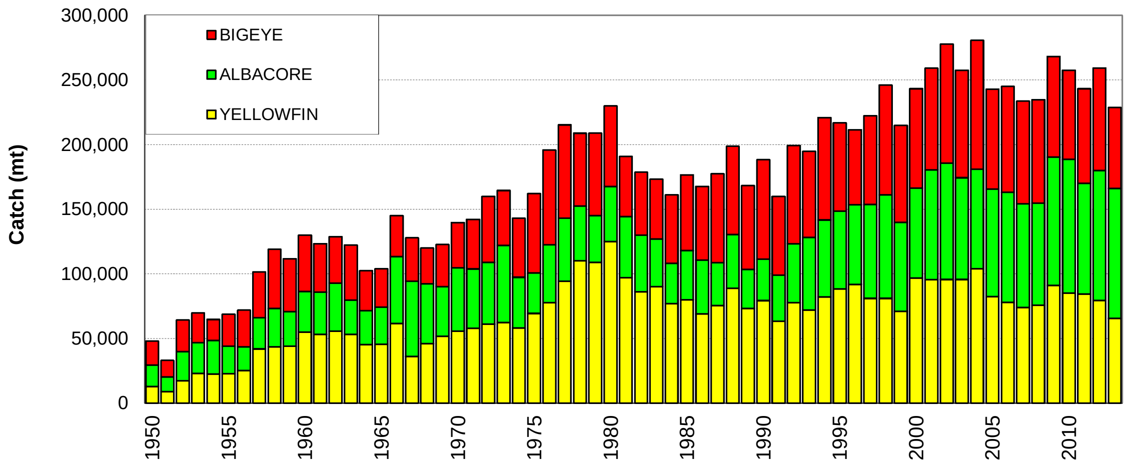

Figure 35. Longline catch (mt) of target tunas in the WCP–CA

5.2 Provisional catch estimates and fleet sizes (2013)

The provisional WCP–CA longline catch (230,073 mt) for 2013 was the lowest catch since 1999. The WCP–CA albacore longline catch (100,666 mt – 47%) for 2013 was the second highest on record, only 2,000 mt lower than the record (103,466 mt in 2010). The provisional bigeye catch (62,641 mt – 29%) for 2013 was the lowest since 1996. The yellowfin catch for 2013 (65,499 mt – 30%) was the lowest since 1991.

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 450 (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 6,382 mt in 2013) and vessel numbers (366 in 2004 to 142 in 2013). The Chinese-Taipei distant-water longline fleet bigeye catch declined from 16,888 mt in 2004 to 5,129 mt (in 2013), mainly related to a substantial drop in vessel numbers (137 vessels in 2004 reduced to 82 vessels in 2013). The Korean distant-water longline fleet also experienced declines in bigeye and yellowfin catches over the past decade in line with a reduction in vessel numbers – from 184 vessels active in 2002 reduced to 108 vessels in 2008, but back to 125 vessels in 2013.

With domestic fleet sizes continuing to increase as foreign-offshore and distant-water fleets decrease (Figure 34), 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–SC10 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.

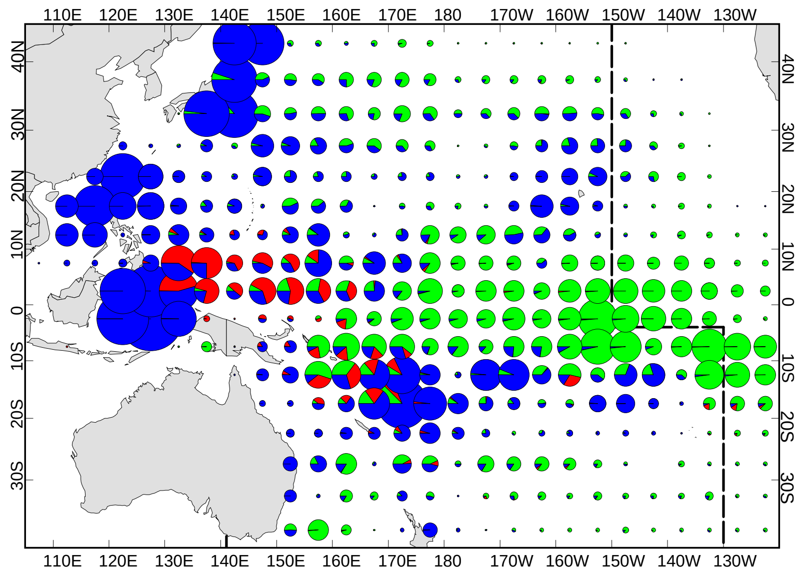

Figure 36. Distribution of longline effort for distant-water fleets (green), foreign-offshore fleets (red) and domestic fleets (blue) for the period 2000–2013.
(Note that distant-water effort for Chinese-Taipei and other fleets targeting albacore in the North Pacific is poorly covered)

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 36 shows the distribution of effort by category of fleet for the period 2000–2013. 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 fleets in this category are the Cook Islands, Samoan, Fijian, French Polynesian and Vanuatu fleets (Figure 37).

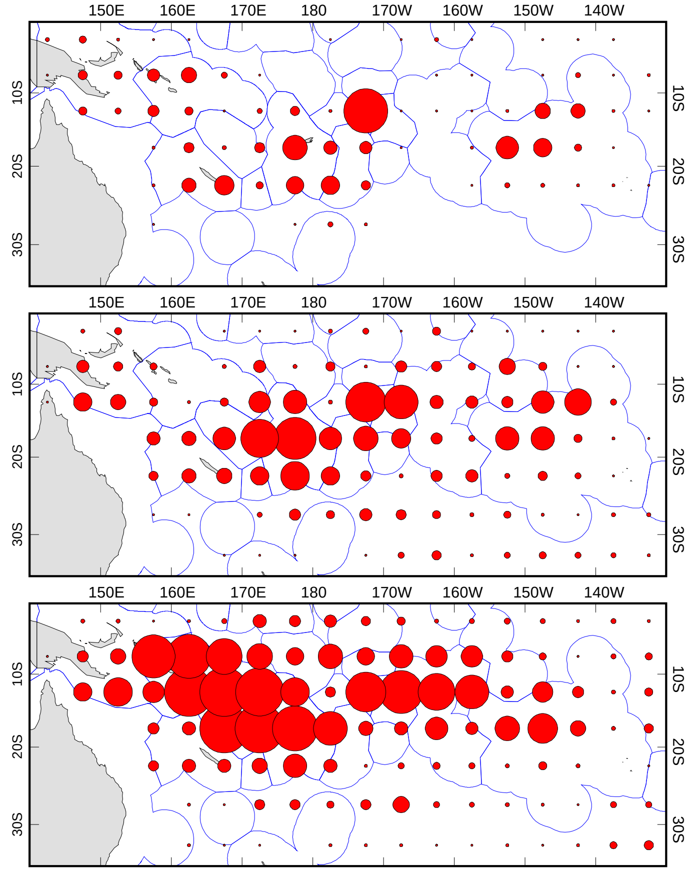

Figure 37. Distribution of south Pacific-island fleet longline effort for 1999 (top), 2003 (middle) and 2013 (bottom). Note that 2013 includes estimated effort for charter vessels assigned according to the WCPFC CMM on charter notification.

Figure 38 shows quarterly species composition by area for the period 2000–2012 and 2013. 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 continued decline in bigeye catches is evident when comparing the 2000-2012 quarterly averages (Figure 38–left) with the 2013 catches (Figure 38–right). The 2013 data are considered preliminary for some fleets, but nonetheless show the increased catches in the Cook Islands EEZ, the continued reduction of the longline fisheries of Micronesia, and increased catches in sub-tropical area east of French Polynesia (10°-20°S) in the 1st and 4th quarters.

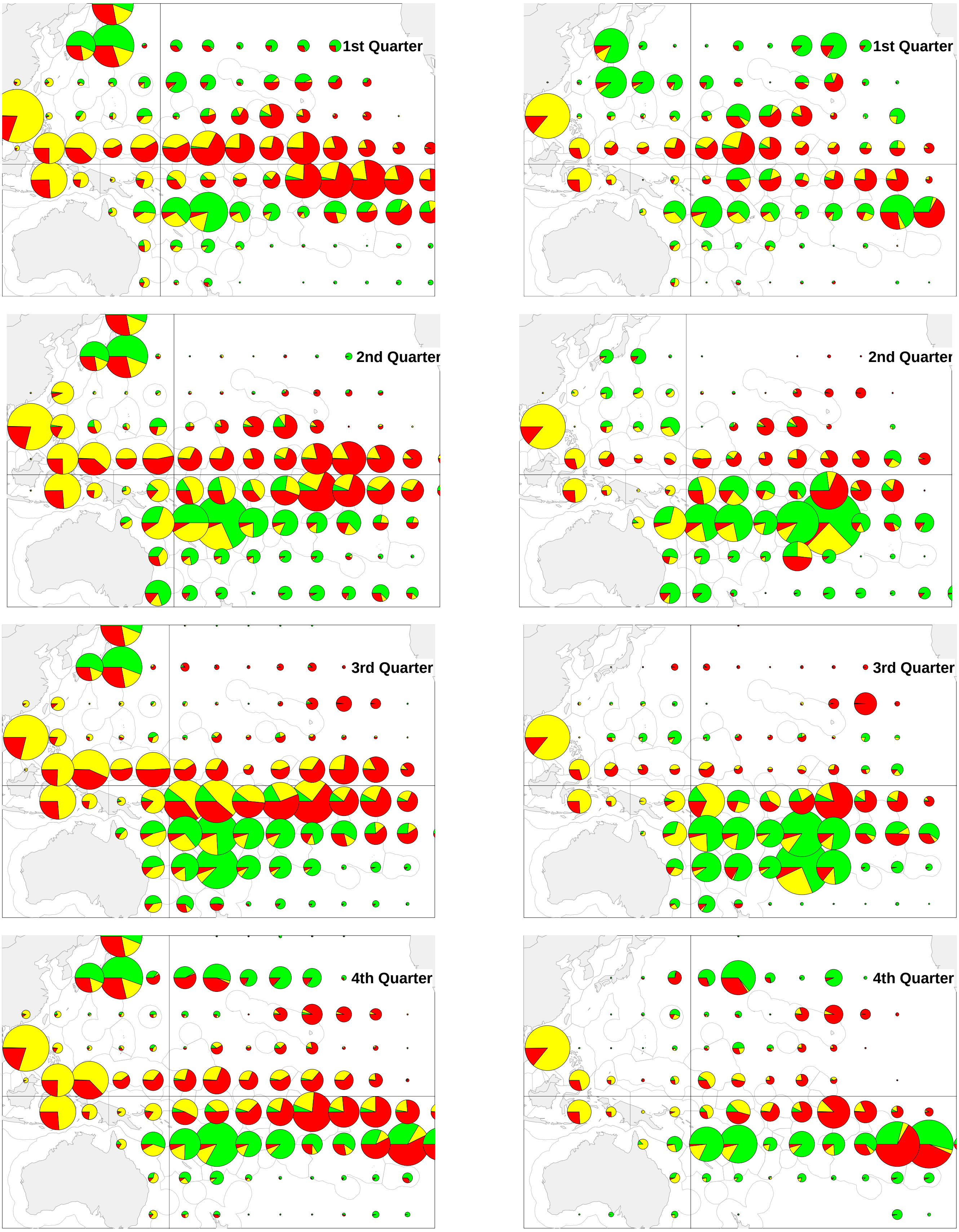

Figure 38. Quarterly distribution of longline tuna catch by species, 2000-2012 (left) and 2013 (right*)*
(Yellow–yellowfin; Red–bigeye; Green–albacore)
(Note that catches from some distant-water fleets targeting albacore in the North Pacific may not be fully covered)

5.5 Economic overview of the longline fishery

5.5.1 Price trends – Yellowfin

The Japan market prices in 2013 in JPY terms showed fresh imports from all sources rising by 2% while the Yaizu port prices were stable. In US$ terms, however, Japanese prices for WCPO longline caught yellowfin showed significant declines in 2013; fresh yellowfin import prices (c.i.f.) from all sources declined by 17% and Yaizu port fresh & frozen prices (ex-vessel) declined by 21%. The US 2013 prices (f.a.s.) on the other hand remained steady relative to 2012.

In 2013, the Japan fresh yellowfin prices from all sources and at Yaizu port showed relative stability to the 2012 levels. In US$ terms, however, Japan fresh yellowfin import prices (c.i.f.) from all sources significantly declined by 17% to an average $9.41/Kg, This followed a moderate improvement of 5% to $11.28/Kg in 2012. Over the first half of 2014, however, the overall import prices have broadly been stable relative to the latter half and first half of 2013, contributed to by the relative stability in the exchange rate.

The Yaizu port 2013 longline caught yellowfin fresh/frozen prices (ex-vessel) lowered by 21% to $6.04/Kg in 2013. Over the first half of 2014, the prices were stable relative to the latter half of 2013 prices but significantly up by 16% compared to the first half of 2013 prices. In contrast to the 2013 downtrends, however, the longterm trends of imports and Yaizu port prices have generally been on the increase, in USD terms, that is. However, in JPY terms, the longterm prices have been stagnant for the most part (Figures 39 & 40). Broadly, this reflects the overall downtrend in demand in Japan for yellowfin (and bigeye) as reflected in its annual import trends; fresh yellowfin imports have steadily declined over the years with imports in 2013 at 9,900 Mt being the lowest on record that represents a decline of 19% on last year's and 73% from a high of 36,000 Mt in 2001.

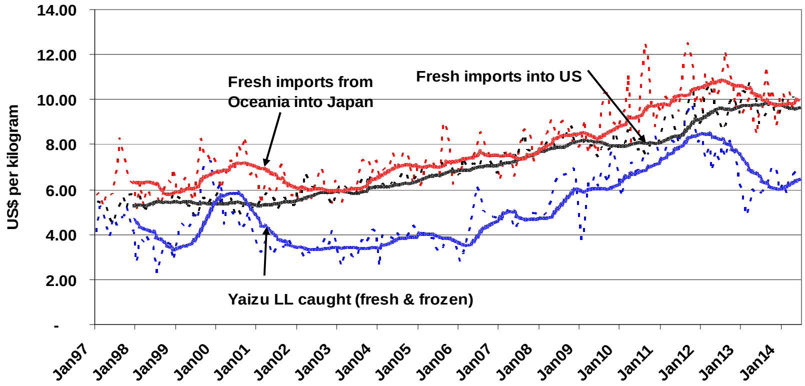

Figure 39. Yellowfin prices in $: US fresh imports (f.a.s.), Japanese fresh imports from Oceania (c.i.f.) and Yaizu longline caught (ex-vessel)

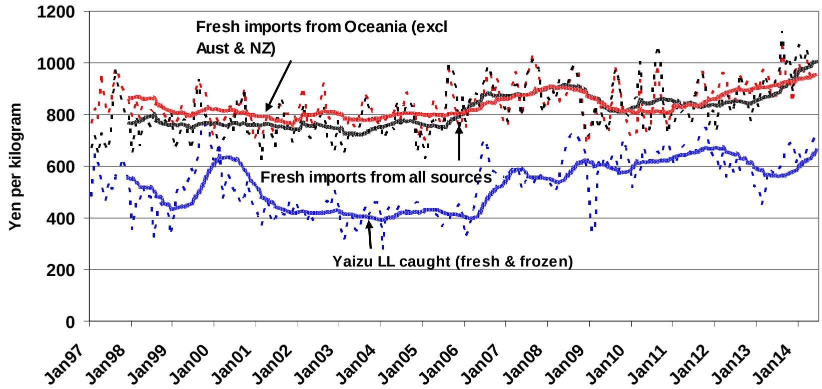

Figure 40. Yellowfin prices on Japanese markets; fresh imports from all sources (c.i.f.), fresh imports from Oceania (c.i.f.) and Yaizu longline caught (ex-vessel)

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

In the US market imports of fresh yellowfin have broadly been steady at around 16,000 Mt annually over recent years. Imports from Oceania generally have been on the decline, reflected in the 2013 imports being 36% lower compared to the high of 2,000 Mt in 2001. However these have been stable at around 1,300 Mt in the last three years.
The US fresh yellowfin import prices (f.a.s.) from all sources averaged $9.77 in 2013, comparable to the 2012 prices but 8% on 2011. Imports from Oceania, at $6.13/Kg) was a 15% improvement on 2012 prices but 30% improvement on 2011. Developments over the first half of 2014 show continuing positive trends especially for Oceania imports; prices for Oceania imports were 15% and 3% higher than the latter half and the first half in 2013 respectively while prices for imports from all sources were 3% higher compared to the latter half of 2013 although down by the same margin relative to the average price in the corresponding period last year.

5.5.2 Price trends – Bigeye

The Japan market prices in 2013 in JPY terms showed fresh imports from all sources rising by 2% while Japan selected ports prices declined by 10%. In US$ terms, however, the price trends in major markets in Japan for WCPO longline caught bigeye showed significant declines in 2013; fresh bigeye import prices (c.i.f.) from all sources declined by 19% and Japan selected ports frozen prices (ex-vessel) declined by 29%. The US 2013 prices (f.a.s.) on the other hand, as for fresh yellowfin, remained steady relative to 2012.

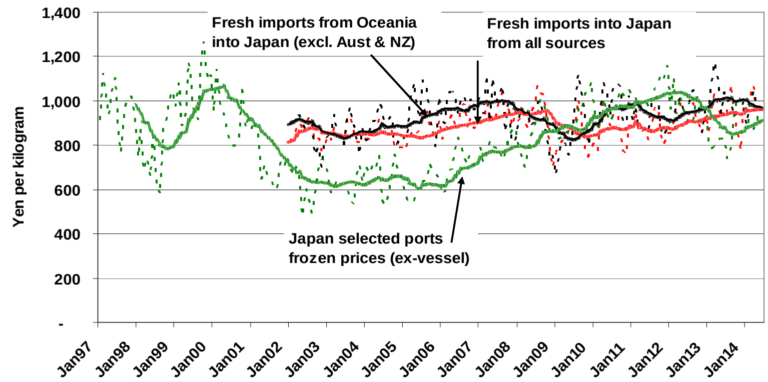

Figure 41. Bigeye prices on Japanese markets; fresh imports all sources (c.i.f.), fresh imports from Oceania (c.i.f.) and Japan selected ports (ex-vessel)

The Japan market prices in 2013 in JPY terms showed fresh imports from all sources rising by 2% to ¥944/Kg while Japan selected ports prices declined by 10% to ¥860/Kg. In US$ terms, the 2013 Japan fresh bigeye import prices (c.i.f.) from all sources significantly declined by 19% to an average $9.38/Kg, This followed a moderate improvement of 5% to $11.28/Kg in 2012. Over the first half of 2014, however, the overall import prices rose 8% to $9.78/Kg compared to the latter half of 2013 while broadly maintaining same level as in first half of 2013.

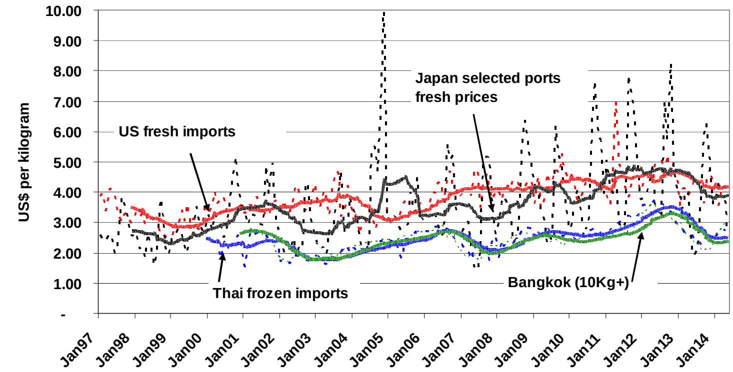

Figure 42. Albacore prices in $: Thai frozen imports, Japan fresh / frozen selected ports (ex-vessel) and US fresh imports (f.a.s.)

The Japan selected ports frozen longline bigeye prices (ex-vessel) in 2013 dropped by a substantial 29% to $8.58/Kg. This contrasted expectations from reported prolonged poor fishing conditions in the Pacific and other oceans and were primarily a consequence to prevalence of exceptionally high inventory of low grade Indian Ocean 2012 bigeye imports. Developments over the first half of 2014 indicates further declines, albeit moderate, by 3% relative to the second half of 2013 prices but moderate improvement when compared to the first half of 2013 prices.

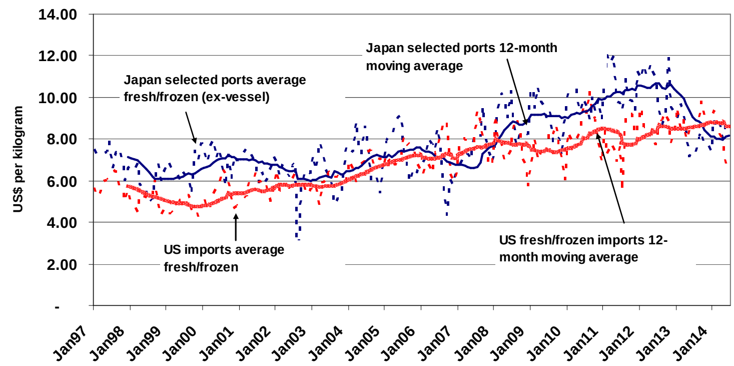

Figure 43. Swordfish prices in $: Japan selected ports fresh/frozen (ex-vessel) and US fresh/frozen import prices (f.a.s.)

Fresh bigeye imports have also steadily declined over the years as for fresh yellowfin and for the same reasons. Imports in 2013 came to 11,330 Mt, the lowest on record and represents a decline of 15% on last year's and 48% from a high of 22,000 Mt in 2002. Imports from Oceania have reflected the same trends with a 21% decline to 2,000 Mt but 72%

lower compared to the high of 8,200 Mt in 2002.

In the US where fresh bigeye imports have also been on a long-term declining trend, imports in 2013 came to 4,023 Mt, a moderate 8% increase on 2012 but substantially down by 45% on the past peak of more than 7,000 Mt in 2003. US fresh bigeye import price (f.a.s.) from all sources averaged $8.83 that is among the highest over the period 2001-2013 (the highest was $8.98 in 2012). Imports from Oceania, at $4.92/Kg, were a significant improvement of 23% improvement on 2012 and 35% on 2011.

5.5.4 Price trends – Albacore

Albacore prices experienced substantial declines across markets in 2013; the Bangkok benchmark (10kg and up, c&f) dropped 28%, Thai frozen imports (c.i.f) 29%, Japan selected ports fresh (ex-vessel) 27% and US imports fresh (f.a.s.) 12%.

This price decline resulted from an oversupply of raw material, attributed to the high catch levels in the Atlantic, the expansion in the number of Chinese mini-longline vessels, the entry into the Pacific of Taiwanese longline vessels from the Indian Ocean as they switched away from bigeye targeting because of deteriorating economic conditions in that fishery, and stagnant demand in the US for canned albacore.. These developments took adverse toll on markets and on many Pacific Islands fleets.

There has been a marked recovery in albacore prices recently with the Bangkok price trending up from $2,200 at the end of 2013 to US$3,000 in May 2014 before dipping to $2,800 by end June in response to a slowdown in market conditions and then rebounding to $3,000/Mt toward by mid-July.

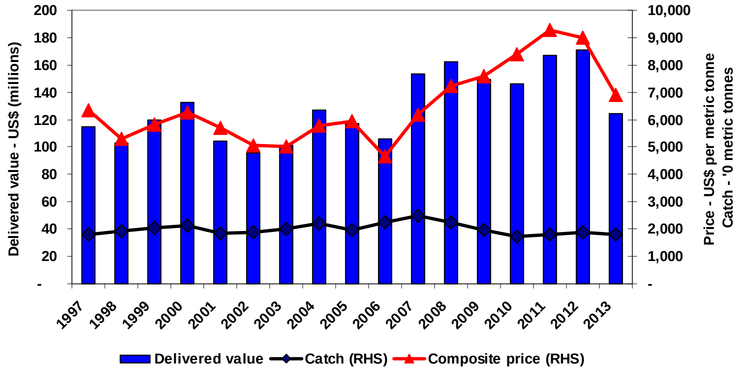

Figure 44. Swordfish in the WCPFC-CA longline fishery – Catch, value and price

5.5.5 Price trends – Swordfish

The US swordfish market weighted average price (fresh and frozen, f.a.s.) averaged $8.83 in 2013, up 3% from 2012 that follows from a similar rise in 2012. Against the moderate price increase, the volume of imports rose by 9% to almost 6,000 Mt while in value terms the increase was 13% to $53 million. Although the long-term trend of swordfish prices in the US market has been up from around $5.00/Kg to almost $9.00/Kg, there have been apparent stagnancies in between years (Figure 43).

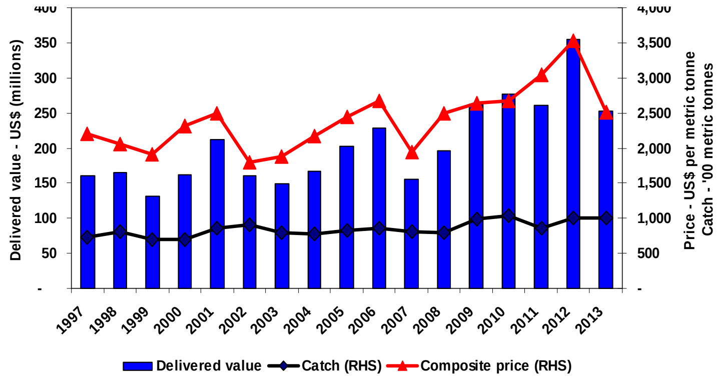

Figure 45. Albacore in the WCPFC longline fishery – Catch, delivered value of catch and composite price

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 2013 was ¥787/Kg ($7.72), a 4% decline from the previous year's while the landed volume rose by 2% to 3,900 Mt.

In the first half of 2014, the US fresh import prices averaged $8.56/Kg, a slight increase of 1% as imports rose 11% 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% to ¥570/Kg ($6.00/Kg) despite a decline in landings of 5%.

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.[9] The estimated delivered value of the longline swordfish catch in the WCP-CA for 2013 is $124 million. This represents a decrease of 28% ($47 million) compared to the estimated value of the catch in 2012 and results from a 6 % decrease in catch (105 Mt to 17,973 Mt) and a 23 % decline in the composite price.

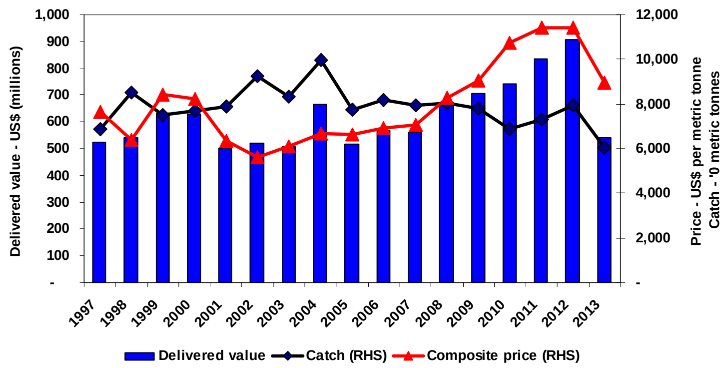

Figure 46. Bigeye in the WCPFC longline fishery – Catch, delivered value of catch and composite price

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 2013 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. [10]

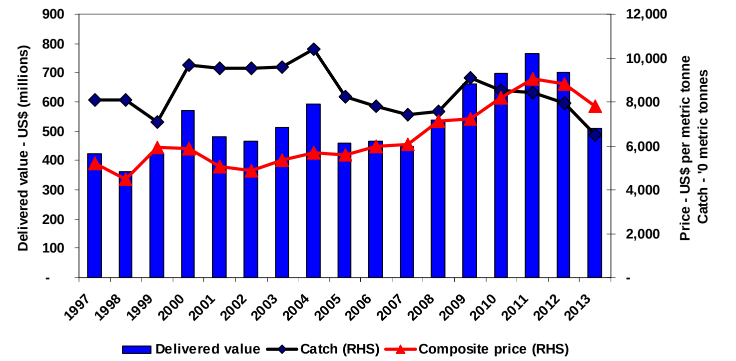

Figure 47. Yellowfin in the WCPFC longline fishery – Catch, delivered value of catch and composite price

The estimated delivered value of the longline tuna catch in the WCPFC area for 2013 is $1,276 million. This represents a substantial decline of $592 million on the estimated value of the catch in 2012. The value of the albacore catch decreased by $102 million (29%) while the value of the bigeye catch declined by $346 million (38%) and the value of the yellowfin catch decreased by $187 million (27%).

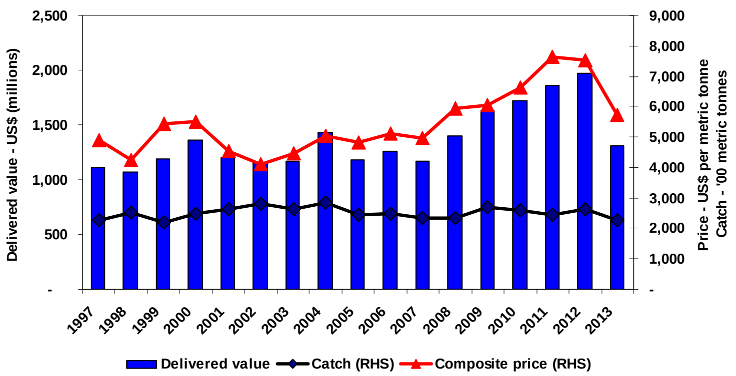

Figure 48. All tuna in the WCPFC longline fishery – Catch, delivered value of catch and composite price

The albacore catch was estimated to be worth $253 million in 2013, a 29% decrease on 2012 resulting solely from the 29% decrease in the composite price as estimated catch remained steady. The bigeye catch was estimated to be worth $560 million in 2013, a decrease of 38% compared to 2012 accounted for by declines in both catch and prices, 21% and 22% respectively. The estimated delivered value of the yellowfin catch was $512 million in 2013, a decline of 27% accounted for by decreases in both catch and price of 18% and 11% respectively.

[9] 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.

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

6 SOUTH-PACIFIC TROLL FISHERY

6.1 Overview

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

The fishery expanded following the development of the STCZ fishery after 1986, with the highest catch attained in 1989 (8,370 mt). 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.

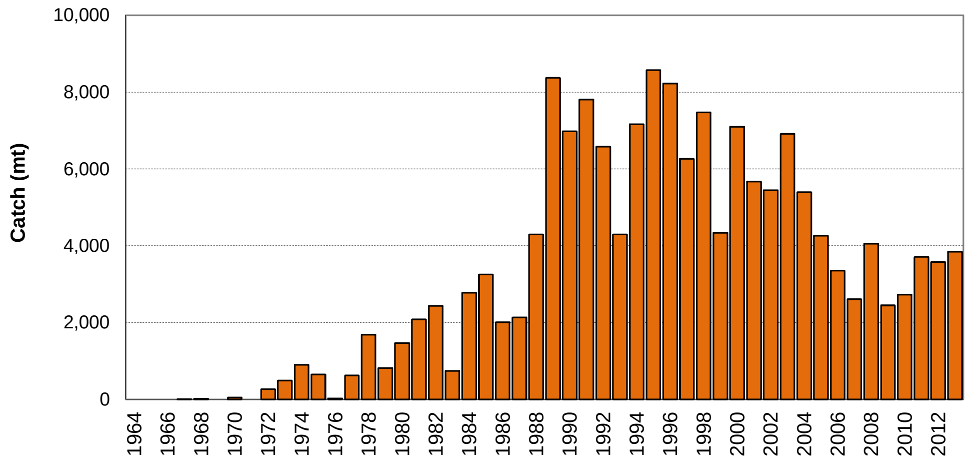

Figure 49. Troll catch (mt) of albacore in the south Pacific Ocean

6.2 Provisional catch estimates (2013)

The 2013 South Pacific troll albacore catch (3,226 mt) was the highest for five years. The New Zealand troll fleet (168 vessels catching 2,836 mt in 2013) and the United States troll fleet (6 vessels catching 390 mt in 2013) 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 2013).

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.

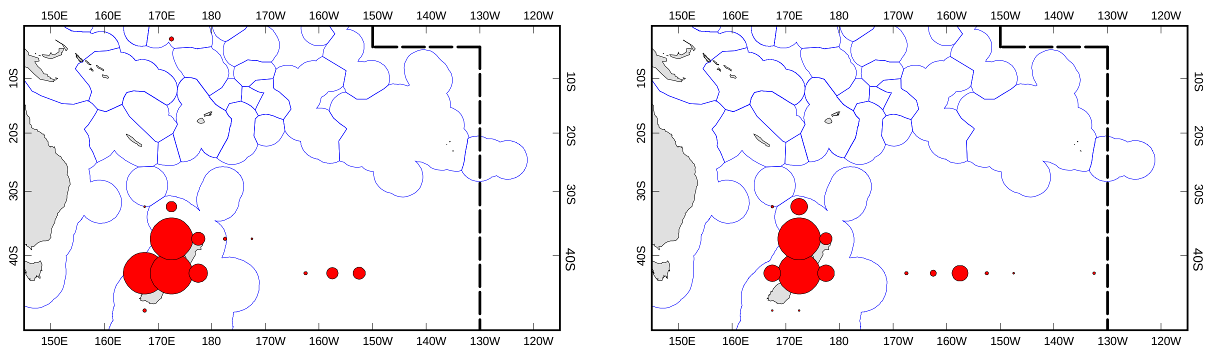

Figure 50. Distribution of South Pacific troll effort during 2012 (left) and 2013 (right)

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 2013 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).

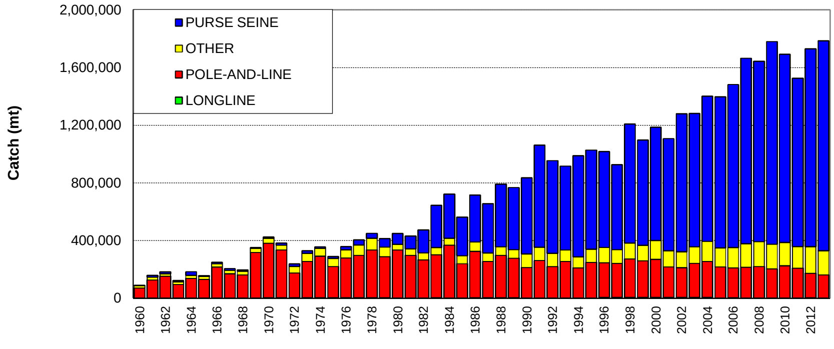

Figure 51. WCP–CA skipjack catch (mt) by gear

The 2013 WCP–CA skipjack catch of 1,784,091 mt was the highest catch recorded, mainly due to a record skipjack catch taken in the **purse seine** fishery (1,455,786 mt in 2013 – 82%). 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 (166,315 mt – 9%). The **longline** fishery accounted for less than 1% of the total catch.

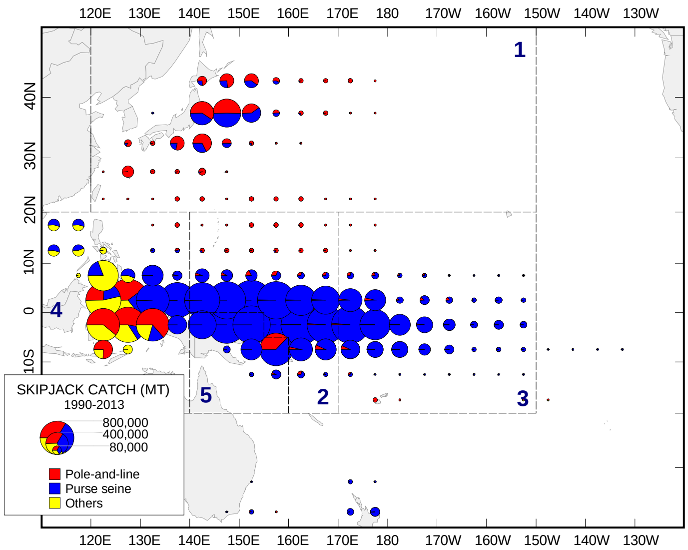

Figure 52. Distribution of skipjack tuna catch, 1990–2013.

The five-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 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 2013 is similar to that of 2010 (i.e. relatively larger fish); most of the catch by weight in 2013 was roughly shared between unassociated and associated schools, with a clear mode of relatively large fish (58-60 cm) from unassociated schools dominant.

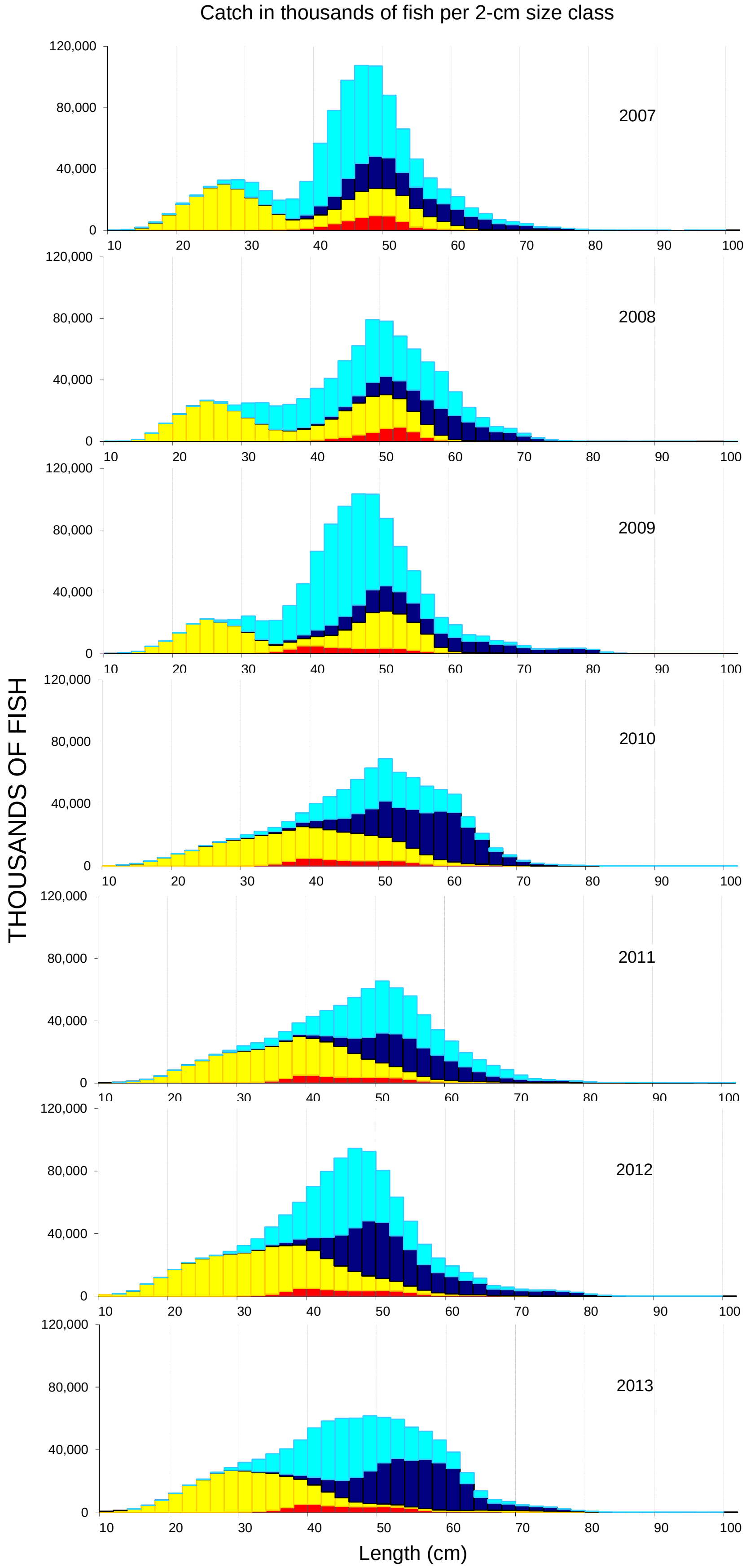

Figure 53. Annual catches (numbers of fish) of skipjack tuna in the WCPO by size and gear type, 2007–2013.

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

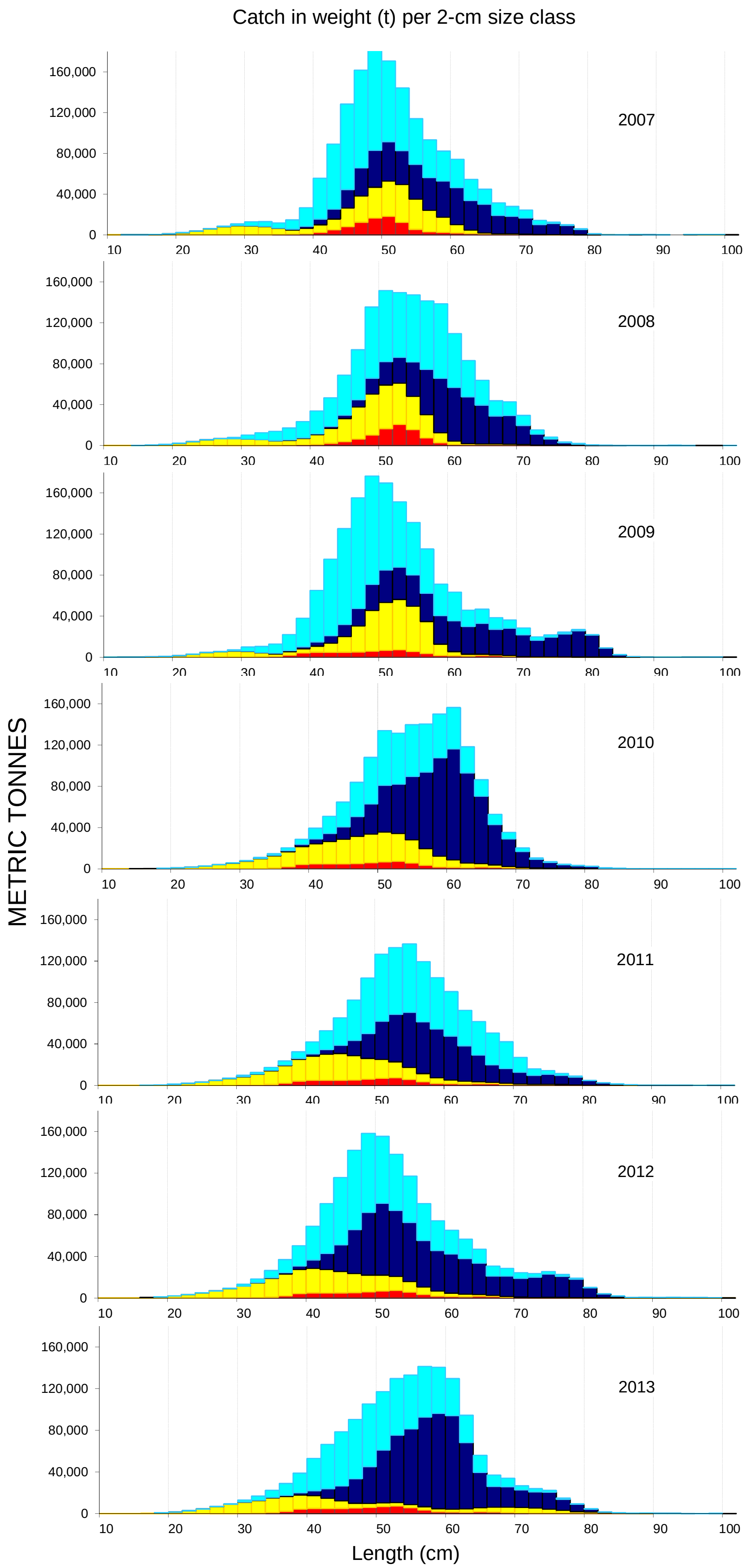

Figure 54. Annual catches (metric tonnes) of skipjack tuna in the WCPO by size and gear type, 2007–2013.

(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 2013 yellowfin catch (**535,656 mt**) was a significant drop (75,000 mt) on the record in 2012. The yellowfin catch in the **purse-seine** fishery (355,960 mt – 66% of the total yellowfin tuna catch) was about average for the past decade, but contributed a relatively low proportion (19%) of the total purse seine catch. 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 2013 (65,499 mt–12%) was the lowest since 1991 with less activity in the traditional yellowfin fishing areas and more interest in the albacore fishery. Since the late 1990s, the **purse-seine** catch of yellowfin tuna has accounted for about 3-5 times the **longline** yellowfin catch and continues to diverge.

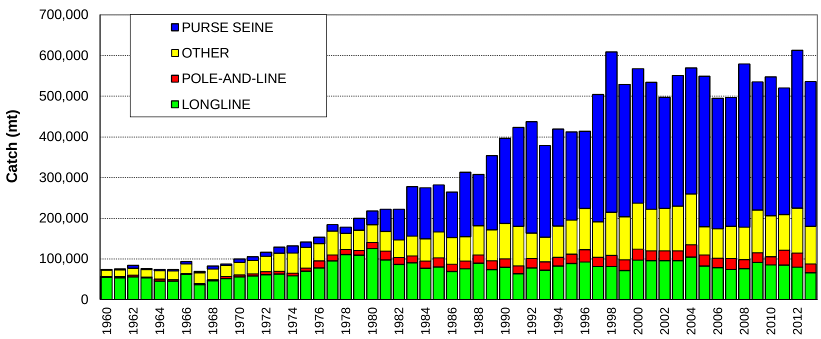

Figure 55. WCP–CA yellowfin catch (mt) by gear

The **pole-and-line** fisheries took 21,610 mt during 2013 (4% of the total yellowfin catch) and was amongst the lowest catch over the past twenty years, mainly attributed to decreases in the domestic Indonesian catches. The **'other'** category accounted for ~92,000 mt (17%). Catches in the '**other**' category are largely composed of yellowfin taken by various assorted gears (e.g. troll, ring net, bagnet, gillnet, large-fish handline, small-fish hook-and-line and seine net) in the domestic fisheries of the Philippines and eastern Indonesia[11]. Figure 56 shows the distribution of yellowfin catch by gear type for the period 1990–2013. 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.

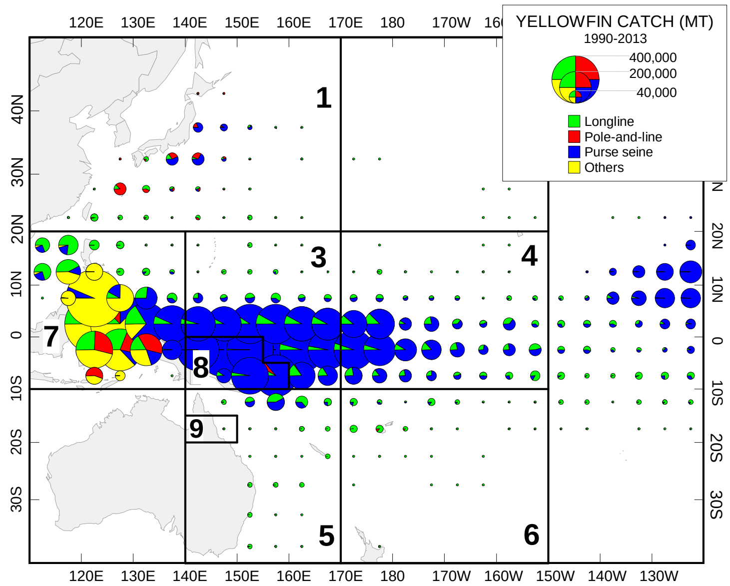

Figure 56. Distribution of yellowfin tuna catch in the WCP–CA, 1990–2013.
The nine-region spatial stratification used in stock assessment is shown.

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 returned to a level of around 210,000-250,000 mt over recent years (noting 2013 is a provisional estimate in OFP(2014)).

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

[11] 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.

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 2013, 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 2013 purse-seine yellowfin catch by weight appeared to be less than 120-cm fish.

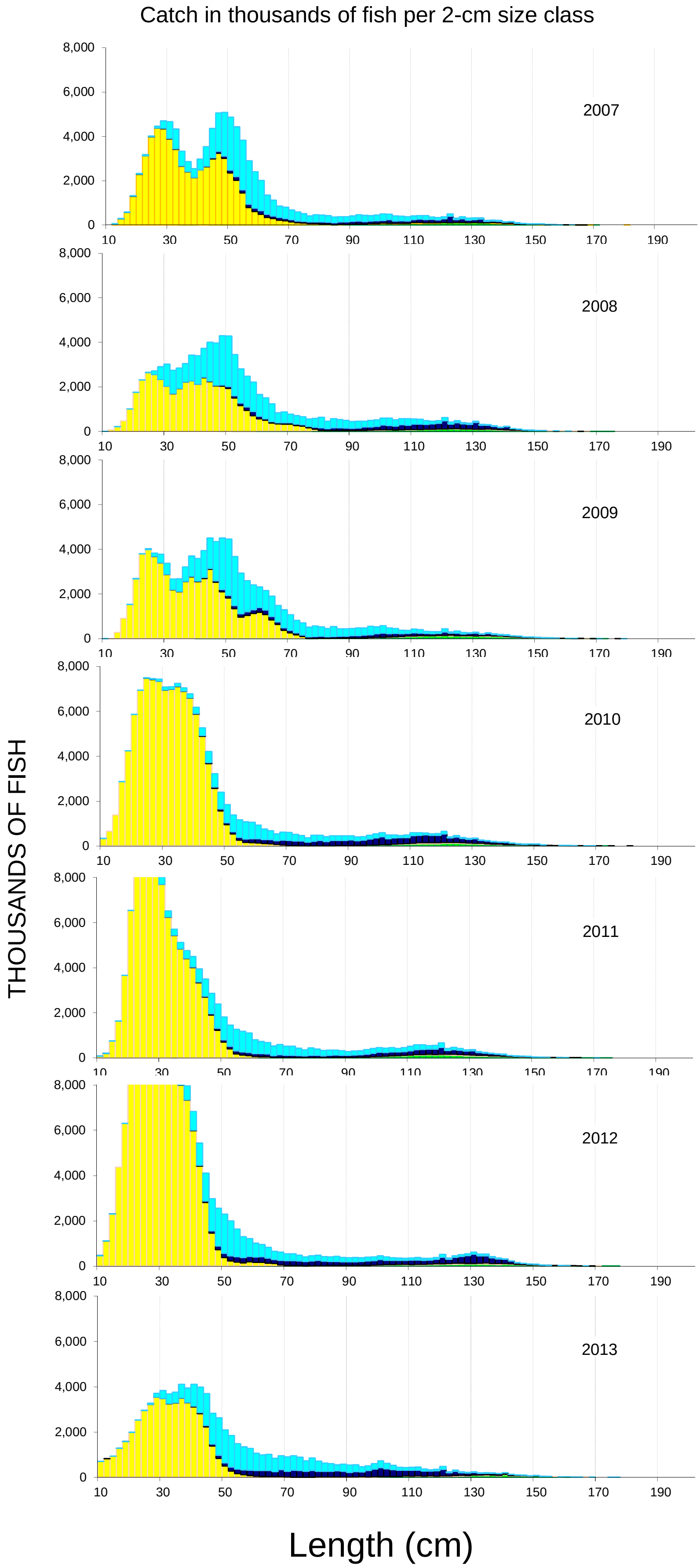

Figure 57. Annual catches (in number of fish) of yellowfin tuna in the WCPO by size and gear type, 2007–2013.

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

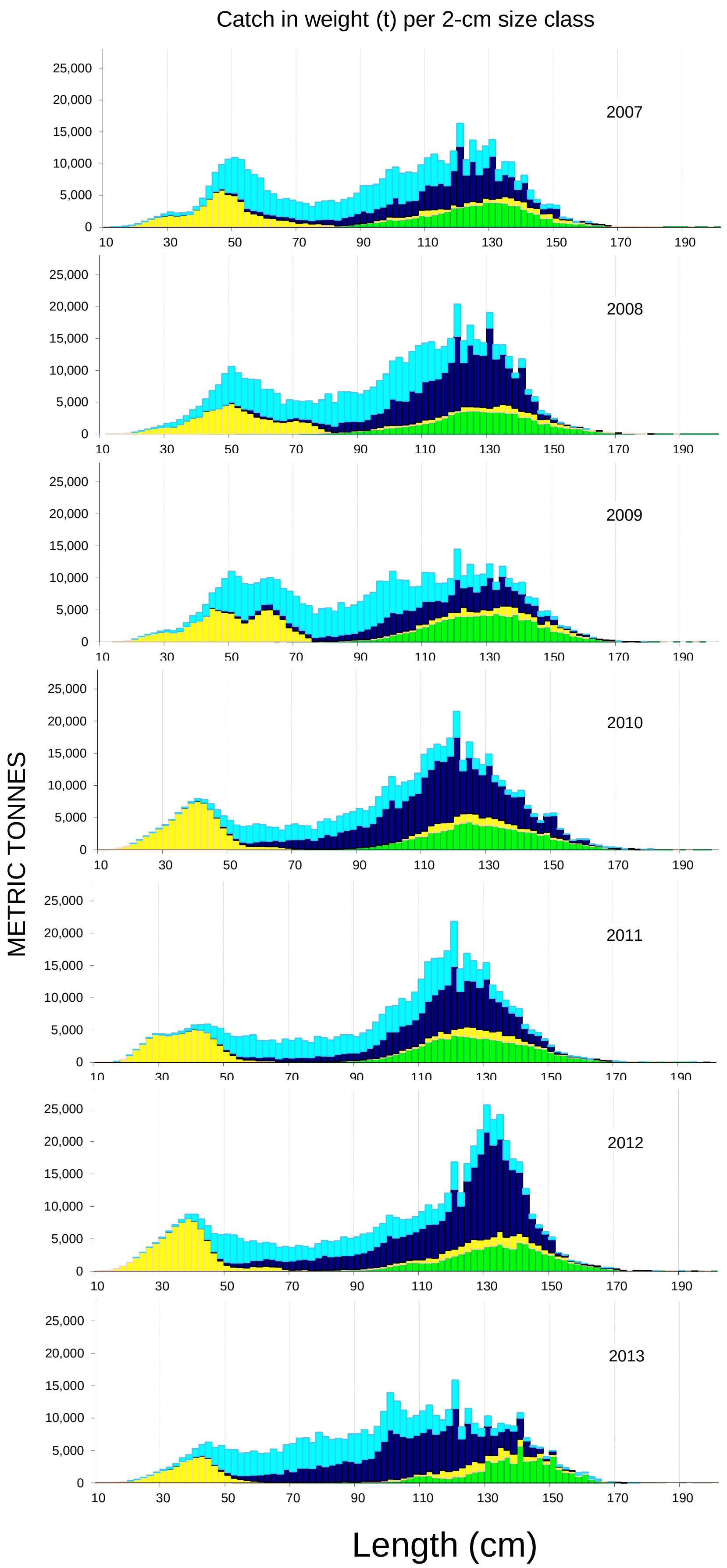

Figure 58. Annual catches (in metric tonnes) of yellowfin tuna in the WCPO by size and gear type, 2007–2013.

(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 2013 bigeye catch for the **Pacific Ocean** (226,717 mt) was about 30,000 mt lower than in 2012, but close to the average for the past ten years.

The **purse-seine** catch in the **EPO** (49,104 mt in 2013) continues to account for a significant proportion (61%) of the total EPO bigeye catch. The provisional 2012 EPO longline bigeye catch estimate (30,861 mt; 2013 estimate not yet available) is around the average for the last seven years but well below the catches prior to 2006, when effort by the Asian fleets was higher. However, the EPO catch estimates are acknowledged to be preliminary[12] and may increase when more data become available.

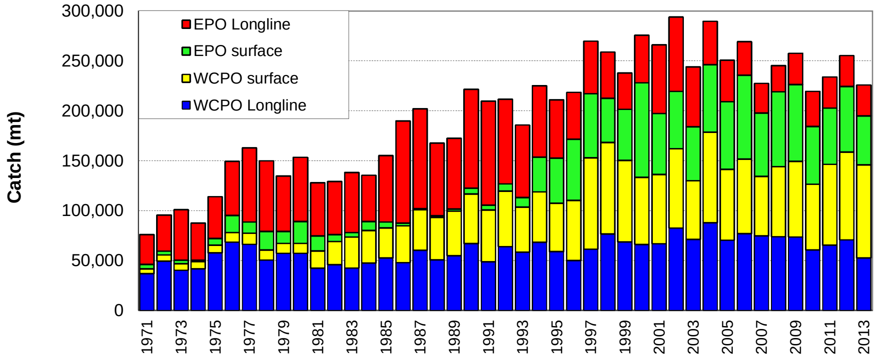

Figure 59. Pacific bigeye catch (mt) by gear
(excludes catches by "other" gears)

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. (2010–68,938 mt, 2011–73,101 mt and 2012–79,438 mt). The provisional WCP-CA longline catch for 2013, at 62,641 mt is the lowest since 1996. In contrast, the provisional **WCP–CA purse seine** bigeye catch for 2013 was estimated to be 82,151 mt (52%) which was clearly the highest on record (Figure 60); in 2013, the WCP-CA purse-seine bigeye catch exceeded the longline catch for the first time (and by nearly 20,000 mt).

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[13] 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.

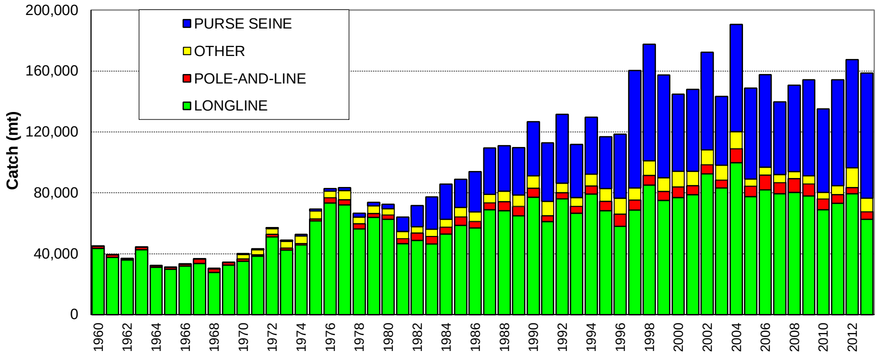

Figure 60. WCP–CA bigeye catch (mt) by gear

Figure 61 shows the spatial distribution of bigeye catch in the Pacific for the period 1990–2013. 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

[12] Catch estimates for the EPO longline fishery for 2012-2013 and the EPO purse seine fishery for 2012-2013 are preliminary

[13] 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. Bigeye tuna estimates in the Indonesian troll fishery were provided for the first time for 2013.

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.

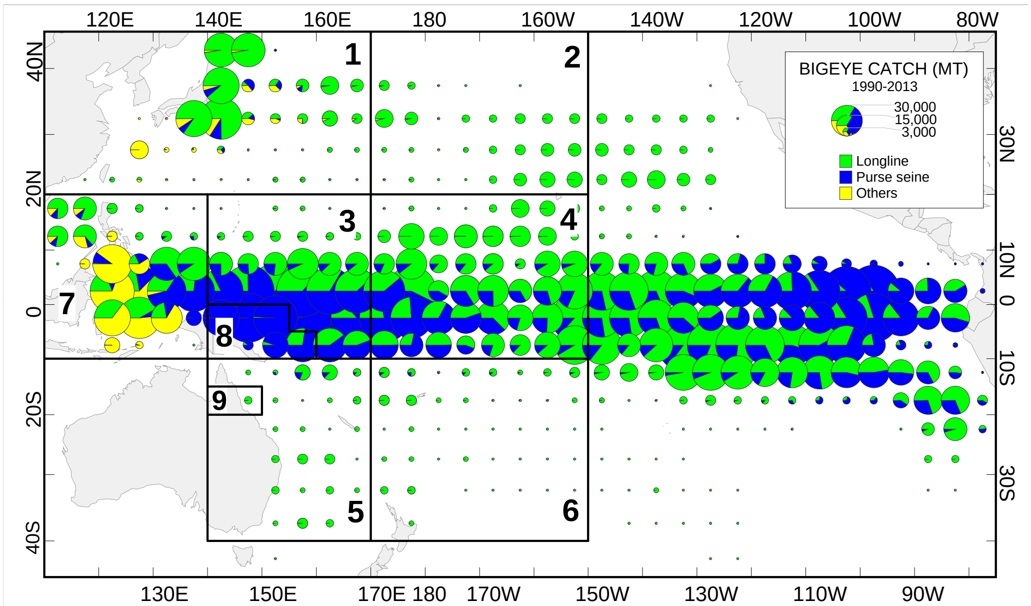

Figure 61. Distribution of bigeye tuna catch, 1990–2013.
The nine-region spatial stratification used in stock assessment for the WCP–CA is shown.

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 year class represented by the mode of fish in the size range of about 25-30 cm in the Philippines/Indonesian domestic fisheries in 2011, appears to progress to a mode of 50-60 cm in the purse seine associated in 2012 and then possibly again in the associated-set catch in 2013 (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). The graphs for 2013 show that there were a higher number of bigeye tuna taken in unassociated sets and the size range of longline-caught fish is narrower, when compared to previous years.

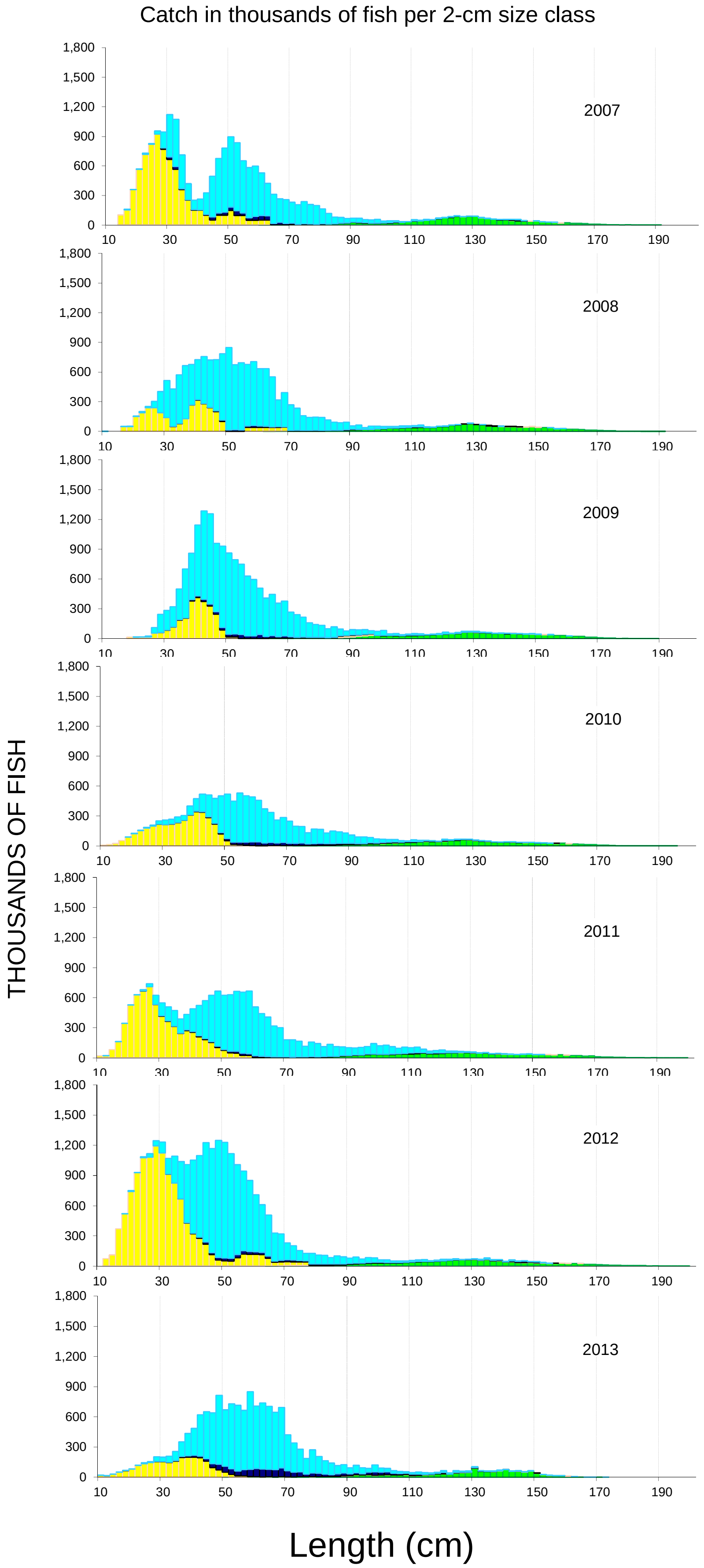

Figure 62. Annual catches (numbers of fish) of bigeye tuna in the WCPO by size and gear type, 2007–2013.

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

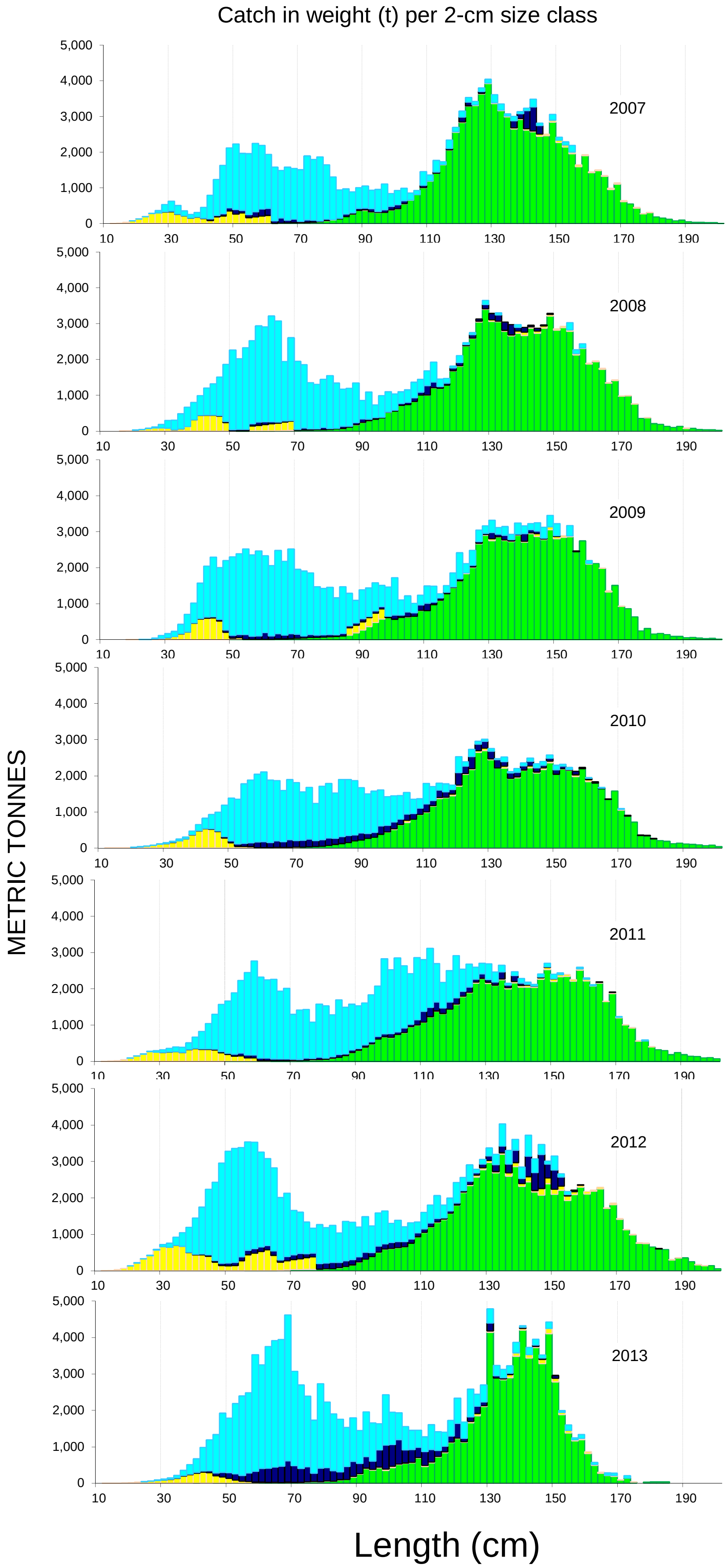

Figure 63. Annual catches (metric tonnes) of bigeye tuna in the WCPO by size and gear type, 2007–2013.
(green–longline; yellow–Phil-Indo archipelagic fisheries; light blue–purse seine associated; dark blue–purse seine unassociated)

7.4 SOUTH PACIFIC ALBACORE

Prior to 2001, south Pacific albacore catches were generally in the range 25,000–50,000 mt, with a significant peak in 1989 (49,076 mt) when driftnet fishing was in existence. Since 2001, catches have greatly exceeded this range, primarily as a result of the growth in several Pacific Islands domestic longline fisheries. The **south Pacific** albacore catch in 2013 (84,698 mt) was the third highest on record (about 4,000 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 2013 (143,102 mt) was the second highest on record and only 4,000 mt lower that the record (147,793 mt in 2002).

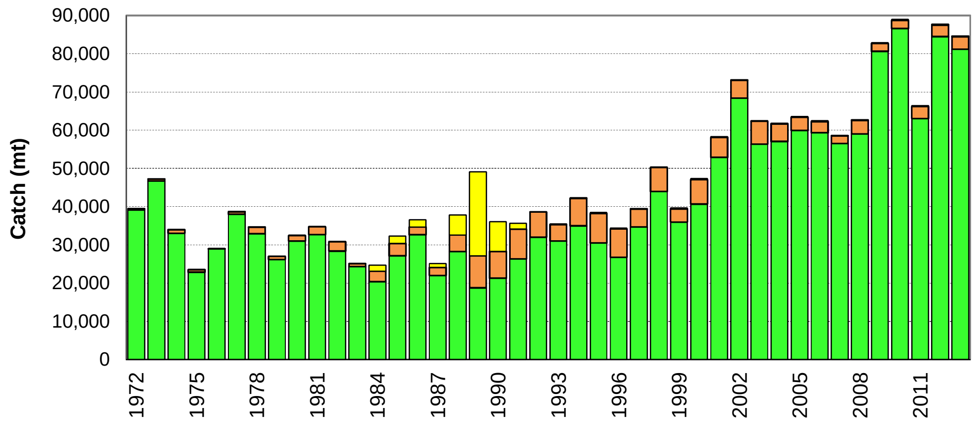

Figure 64. South Pacific albacore catch (mt) by gear ("Other" is primarily catch by the driftnet fishery.)

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.

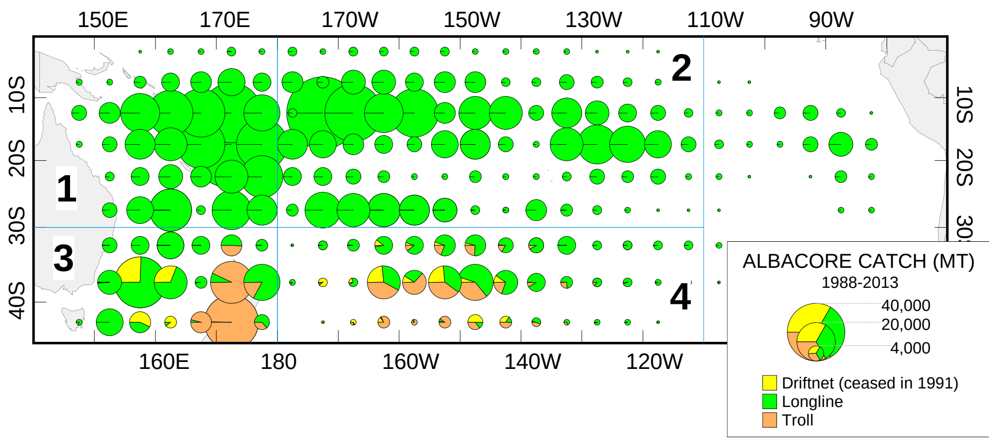

Figure 65. Distribution of South Pacific albacore tuna catch, 1988–2013.
The four-region spatial stratification used in stock assessment is shown.

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).

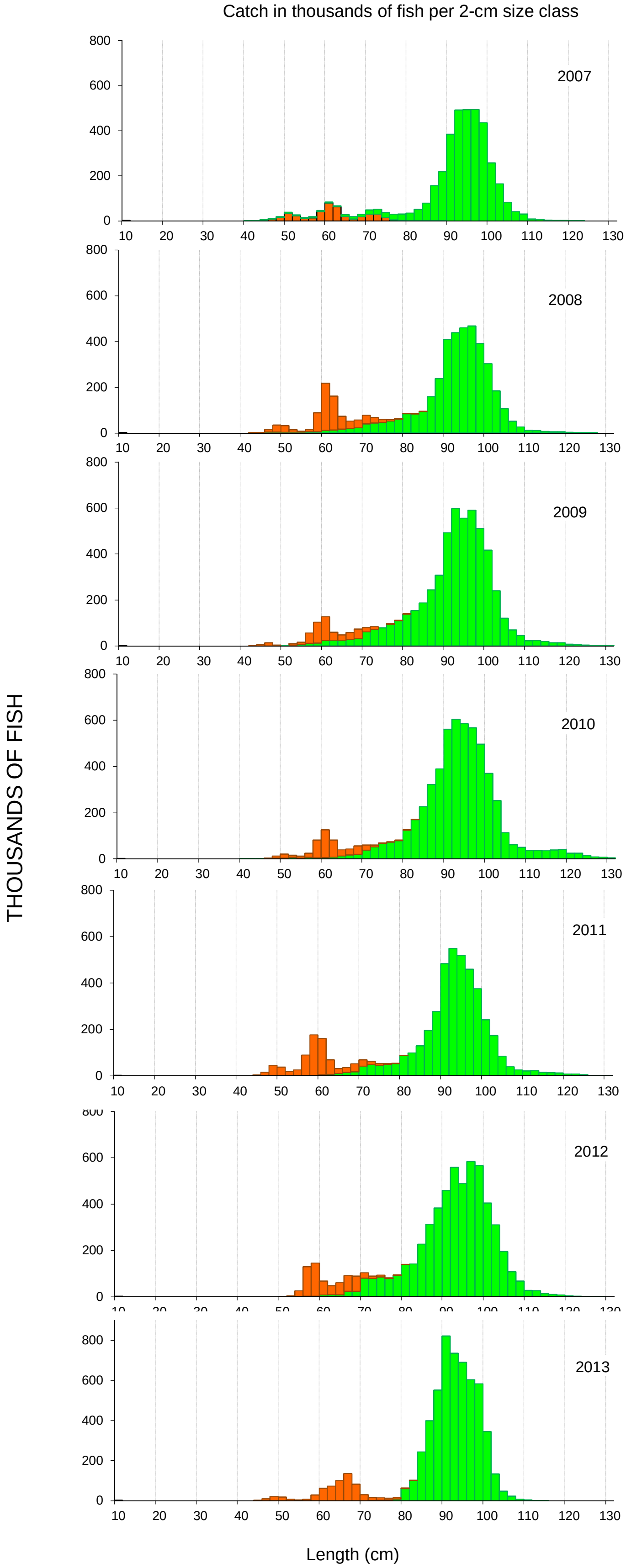

Figure 66. Annual catches (number of fish) of albacore tuna in the South Pacific Ocean by size and gear type, 2007–2013. **(green–longline; orange–troll)**

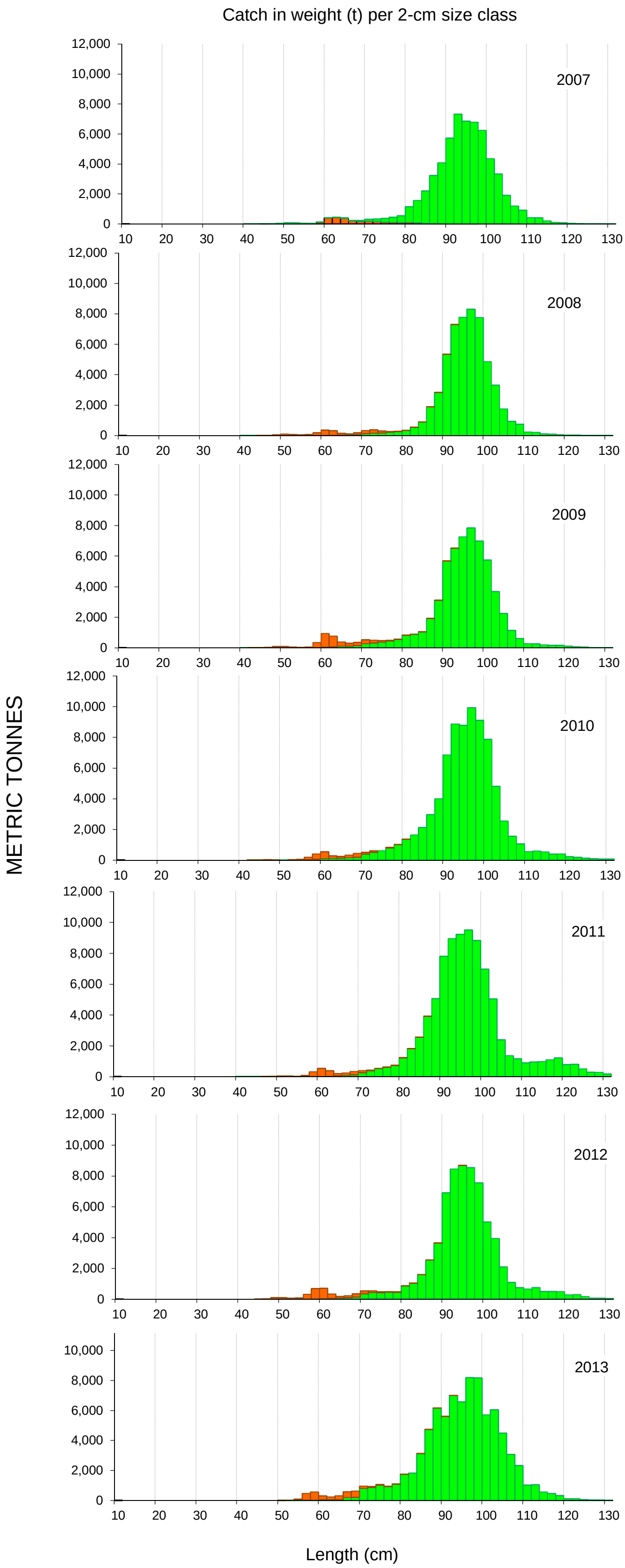

Figure 67. Annual catches (metric tonnes) of albacore tuna in the South Pacific Ocean by size and gear type, 2007–2013. **(green–longline; orange–troll);**

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, and then to more than 20,000 mt over the past three years, with contributions from the distant-water Asian fleet catches. These estimates do not include catches from the South American fleets catching swordfish and the Spanish longline fleet catch estimate for 2013 was not available at the time of writing this paper.

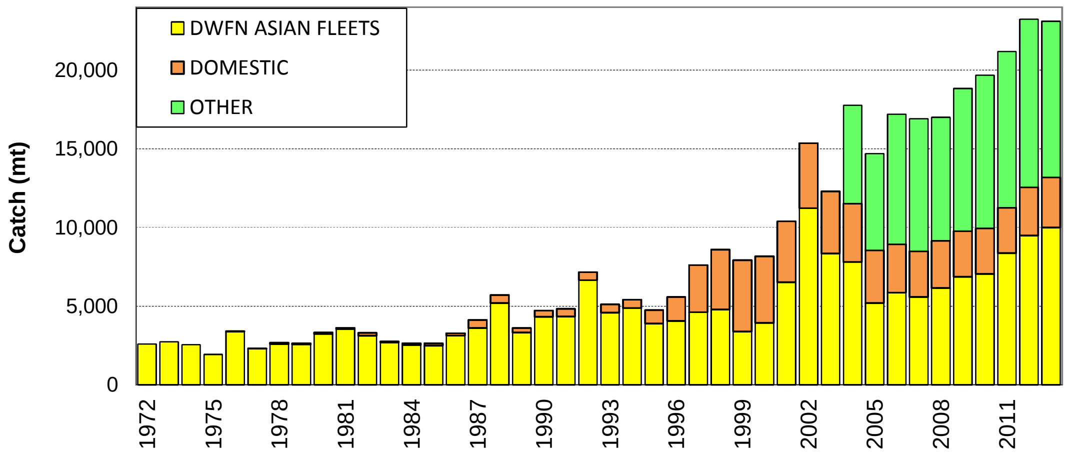

Figure 68. South Pacific longline swordfish catch (mt) by fleet

The longline catch of swordfish is distributed over a large area of the south Pacific (Figure 69–data covering entire south Pacific for 2011/2013 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.

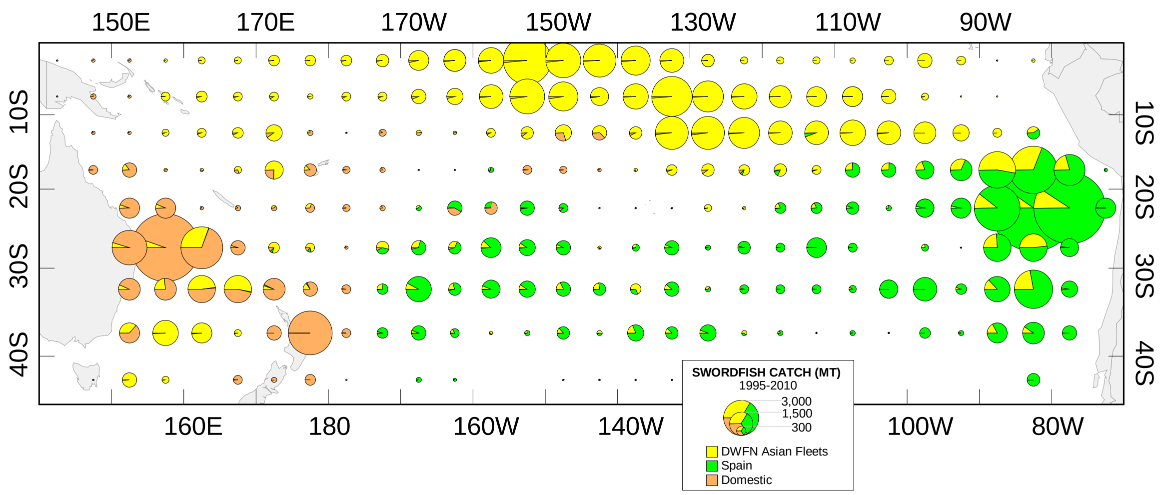

Figure 69. Distribution of South Pacific longline swordfish catch, 1995–2010.

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.

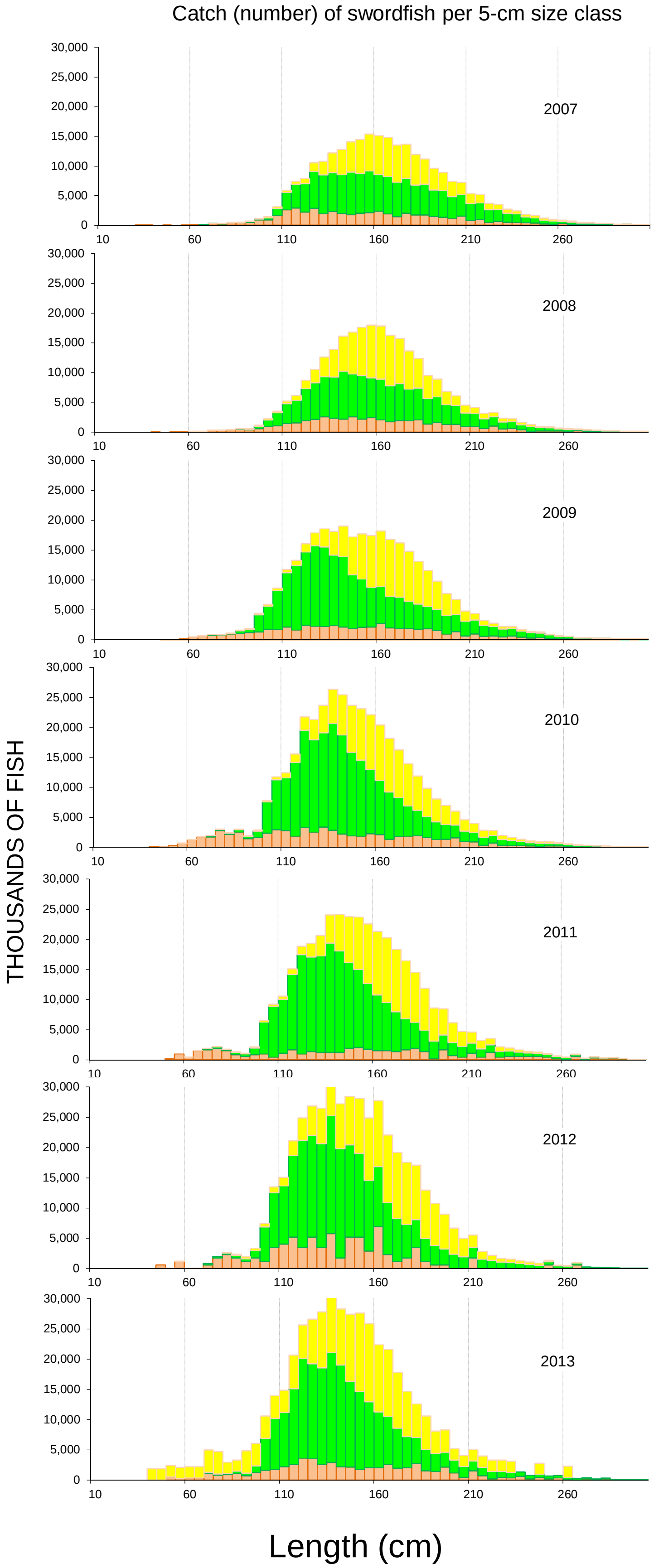

Figure 70. Annual catches (number of fish) of swordfish in the South Pacific Ocean by size and fleet, 2007–2013. **(green–Spanish fleet catch; yellow–distant-water Asian fleet catch; orange– Domestic fleets)**
2012 and 2013 data are provisional (2012 and 2013 data for some fleets have yet to be provided, so 2011 data have been carried over).

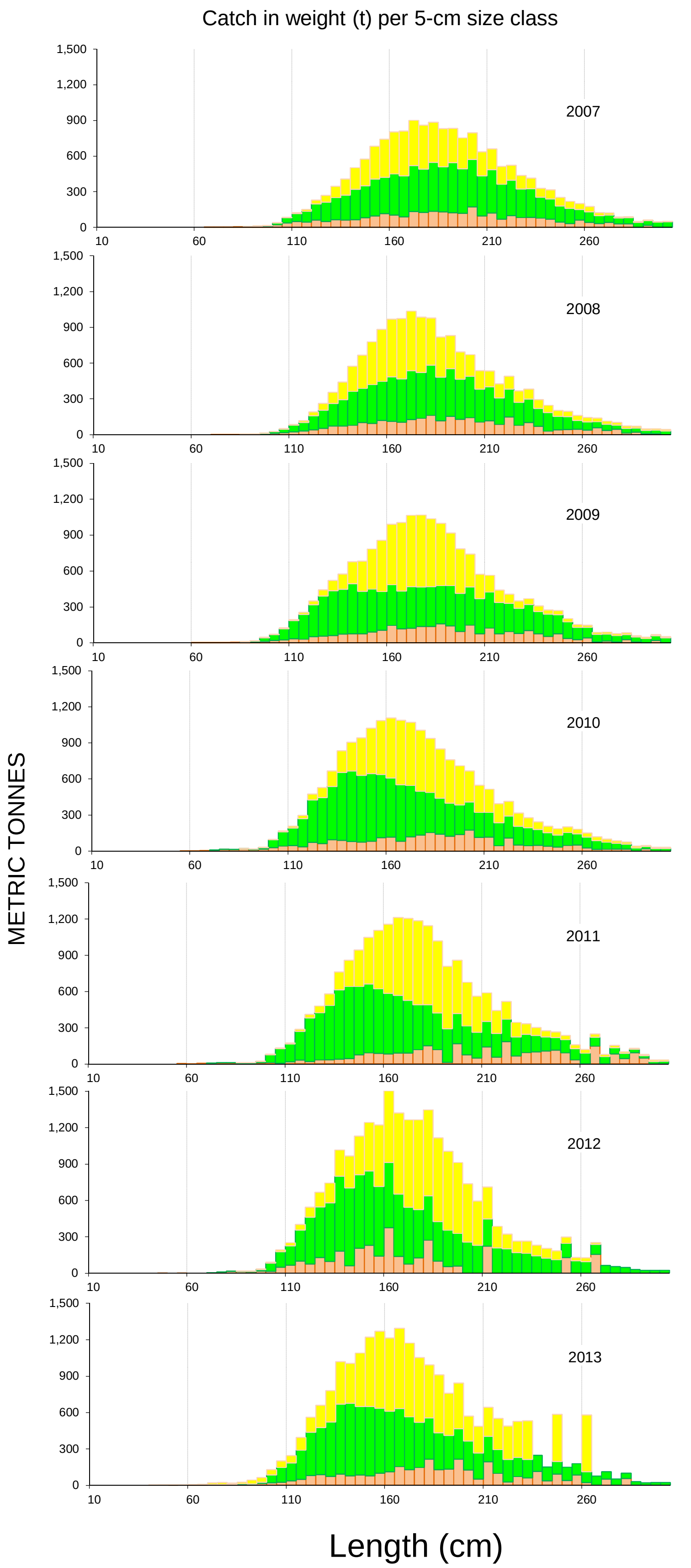

Figure 71. Annual catches (metric tonnes) of swordfish in the South Pacific Ocean by size and fleet, 2007–2013. **(green–Spanish fleet catch; yellow–distant-water Asian fleet catch; orange–Domestic fleets)**
2012 and 2013 data are provisional (2012 and 2013 data for some fleets have yet to be provided, so 2011 data have been carried over).

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OFP (2014) Estimates of annual catches in the WCPFC Statistical Area. Information Paper ST–IP–1. Tenth Regular Session of the Scientific Committee of the WCPFC. Majuro, Republic of the Marshall Islands, 6–14 August 2014.

APPENDIX - ADDITIONAL INFORMATION

Table A1. Proportion of Longline SWORDFISH catch in the area north of 20°S in the WCPFC Convention Area south of the equator, 2000-2013. Source of data: AGGREGATE CATCH DATABASE; Excludes the Indonesian estimated SWORDFISH catches.

Year	WCFPC Area south of equator (MT)	North of 20°S in the WCFPC Area south of equator (MT)	
		(MT)	%
2000	5,259	1,920	37%
2001	5,938	2,175	37%
2002	8,636	3,829	44%
2003	6,503	3,181	49%
2004	7,647	3,660	48%
2005	6,553	2,359	36%
2006	8,892	3,469	39%
2007	9,136	3,046	33%
2008	9,152	4,197	46%
2009	7,862	4,245	54%
2010	6,195	3,289	53%
2011	8,907	4,987	56%
2012	9,049	4,813	53%
2013	7,675	4,174	54%

Table A2. Proportion of Longline SWORDFISH catch by 10° latitude band in the WCPFC Convention Area south of the equator, 2000-2013. Source of data: AGGREGATE CATCH DATABASE; Excludes the Indonesian estimated SWORDFISH catches.

Year	SWORDFISH CATCH - WCFPC Area south of equator									
	METRIC TONNES					%				
	0°-10°S	10°S-20°S	20°S-30°S	30°S-40°S	40°S-50°S	0°-10°S	10°S-20°S	20°S-30°S	30°S-40°S	40°S-50°S
2000	1,507	413	1,683	1,460	197	29%	8%	32%	28%	4%
2001	1,565	611	1,957	1,575	229	26%	10%	33%	27%	4%
2002	2,518	1,311	2,313	2,284	210	29%	15%	27%	26%	2%
2003	2,001	1,180	1,778	1,335	209	31%	18%	27%	21%	3%
2004	2,755	905	1,928	1,874	185	36%	12%	25%	25%	2%
2005	1,614	746	2,609	1,476	109	25%	11%	40%	23%	2%
2006	2,741	727	2,946	2,319	159	31%	8%	33%	26%	2%
2007	2,575	470	2,784	3,272	35	28%	5%	30%	36%	0%
2008	3,209	987	1,949	2,942	64	35%	11%	21%	32%	1%
2009	2,775	1,470	1,556	2,038	24	35%	19%	20%	26%	0%
2010	2,160	1,128	1,055	1,789	62	35%	18%	17%	29%	1%
2011	3,560	1,427	1,748	2,048	125	40%	16%	20%	23%	1%
2012	3,361	1,452	1,739	2,335	161	37%	16%	19%	26%	2%
2013	2,721	1,452	1,618	1,695	188	35%	19%	21%	22%	2%

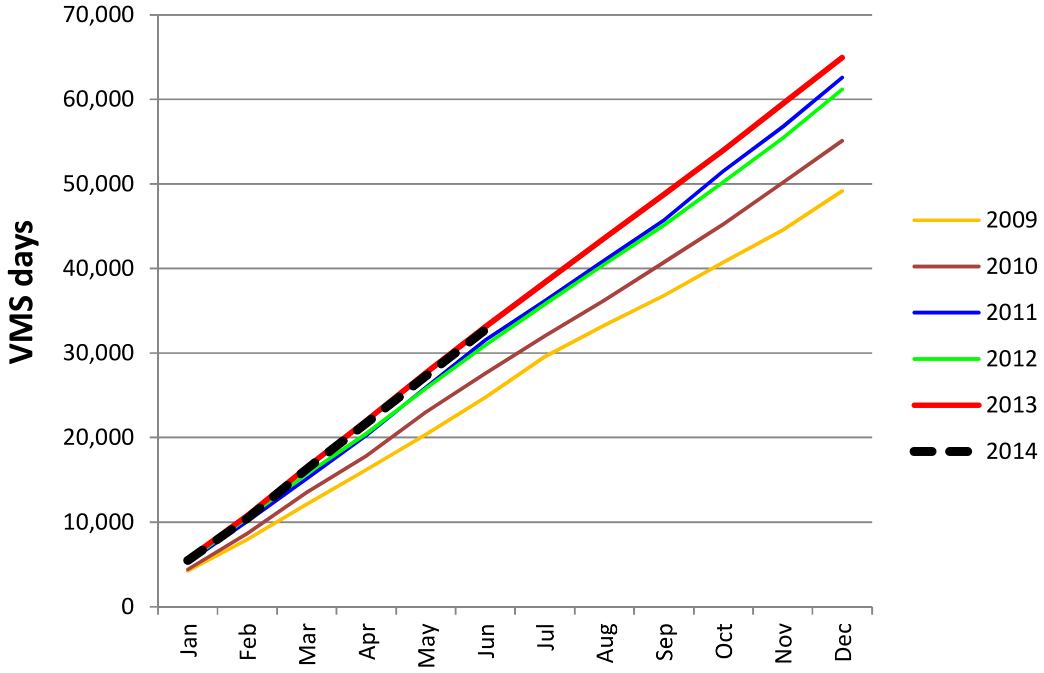


Figure A1. Cumulative purse seine effort by month, 2009-2014, as measured by VMS (days in port and transit days omitted).

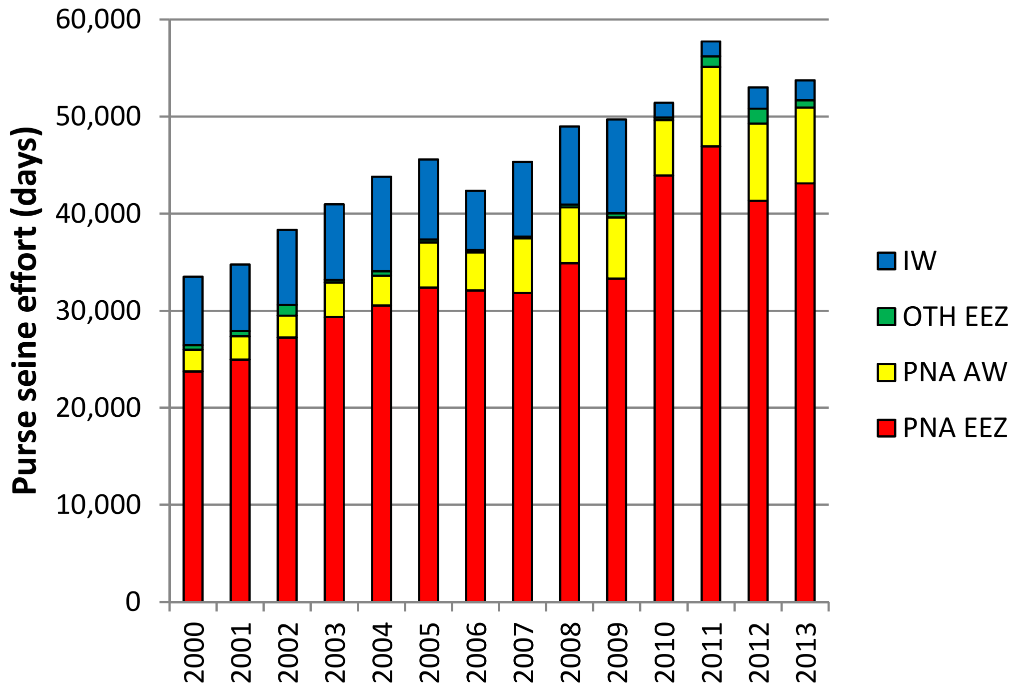


Figure A2. Purse seine effort (days fishing and searching) in the WCPFC Convention Area between 20°N and 20°S, excluding domestic purse seine effort in Philippines and Indonesia. Estimates are based on raised logsheet data.

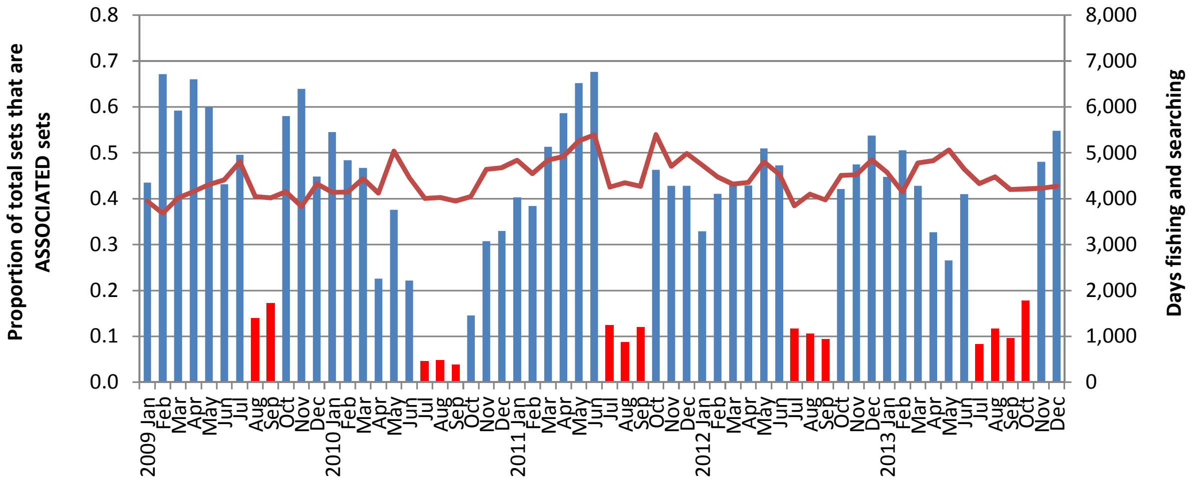


Figure A3. Proportion of the total purse seine fishing activity comprising associated sets, as indicated by logsheet data. Red bars indicate the FAD closure months. Total effort in days is shown by the plotted line. Activities in the domestic purse seine fisheries of Indonesia and Philippines are excluded.

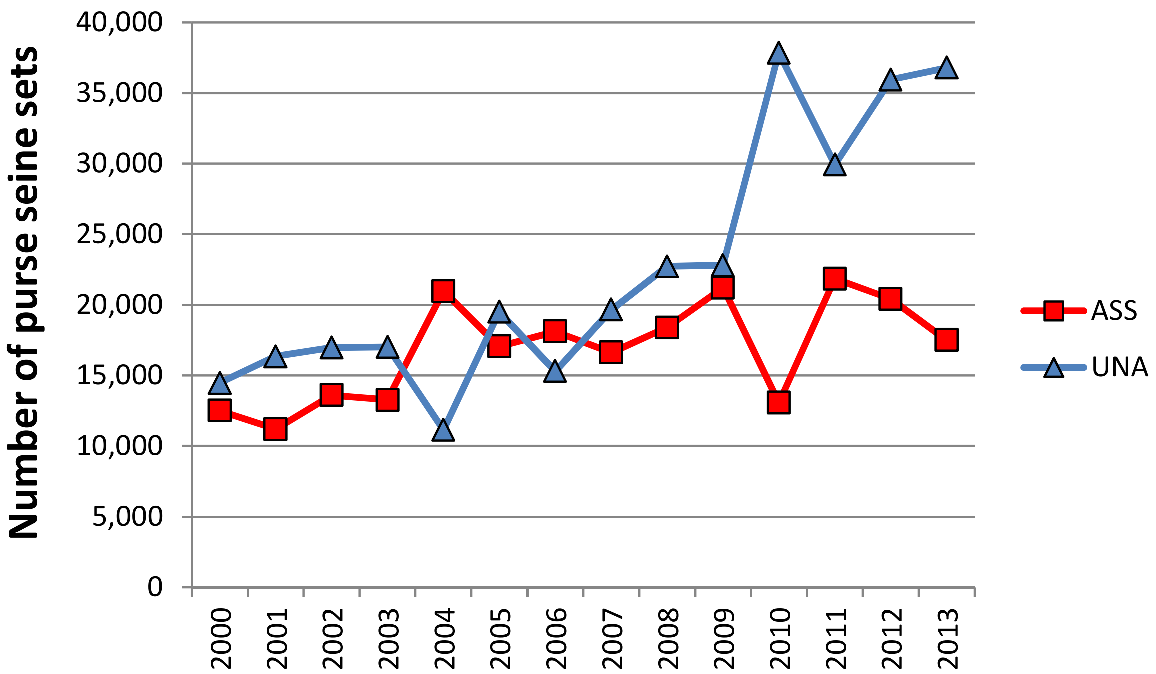
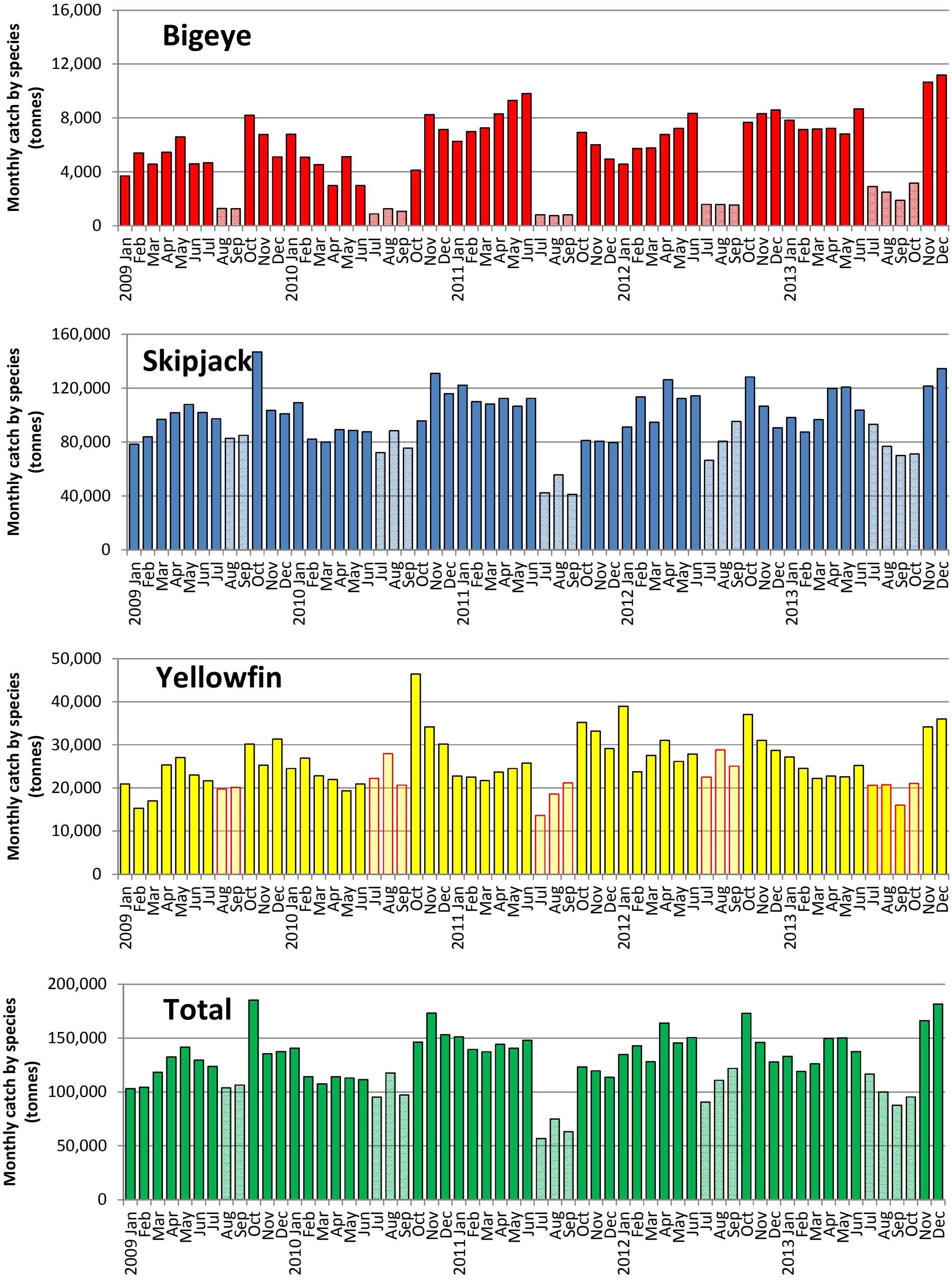


Figure A4. Number of associated (ASS) and unassociated (UNA) sets made in the WCPO tropical purse seine fishery, 2000 – 2013. Activities in the domestic purse seine fisheries of Indonesia and Philippines are excluded.



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

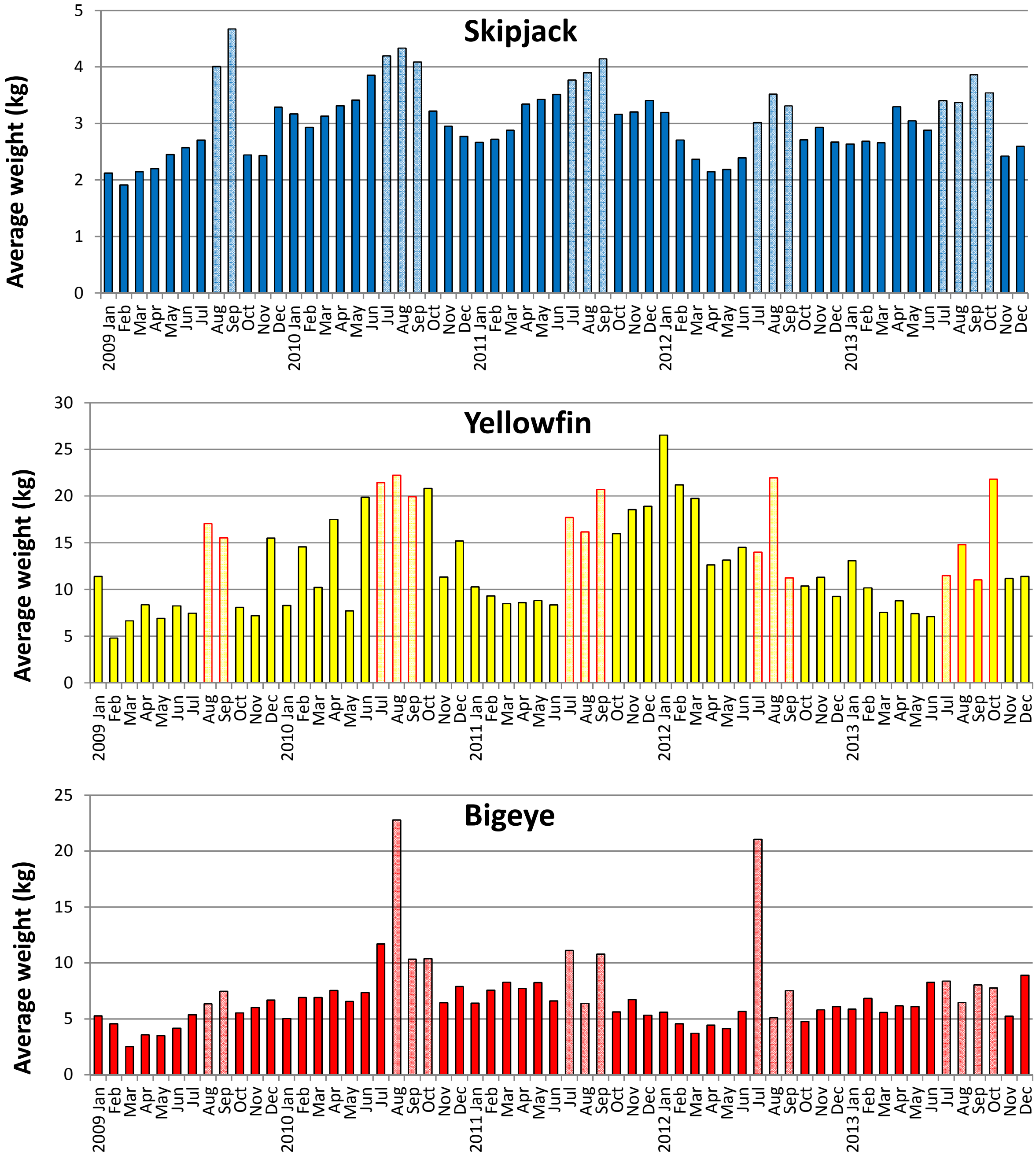


Figure A6. Monthly average weight of bigeye, skipjack and yellowfin tuna, estimated from observer sampling data, 2009-2-13.

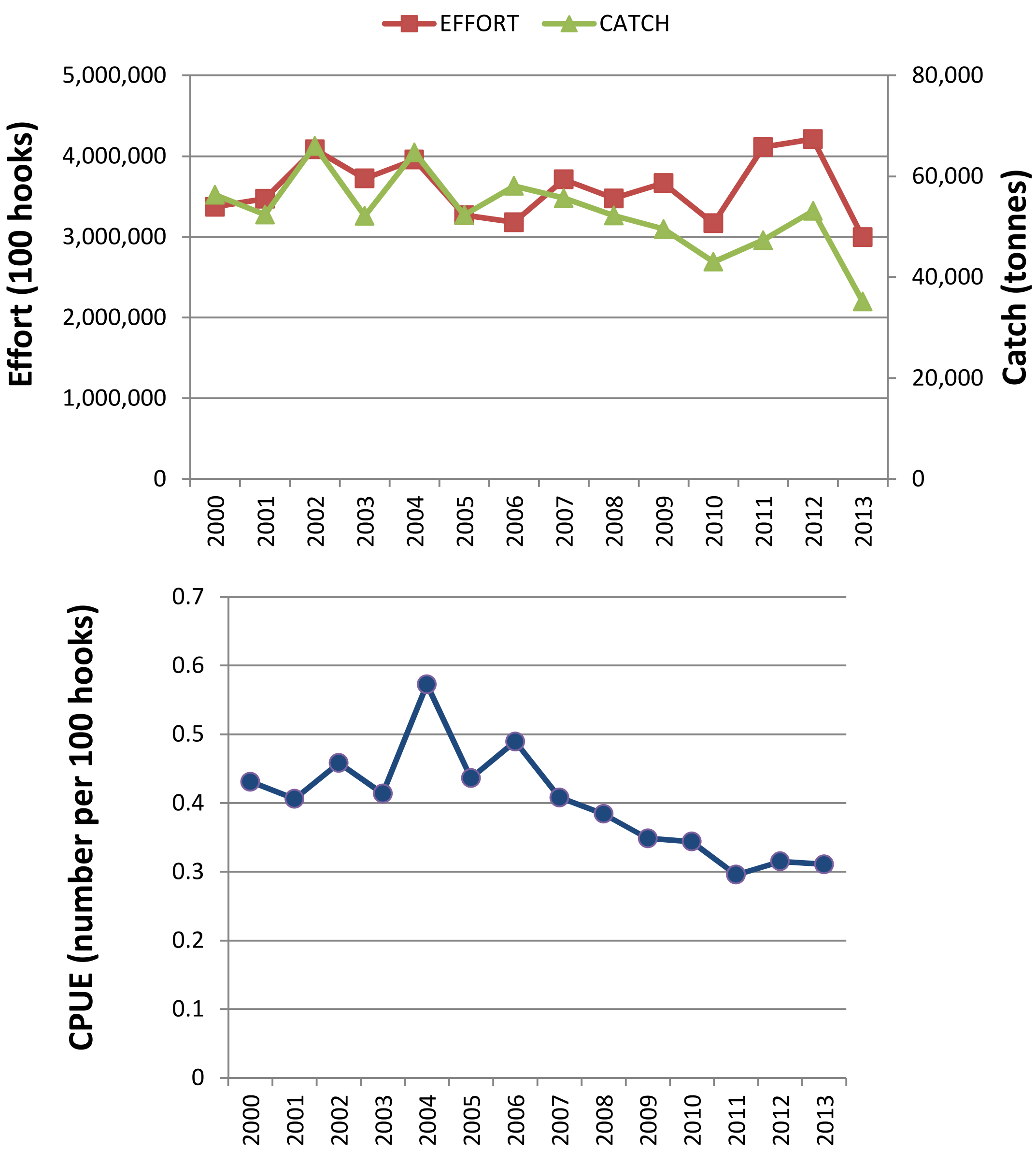


Figure A7. Estimates of longline effort and bigeye catch (upper panel) and bigeye CPUE (lower panel) for the CORE area of the tropical WCPFC longline fishery (130°E - 150°W, 20°N - 10°S).
2013 data are provisional.

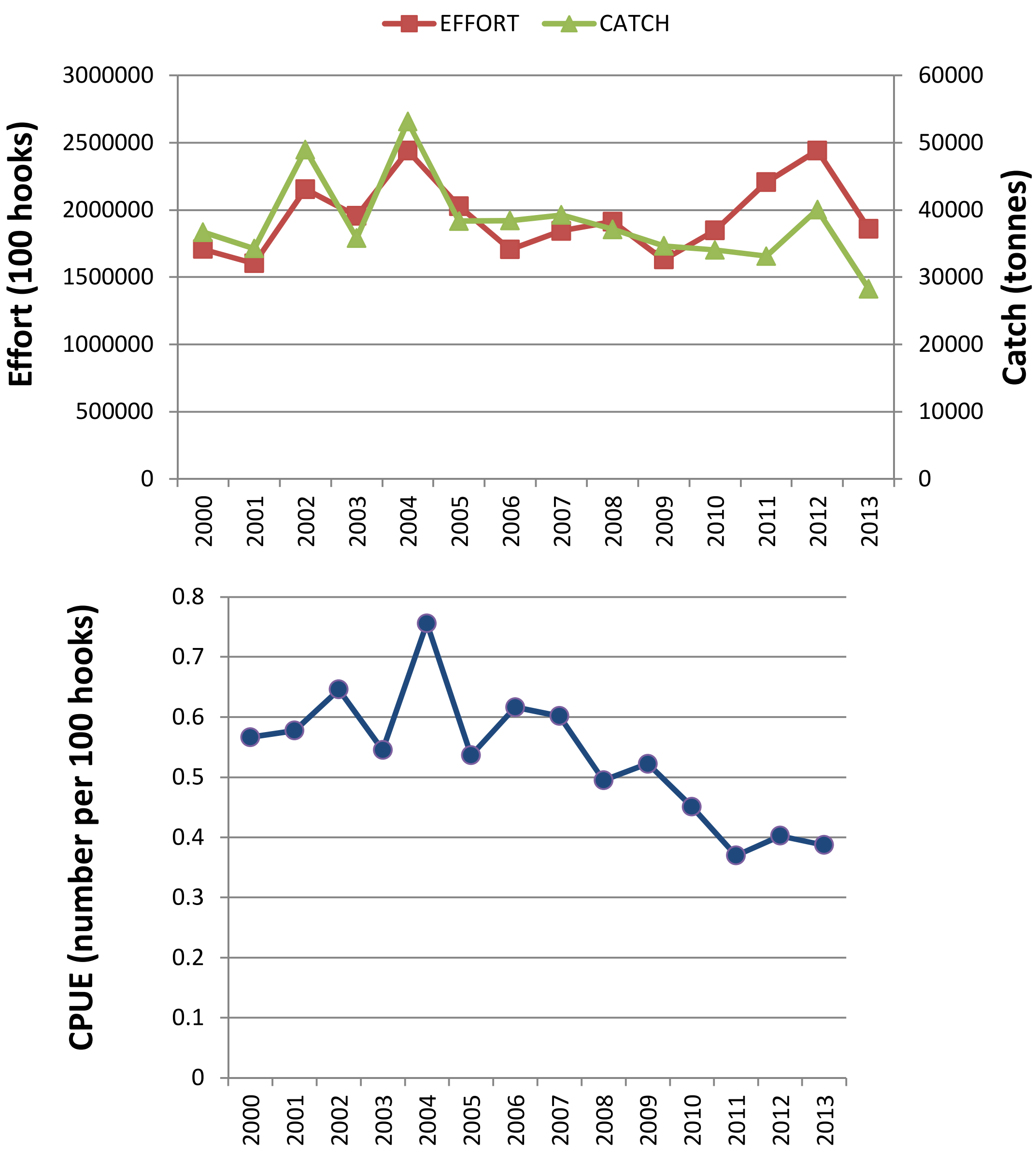


Figure A8. Estimates of longline effort and bigeye catch (upper panel) and bigeye CPUE (lower panel) for the EASTERN area of the tropical WCPFC longline fishery (170°E - 150°W, 20°N - 10°S).
2013 data are provisional.

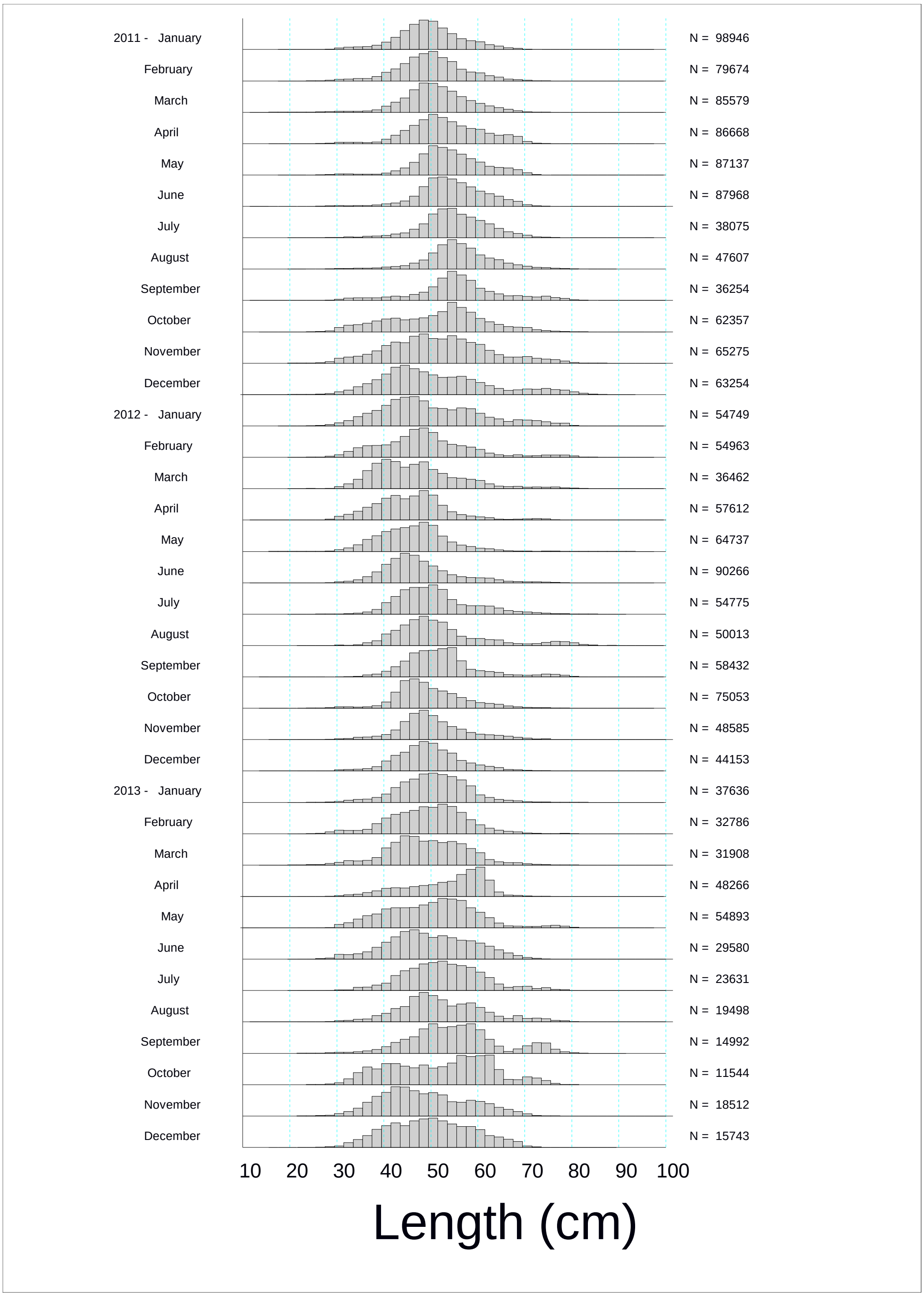


Figure A9. Monthly purse seine SKIPJACK length frequency histograms for the tropical WCPFC area, 2011-2013.

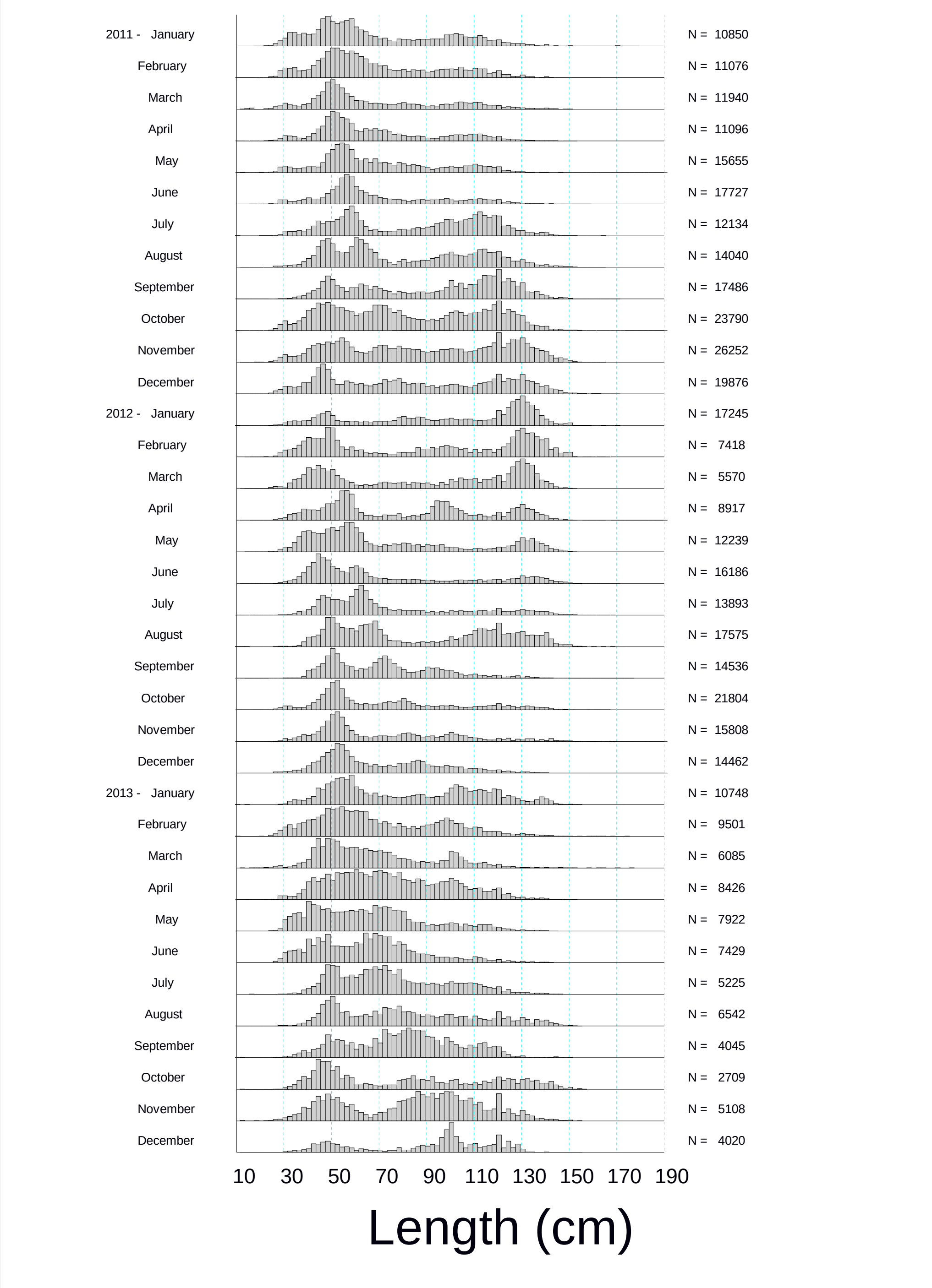


Figure A10. Monthly purse seine YELLOWFIN TUNA length frequency histograms for the tropical WCPFC area, 2011-2013.

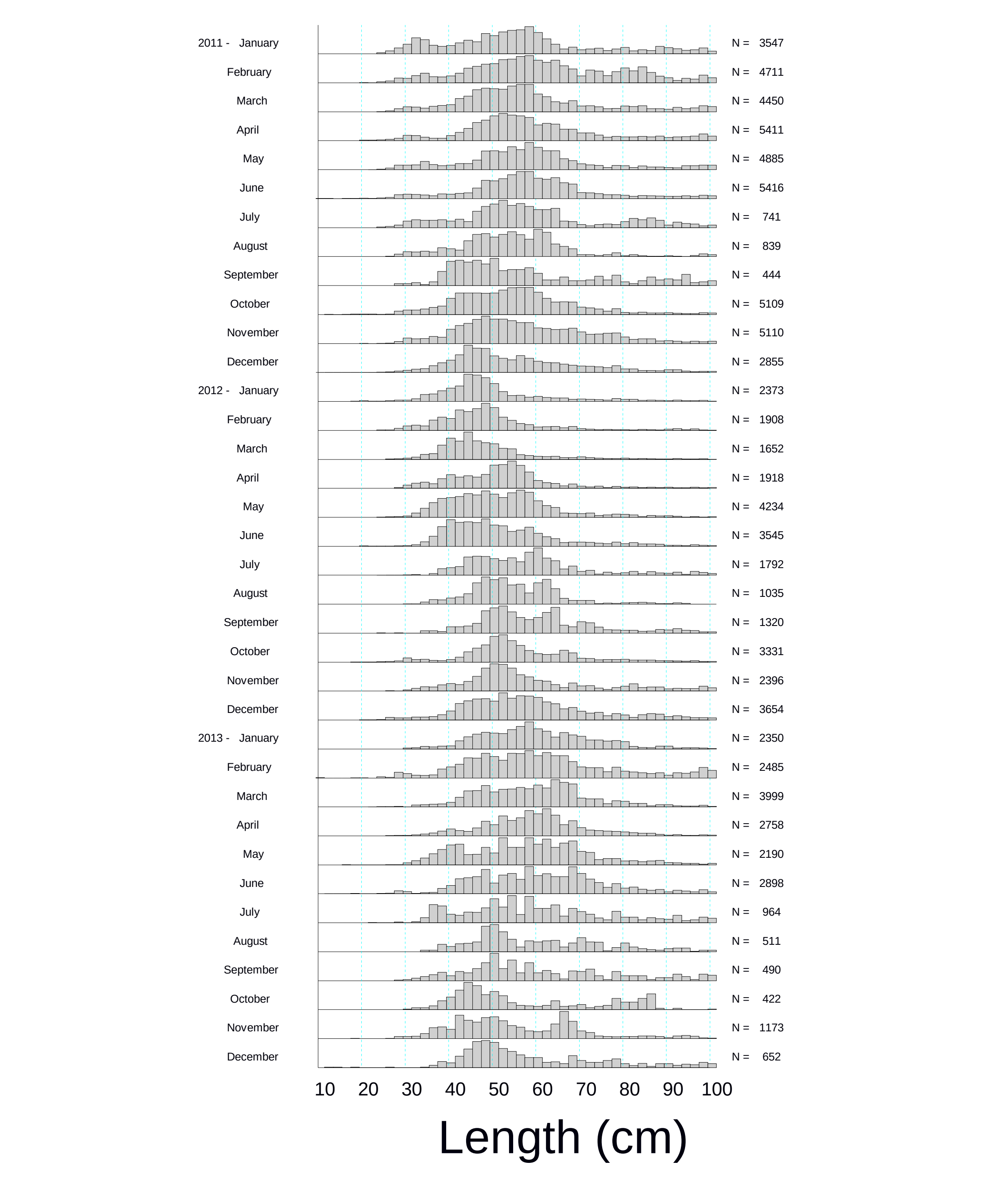


Figure A11. Monthly purse seine BIGEYE TUNA length frequency histograms for the tropical WCPFC area, 2011-2013.

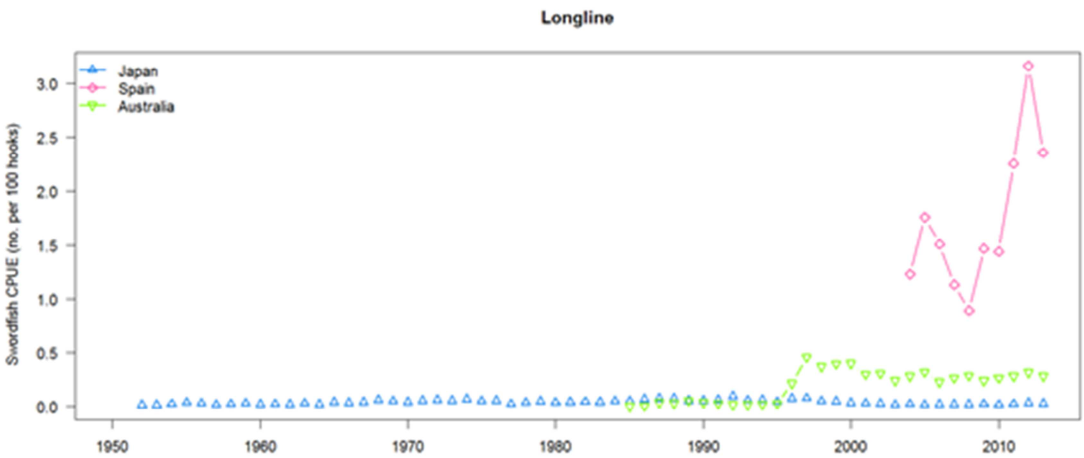


Figure A12. Trends in SWORDFISH nominal CPUE (number of fish per 100 hooks) over time for key LONGLINE fleets in the south Pacific Ocean.

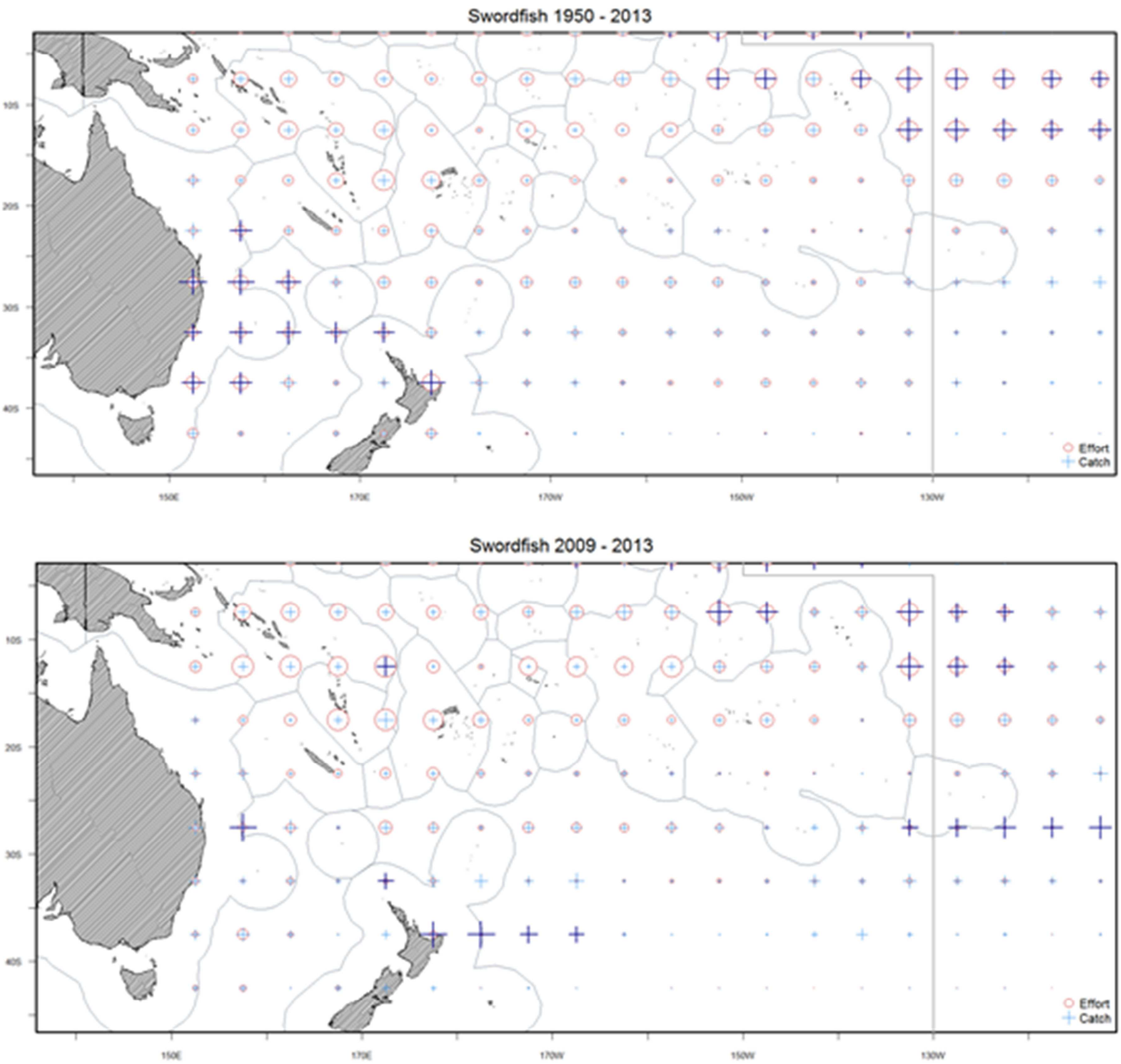


Figure A13. South Pacific SWORDFISH longline catch (+) and effort (circles) distribution for the period 1950-2013 (top) and 2009-2013 (bottom).

The top 15% of 5x5 degree squares for catch have bolded '+'. The relative size of the + and circle give an indication of the CPUE for the square. Where the + is larger than the circle, CPUE is high.