



**SCIENTIFIC COMMITTEE
SIXTH REGULAR SESSION**

Nuku'alofa, Tonga
10-19 August 2010

**OVERVIEW OF TUNA FISHERIES IN THE WESTERN AND CENTRAL PACIFIC
OCEAN, INCLUDING ECONOMIC CONDITIONS – 2009**

WCPFC-SC6-2010/GN WP-1

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CONTENTS

| | | |
|-------|---|----|
| 1. | INTRODUCTION..... | 1 |
| 2. | TOTAL TUNA CATCH FOR 2009 | 2 |
| 3 | WCP–CA PURSE SEINE FISHERY | 3 |
| 3.1 | Historical Overview..... | 3 |
| 3.2 | Provisional catch estimates, fleet size and effort (2009) | 4 |
| 3.3 | Distribution of fishing effort and catch | 5 |
| 3.4 | Catch per unit of effort | 12 |
| 3.5 | Seasonality..... | 13 |
| 3.6 | Economic overview of the purse seine fishery | 15 |
| 3.6.1 | Price trends – Skipjack..... | 15 |
| 3.6.2 | Price trends – Yellowfin..... | 15 |
| 3.6.3 | Value of the Purse-seine Catch | 16 |
| 4 | WCP–CA POLE-AND-LINE FISHERY | 17 |
| 4.1 | Historical Overview..... | 17 |
| 4.2 | Provisional catch estimates (2009)..... | 17 |
| 4.3 | Economic overview of the pole-and-line fishery..... | 19 |
| 4.3.1 | Market conditions..... | 19 |
| 4.3.2 | Value of the pole-and-line catch | 19 |
| 5 | WCP–CA LONGLINE FISHERY | 20 |
| 5.1 | Overview | 20 |
| 5.2 | Provisional catch estimates and fleet sizes (2009) | 21 |
| 5.3 | Catch per unit effort..... | 22 |
| 5.4 | Geographic distribution | 22 |
| 5.5 | Economic overview of the longline fishery..... | 25 |
| 5.5.1 | Price trends – Yellowfin..... | 25 |
| 5.5.2 | Price trends – Bigeye | 26 |
| 5.5.4 | Price trends – Albacore | 26 |
| 5.5.5 | Value of the longline catch..... | 27 |
| 6 | SOUTH-PACIFIC TROLL FISHERY | 29 |
| 6.1 | Overview | 29 |
| 6.2 | Provisional catch estimates (2009)..... | 29 |
| 7. | SUMMARY OF CATCH BY SPECIES..... | 30 |
| 7.1 | SKIPJACK | 30 |
| 7.2 | YELLOWFIN..... | 33 |
| 7.3 | BIGEYE | 37 |
| 7.4 | SOUTH PACIFIC ALBACORE | 41 |
| | References..... | 44 |

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 – 2009. The review draws on the latest catch estimates compiled for the WCP-CA, which can be found in Information Paper WCPFC-SC6 ST IP-1 (*Estimates of annual catches in the WCPFC Statistical Area – OFP 2009a*). Where relevant, comparisons with previous years' activities have been included, although it should be noted that data for 2009, for some fisheries, are provisional at this stage.

This paper includes sections covering a summary of total target tuna catch in the WCP-CA tuna fisheries; an overview of the WCP-CA tuna fisheries by gear, including economic conditions in each fishery; and a summary of target tuna catches by species. In each section, the paper makes some observations on recent developments in each fishery, with emphasis on 2009 catches relative to those of recent years, but refers readers to the SC6 National Fisheries Reports, which offer more detail on recent activities at the fleet level.

This paper acknowledges, but does not currently include information on several WCP-CA fisheries, including the north Pacific albacore troll fishery, the north and south Pacific swordfish fishery, those fisheries catching north Pacific Bluefin tuna, the Vietnamese fisheries, and several artisanal fisheries. These fisheries may be covered in future reviews, depending on the availability of more complete data. This paper does not include a description of species other than the main tuna species at this stage.

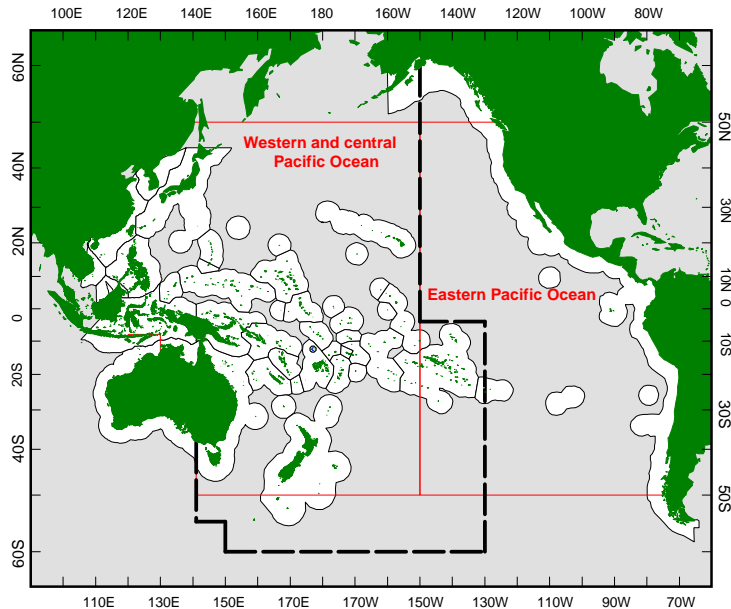


Figure 1. The western and central Pacific Ocean (WCPO), the eastern Pacific Ocean (EPO) and the WCPFC Convention Area (WCP-CA in dashed lines)

2. TOTAL TUNA CATCH FOR 2009

Annual total catches of the four main tuna species (skipjack, yellowfin, bigeye and albacore) in the WCP–CA increased steadily during the 1980s as the purse seine fleet expanded and remained relatively stable during most of the 1990s until the sharp increase in catch during 1998. Over the past 6 years, there has been an increasing trend in total tuna catch, primarily due to increases in purse-seine fishery catches (Figure 2 and Figure 3). The provisional total WCP–CA tuna catch for 2009 was estimated at **2,467,903 mt**, the highest annual catch recorded and 70,000 mt higher the previous record in 2008 (2,398,664 mt). During 2009, the purse seine fishery accounted for an estimated 1,894,500 mt (77% of the total catch, and another record for this fishery), with pole-and-line taking an estimated 165,814 mt (7%), the longline fishery an estimated 223,792 mt (9%), and the remainder (7%) taken by troll gear and a variety of artisanal gears, mostly in eastern Indonesia and the Philippines. The WCP–CA tuna catch (2,467,903 mt) for 2009 represented 81% of the total Pacific Ocean catch of 3,042,092 mt, and 58% of the global tuna catch (the provisional estimate for 2009 is 4,222,289 mt).

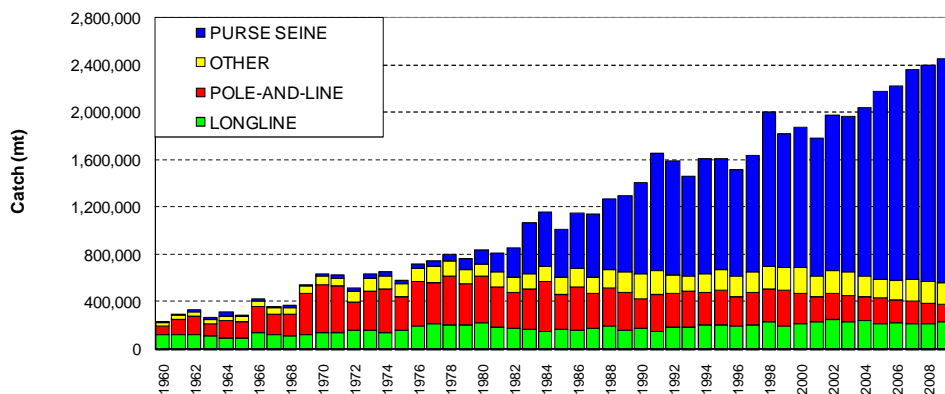


Figure 2. Catch (mt) of albacore, bigeye, skipjack and yellowfin in the WCP–CA, by longline, pole-and-line, purse seine and other gear types

The 2009 WCP–CA catch of skipjack (1,789,979 mt – 73% of the total catch) was clearly the highest recorded, and nearly 120,000 mt more than the previous record catch of 2007 (1,672,996 mt). The WCP–CA yellowfin catch for 2009 (433,788 mt – 18%) was 115,000 mt (21%) lower than the record catch taken in 2008 (547,985 mt). The WCP–CA bigeye catch for 2009 (118,657 mt – 5%) was the lowest since 2003, mainly due to a drop in 2009 provisional estimates for the longline fishery. The 2009 WCP–CA albacore¹ catch (125,479 mt [5%]) was the second highest on record, with very good catches from the longline fishery.

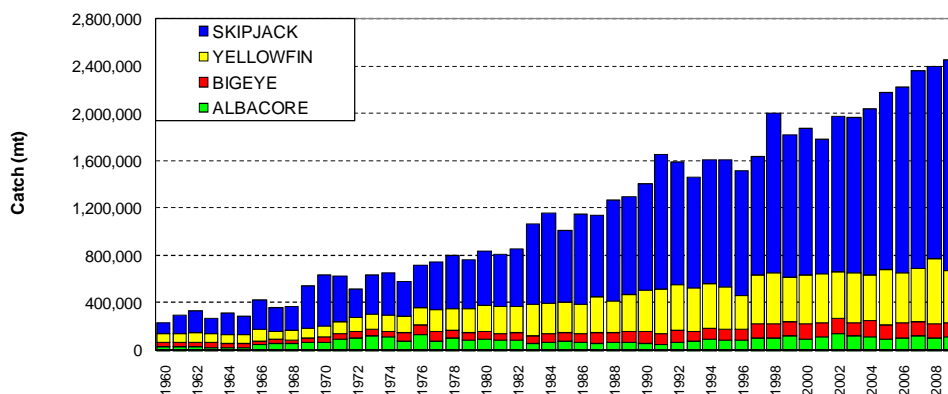


Figure 3. Catch (mt) of albacore, bigeye, skipjack and yellowfin in the WCP–CA.

¹ includes catches of north and south Pacific albacore in the WCP–CA, which comprised 87% of the total Pacific Ocean albacore catch of 144,624 mt in 2009; the section 7.4 “Summary of Catch by Species - Albacore” is concerned only with catches of south Pacific albacore, which make up approximately 46% of the Pacific albacore catch.

3 WCP-CA PURSE SEINE FISHERY

3.1 Historical Overview

During the mid-1980s, the purse seine fishery (400,000–450,000 mt) accounted for only 40% of the total catch, but has grown in significance to a level now contributing around 77% of total tuna catch volume (close to 1,900,000 mt – Figure 2). The majority of the historic WCP-CA purse seine catch has come from the four main Distant Water Fishing Nation (DWFN) fleets – Japan, Korea, Chinese-Taipei and USA, which numbered 147 vessels in 1995, declined to a low of 110 vessels in 2006 before increasing again to 135 vessels in 2009². In contrast, Pacific Islands fleets peaked in 2005 (75 vessels) but have dropped back to 71 vessels in 2009 (Figure 4). The remainder includes a large number of smaller vessels in the Indonesian and Philippines domestic fisheries, and a variety of other domestic and foreign fleets, including several relatively recent distant-water entrants into the tropical fishery (e.g. China, 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 in the last three years, the number has increased to be 257 vessels in 2009.

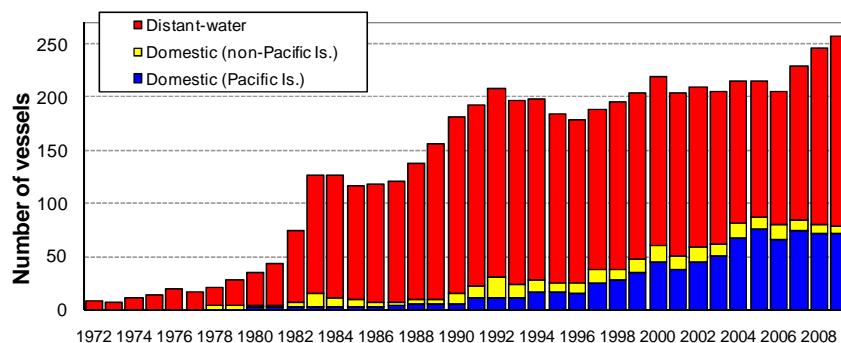


Figure 4. Number of purse seine vessels operating in the WCP-CA
(this does not include the Japanese Coastal purse seine fleet and the Indonesian and Philippines domestic purse-seine/ringnet fleets which account for over 1,000 vessels)

The WCP-CA purse-seine fishery is essentially a skipjack fishery, unlike those of other ocean areas. Skipjack generally account for 70–85% of the purse seine catch, with yellowfin accounting for 15–30% and bigeye accounting for only a small proportion (Figure 5). Small amounts of albacore tuna are also taken in temperate water purse seine fisheries in the North Pacific.

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

- Annual skipjack catches fluctuating between 600,000 and 800,000 mt prior to 1998, a significant increase in the catch during 1998, with catches now maintained well above 1,000,000 mt and now approaching 1,600,000 mt;
- Annual yellowfin catches fluctuating considerably between 115,000 and 270,000 mt. The proportion of yellowfin in the catch is generally higher during El Niño years and lower during La Niña years (for example, 1995/96 and to a lesser extent 1999/2000);
- Increased bigeye tuna purse seine catches, (e.g. 41,371 mt in 1997 and 39,883 mt in 2000) coinciding with the introduction of drifting FADs (since 1996). In the period 2001–2004, bigeye catches were generally lower, but the catch estimates in recent years have been the highest on record (44,457 mt for 2008 and 43,580 mt for 2009).

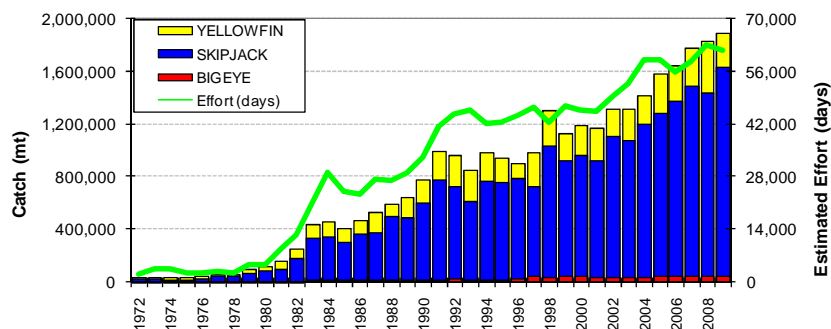


Figure 5. Purse seine catch (mt) of bigeye, skipjack and yellowfin and estimated fishing effort (days fishing and searching) in the WCP-CA

² The number of vessels by fleet in 1995 was Japan (31), Korea (30), Chinese-Taipei (42) and USA (44) and in 2009 the number of vessels by fleet was Japan (37), Korea (27), Chinese Taipei (33) and USA (38).

Total estimated effort tends to track the increase in the catch over time (Figure 5), with years of exceptional catches apparent when the effort line intersects the histogram bar (i.e. in 1998 and 2006-2009).

3.2 Provisional catch estimates, fleet size and effort (2009)

The provisional **2009 purse-seine catch of 1,894,500 mt** was the sixth consecutive record catch for this fishery and 70,000 mt higher than the previous record in 2008. The 2009 purse-seine skipjack catch (1,585,307 mt – 84% of the total catch) was clearly higher than both the 2008 catch (by 190,000 mt) and the record catch in 2007 (by 140,000 mt). The purse-seine skipjack catch has now increased by nearly 700,000 mt (or 79%) since 2001 (890,605 mt), at an average of about 88,000 mt per year. The proportion of skipjack tuna in the total catch (84%) was the highest since 1996³. The 2009 purse-seine catch of yellowfin tuna (264,787 mt – 14%) was a significant reduction (124,000 mt) on the record catch taken in 2008 (386,293 mt) but still the fourth highest on record. The provisional catch estimate for bigeye tuna for 2009 (43,580 mt) was the second highest on record (only 900 mt (–2%) less than the 2008 record catch) but may be revised once all observer data for 2009 have been received and processed⁴.

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 2009 catch for these fleets was the highest ever, and the combined effort is the second highest. The Chinese-Taipei fleet had been the highest producer in the tropical purse seine fishery until 2004, when it was surpassed by the combined Pacific Islands purse seine fleets fishing under the FSM Arrangement; from 2006-2008, the Korean and FSM Arrangement fleets were the highest producers, but there has been a notable decline in the FSM Arrangement fleet catch and effort in 2009 due to a reduction in the number of vessels (some vessels reflagged to the US purse-seine fleet). 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 reflagged in 2002, dropping the fleet from 41 to 34 vessels, with fleet numbers stable since. The increase in annual catch by the FSM Arrangement fleet until 2005 corresponded to an increase in vessel numbers, and coincidentally, 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 during 2009, which is now in line with the other major purse seine fleets.

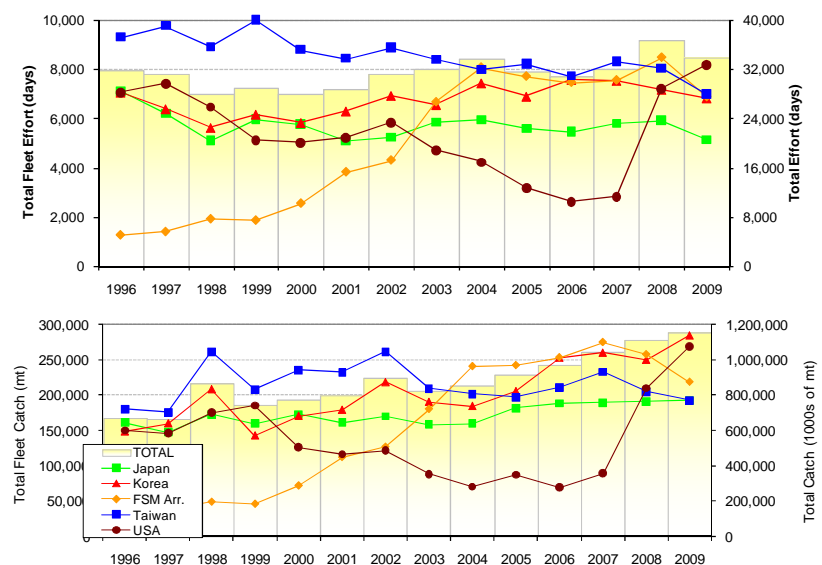


Figure 6. Trends in annual effort (top) and catch (bottom) estimates for the top five purse seine fleets operating in the tropical WCP–CA, 1996–2009.

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The total number of Pacific-island domestic vessels has been relatively stable for the past 5 years (71 vessels in 2009) after a period of sustained growth from 1990 to 2005. The Pacific-islands purse seine fleets comprise vessels fishing under the FSM Arrangement (26 vessels in 2009), the Vanuatu fleet operating under bilateral

³ However, it is acknowledged that the catch of small yellowfin and bigeye is sometimes included in the catch of small skipjack reported on logsheets. The extent of this misreported catch is not yet known.

⁴ Purse-seine bigeye catches have been adjusted to account for the mis-identification of bigeye as yellowfin in operational catch data and reports of unloadings by a process which uses observer data (see Lawson 2007 and Lawson 2009).

arrangements (6 vessels), and domestic vessels operating in PNG (Papua New Guinea; 26 vessels) and Solomon Islands (7 vessels) waters. The FSM Arrangement (FSMA) fleet comprises vessels managed by the Pacific Island “Home Parties” of PNG (15 vessels), the Marshall Islands (5 vessels), FSM (4 vessels) and Kiribati (1 vessel) which fish over a broad area of the tropical WCP-CA. During 2009, FSM added 2 new non-FSMA vessels to their fleet, Kiribati added 3 new non-FSMA vessels, and the first Tuvaluan purse-seine vessel entered the fishery.

The domestic Philippine purse-seine and ring-net fleets operate in Philippine and northern Indonesian waters, and have taken a combined catch of around 200,000 t in recent years (OFP 2009a). The domestic Indonesian purse-seine and ring-net fleets take a similar catch level which means that between 20-25% of the WCP-CA purse seine catch now comes from the waters of these countries.

Figure 7 shows annual trends in the school types set on by the major purse-seine fleets. Sets on free-swimming (unassociated) schools of tuna have predominated during recent years and this was again the case during 2009 (57% of all sets for these fleets, dropping slightly from 63% in 2008). There was a slight increase in the number of sets on logs (15% of all sets) and drifting FADs (28% of all sets—the highest since 2000). The Korean and Chinese Taipei fleets have clearly increased their use of drifting FADs in recent years (Korea: 25% of sets in 2009 were on drifting FADs).

Preliminary review of available observer data for the period 2004-2009 shows similar trends in effort by flag and set type when compared to the logsheet data (OFP 2010b).

3.3 Distribution of fishing effort and catch

The purse-seine catch distribution in tropical areas of the WCP-CA is strongly influenced by El Niño–Southern Oscillation Index (ENSO) events. Figure 8 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 a contracting back to western areas during La Niña periods.

The WCP-CA experienced an El Niño period in the first quarter of 2003, followed by a return to an ENSO-transitional (neutral) period for the remainder of 2003. The ENSO-neutral state continued into the first half of 2004 and then moved to a weak El

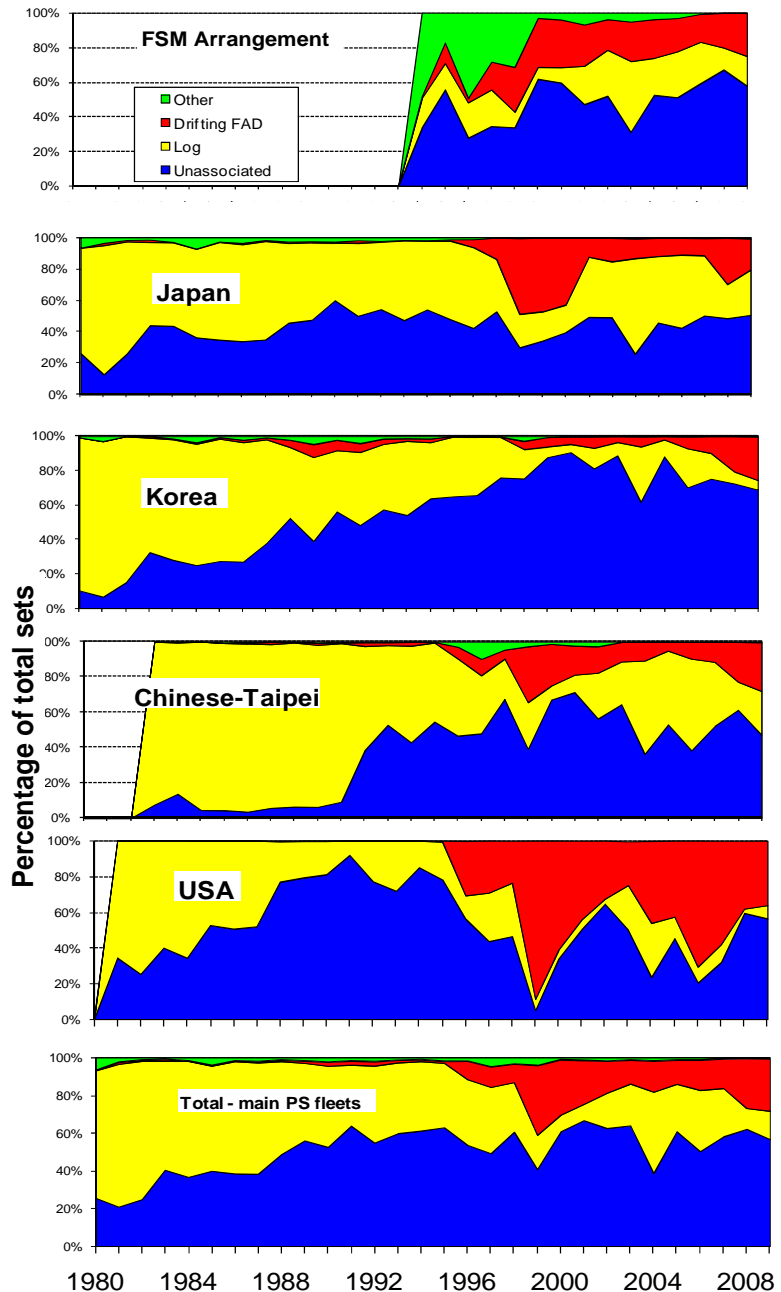


Figure 7. Time series showing the percentage of total sets by school type for the major purse-seine fleets operating in the WCP-CA.

Nino state in the second half of 2004. During 2005, the WCP-CA was generally in an ENSO-neutral state, moving from a weak El Niño in the early months of 2005 through to a weak La Nina-state by the end of 2005. The weak La Nina established at the end of 2005 continued into the first part 2006 but soon dissipated and a weak El Niño event then presided over remainder of 2006. During 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. This La Nina period gradually waned over the first half of 2009 and the second half of 2009 clearly moved into an El Nino period which appears to have intensified in early 2010. In line with this recent El Nino event, fishing activity during 2009 extended further eastwards compared to recent years (2007-2008) when the La Nina conditions generally restricted activities to waters of the PNG, FSM and Solomon Islands.

The distribution of effort by set type Figure 8 (right) for the past seven years shows there was less activity east of 160°E and fewer sets with drifting FADs in the years 2003-2006 than the period 2004-2009. The low number of drifting FAD sets during 2004-2006 was probably related to the displacement of effort further west to an area where free-swimming and log-associated tuna schools were more available to purse seine fleets, and therefore there was less of a need to use drifting FADs. There was a significant increase in the number of log sets made during 2004 suggesting that, for one reason or another, more logs had moved into the main fishing area and had successfully aggregated tuna schools. There was a notable increase in the number of drifting FAD sets in the past two years (2008-2009) which probably resulted from a reduction in the availability of logs and/or a reduction in school aggregation on logs such that drifting FAD fishing was more favourable. In general, the proportion of sets by set type to the east of 170°E appears to depend on the availability of free-swimming (unassociated) schools (there were more available during 2005 than in 2004 and 2006, for example), the extension of the warm pool (related to ENSO conditions), and/or whether drifting FADs are more effective, for example, in the absence of drifting natural logs.

[Figure 9](#) through 13 show the distribution of purse seine effort for the five major purse seine fleets during 2008 and 2009. The distribution of effort for all fleets in 2009 was similar to that of 2008, except for a clear extension of activities eastwards by the Korea and US fleets; the increase in effort by the US fleet during 2009 is also evident ([Figure 13](#) – right). The FSM Arrangement fleet tends to fish in a similar area to the Asian fleets, although there is also activity in their respective Pacific-Island home waters for some vessels ([Figure 9](#)). [Figure 14](#) shows the distribution of catch by species for the past seven years, [Figure 15](#) shows the distribution of skipjack and yellowfin catch by set type for the past seven years, and [Figure 16](#) shows the distribution of estimated bigeye catch by set type for the past seven years. The distribution and proportion of skipjack and yellowfin in the purse-seine catch has been relatively consistent over the past three years ([Figure 14](#)–left).

Unassociated sets tend to account for a higher proportion of the total yellowfin catch in the area to the east of 160°E (Figure 15). In the past, higher proportions of yellowfin in the overall catch (by weight) usually occur during El Nino years as fleets have access to “pure” schools of large yellowfin that are more available in the eastern tropical areas of the WCP-CA. However, a large yellowfin catch was taken in the purse seine fishery during 2008, which was a La Nina year, and lower catches in 2009, which was an El Nino year. The displacement of the cold-water tongue from the eastern Pacific further to the west during 2008 (see Figure 8–left–“2008”) may have provided conditions (e.g. a shallower surface-mixed layer) conducive to catching large yellowfin in some of these areas. Purse-seine activity during 2009 was further eastwards than in 2008 due to the eastwards extension of the warm pool (Figure 8), but perhaps effort in 2009 was not as close to the cold-water tongue convergence areas which may result in the higher catches of large yellowfin.

In contrast to unassociated sets targeting yellowfin, associated-school sets usually account for a higher proportion of the skipjack and bigeye catch in the respective total catch of each species ([Figure 15](#)–left and [Figure 16](#)). During 2009, the number of drifting FAD sets was half the number of sets on unassociated, free-swimming schools, but the skipjack and bigeye catches were higher from drifting-FAD sets. The estimated proportion of bigeye in the “yellowfin plus bigeye” catch tends to be dominated by anchored FADs and logs in the area to the west of 160°E, and drifting FAD sets in the area to the east of 160°E ([Figure 16](#)). The distribution of the estimated bigeye catch by set type for 2009 is based on very few observer data and should be treated as provisional at this stage.

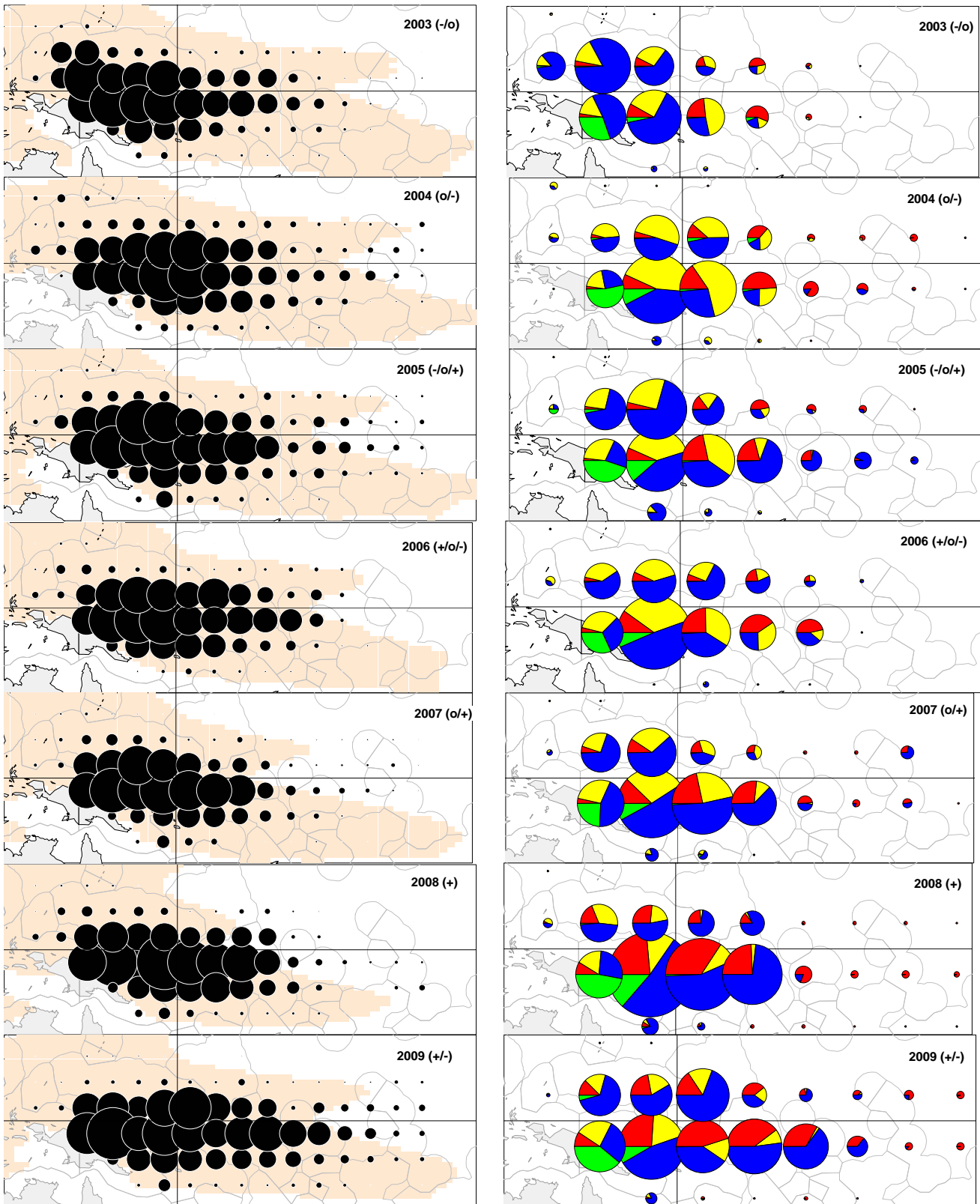


Figure 8. Distribution of purse-seine effort (days fishing – left; sets by set type – right), 2003–2009. (Blue–Unassociated; Yellow–Log; Red–Drifting FAD; Green–Anchored FAD).

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.

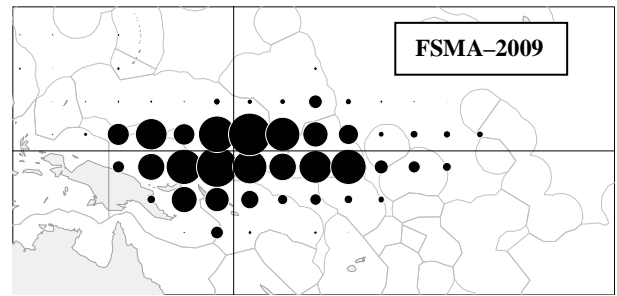
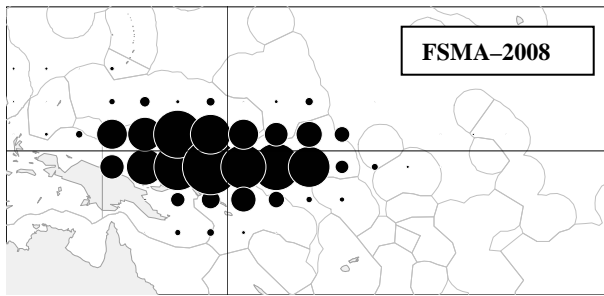


Figure 9. Distribution of effort by fleets operating under the FSM Arrangement during 2008 and 2009
lines for the equator (0° latitude) and 160° E longitude included.

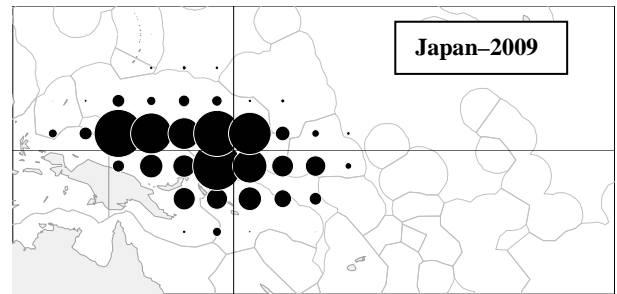


Figure 10. Distribution of effort by the Japanese purse seine fleet during 2008 and 2009
lines for the equator (0° latitude) and 160° E longitude included.

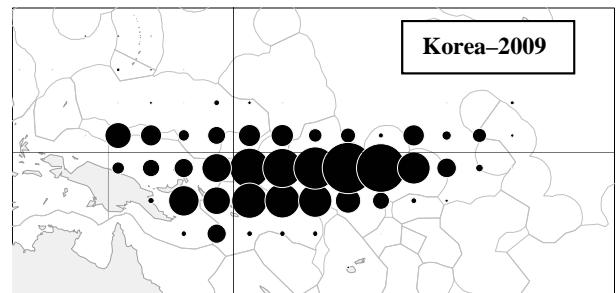


Figure 11. Distribution of effort by the Korean purse seine fleet during 2008 and 2009
lines for the equator (0° latitude) and 160° E longitude included.

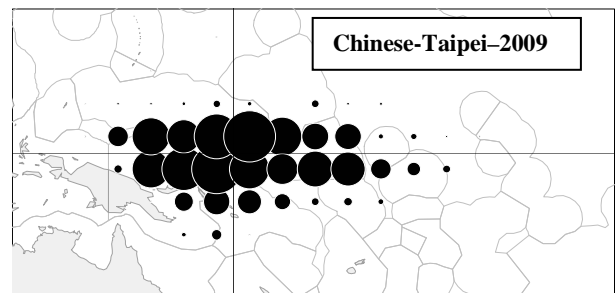
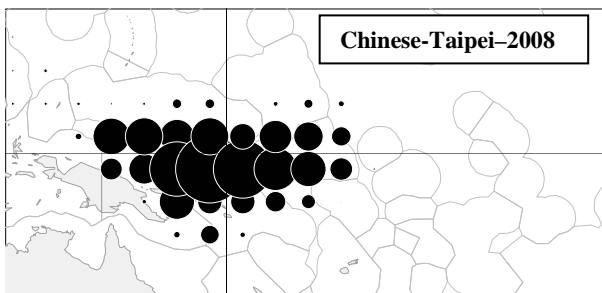


Figure 12. Distribution of effort by the Chinese-Taipei purse seine fleet during 2008 and 2009
lines for the equator (0° latitude) and 160° E longitude included.

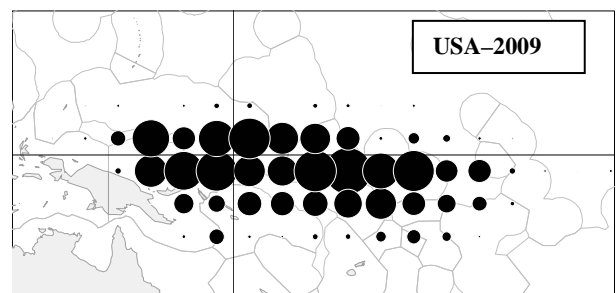
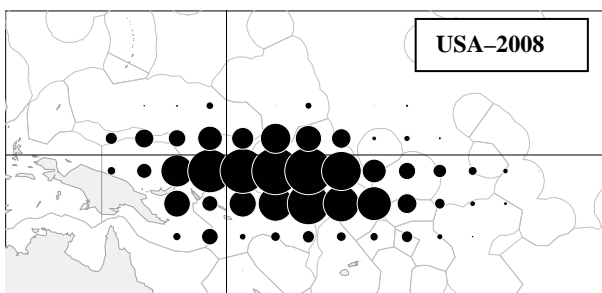


Figure 13. Distribution of effort by the US purse seine fleet during 2008 and 2009
lines for the equator (0° latitude) and 160° E longitude included.

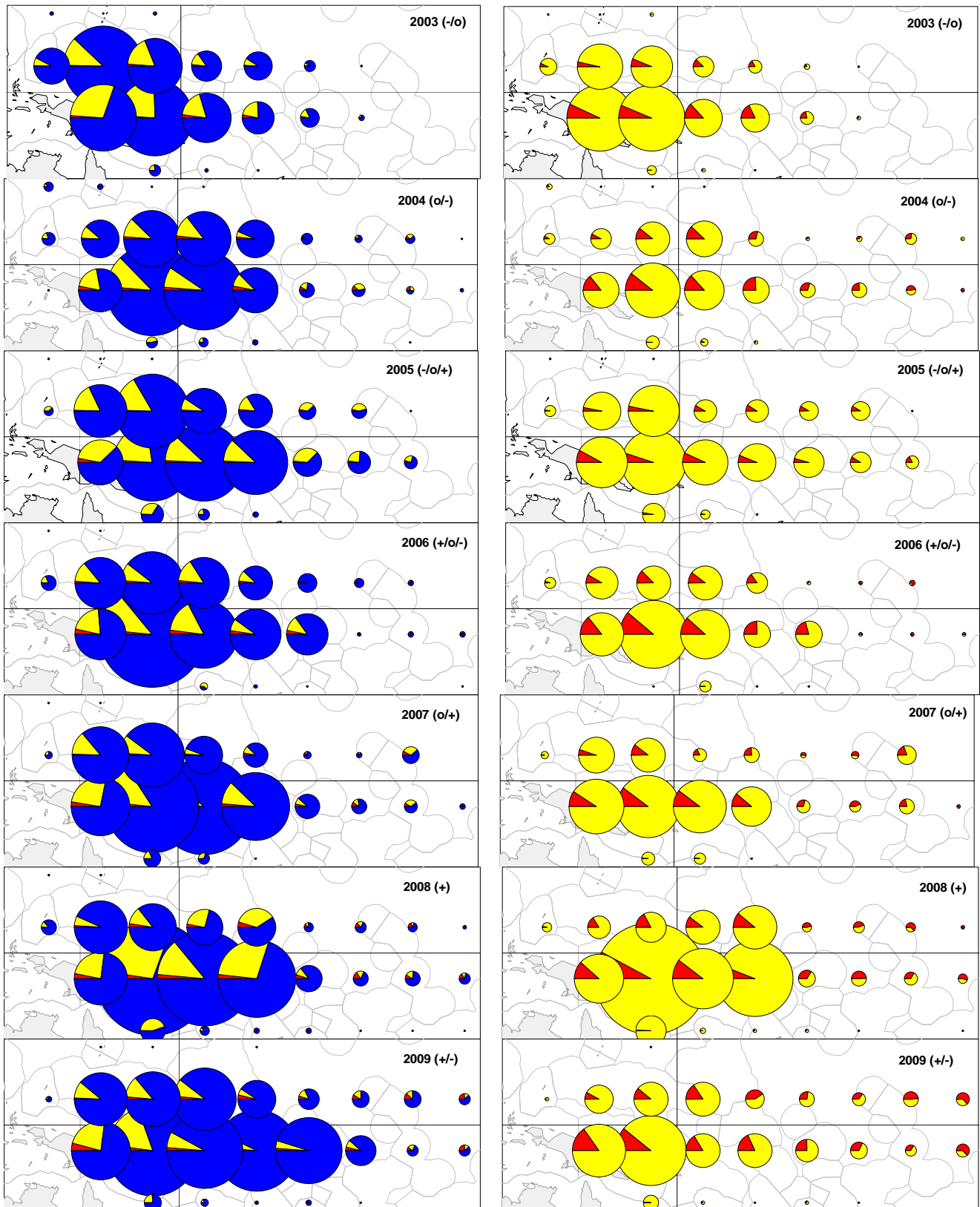


Figure 14. Distribution of purse-seine skipjack/yellowfin/bigeye tuna catch (left) and purse-seine yellowfin/bigeye tuna catch only (right), 2003–2009 (Blue–Skipjack; Yellow–Yellowfin; Red–Bigeye).

ENSO periods are denoted by “+”: La Niña; “-”: El Niño; “o”: transitional period.
Estimates of bigeye catch for 2009 are provisional.

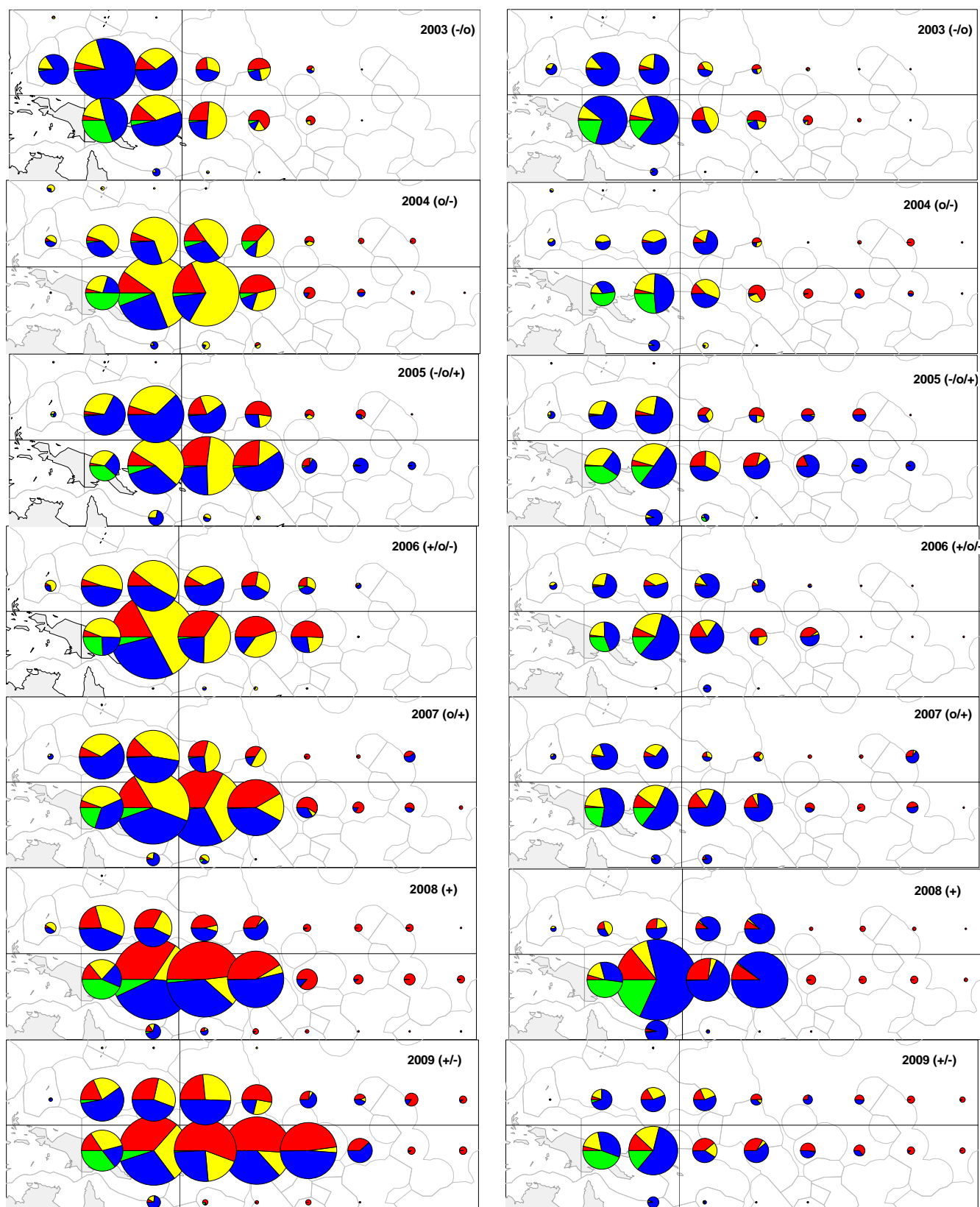


Figure 15. Distribution of skipjack (left) and yellowfin (right) tuna catch by set type, 2003–2009 (Blue–Un-associated; Yellow–Log; Red–Drifting FAD; Green–Anchored FAD).

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

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

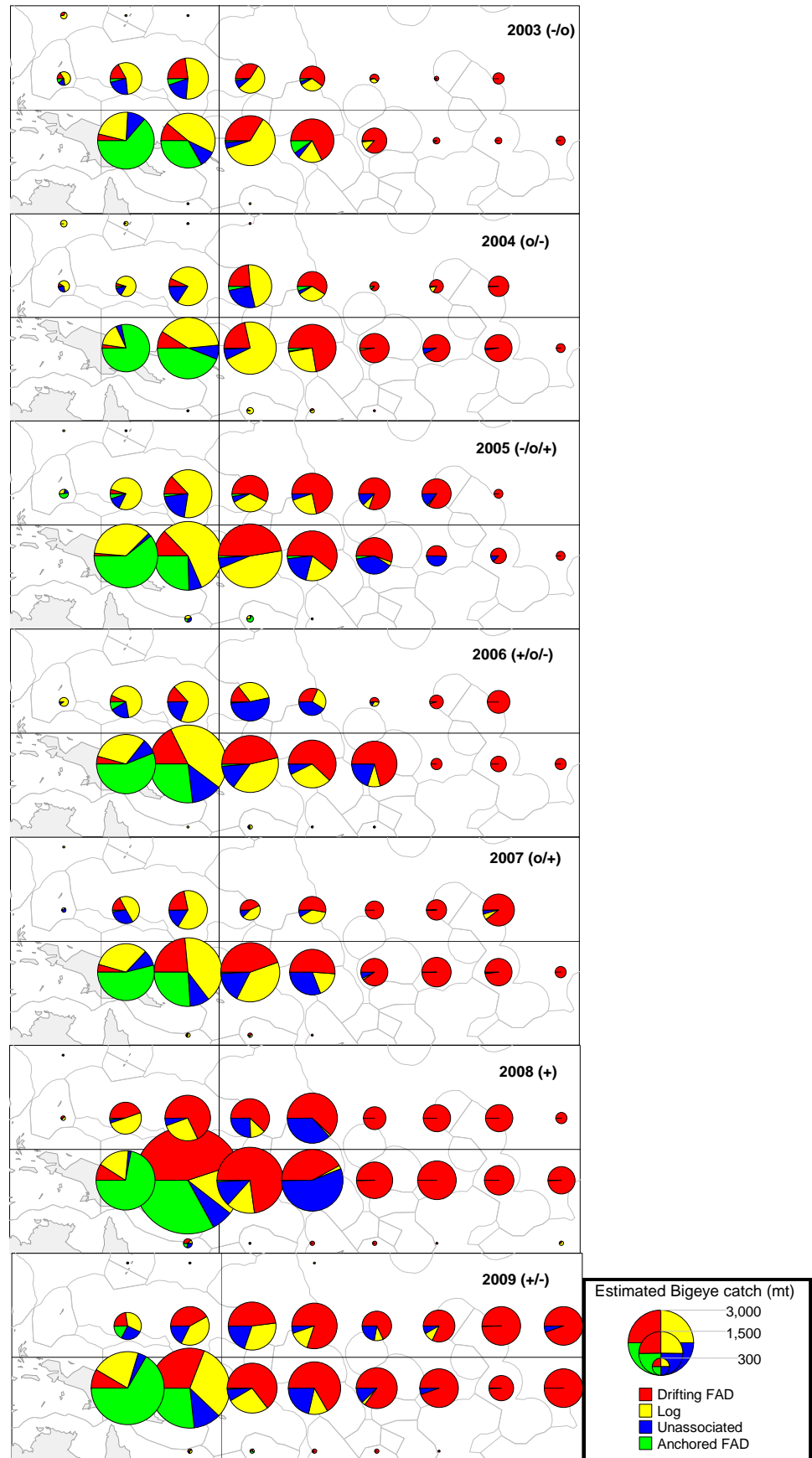


Figure 16. Distribution of estimated bigeye tuna catch by set type, 2003–2009 (Blue–Unassociated; Yellow–Log; Red–Drifting FAD; Green–Anchored FAD).

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

Estimates of bigeye catch for 2009 are provisional.

3.4 Catch per unit of effort

Figure 17 shows the annual time series of nominal CPUE by set type and vessel nation for skipjack (left) and yellowfin (right). Purse-seine skipjack CPUE for all set types and fleets increased to record levels in 2009. The 2009 skipjack CPUE (all set types) for the Korean fleet increased substantially to twice the level taken during the 1990s. As mentioned in the previous section, the overall skipjack catch from drifting FAD sets is at least 50% higher than that taken from unassociated, free-swimming school sets, and this is reflected in the CPUE trends.

Yellowfin purse-seine CPUE is characterised by strong inter-annual variability and differences among the fleets. School-set CPUE is strongly related to environmental factors in the WCP-CA, with CPUE generally higher during El Niño episodes, but may also depend on where vessels fish in relation to the cold-tongue convergence with the warm pool. These circumstances are believed to have resulted in 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 produce higher catch rates (mt/day) for skipjack than unassociated sets, yet unassociated sets produce a higher catch rate for yellowfin than associated sets. This is mainly due to unassociated sets in the eastern areas of the tropical WCP-CA taking large, adult yellowfin, which account for a larger catch (by weight) than the (mostly) juvenile yellowfin encountered in associated sets. The yellowfin CPUE from unassociated sets in 2008 was the highest experienced in several years, but there was a clear decline in 2009, similar to the pattern seen in other years following good yellowfin catches (e.g. from 1998 to 1999).

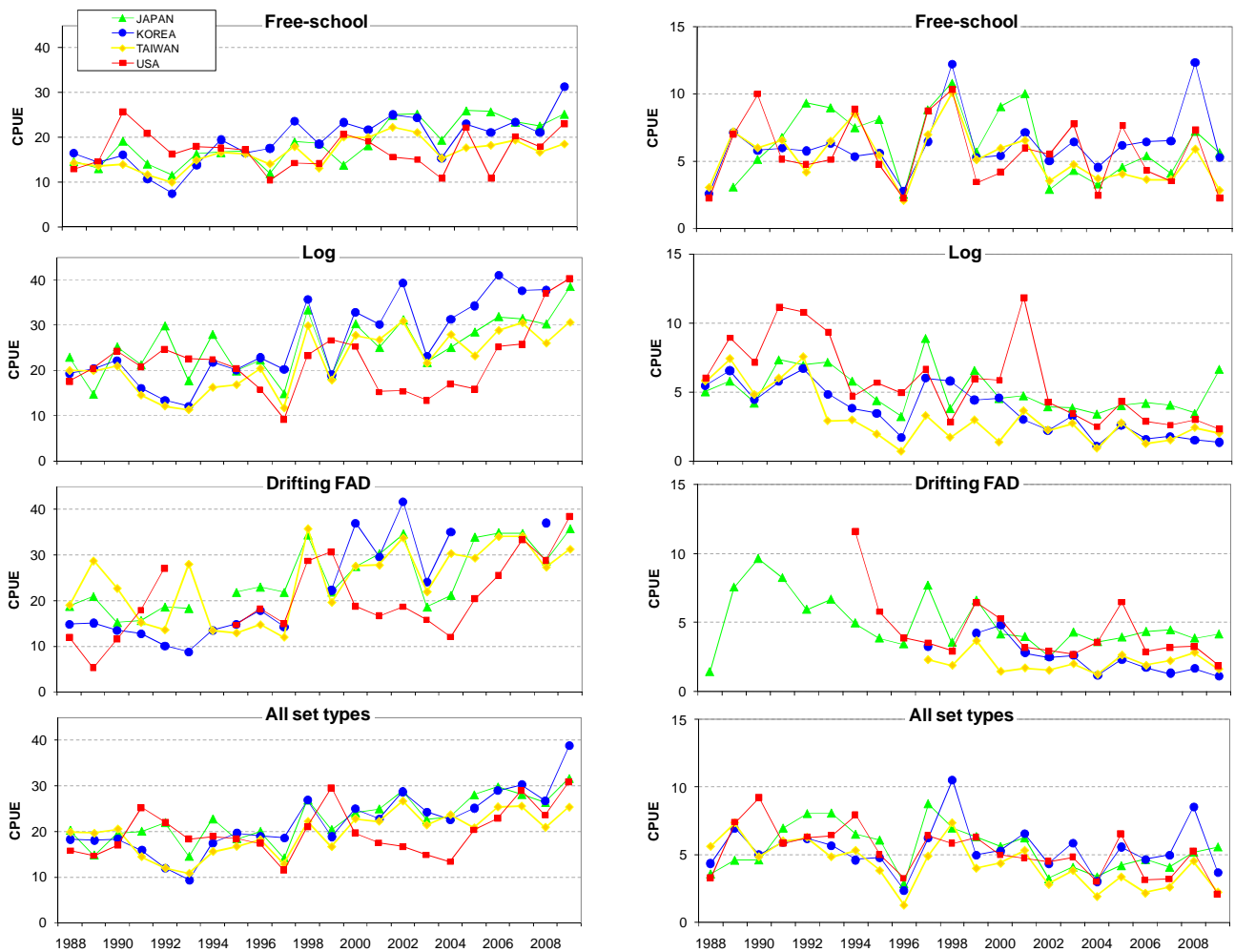


Figure 17. Skipjack tuna CPUE (mt per day-left) and Yellowfin tuna CPUE (mt per day-right) by set-type, and all set types combined, for selected purse-seine fleets fishing in the tropical WCP-CA. Effort and CPUE were partitioned by set type according to the proportions of total sets attributed to each set type.

The trend in total skipjack CPUE over this time series (Figure 17) is clearly upwards and thought to be related to increased abundance and improved efficiency in fishing strategy as well as technological advances in equipment used to better locate schools of tuna. The pattern is different for yellowfin tuna which shows a gradual, but continuous decline in CPUE from associated sets over time, and a CPUE trend from unassociated sets that is relatively constant (Figure 17–right). It is not known whether the trends in associated-set CPUE reflect an increasing ability to target skipjack tuna at the expense of yellowfin, a decrease in yellowfin abundance, or perhaps a misreporting problem whereby some of the small-yellowfin catch is included in the logsheet-reported catch of skipjack.

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 an order of magnitude higher (Figure 18). The trends in estimated bigeye tuna CPUE since 2000 sometimes varies by fleet and set type with no clear pattern evident.

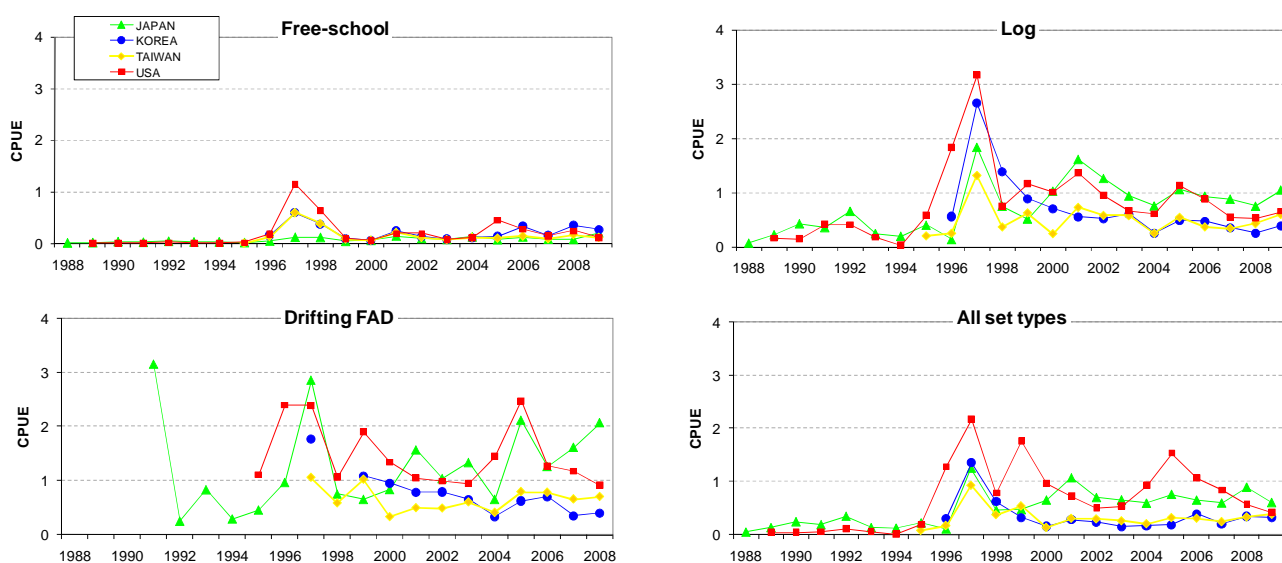


Figure 18. Estimated Bigeye tuna CPUE (mt per day) by major set-type categories (free-school, log and drifting FAD sets) and all set types combined for Japanese, Korean, Chinese-Taipei and US purse seiners fishing in the tropical WCP–CA.

Effort and CPUE were partitioned by set type according to the proportions of total sets attributed to each set type. Estimates of bigeye catch for 2009 are provisional.

3.5 Seasonality

Figure 19 shows the seasonal average CPUE for skipjack (left) and yellowfin (right) in the purse seine fishery for the period 2000–2009, and Figure 20 shows the distribution of catch by species and quarter for the period 2000–2008 contrasting with seasonal catch in 2009. Over the period 2000–2008, the average monthly skipjack CPUE was highest from February–May which is in contrast to the yellowfin CPUE, which was at its lowest during the early part of the year, but gradually increased towards the end of the year. This situation corresponds to the eastward extension of the fishery in the second half of the year (Figure 20–left), 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 2009 was above the 2000–2008 average for all months except January and at record levels for October and November, which were the months immediately following the FAD closure. This suggests the two month period in which drifting FADs were not set on resulted in a larger skipjack biomass aggregated around the FADs. In contrast, the monthly Yellowfin tuna CPUE for 2009 was generally below the 2000–2008 average which was reflected in a relatively low catch level overall compared to recent years.

The transition to El Niño is apparent in the quarterly purse seine effort for 2009 (Figure 20 – right), with the warm pool of water (>28.5°C on average) extending more eastwards than the quarterly average for years 2000–2008 (Figure 20 – left). Purse seine effort extended further to the east in the third quarter of 2009 (with the onset of the El Niño), and by the fourth quarter there seemed to be two fleet components, one to the east (in the Gilberts and Phoenix Is., Tuvalu and adjacent high seas) and the other near the 160°E longitude.

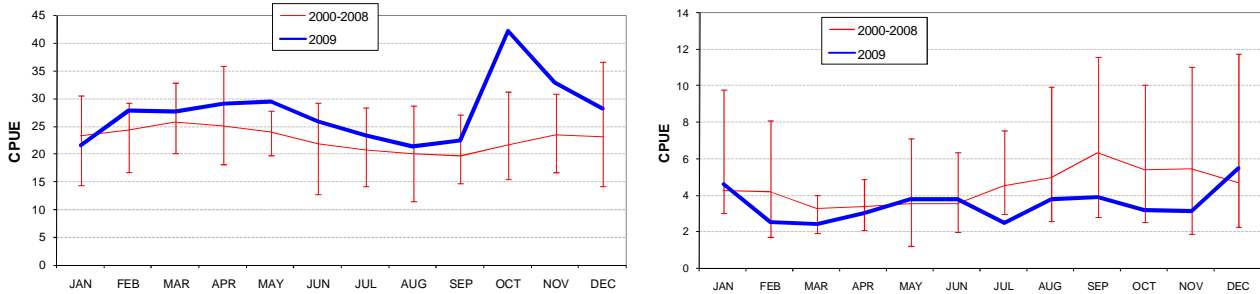


Figure 19. Average monthly Skipjack (left) and Yellowfin (right) tuna CPUE (mt per day) for purse seiners fishing in the tropical WCP-CA, 2000–2009.

Red line represents the period 2000–2008 and the blue line represents 2009.

The bars represent the range (i.e. minimum and maximum) of monthly values for the period 2000–2008.

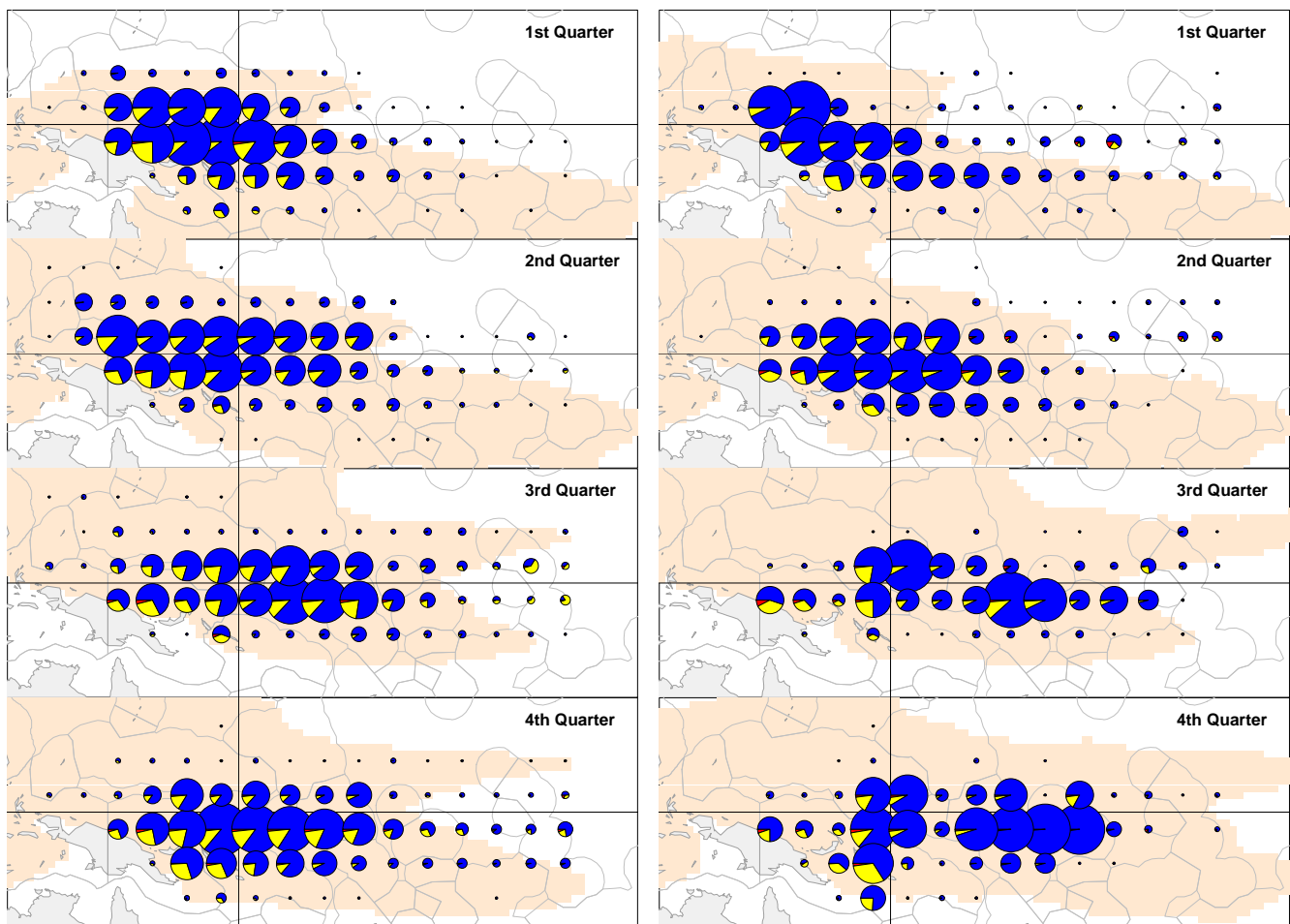


Figure 20. Quarterly distribution of purse-seine catch by species for 2000–2008 (left) and 2009 (right).

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

Pink shading represents the extent of average sea surface temperature > 28.5°C by quarter for the period 2000–2008 (left) and 2009 (right)

3.6 Economic overview of the purse seine fishery

3.6.1 Price trends – Skipjack

Skipjack prices in 2009 averaged around 30% lower than 2008 prices with Bangkok and Yaizu averages at US\$1,099 (US\$1,543 in 2008) and US\$1,325⁵ (US\$1,777 in 2008), respectively. The respective averages in 2007 were US\$1,280 and US\$1,287.

From peak levels in mid-2008, prices trended downward sharply well into the first quarter of 2009 (Figure 21, monthly figures). There were moderate improvements towards mid-2009 however prices declined again over the rest of the year. This overall declining trend in skipjack prices was accompanied by reversals in the trends of some of the important factors that previously had driven up fish prices, including trends in global food and oil prices as well as skipjack supplies.

With regard to supplies, estimated purse seine skipjack catch in the WCPO in 2009 was almost 15% higher than in 2008. The supply of skipjack during the course of 2009 was strongly influenced not only by relatively better fishing conditions but also by processors' decisions to stockpile fish prior to introduction of the two-month (August – September) FAD closure conservation and management measure. During the closure period, however, skipjack supply remained ample.

Over the first half of 2010 monthly skipjack prices have risen strongly. Bangkok prices (4-7.5lbs, c&f) have increased to US\$1,700/Mt and Yaizu (ex-vessel) prices to US\$1,617/Mt. This in part is a consequence of the supply situation increasingly being influenced not only by fishing conditions but also by the introduction of increased restrictions on fishing areas, i.e. closure of two high seas pockets in the WCPO, as well as the EU-IUU regulations as of the start of the year. Recent recovery from the global financial downturn is also an important factor.

3.6.2 Price trends – Yellowfin

The price trends for purse seine caught yellowfin in 2009, as for skipjack, were also down with Bangkok prices at around US\$1,387 or 30% lower than in 2008 (and 22% lower than in 2007) while the Yaizu prices in US-dollar terms at US\$2,279 were about 11% lower than in 2008 (but 18% higher than in 2007)⁶.

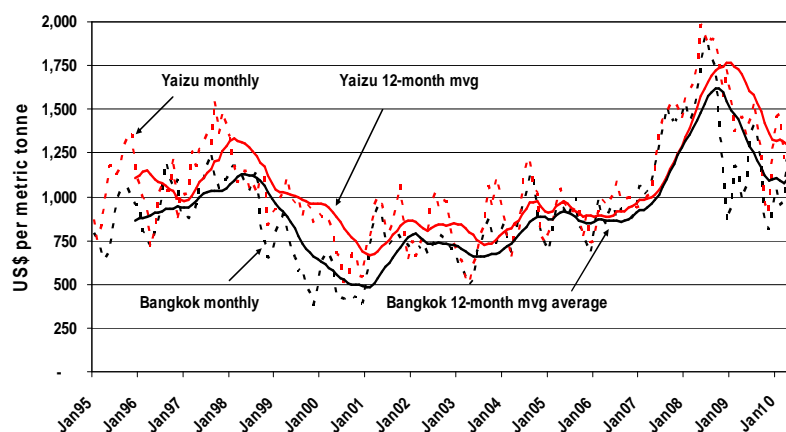


Figure 21. Skipjack prices, Bangkok (4-7.5lbs, c&f) and Yaizu (ex-vessel) monthly and 12 month moving average

Note: The Bangkok prices shown in the above figure are indicative figures only. They reflect estimates of the mid-point of prices paid during the respective month based on information received from a range of sources

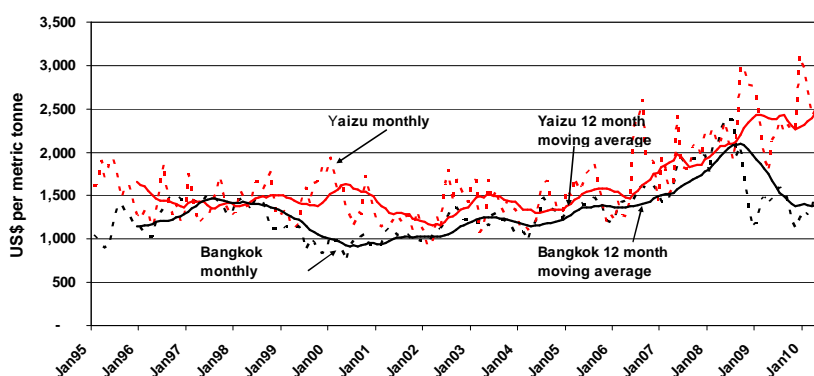


Figure 22. Yellowfin prices, Bangkok (20lbs and up, c&f) and Yaizu (ex-vessel) monthly and 12 month moving average

Note: The Bangkok prices shown in the above figure are indicative figures only. They reflect estimates of the mid-point of prices paid during the respective month based on information received from a range of sources

⁵ Where prices are obtained in currencies other than US\$ they are converted using inter-bank exchange rates as given by www.oanda.com/convert/fxhistory

⁶ The lesser fall in Yaizu prices in US\$-terms is explained by the 10% appreciation of the Japanese Yen against the US\$ and the sale of larger yellowfin catch as sashimi grade fish. Between 2007 and 2009 the Japanese Yen appreciated by 20% against the US\$.

During the course of 2009, Bangkok yellowfin prices (20lbs +, c&f) consistently fell, averaging US\$1,411/Mt in the first half and US\$1,364/Mt in the second half. During the first half of 2010, yellowfin prices have increased to an average of US\$1,502/Mt.

At the Yaizu market, purse seine caught yellowfin prices, in US\$ terms, averaged US\$2,208/Mt in the first half of 2009 and US\$2,345/Mt in the latter half. Yaizu prices during the first half of 2010 averaged US\$2,662/Mt, a notable increase over the previous twelve months.

3.6.3 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 2009 were obtained (Figures 23–25). In deriving these estimates certain assumptions were made due to data and other constraints that may or may not be valid and as such caution is urged in the use of these figures.⁷

The estimated delivered value of the entire purse seine tuna catch in the WCPFC area for 2009 is US\$2,300 million that drops from last year’s record level of US\$3,178 million. This represents a decline of US\$878 million or 28 per cent on the estimated delivered value of the catch in 2008. This decrease was driven by a US\$515 million (21 per cent) decrease in delivered value of the skipjack catch, which is estimated to be worth US\$1,897 million in 2009, resulting from a 31 per cent decrease in the composite price that more than offset the rise of 15 per cent in the catch. The value of the purse seine yellowfin catch declined even more sharply, by almost 41 per cent, to around US\$404 million as a result of a 24 per cent decrease in the composite price and a 31 per cent decrease in catch.⁸

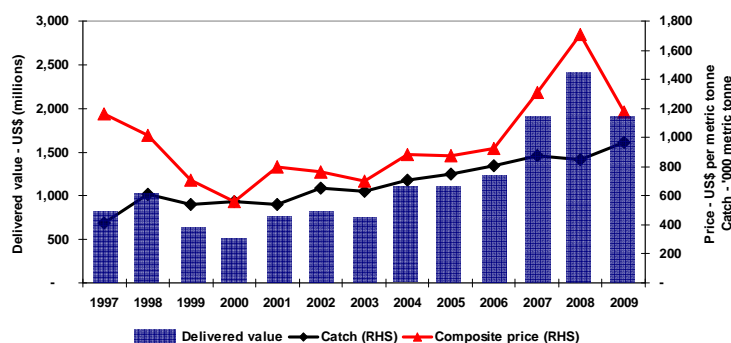


Figure 23. Skipjack in the WCPFC purse seine fishery – Catch, delivered value of catch and composite price

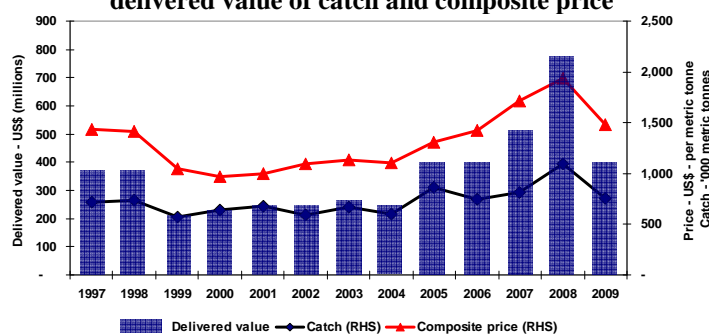


Figure 24. Yellowfin in the WCPFC purse seine fishery – Catch, delivered value of catch and composite price

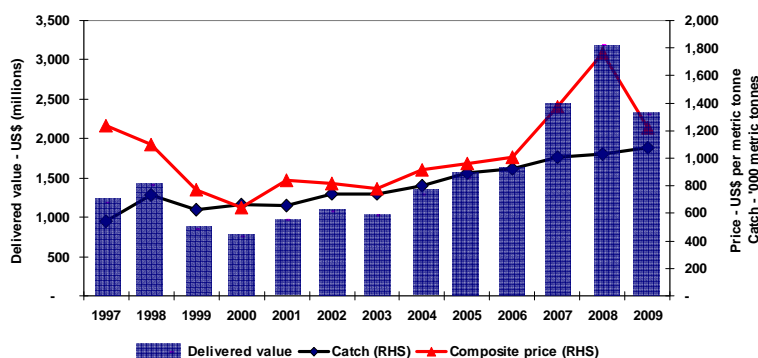


Figure 25. All tuna in the WCPFC purse seine fishery – Catch, delivered value of catch and composite price

⁷ The delivered value of each year’s catch was estimated as the sum of the product of the annual purse catch of each species, excluding the Japanese purse seine fleet’s catch, and the average annual Thai import price for each species (bigeye was assumed to attract the same price as for yellowfin) plus the product of the Japanese purse seine fleet’s catch and the average Yaizu price for purse seine caught fish by species. Thai import and Yaizu market prices were used as they best reflect the actual average price across all fish sizes as opposed to prices provided in market reports which are based on benchmark prices, for example, for skipjack the benchmark price is for fish of size 4-7.5lbs.

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

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).

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 26) and in the annual pole-and-line catch during the past 15–20 years (Figure 27). 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 Palau, Papua New Guinea and Kiribati are no longer active, only one vessel is now operating (seasonally) in Fiji, and fishing activity in the Solomon Islands fishery during the 2000s was reduced substantially from the level experienced during the 1990s, and ceased altogether in 2009. Several vessels continue to fish in Hawai'i, and the French Polynesian *bonitier* fleet remains active, but an increasing number of vessels have turned to longline fishing. Provisional statistics also suggest that the Indonesian pole-and-line fleet has also declined over the past decade. Despite the widespread decline in pole-and-line activities, it is seen to be an “eco-friendly” fishing method and there is at least one initiative planned to re-commence this form of fishing in Pacific Island countries.

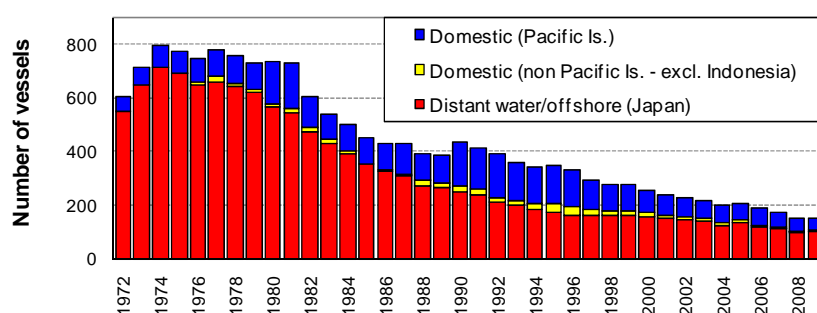


Figure 26. Pole-and-line vessels operating in the WCP-CA
(excludes pole-and-line vessels from the Japanese Coastal and Indonesian domestic fisheries)

4.2 Provisional catch estimates (2009)

The 2009 pole-and-line catch (165,814 mt) was the lowest annual catch for this fishery since the mid-1960s.

Skipjack tends to account for the majority of the catch (~70-80% 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 (5–10%) and a small component of bigeye tuna (1–6%) make up the remainder of the catch.

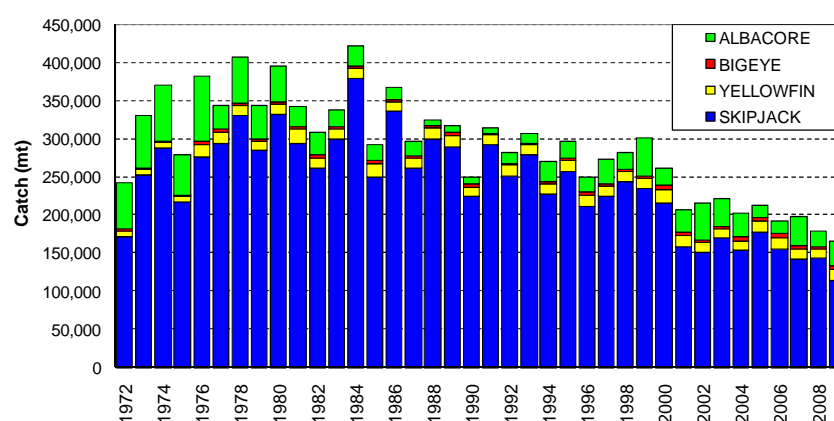


Figure 27. Pole-and-line catch in the WCP-CA

The Japanese distant-water and offshore (104,232 mt in 2009) fleets, and the Indonesian fleets⁹ (60,415 mt

⁹ Indonesia has recently revised the proportion of catch taken by gear type for their domestic fisheries. This has resulted in a much larger allocation to their domestic purse seine fishery (at the expense of catches in the pole-and-line and “unclassified” fisheries) since 2004 than has been reported in previous years.

in 2007), account for most of the WCP–CA pole-and-line catch. The catches by the Japanese distant-water and offshore fleets in recent years have been the lowest for several decades and this is no doubt related to the continued reduction in vessel numbers (in 2009 reduced to only 96 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, but this fleet ceased operating in 2009, with no apparent plan to resume activities in the short term.

[Figure 28](#) shows the average distribution of pole-and-line effort for the period 1995–2009. 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.

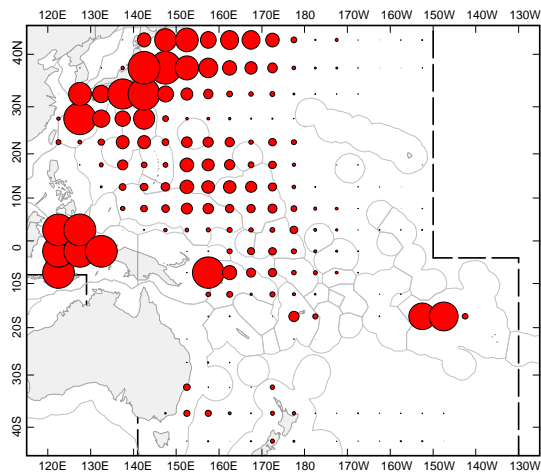


Figure 28. Average distribution of WCP–CA pole-and-line effort (1995–2009).

4.3 Economic overview of the pole-and-line fishery

4.3.1 Market conditions

During 2009 the Yaizu price of pole and line caught skipjack in waters off Japan averaged 215JPY/kg (US\$2,297/Mt), a decrease of 11% compared to 2008. By contrast, the Yaizu price of pole and line caught skipjack in waters south of Japan increased averaging 253JPY/kg (US\$2,704/Mt) during 2009, a rise of only 1% in JPY terms.

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 1997-2009, a rough estimate of the annual delivered value of the tuna catch in the pole and line fishery in the WCPFC Area is provided in Figures 29 and 30. The estimated delivered value of the total catch in the WCPFC pole and line fishery for 2009 is US\$344 million.¹⁰ This represents a 12% decrease in the estimated value of the catch as compared to 2008 and is driven by declines of 5% in price and 7% in catch.

The estimated delivered value of the skipjack catch in the WCPFC pole and line fishery for 2009 is US\$228 million. This represents a 26% decrease as compared to the estimated value of the catch in 2007 and results from a 7% decrease in prices and a 20% decrease in catch.

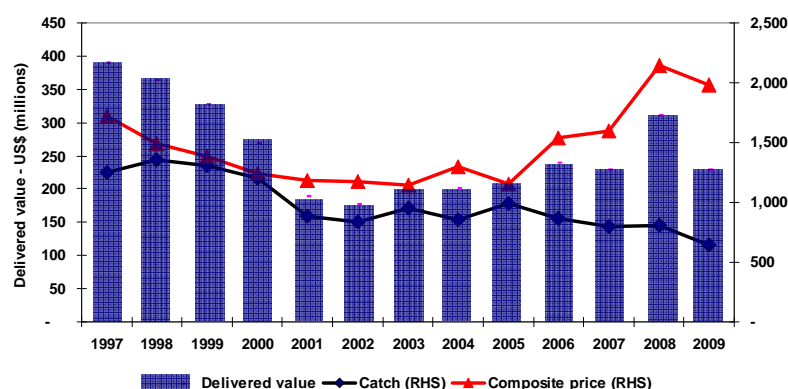


Figure 29. Skipjack in the WCPFC pole and line fishery – Catch, delivered value of catch and composite price

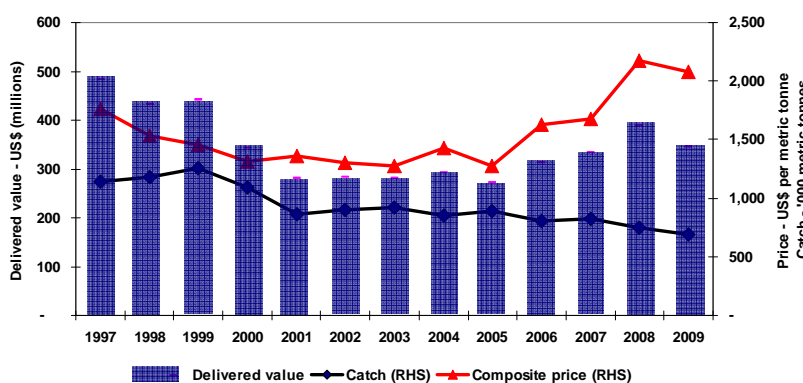


Figure 30. All tuna in the WCPFC pole and line fishery – Catch, delivered value of catch and composite price

¹⁰ Delivered skipjack prices for the Japanese pole and line fleet are based on a weighted average of the Yaizu 'south' and 'other' pole and line caught skipjack prices. Delivered yellowfin price for the Japanese pole and line fleet are based on the Yaizu purse seine caught yellowfin price. All other prices are based on Thai import prices.

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 2010a), 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 (OFP 2010a). The total number of vessels involved in the fishery has generally fluctuated between 3,500 and 6,000 for the last 30 years (Figure 31), 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.

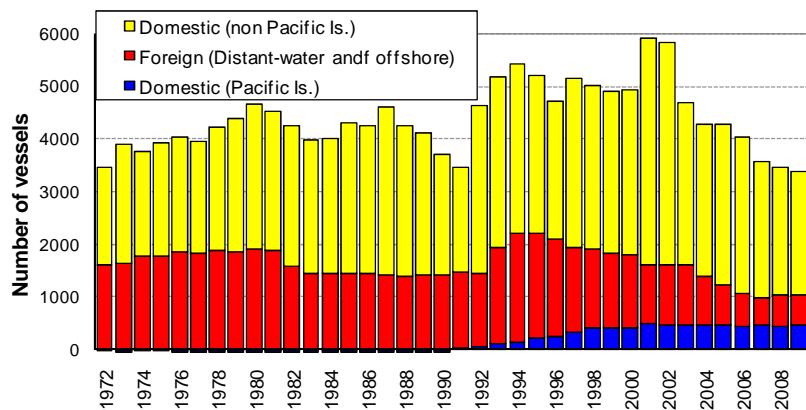


Figure 31. Longline vessels operating in the WCP-CA

(Available data does not make the distinction between foreign “distant-water” and “offshore”)

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

- **South Pacific offshore albacore fishery** comprises Pacific-Islands domestic “offshore” vessels, such as those from American Samoa, Cook Islands, Fiji, French Polynesia, New Caledonia, Samoa, Solomon Islands, Tonga and Vanuatu; these fleets mainly operate in subtropical waters, with albacore the main species taken.
- **Tropical offshore bigeye/yellowfin-target fishery** includes “offshore” sashimi longliners from Chinese-Taipei, based in Micronesia, Guam, Philippines and Chinese-Taipei, mainland Chinese vessels based in Micronesia, and domestic fleets based in Indonesia, Micronesian countries, Philippines, PNG, the Solomon Islands and Vietnam.
- **Tropical distant-water bigeye/yellowfin-target fishery** comprises “distant-water” vessels from Japan, Korea, Chinese-Taipei, mainland China and Vanuatu. These vessels primarily operate in the eastern tropical waters of the WCP-CA (and into the EPO), targeting bigeye and yellowfin tuna for the frozen sashimi market.
- **South Pacific distant-water albacore fishery** comprises “distant-water” vessels from Chinese-Taipei, mainland China and Vanuatu operating in the south Pacific, generally below 20°S, targeting albacore tuna destined for canneries.
- **Domestic fisheries in the sub-tropical and temperate WCP-CA** comprise vessels targeting different species within the same fleet depending on market, season and/or area. These fleets include the domestic fisheries of Australia, Japan, New Zealand and Hawaii. For example, the Hawaiian longline fleet has a component that targets swordfish and another that targets bigeye tuna.
- **South Pacific distant-water swordfish fishery** is a relatively new fishery and comprises “distant-water” vessels from Spain.
- **North Pacific distant-water albacore and swordfish fisheries** mainly comprise “distant-water” vessels from Japan (swordfish and albacore), Chinese-Taipei (albacore only) and Vanuatu (albacore only).

Additionally, small vessels in Indonesia, Philippines and more recently PNG use handline and small vertical longline gears, usually fishing around the numerous arrays of anchored FADs in home waters (these types of vessels are not included in Figure 31). The commercial handline fleets target large yellowfin tuna which comprise the majority of the overall catch (> 90%).

The WCP–CA longline tuna catch steadily increased from the early years of the fishery (i.e. the early 1950s) to 1980 (227,707 mt), but declined to 157,072 mt in 1984 (Figure 32). 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–39%; BET–29%; YFT–31%; SKJ–1% in 2009) differs considerably 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).

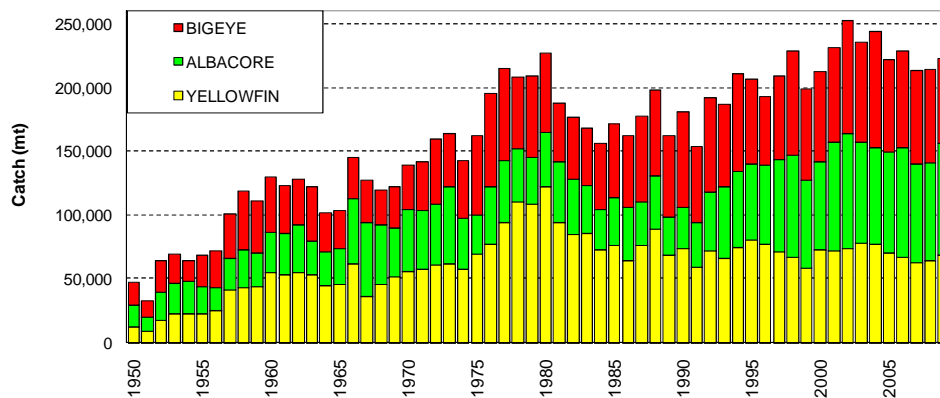


Figure 32. Longline catch (mt) of target tunas in the WCP–CA

5.2 Provisional catch estimates and fleet sizes (2009)

The provisional WCP–CA longline catch (223,792 mt) for 2009 was slightly below the average annual catch for the period 2000–2009 and around 10% (23,000 mt) lower than the highest on record attained in 2002 (256,582 mt). The WCP–CA albacore longline catch (87,080 mt – 39%) for 2009 was only 2,000 mt lower than the highest catch on record (89,883 mt in 2002). The provisional bigeye catch (65,606 mt – 29%) for 2009 was the lowest since 1996, but may be revised upwards when revised estimates are provided. The yellowfin catch for 2009 (69,158 mt – 31%) was similar to the average catch level for this species over the period 2000–2009.

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 making up the Pacific Islands domestic albacore fishery have numbered around 300 (mainly small “offshore”) vessels in recent years.

The clear shift in effort by some albacore-targeting vessels in the Chinese-Taipei distant-water longline fleet to targeting bigeye in the eastern equatorial waters of the WCP–CA resulted in a reduced contribution to the albacore catch in recent years (which was compensated by the increase in Pacific Islands fleet albacore catches), and a significant increase in bigeye catches. During the 1990s, this fleet consistently took less than 2,000 mt of bigeye tuna each year, but in 2002, the bigeye catch increased to 8,741 mt, and by 2004 it had increased to 16,888 mt. The bigeye catch by the Chinese-Taipei distant-water longline fleet has since declined to 8,863 mt (in 2009), related to a substantial drop in vessel numbers (142 vessels in 2003 reduced to 75 vessels in 2009). The Korean distant-water longline fleet has also experienced a large decline in bigeye and yellowfin catches in recent years, with a corresponding drop in vessel numbers – from 184 vessels active in 2002 reduced to 108 vessels in 2009 (41% decline), although their bigeye catch for the past two years (15,239 to 17,001 mt) were relatively high for this number of vessels. The Japanese distant-water and offshore longline fleets have also experienced a substantial decline in both bigeye catches (from 21,879 mt in 2000 to 7,699 mt in 2009) and vessel numbers (683 in 2000 to 165 in 2009).

With domestic fleet sizes continuing to increase as foreign-offshore and distant-water fleets decrease (Figure 31), 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 has been balanced to some extent by the switch to targeting bigeye tuna (from albacore) by certain vessels in the distant-water Chinese-Taipei fleet. More detail on individual fleet activities during recent years is available in WCPFC–SC6 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.

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. For example, SC5 Working Paper SA WP–5 (Bigelow & Hoyle 2009) looks at the standardisation of CPUE for distant-water longline fleets targeting south Pacific albacore and SC6 Working Paper SA WP–3 (Hoyle 2010) looks at the standardisation of CPUE for bigeye and yellowfin tuna.

5.4 Geographic distribution

[Figure 33](#) shows the distribution of effort by category of fleet for the period 2000–2009.

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.

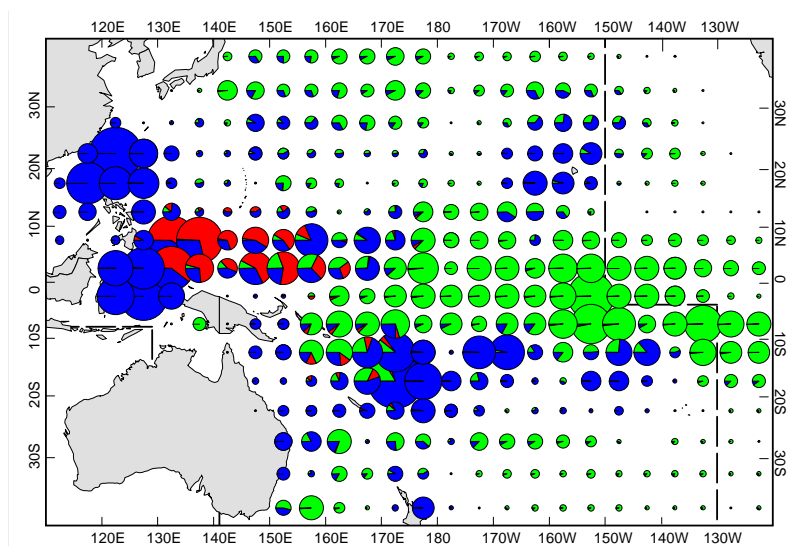


Figure 33. Distribution of longline effort for distant-water fleets (green), foreign-offshore fleets (red) and domestic fleets (blue) for the period 2000–2009.

(Note that the domestic fleet effort excludes the Japanese coastal fishery and the Vietnam fishery; distant-water effort for Chinese-Taipei and other fleets targeting albacore in the North Pacific are poorly covered; the Eastern Pacific effort is incomplete)

Activity by the **foreign-offshore fleets** from Japan, mainland China and Chinese-Taipei are 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 and Chinese-Taipei **domestic fleets** targeting yellowfin and bigeye.

The growth in **domestic fleets** in the South Pacific over the past decade has been noted; the most prominent examples are the increases in the Samoan, Fijian and French Polynesian fleets ([Figure 34](#)).

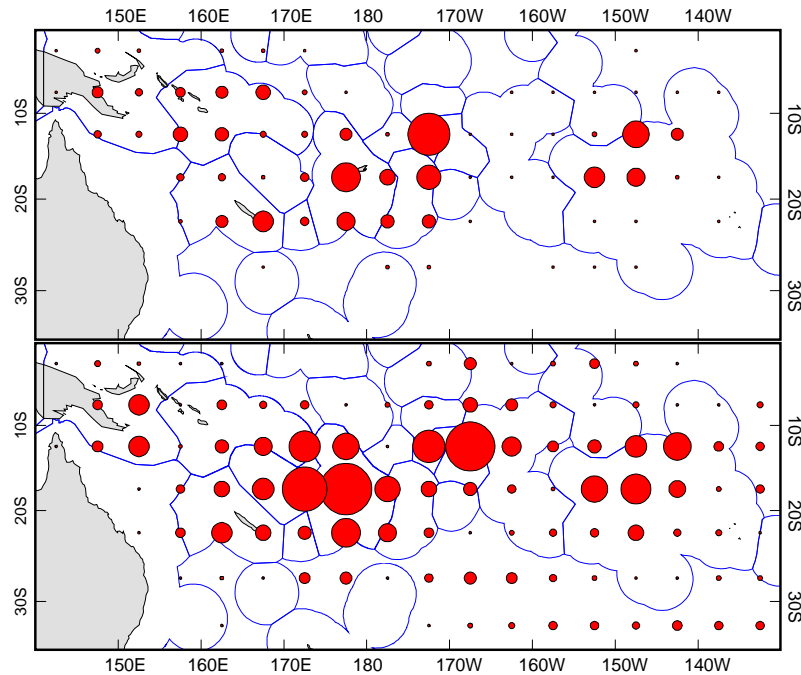


Figure 34. Distribution of south Pacific-islands domestic longline effort for 1998 (top) and 2008 (bottom).

[Figure 35](#) shows quarterly species composition by area for the period 2000–2007 and 2008 (2009 data are incomplete). 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 10°–20°S. The decline in bigeye catches over recent years is evident when comparing the 2000–2007 quarterly averages ([Figure 35–left](#)) with the 2008 catches ([Figure 35–right](#)).

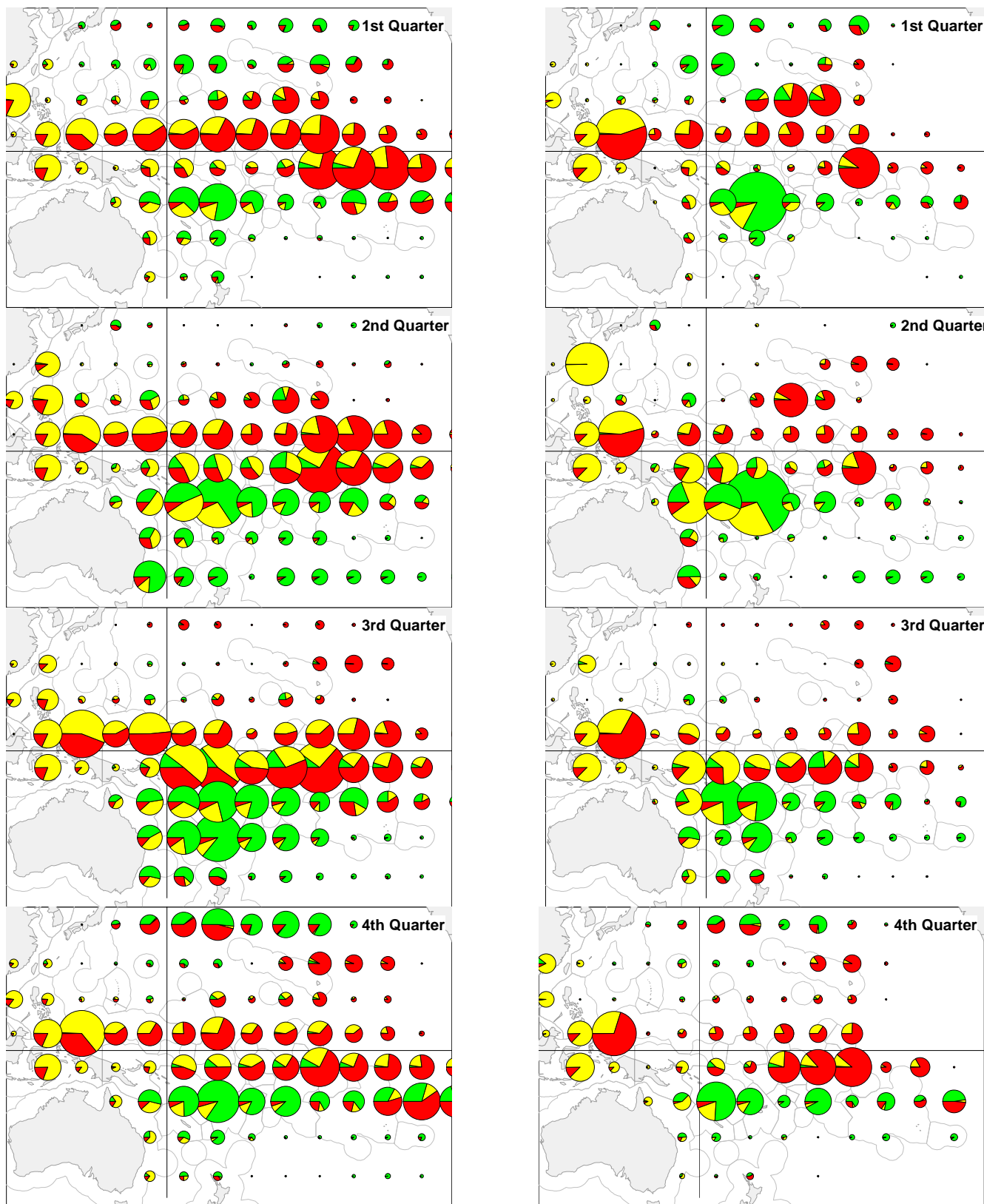


Figure 35. Quarterly distribution of longline tuna catch by species, 2000-2007 (left) and 2008 (right)
 (Yellow–yellowfin; Red–bigeye; Green–albacore)

(Note that the domestic fleet effort excludes the Japanese coastal fishery and the Vietnam fishery; catches from some distant-water fleets targeting albacore in the North Pacific and Bigeye/Yellowfin in the Eastern Pacific may not be fully covered)

5.5 Economic overview of the longline fishery

5.5.1 Price trends – Yellowfin

Longline caught yellowfin prices (ex-vessel) landed at Yaizu dropped by 3% to 616 JPY/kg and average fresh yellowfin prices (ex-vessel) at selected Japanese ports also dropped 3% to 634 JPY/kg.

Fresh yellowfin import prices (c.i.f.) dropped 9% to 788 JPY/kg, however, in US\$ terms there was a rise as a result of the depreciation of the US\$ against the JPY with prices rising by 1% to US\$8.41/kg. Japanese import prices for fresh yellowfin sourced from Oceania declined 9% to 846 JPY/kg (US\$9.04/kg).

Japanese imports¹¹ of fresh yellowfin have steadily declined since 2001. Japanese imports of fresh yellowfin were stable at slightly more than 15,600Mt in 2009 and at their lowest level in recent years. After a sharp decline of 35% in 2005, Japanese imports of fresh yellowfin from Oceania recovered in 2006 by 22% to 5,003Mt but declined again in the next two years. These imports declined further by 13% to 3,103Mt in 2009. US fresh yellowfin import volumes declined by 4% to 15,904Mt in 2009 while prices (f.a.s.) declined 3% to US\$7.91/kg.

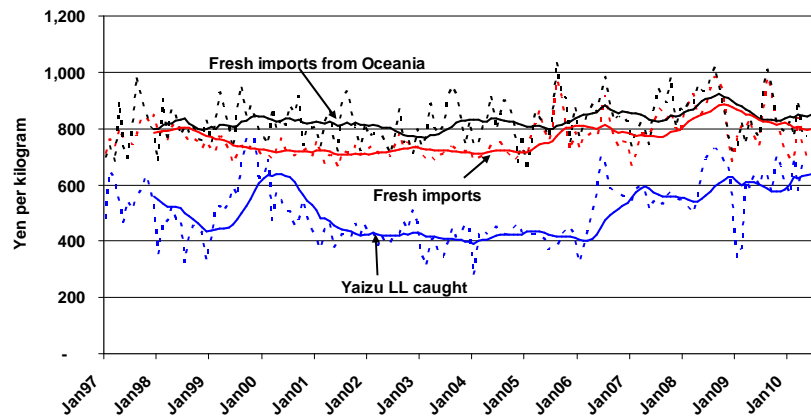


Figure 36. Yellowfin prices on Japanese markets; fresh imports (c.i.f.), fresh imports from Oceania (c.i.f.) and Yaizu longline caught (ex-vessel)

(Monthly price given by dashed lines, 12 month moving average price given by solid line)
Sources: Ministry of Finance (www.customs.go.jp), FFA Tuna Industry Advisor, and US National Marine and Fisheries Service (swr.nmfs.noaa.gov)

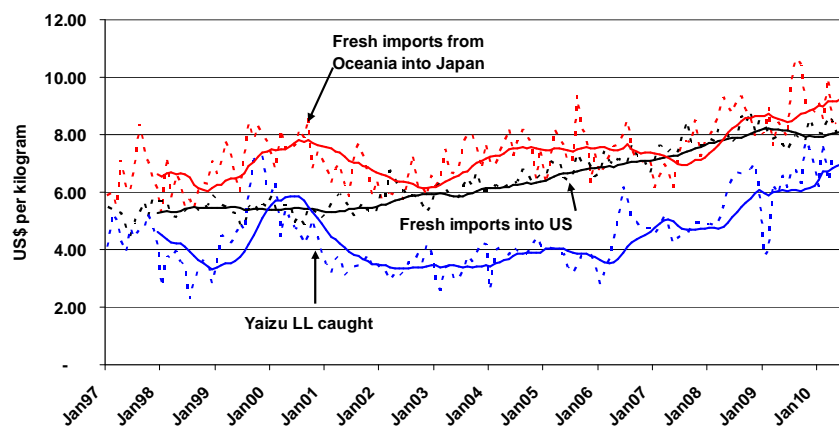


Figure 37. Yellowfin prices in US\$: US fresh imports, Japanese fresh imports from Oceania (c.i.f.) and Yaizu longline caught (ex-vessel)

(Monthly price given by dashed lines, 12 month moving average price given by solid line)
Sources: Ministry of Finance (www.customs.go.jp), FFA Tuna Industry Advisor, and US National Marine and Fisheries Service (swr.nmfs.noaa.gov)

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

5.5.2 Price trends – Bigeye

Frozen bigeye prices (ex-vessel) at selected major Japanese ports rose 4% in 2008 to 895JPY/kg while fresh bigeye prices (ex-vessel) declined 16% to 986JPY/kg.

Japan fresh bigeye import prices (c.i.f.) declined 7% to 844JPY/Kg while frozen bigeye import prices (c.i.f.) declined 8% to 684JPY/kg. In US\$ terms, fresh bigeye import prices were up to US\$9.01/kg while frozen bigeye import prices rose 26% to US\$7.31/kg.

Import volumes of fresh bigeye marginally rose 1% in 2009 to 15,269Mt of which 3,317Mt was sourced from the Oceania region. Average prices for fresh bigeye from Oceania declined 5% to 978JPY/kg (US\$10.45/kg).

US fresh bigeye import volumes rose 7% to 5,459Mt while prices (f.a.s.) rose 1% to US\$7.64/kg.

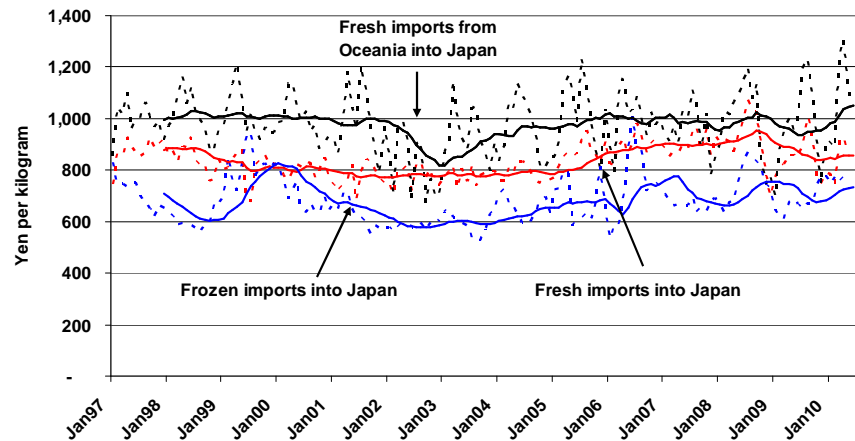


Figure 38. Bigeye prices on Japanese markets; fresh imports (c.i.f.), fresh imports from Oceania (c.i.f.) and frozen imports (ex-vessel)

(Monthly price given by dashed lines, 12 month moving average price given by solid line)
Sources: Ministry of Finance (www.customs.go.jp), FFA Tuna Industry Advisor, and US National Marine and Fisheries Service (swr.nmfs.noaa.gov)

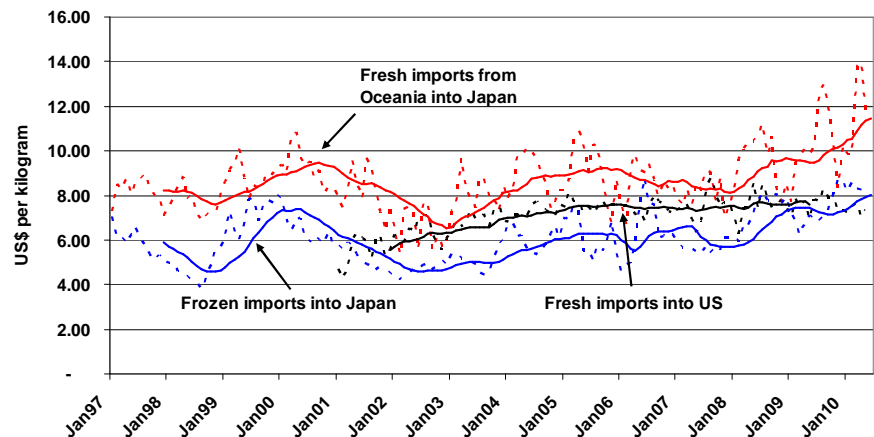


Figure 39. Bigeye prices in US\$: US fresh imports, Japanese fresh imports from Oceania (c.i.f.) and Japanese frozen imports from Oceania (c.i.f.)

(Monthly price given by dashed lines, 12 month moving average price given by solid line)
Sources: Ministry of Finance (www.customs.go.jp), FFA Tuna Industry Advisor, and US National Marine and Fisheries Service (swr.nmfs.noaa.gov)

5.5.4 Price trends – Albacore

The Bangkok albacore market price (10kg and up, c&f) averaged US\$2,653/Mt in 2009 up 7% from the 2008 average and up 25% from the 2007 average. Prices throughout the year were steady in the range between US\$2,500/Mt and US\$2,800/Mt according to FFA databases¹². During the first half of 2010, Bangkok albacore prices fluctuated within a slightly lower range between US\$2,400/Mt and US\$2,600/Mt.

Thai imports of frozen albacore in 2009 rose 20% to 39,546Mt that more reversed the decline of 7% observed in 2008. Average prices improved by 7% to US\$2,621/Mt (2.62/kg) from US\$2,448/Mt (US\$2.45/kg).

¹² Data for Bangkok albacore market prices (10kg and up, c&f) held at the FFA dates back to 8 June 2001.

The US import volume of fresh albacore in 2009 totaled 718Mt, a 10% increase compared to 2008. The US price for fresh albacore rose 2% to US\$4.27/kg while prices for fresh landings at selected Japanese ports declined by 5% to US\$2.97/kg that in part reflected the 24% increase in the volume of landings to more than 40,000Mt.

5.5.5 Value of the longline catch

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 2009 was obtained (Figures 41–44). In deriving these estimates certain assumptions were made due to data and other constraints that may or may not be valid and as such caution is urged in the use of these figures.¹³

The estimated delivered value of the longline tuna catch in the WCPFC area for 2009 is US\$1,301 million. This represents an increase of US\$48 million on the estimated value of the catch in 2008. The value of the albacore catch increased by US\$42 million (22%) while the value of the bigeye catch decreased by US\$23 million (-4%) and the value of the yellowfin catch increased by \$US29 million (6%). The albacore catch was estimated to be worth US\$232 million in 2009 with the 22% increase being driven by a 6% increase in the composite price and a 15% increase in catch. The bigeye catch was estimated to be worth US\$583 million in 2009 with the 4% decline accounted for by a 10% drop in catch which more than offset the impact of the 7% increase in the composite price. The estimated delivered value of the yellowfin catch was US\$486 million accounted for solely by the 6% increase in catch as the composite price was basically unchanged (-<1%).

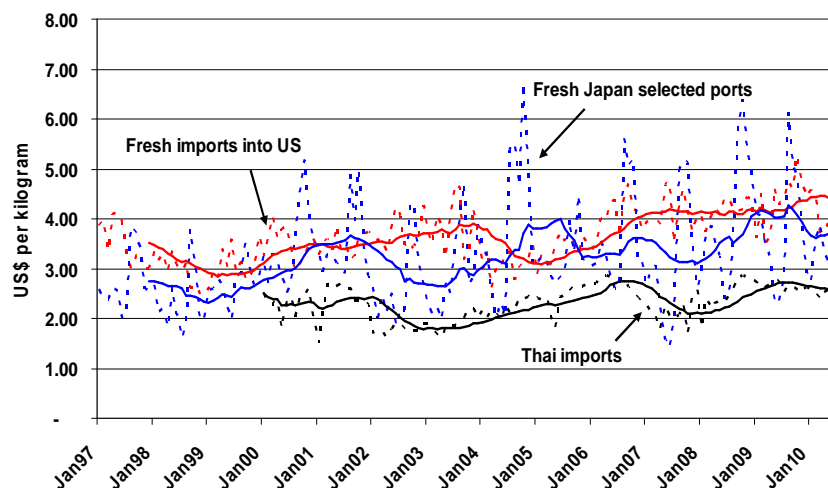


Figure 40. Albacore prices in US\$: US fresh imports (f.a.s), fresh landings at selected Japanese ports and Thai frozen imports (c.i.f.)

(Monthly price given by dashed lines, 12 month moving average price given by solid line)
Sources: Thai Customs (www.customs.go.th), FFA Tuna Industry Advisor, and US National Marine and Fisheries Service (swr.nmfs.noaa.gov)

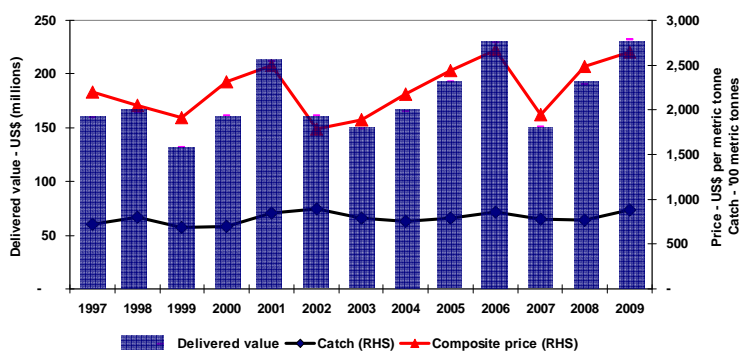


Figure 41. Albacore in the WCPFC longline fishery – Catch, delivered value of catch and composite price

¹³ For the yellowfin and bigeye caught by fresh longline vessels it is assumed that 80% of the catch is of export quality and 20% is non-export quality. For export quality the annual prices for Japanese fresh yellowfin and bigeye imports from Oceania are used, while it is simply assumed that non-export grade tuna attracted US\$1.50/kg throughout the period 1995-2005. For yellowfin caught by frozen longline vessels the delivered price is taken as the Yaizu market price for longline caught yellowfin. For bigeye caught by frozen longline vessels the delivered price is taken as the frozen bigeye price at selected major Japanese ports. For albacore caught by fresh and frozen longline vessel the delivered prices is taken as the Thai import price. The frozen longline catch is taken to be the catch from the longline fleets of Japan and Korea and the distant water longline fleet of Chinese Taipei.

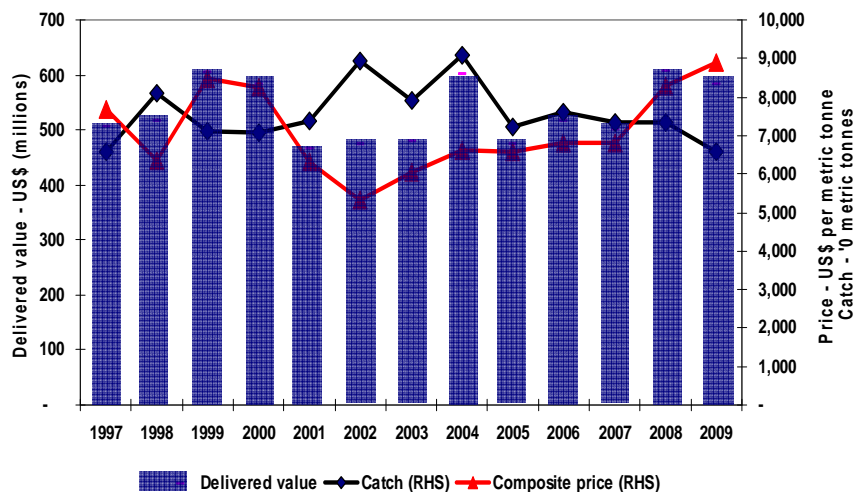


Figure 42. Bigeye in the WCPFC longline fishery – Catch, delivered value of catch and composite price

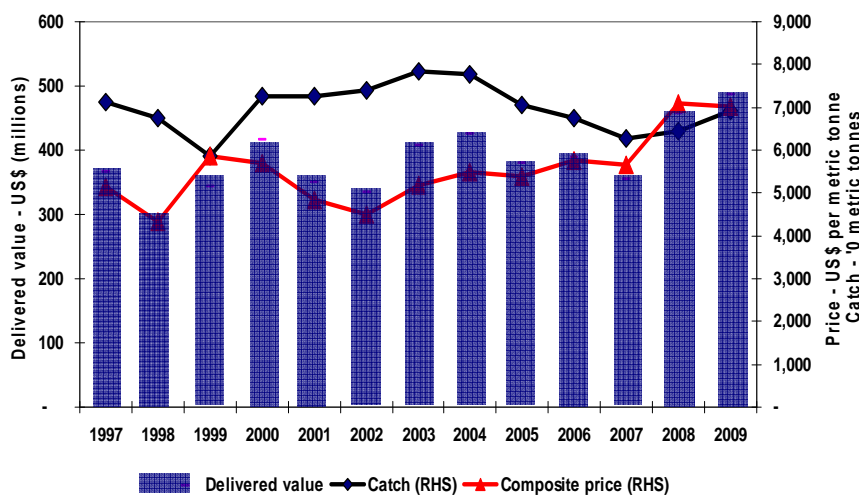


Figure 43. Yellowfin in the WCPFC longline fishery – Catch, delivered value of catch and composite price

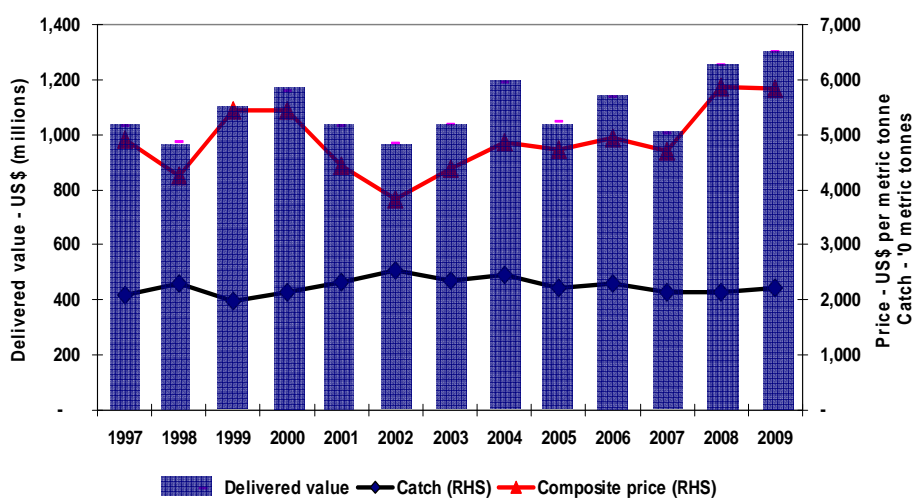


Figure 44. All tuna in the WCPFC longline fishery – Catch, delivered value of catch and composite price

6 SOUTH-PACIFIC TROLL FISHERY

6.1 Overview

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

The fishery expanded following the development of the STCZ fishery after 1986, with the highest catch attained in 1989 (8,370 mt). In recent years, catches have declined to below 3,000 mt, a catch level which has been exceeded 1987. 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.

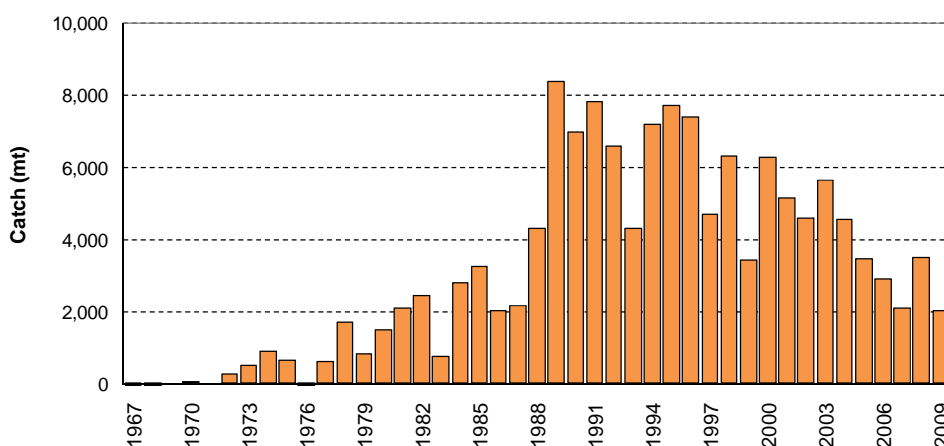


Figure 45. Troll catch (mt) of albacore in the south Pacific Ocean

6.2 Provisional catch estimates (2009)

The 2009 troll albacore catch (2,027 mt) was the lowest since 1986, and was apparently due to poor catches experienced in the New Zealand domestic fishery. The New Zealand troll fleet (165 vessels catching 1,790 mt in 2009) and the United States troll fleet (4 vessels catching 237 mt in 2009) typically account for most of the albacore troll catch, with minor contributions coming from the Canadian, the Cook Islands and French Polynesian fleets.

Effort by the South Pacific albacore troll fleets is concentrated off the coast of New Zealand and across the Sub-Tropical Convergence Zone (STCZ). [Figure 46](#) shows the continued reduction in effort by the US troll fleet in the STCZ in recent years (US troll fleet aggregate data covering complete 2008/2009 activities have yet to be provided).

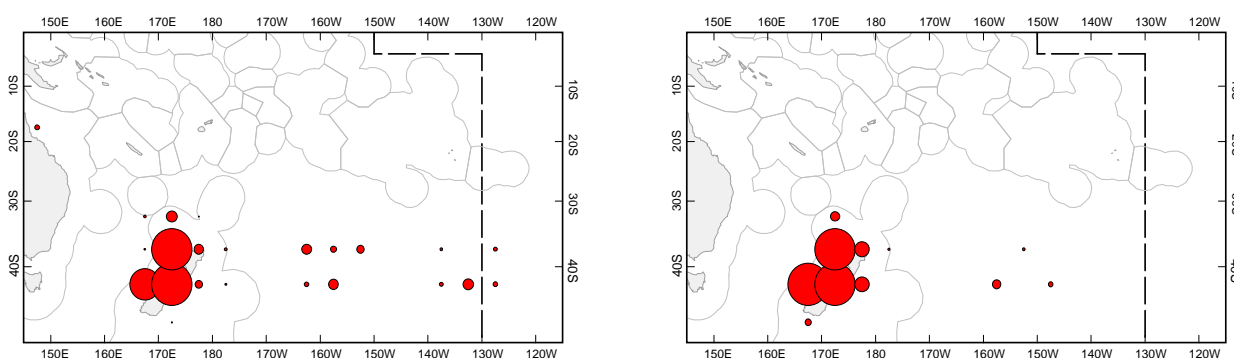


Figure 46. Distribution of South Pacific troll effort during 2007 (left) and 2008 (right)

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 1.2 million mt in eight of the last nine years (Figure 47). 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 WCP-CA pole-and-line catch was the lowest since 1963). 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 now make up 20–25% of the total skipjack catch in WCP-CA in recent years).

The 2009 WCP-CA skipjack catch of 1,789,979 mt was the highest on record (nearly 120,000 mt higher than the previous record in 2007). As has been the case in recent years, the main determinant in the overall catch of skipjack is catch taken in the **purse seine** fishery (1,585,307 mt in 2009 – 89%). A declining proportion of the catch was taken by the **pole-and-line** gear (115,157 mt – 6%) and the “**unclassified**” gears in the domestic fisheries of Indonesia, Philippines and Japan (~83,762 mt – 5%). The **longline** fishery accounted for less than 1% of the total catch.

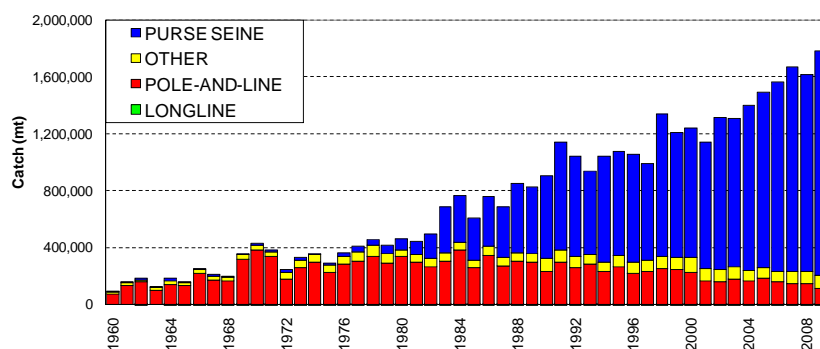


Figure 47. WCP-CA skipjack catch (mt) by gear

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 48). 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.

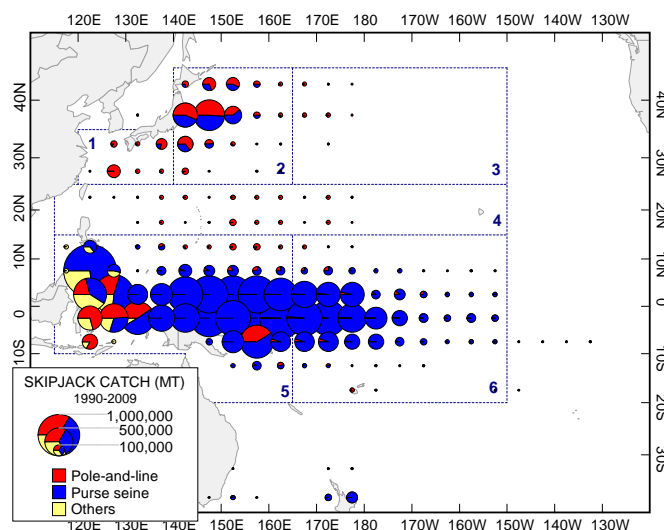


Figure 48. Distribution of skipjack tuna catch, 1990–2009.

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

The Philippines and Indonesian domestic fisheries account for most of the skipjack catch in the 20–40 cm size range which represents a significant proportion of the WCP-CA skipjack catch, in terms of numbers of fish (Figure 49).

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 50). There was a greater proportion of medium-large (60–80 cm) skipjack caught in the purse seine fishery during 2005 (unassociated, free swimming school sets account for most of the large skipjack). In contrast, the WCP-CA skipjack purse-seine catch in 2004, 2007 and 2009 comprised younger fish, mainly from associated schools. There was a strong mode of skipjack at 48cm from associated sets during 2009, but also a pulse of larger fish >70 cm from unassociated sets.

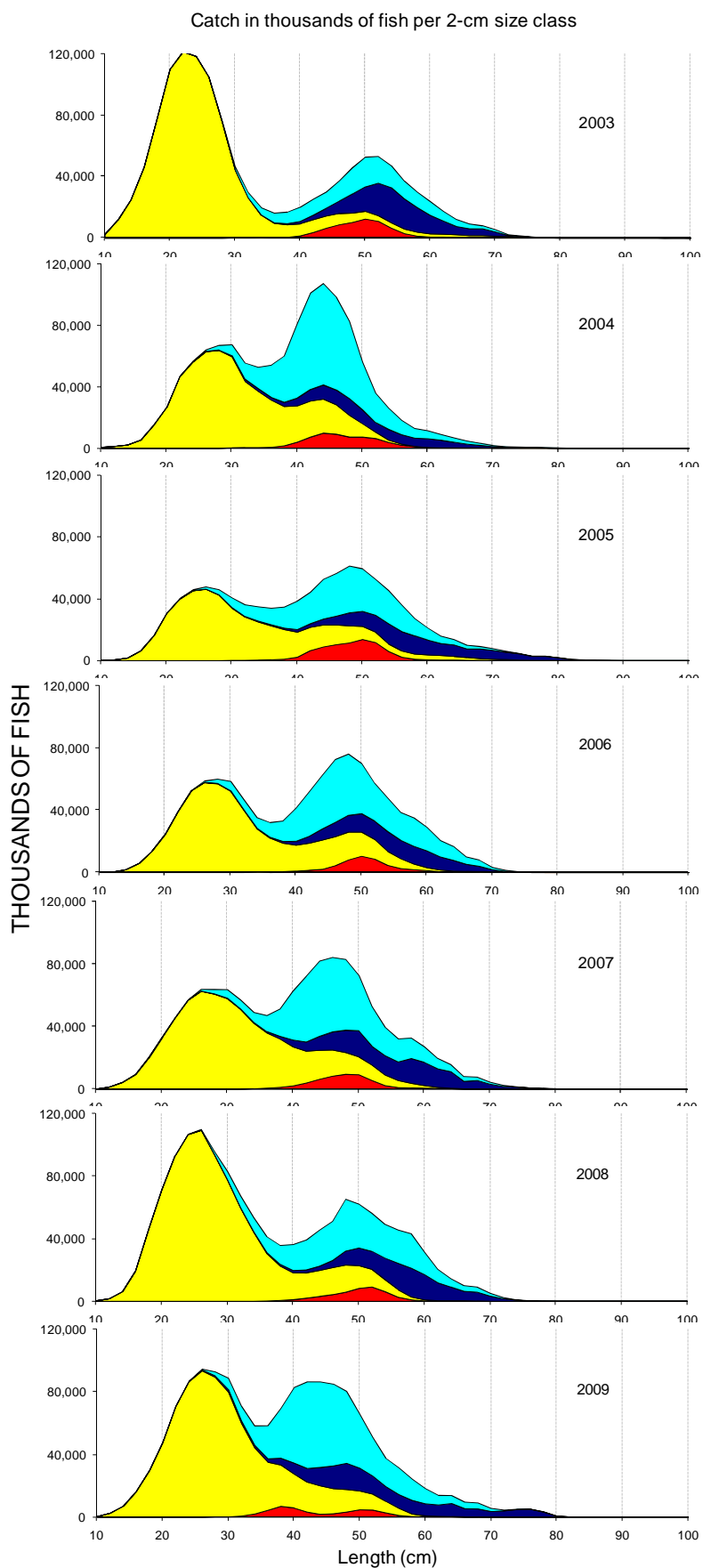


Figure 49. Annual catches (numbers of fish) of skipjack tuna in the WCPO by size and gear type, 2003–2009. (red–pole-and-line; yellow–Phil-Indo fisheries; light blue–purse seine associated; dark blue–purse seine unassociated)

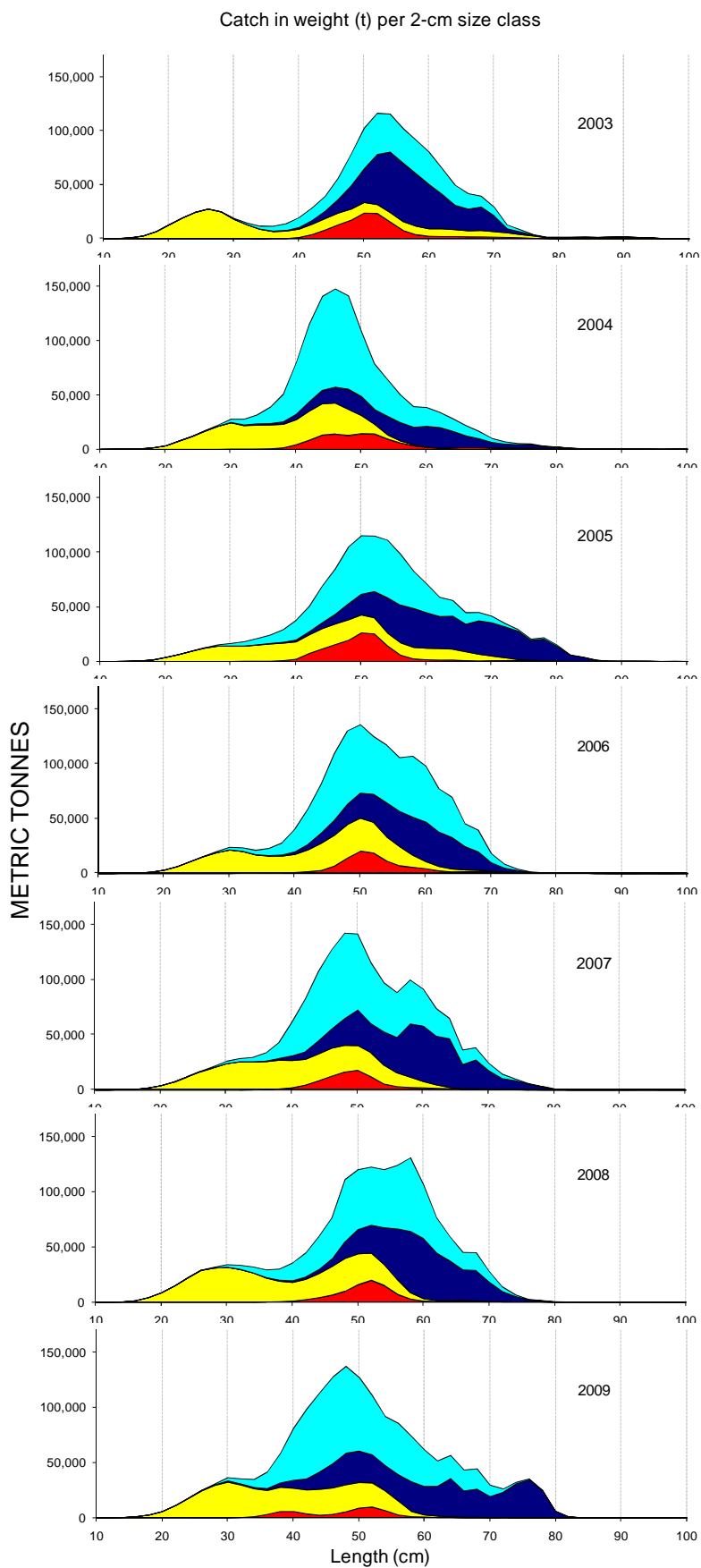


Figure 50. Annual catches (metric tonnes) of skipjack tuna in the WCPO by size and gear type, 2003–2009.

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

7.2 YELLOWFIN

Since 1997, the total yellowfin catch in the WCP-CA has been generally between 400,000–470,000 mt (Figure 51). The 1998 catch (430,024 mt) was the largest at that time and followed two years after an unusually low catch in 1996; the poor yellowfin catch experienced in the purse-seine fishery during 1996 was reflected in the age class that had recruited to the longline fishery by 1999 (which was a relatively poor catch year in that fishery).

Yellowfin catches in recent years have been the highest on record, primarily due to increased effort and catches in the purse seine fishery. The 2008 yellowfin catch (547,985 mt) was clearly the highest on record and was primarily attributed to the record catch in the **purse-seine** fishery (386,293 mt – 70% of the total yellowfin tuna catch). The WCP-CA yellowfin catch dropped by 115,000 mt in 2009 (433,788 mt) as result of a decline in the **purse-seine** fishery (264,787 mt).

The remainder of the yellowfin tuna catch comes from the pole-and-line fishery and the domestic Indonesian and Philippines “other” gears. In recent years, the yellowfin **longline** catch has ranged from 75,000–82,000 mt, which is well 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 and the gradual reduction in the number of distant-water vessels. The WCP-CA **longline** catch for 2009 was similar to the average catch level over the period 2000–2009. However, in recent years, the **purse-seine** catch of yellowfin tuna has attained a level of about four times the **longline** catch (69,516 mt in 2009 – 13%).

The recent high catches of yellowfin experienced in the EPO (annual catches of over 400,000 mt for 2001–2003) dropped to 280,000–290,000 in 2004 and 2005, and have further declined to 177,000–195,000 mt in recent years, a level not experienced since the mid-1980s. Declines in catches in both the EPO purse-seine and longline fisheries are apparent since 2003. The EPO yellowfin tuna catch in 2009 (241,822 mt) seems to have recovered slightly, mainly due to higher purse-seine catches as compared to recent years.

The **pole-and-line** fisheries took 14,159 mt (3% of the total yellowfin catch) during 2009, and ‘**other**’ category accounted for ~86,000 mt (20%). 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

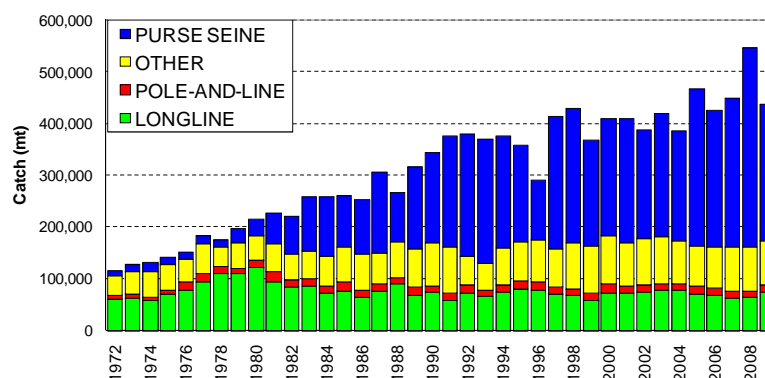


Figure 51. WCP-CA yellowfin catch (mt) by gear

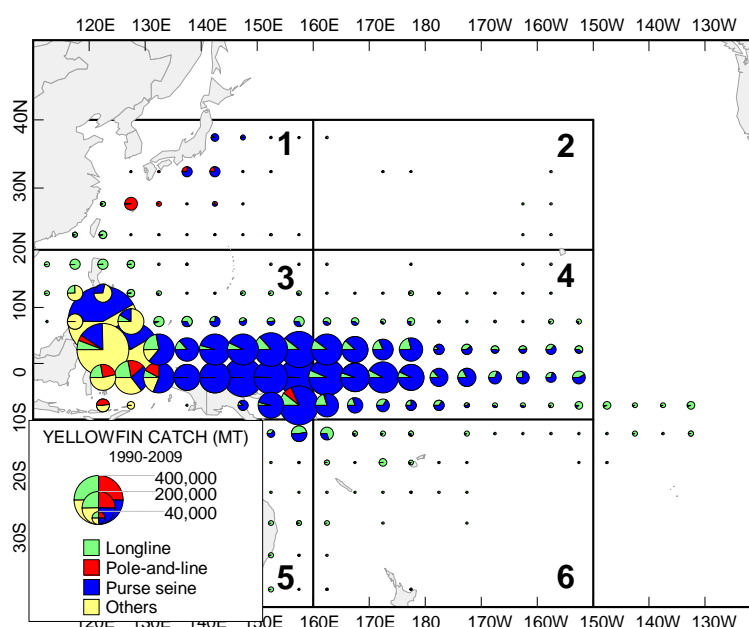


Figure 52. Distribution of yellowfin tuna catch in the WCP-CA, 1990–2009.

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

the domestic fisheries of the Philippines and eastern Indonesia¹⁴. [Figure 52](#) shows the distribution of yellowfin catch by gear type for the period 1990–2008 (data for 2009 are incomplete). 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.

The domestic surface fisheries of the Philippines and Indonesia take large numbers of small yellowfin in the range of 20–50 cm ([Figure 53](#)). 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 usually higher than the longline catch. This is clearly the case in 2008, where exceptional catches of large yellowfin in the size range 120–130 cm were experienced in the purse seine fishery (see [Figure 54 – 2008](#)). Inter-annual variability in the size of yellowfin taken exists in all fisheries. For example, the relatively high proportion of yellowfin taken from associated purse-seine sets during 2005 corresponds to a strong recruitment, with the age class of fish taken in this year present as a “peak” of larger fish taken in the purse seine unassociated sets and longline fishery during 2006, 2007 and possibly again in 2008 purse seine catch. The strong mode of large (130–150cm) yellowfin from (purse-seine) unassociated-sets in 2008 corresponds to the good catches experienced in the central areas of the tropical WCP-CA ([Figure 15–right](#)). The purse seine fishery experienced relatively poor catches of yellowfin during 2004 and 2009, 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), especially when contrasted with the 2008 purse-seine catch levels.

¹⁴ 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.

Catch in thousands of fish per 2-cm size class

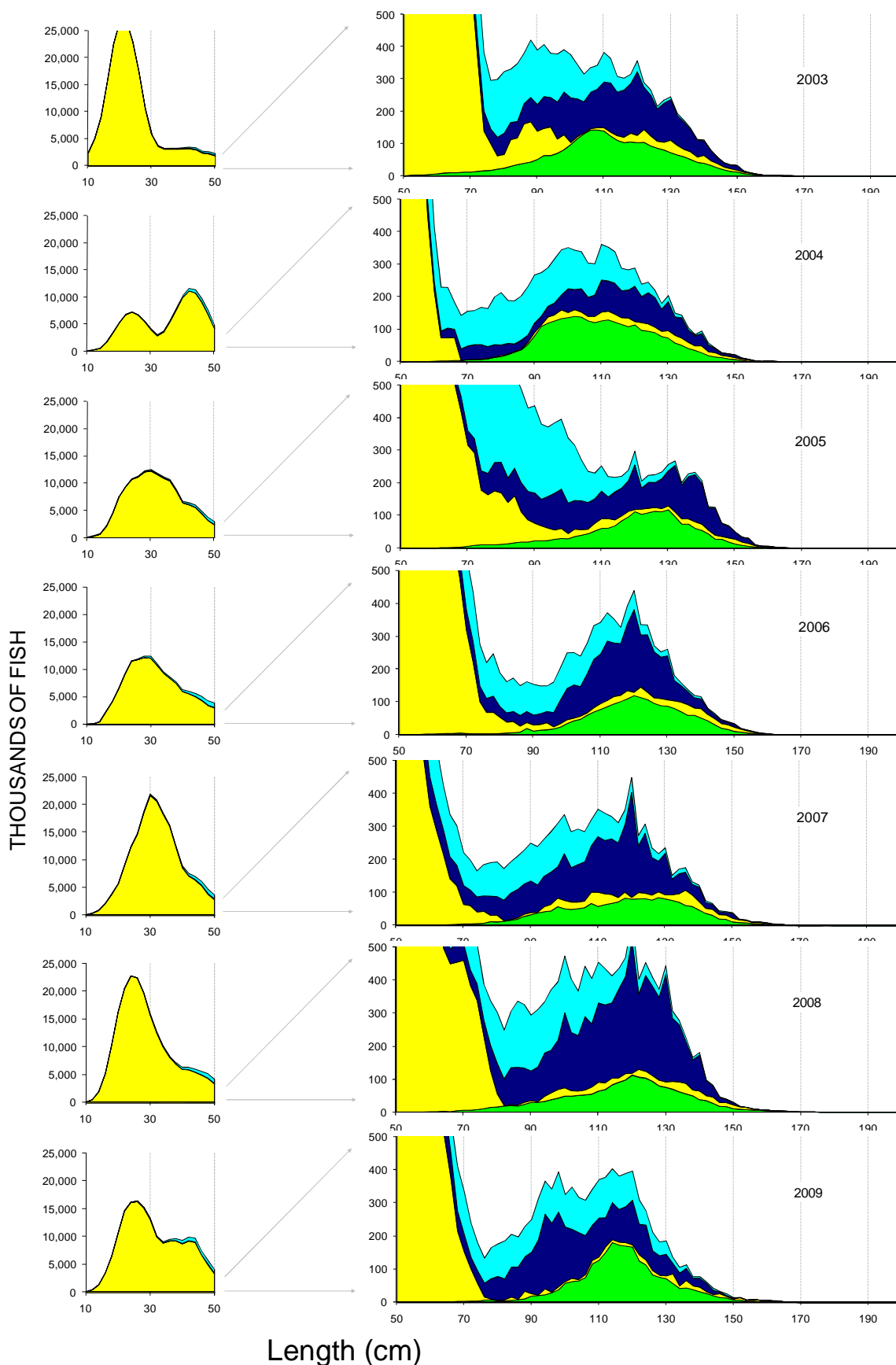


Figure 53. Annual catches (in number of fish) of yellowfin tuna in the WCPO by size and gear type, 2003–2009.
 (green–longline; yellow–Phil-Indo fisheries; light blue–purse seine associated; dark blue–purse seine unassociated)

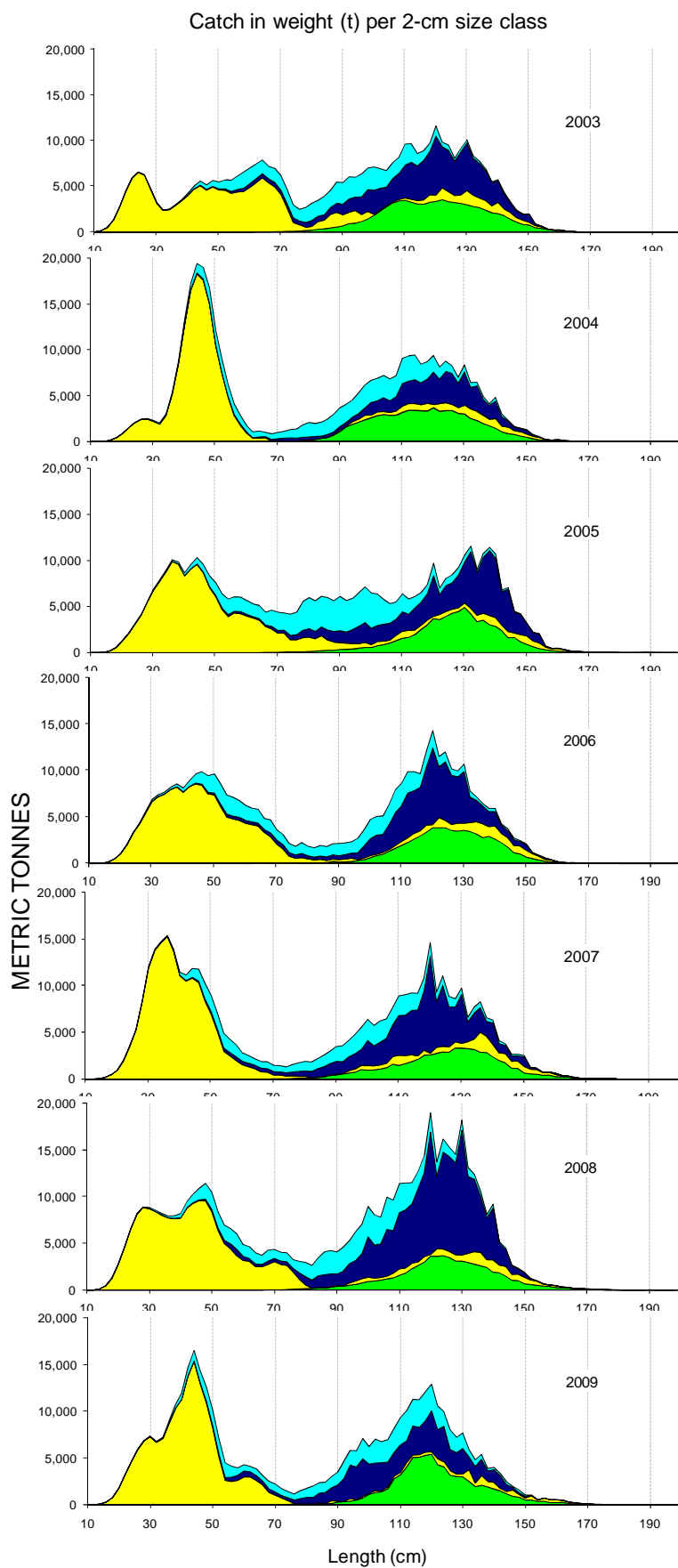


Figure 54. Annual catches (in metric tonnes) of yellowfin tuna in the WCPO by size and gear type, 2003–2009.

(green–longline; yellow–Phil-Indo 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 260,000 mt ([Figure 55](#)), with Japanese longline vessels generally contributing over 80% of the catch until the early 1990s. The 2009 bigeye catch for the **Pacific Ocean** (215,916 mt) is lower than the average level for the past ten years.

The **purse-seine** catch in the **EPO** (76,513 mt in 2009) continues to account for a significant proportion (74%) of the total EPO bigeye catch. The provisional 2009 EPO longline bigeye catch estimate (27,935 mt), together with the 2008 catch (25,624 mt) were the lowest since 1960, reflecting, to some extent, the reduction in effort by the Asian fleets. However, the EPO catch estimates are acknowledged to be preliminary¹⁵ and may increase when more data become available.

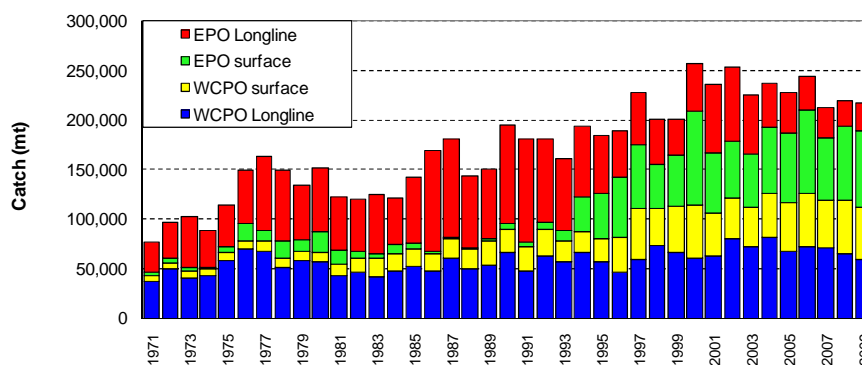


Figure 55. Pacific bigeye catch (mt) by gear
(excludes catches by "other" gears)

The **WCP-CA longline** bigeye catches have fluctuated between 70,000–98,000 mt since 1999, but the 2009 catch (65,606 mt) is the lowest since 1996. The provisional **WCP-CA purse seine** bigeye catch for 2009 was estimated to be 43,580 mt which is slightly lower than the highest on record, taken in 2008 (44,457 mt) ([Figure 56](#)). However, this estimate may change since there is a substantial amount of 2009 observer data, which is used to estimate the purse-seine bigeye catch, yet to be received and processed.

The **WCP-CA pole-and-line** fishery has generally accounted for between 2,800–6,700 mt (3-5%) of bigeye catch annually over the past decade. The **"other"** category, representing various gears in the Philippine, Indonesian¹⁶ and Japanese domestic fisheries, has accounted for an estimated 4,000–8,000 mt (4–6% of the total WCP-CA bigeye catch) in recent years.

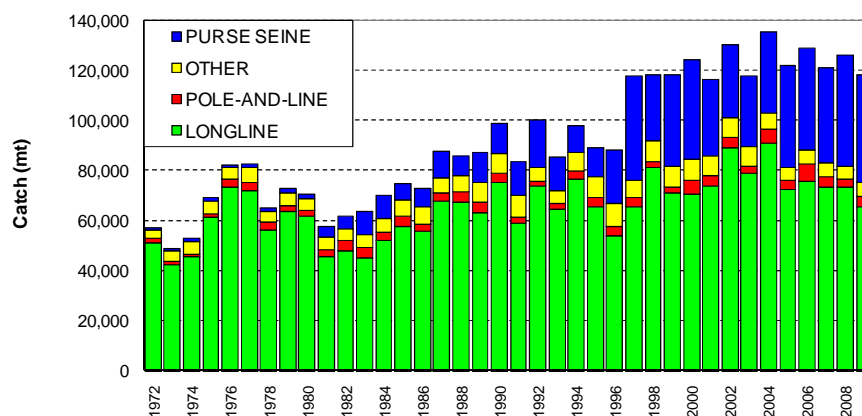


Figure 56. WCP-CA bigeye catch (mt) by gear

[Figure 57](#) shows the spatial distribution of bigeye catch in the Pacific for the period 1990–2009. The majority of the WCP-CA catch is taken in equatorial areas, both by purse seine and longline, but with some longline catch in sub-tropical areas (e.g. east of Japan and off the east coast of Australia). In the equatorial areas, much of the longline catch is taken in the central Pacific, continuous with the important traditional bigeye longline area in the eastern Pacific.

¹⁵ Catch estimates for the EPO longline fishery for 2007-2009 and the EPO purse seine fishery for 2008-2009 are preliminary

¹⁶ Indonesia has recently revised the proportion of catch by species for their domestic fisheries which has resulted in differences in species composition by gear type since 2000 compared to what has been reported in previous years.

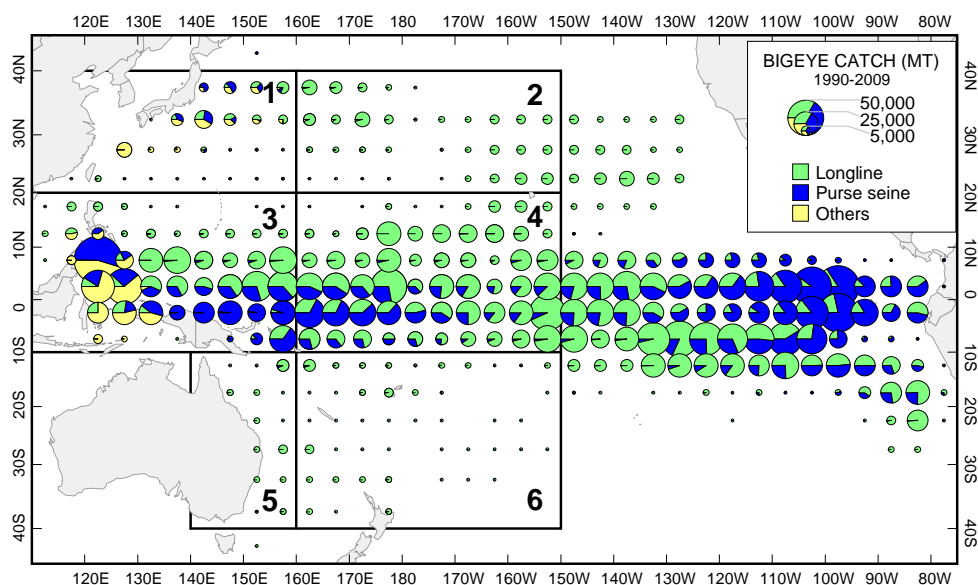


Figure 57. Distribution of bigeye tuna catch, 1990–2009.
 The six-region spatial stratification used in stock assessment for the WCP–CA is shown.
 Bigeye longline catches in the Eastern Pacific may not be fully covered

As with skipjack and yellowfin tuna, the domestic surface fisheries of the Philippines and Indonesia take large numbers of small bigeye in the range 20–60 cm (Figure 58). The longline fishery clearly accounts for most of the catch (by weight) of large bigeye in the WCP–CA (Figure 58). 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 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. The age class of bigeye taken by associated purse seine sets in the size range 50–55 cm during 2004 and around 70 cm in 2005, are probably represented as the clear mode of fish at size 105–110 cm in the longline fishery in 2006, and modes of larger fish in subsequent years. The clear mode of fish in the size range of 45–50 cm from the purse seine associated and Philippines/Indonesian domestic surface fisheries in 2009 suggests a strong year-class potentially coming through the WCP–CA fisheries over the next few years.

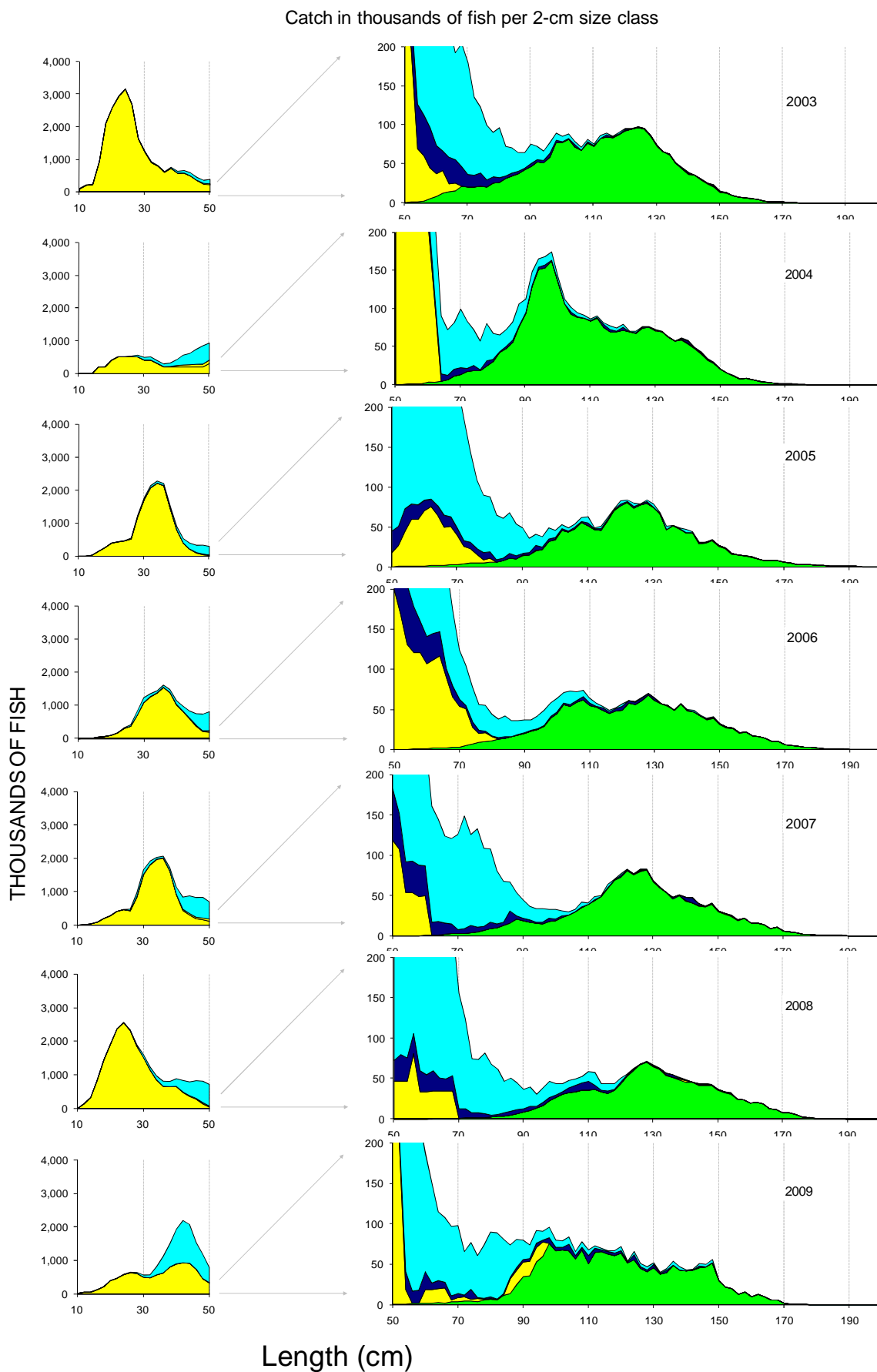


Figure 58. Annual catches (numbers of fish) of bigeye tuna in the WCPO by size and gear type, 2003–2009.

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

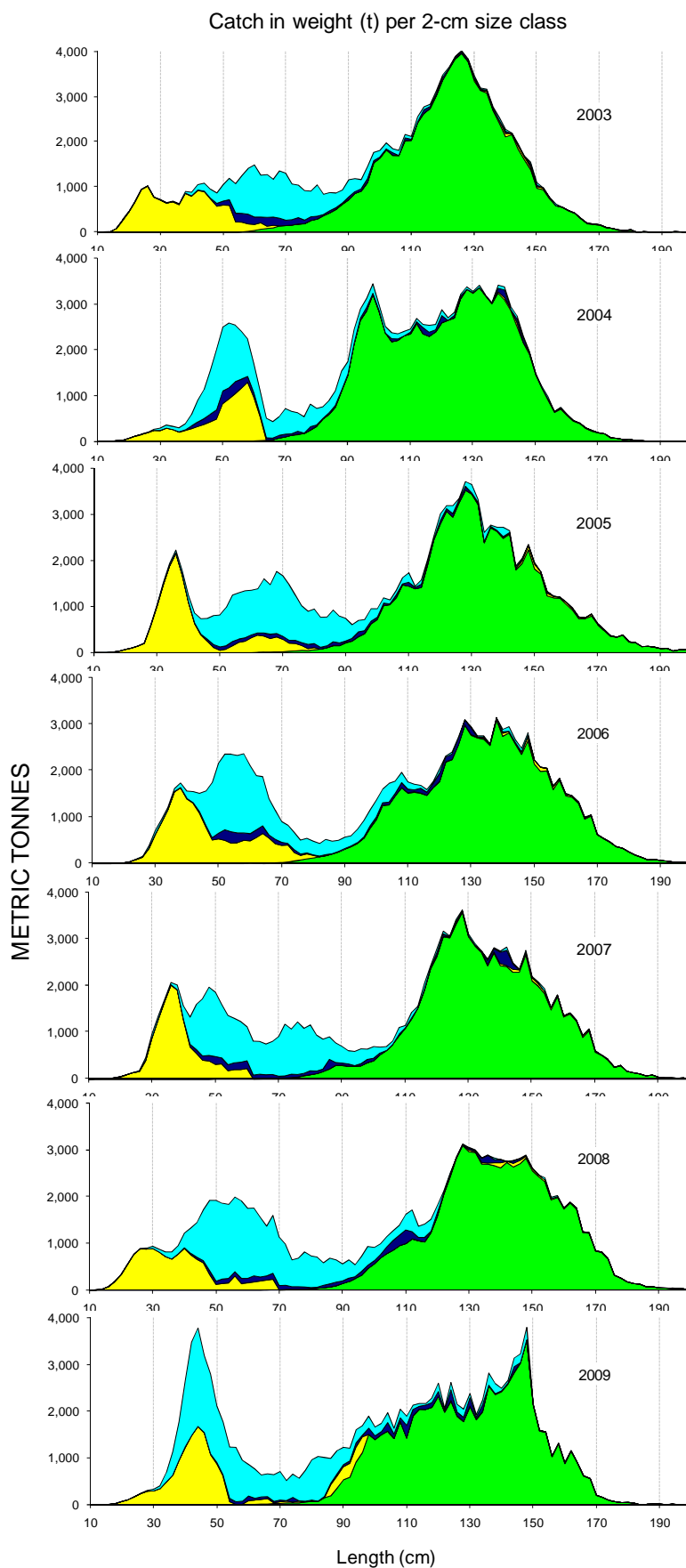


Figure 59. Annual catches (metric tonnes) of bigeye tuna in the WCPO by size and gear type, 2003–2009.
 (green—longline; yellow—Phil-Indo fisheries; light blue—purse seine associated; dark blue—purse seine unassociated)

7.4 SOUTH PACIFIC ALBACORE

Prior to 2001, south Pacific albacore catches were generally in the range 25,000–44,000 mt, although a significant peak was attained in 1989 (49,076 mt), when driftnet fishing was in existence. Since 2001, catches have greatly exceeded this range, primarily as a result of the growth in several Pacific Islands domestic longline fisheries. The **south Pacific** albacore catch in 2009 (66,996 mt) was the highest on record (slightly higher than the previous record in 2006 at 65,798 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 60), but has declined to <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 2009 (125,479 mt) was the second highest on record (after 147,782 mt in 2002), mainly due to large longline fishery catches.

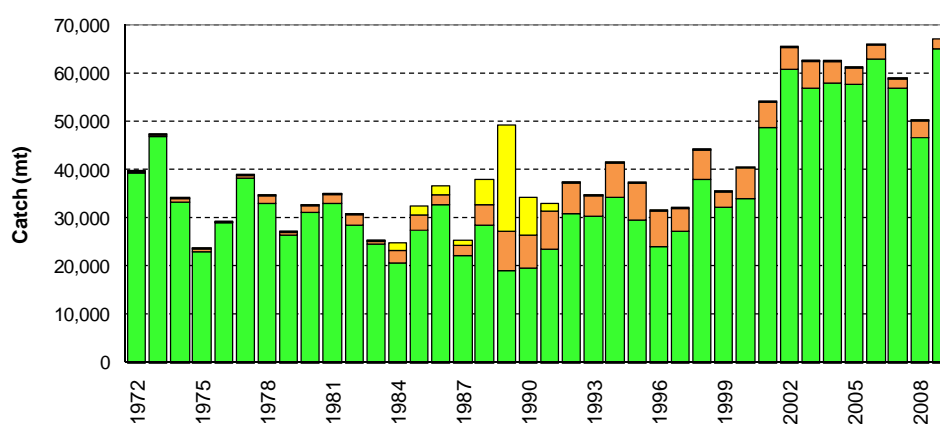


Figure 60. South Pacific albacore catch (mt) by gear ("Other" is primarily catch by the driftnet fishery.)

The longline catch of albacore is distributed over a large area of the south Pacific (Figure 61), but concentrated in the west. The Chinese-Taipei distant-water longline fleet catch is taken in all three 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.

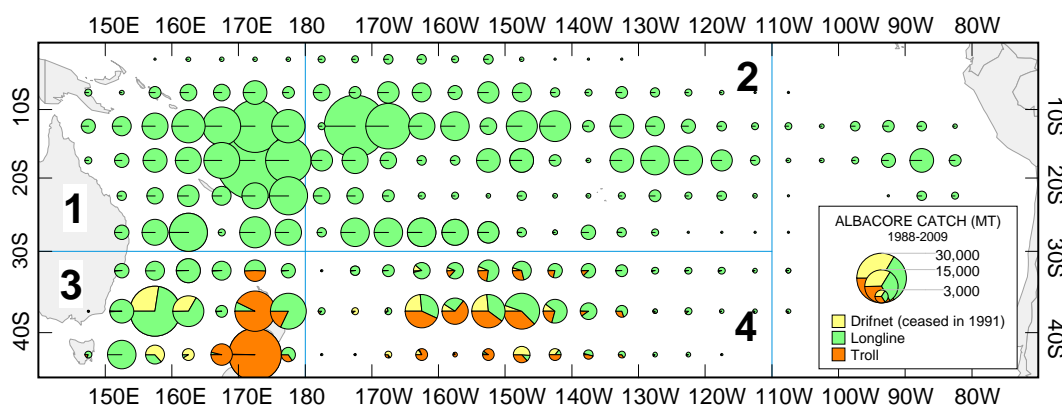


Figure 61. Distribution of South Pacific albacore tuna catch, 1988–2009.

The four-region spatial stratification used in stock assessment is shown.
Albacore longline catches in the Eastern Pacific may not be fully covered by these data

The longline fishery take adult albacore generally in the narrow size range of 90–105cm and the troll fishery takes juvenile fish in the range of 45–80cm (Figure 62 and Figure 63). Juvenile albacore also appear in the longline catch from time to time (e.g. fish in the range 60–70cm sampled in the longline catch during 2003 and 2005).

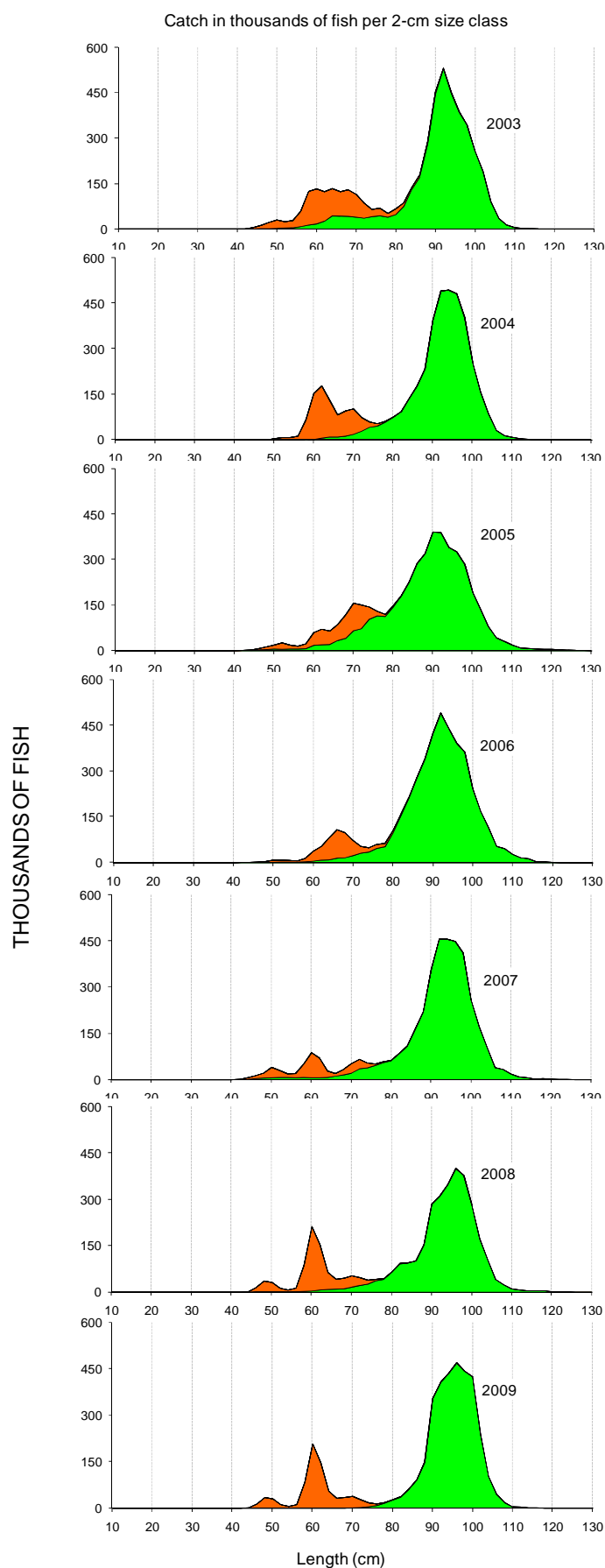


Figure 62. Annual catches (number of fish) of albacore tuna in the South Pacific Ocean by size and gear type, 2003–2009. (green–longline; orange–troll); 2008 troll size data carried over to 2009

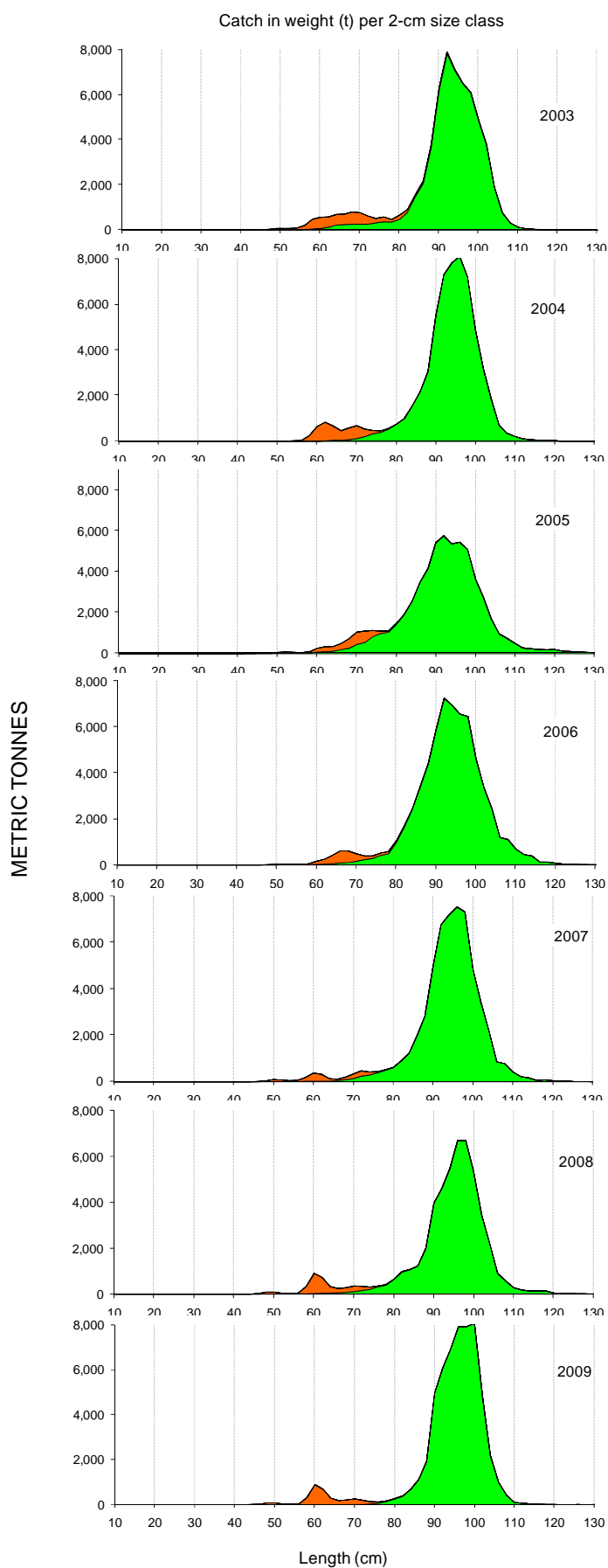


Figure 63. Annual catches (metric tonnes) of albacore tuna in the South Pacific Ocean by size and gear type, 2003–2009. (green–longline; orange–troll); 2008 troll size data carried over to 2009

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