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**OVERVIEW OF TUNA FISHERIES IN THE WESTERN AND CENTRAL PACIFIC OCEAN,  
INCLUDING ECONOMIC CONDITIONS – 2006**

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**WCPFC-SC3-2007/GN WP-1**

Paper prepared by

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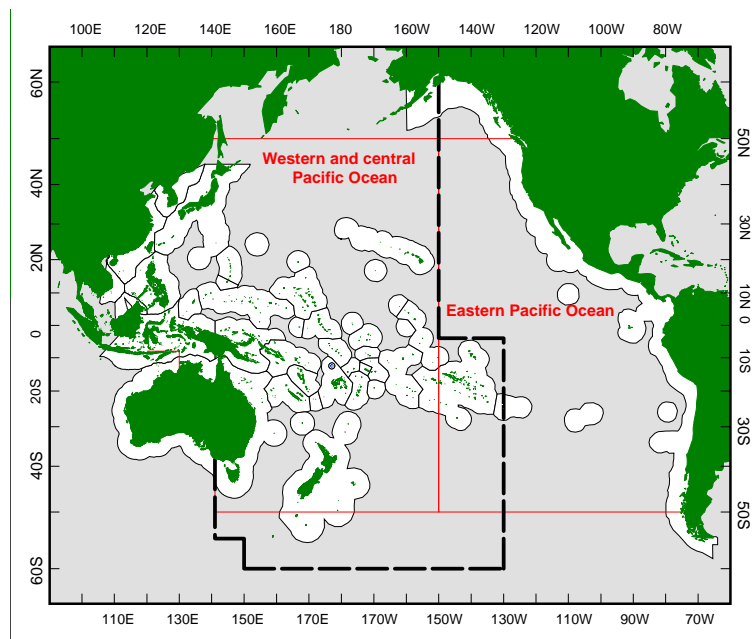
## 1. INTRODUCTION

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 – 2006. The review draws on the latest catch estimates compiled for the WCP-CA, which can be found in Information Paper WCPFC-SC3 ST IP-2 (*Estimates of annual catches in the WCPFC Statistical Area – OFP, 2006*). Where relevant, comparisons with previous years' activities have been included, although it should be noted that data for 2006, 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 2006 catches relative to those of recent years, but refers readers to the SC3 National Fisheries Reports, which offer more detail of recent activities at the fleet level.

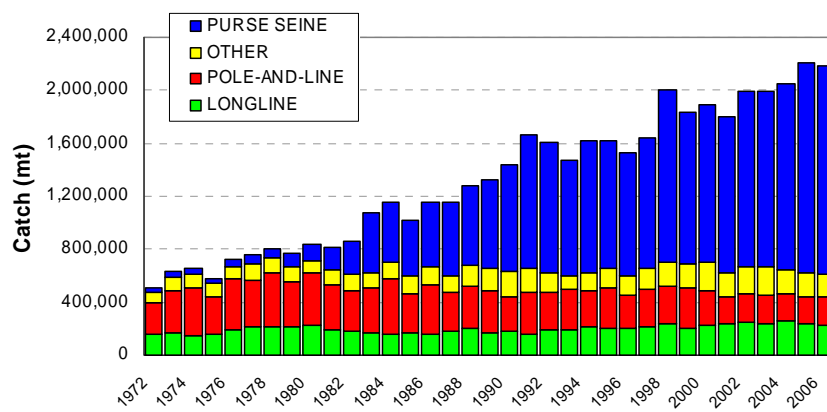
This paper acknowledges, but does not currently include, information on several WCP-CA fisheries, including the north Pacific albacore troll, the north and south Pacific swordfish, the Vietnamese and several artisanal fisheries. These fisheries may be covered in future reviews, depending on the availability of more complete data. This paper does not include a description of non-target species catches 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)**

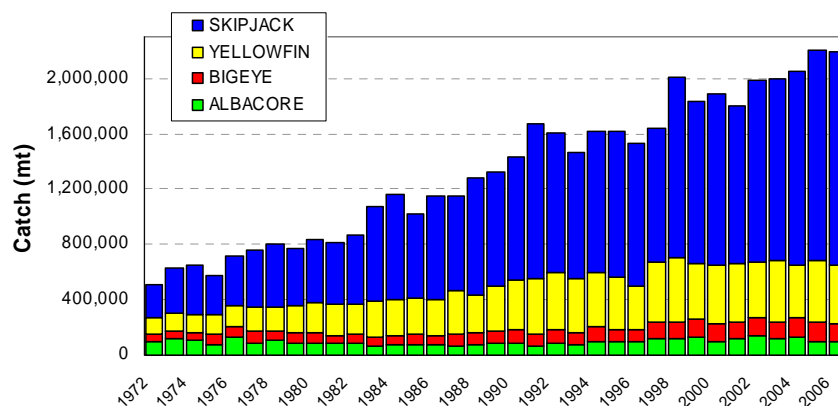
## 2. TOTAL TUNA CATCH FOR 2006

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 5 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 2006 was estimated at **2,189,985 mt**, the second highest annual catch recorded, and only slightly less than the record in 2005 (2,204,335 mt). During 2006, the purse seine fishery accounted for an estimated 1,573,447 mt (72% of the total catch—only 12,000 mt less than the record catch of 2005), with pole-and-line taking an estimated 211,829 mt (10%), the longline fishery an estimated 229,323 mt (10%), and the remainder (8%) taken by troll gear and a variety of artisanal gears, mostly in eastern Indonesia and the Philippines. The WCP–CA tuna catch (2,189,985 mt) for 2006 represented 78% of the total Pacific Ocean catch of 2,800,740 mt and 51% of the global tuna catch (the provisional estimate for 2006 is just over 4.3 million 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 2006 WCP–CA catch of skipjack (1,537,524 mt – 70% of the total catch) was the highest ever, continuing the trend of consecutive record catches since 2002. The WCP–CA yellowfin catch for 2006 (426,726 mt – 19%) was about 5% lower than in 2005, but still around the average catch level for the period since 2000. The WCP–CA bigeye catch for 2006 (125,874 mt – 6%) was also lower than in 2005, but slightly higher than the average catch level for the period since 2000. Recent WCP–CA albacore<sup>1</sup> catches (98,626 mt [4%] in 2005 and 99,861 mt in 2006 [5%]) have been the lowest for nearly ten years, mainly due to low catches in the North Pacific.



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

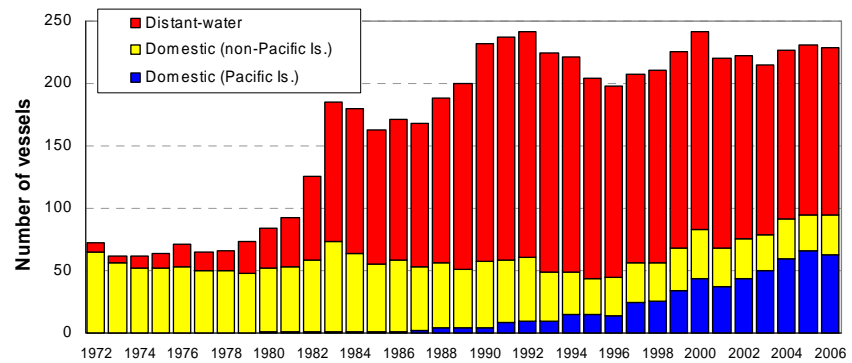
<sup>1</sup> includes catches of North and South Pacific albacore in the WCP–CA, which comprised 79% of the total Pacific Ocean albacore catch of 126,421 mt in 2006; the section 7.4 “Summary of Catch by Species - Albacore” is concerned only with catches of South Pacific albacore, which make up approximately 54% 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 72% of total tuna catch volume (~1,500,000 mt – [Figure 2](#)). The majority of the historic WCP-CA purse seine catch has come from the four main DWFN fleets – Japan, Korea, Chinese-Taipei and USA, which numbered 147 vessels in 1995, but has gradually declined in numbers to 112 vessels in 2006<sup>1</sup>.

In contrast, there has been a steady increase in the number of vessels from Pacific Islands fleets, which totalled 63 vessels in 2006 ([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).

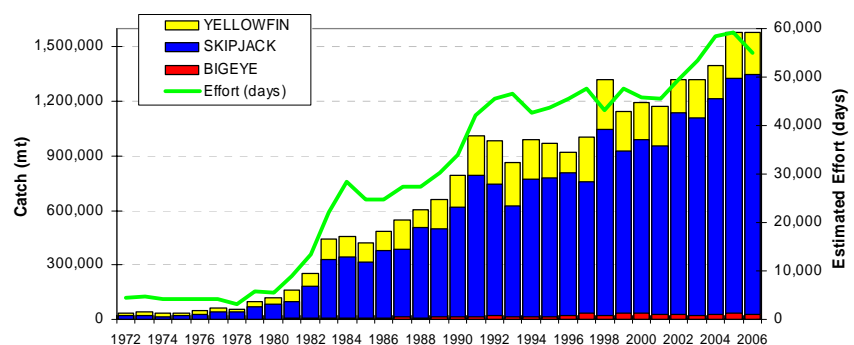


**Figure 4. Number of purse seine vessels operating in the WCP-CA** (this does not include the Indonesian and Philippines domestic purse-seine/ringnet fleets which account for over 1,000 vessels)

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;
- 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. 39,680 mt in 1997 and 37,720 mt in 1999) coinciding with the introduction of drifting FADs (since 1996). Since 2000, bigeye catches have been lower, in the range 23,000–35,000 mt, partially due to a reduction in the use of drifting FADs.



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

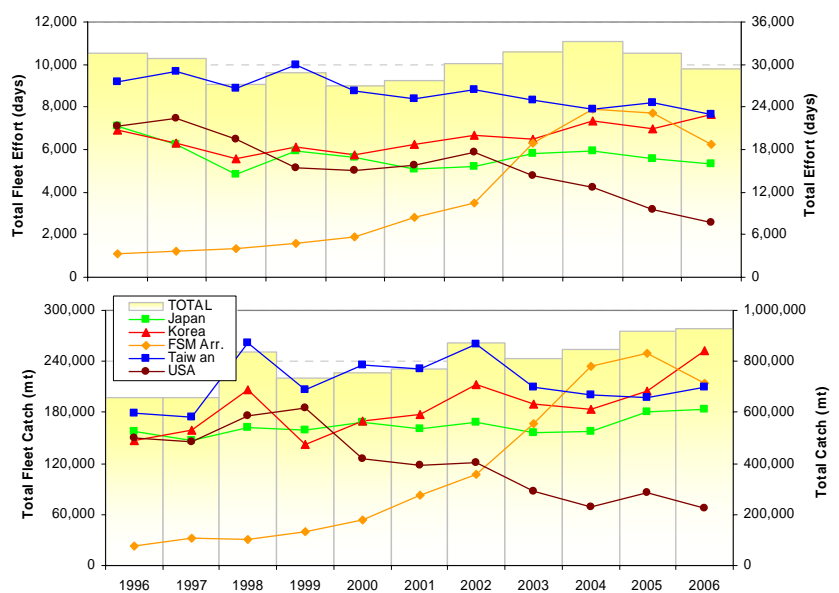
<sup>1</sup> The number of vessels by fleet in 1995 was Japan (31), Korea (30), Chinese-Taipei (42) and USA (44) and in 2006 the number of vessels by fleet was Japan (35), Korea (28), Chinese Taipei (34) and USA (15).

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 overlays the histogram bar (i.e. in 1998, 2002, 2005 and 2006).

### 3.2 Provisional catch estimates, fleet size and effort (2006)

The provisional 2006 purse-seine catch of 1,573,447 mt was the second highest on record but only 12,000 mt less than the record in 2005 (1,586,064 mt). The 2006 purse seine catch was dominated by a record catch of skipjack tuna (1,305,405 mt – 83% of the total catch), but experienced a drop in yellowfin tuna catch (243,620 mt – 15%) compared to the relatively high level taken during 2005 (258,273 mt). The estimated purse seine bigeye catch<sup>2</sup> for 2006 (24,180 mt – 2%) was slightly less than the average for years since 2000. The total estimated purse-seine effort for 2006 was lower than the previous two years (Figure 5), even though the 2006 catch level is on par with 2005, which suggests good catch rates were experienced during 2006.

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 2006 catch for these fleets was the highest ever even though effort was clearly lower than in recent years, suggesting higher catch rates were experienced during 2006 (see section 3.4). The Chinese-Taipei fleet had been the highest producer in the tropical purse seine fishery until 2004, when surpassed by the combined Pacific Islands purse seine fleets fishing under the FSM Arrangement, until 2006, when the Korean purse seine fleet took the highest catch. The fleet sizes and effort by the Japanese and Korean purse seine fleets have been relatively stable for most of this time series. Several Chinese-Taipei vessels re-flagged in 2002, dropping the fleet from 41 to 34 vessels, with fleet numbers stable since. The increase in annual catch by the FSM Arrangement fleet until 2005 corresponds to an increase in vessel numbers, and coincidentally, mirrors the decline in US purse seine catch, vessel numbers and effort over this period. The total 2006 tuna catch by the FSM Arrangement was lower than the previous two years, mainly due to a reduction in the number of vessels in this fleet.



**Figure 6. Trends in annual effort (top) and catch (bottom) estimates for the top five purse seine fleets operating in the tropical WCP-CA, 1996–2006.**

The total number of Pacific-island domestic vessels has now stabilised at 63 vessels after a period of sustained growth over more than a decade – at its highest level, there were 66 vessels (2005) in this category. The Pacific-islands purse seine fleets comprise vessels fishing under the FSM Arrangement (30 vessels in 2006), the Vanuatu fleet operating under bilateral arrangements (8 vessels) and domestic vessels operating in PNG and Solomon Islands waters. The FSM Arrangement fleet comprises vessels managed by the Pacific Island “Home Parties” of PNG (18 vessels), the Marshall Islands (5 vessels), FSM (3 vessels), Kiribati (1 vessels) and the Solomon Islands (3 vessels) which fish over a broad area of the tropical WCP-CA.

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The domestic Philippine purse-seine and ring-net fleets operate in Philippine and northern Indonesian waters, and have each taken around 150,000 t. in recent years (OFP, 2007). The domestic Indonesian purse-seine and ringnet fleets take a similar catch level which means that around 20% of the WCP-CA purse seine catch comes from the waters of these countries.

<sup>2</sup> 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 (see Lawson, 2007)

Figure 7 shows the annual trends in the school types set on by the major purse-seine fleets. The proportion of sets on free-swimming (unassociated) schools of tuna declined for all fleets in 2006 (compared to 2005), with a corresponding increase on the number of sets on associated schools (logs and drifting FADs) – this trend was also experienced from 2003 to 2004. Overall, unassociated sets accounted for about 49% of all sets for these fleets during 2006 (compared to around 61% in 2005). The Korean purse-seine fleet predominantly fish on unassociated, free-swimming schools (71% of all sets during 2006), while the other fleets have concentrated on associated-set types in recent years. Of the associated set types, log sets have been favoured over drifting FAD sets by most purse seine fleets in recent years, with the exception being the US fleet which continues to operate in more eastern (and southern) areas of the WCP-CA concentrating on drifting FAD sets (69% in 2006 according to available logsheet data).

### 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 distributed further to the east during El Niño years and a contraction westwards during La Niña periods.

The WCP-CA experienced an ENSO-transitional (or neutral) period during 2001, an El Niño period during 2002 and into the first quarter of 2003, then 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 Niño 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 Niña-state by the end of 2005.

The weak La Niña established at the end of 2005 continued into the first part of 2006, but soon dissipated and a weak El Niño event then presided over the remainder of 2006. Fishing activity remained concentrated in the PNG, FSM and Solomon Islands area in the first six months of 2006 (as in previous years), but there was a clear movement eastwards by fleets into Nauru and Kiribati waters in the 3<sup>rd</sup> and 4<sup>th</sup> quarters of 2006, perhaps related to the prevailing ENSO conditions.

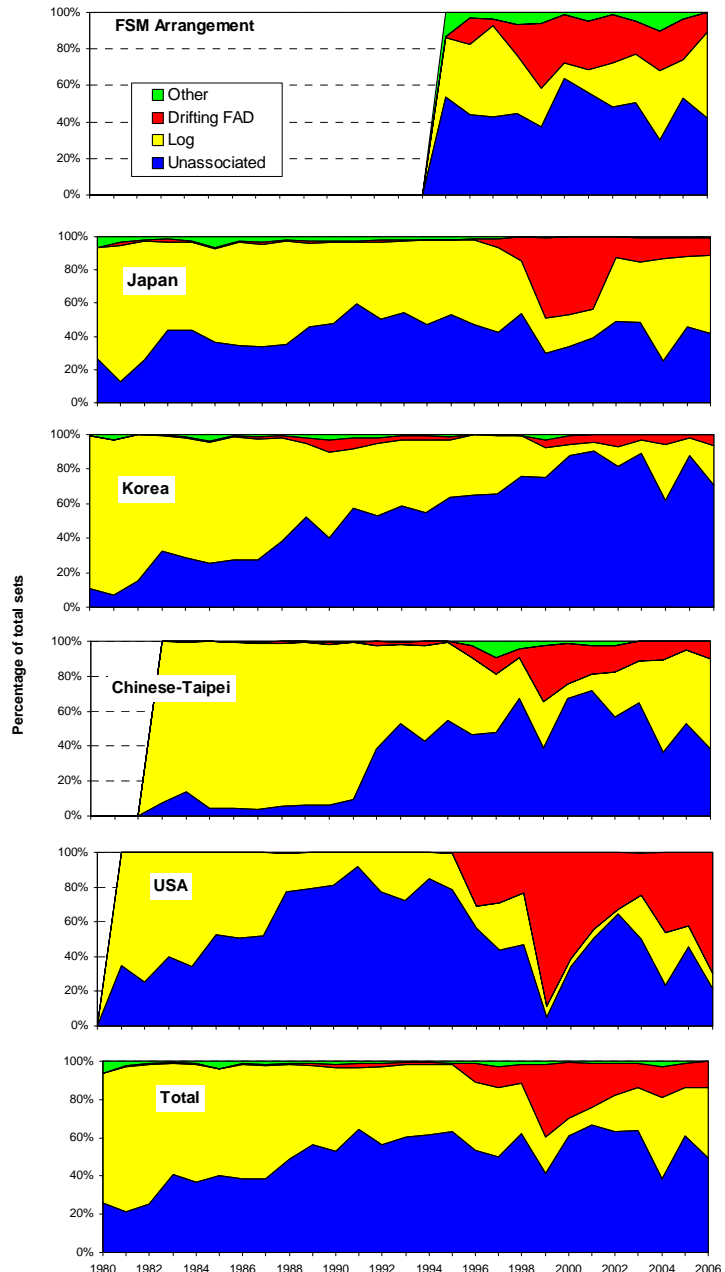


Figure 7. Time series showing the percentage of total sets by school type for the major purse-seine fleets operating in the WCP-CA.

The distribution of effort by set type [Figure 8](#) (right) for the past seven years shows that the establishment of the El Nino event during 2002 resulted in a higher proportion of log-associated sets east of 160°E than in the previous two years when drifting FADs were used to better aggregate schools of tuna in the absence of logs, and/or where unassociated schools were not as available in this area. The reduction in the use of drifting FAD sets in recent years is 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 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. The distribution of effort by set type has not changed significantly over the past three years (2004-2006) compared to the earlier periods shown in [Figure 8](#) (right). The proportion of sets by set type to the east of 170°E appears to depend on the availability of free-swimming schools (there were more available during 2005 than in 2004 and 2006, for example).

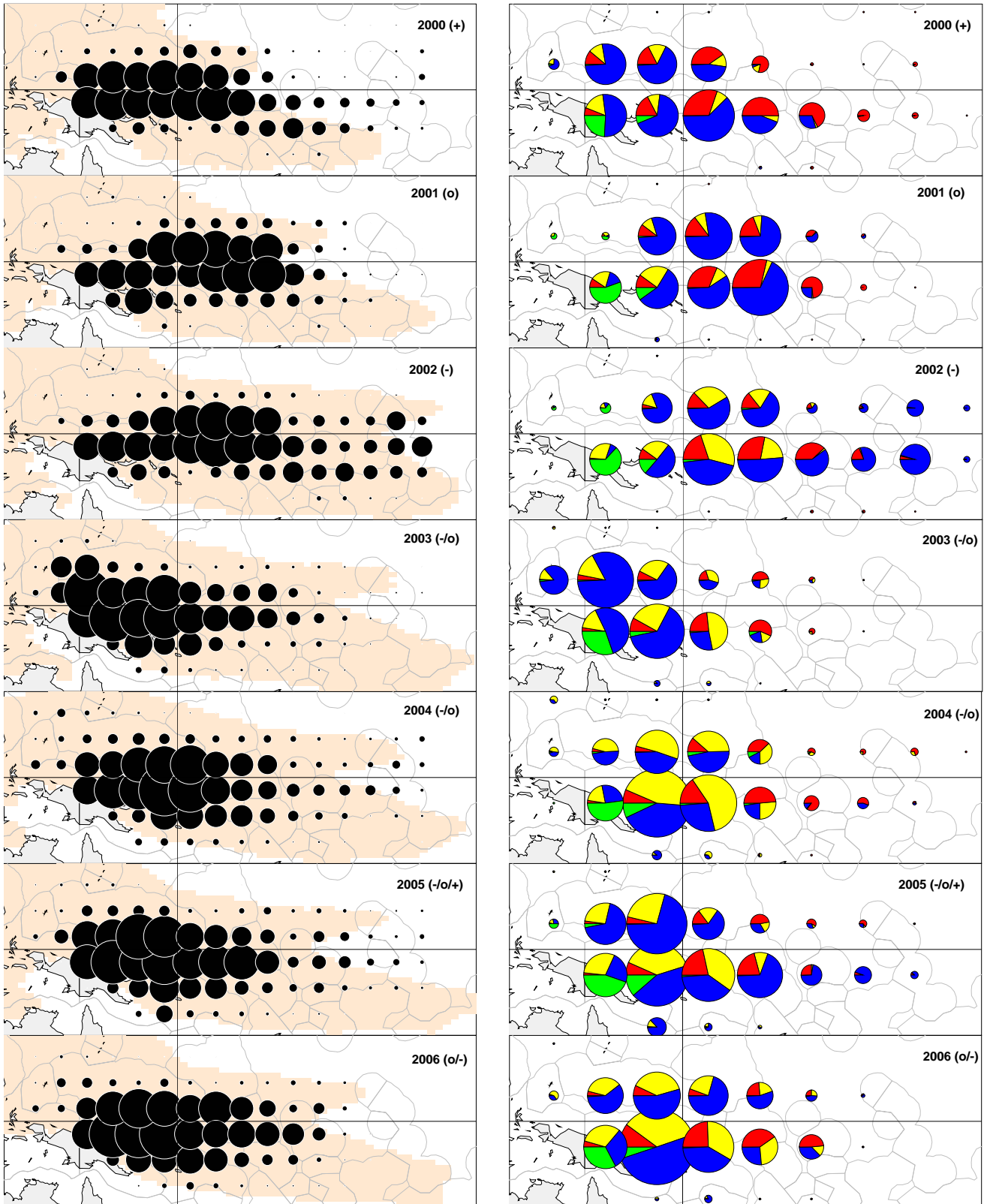
[Figure 9](#) through 13 show the distribution of purse seine effort for the five major purse seine fleets during 2005 and 2006. The distribution of effort in 2006 was very similar to that of 2005, the possible exception of a slightly higher proportion of effort in and around the Marshall Islands, Nauru and Kiribati waters during 2006. Unlike years prior to 2005, there is now more overlap in the area fished by the US fleet to the area fished by the other major fleets ([Figure 13](#) – right). The FSM Arrangement fleet tends to fish in a similar area to the Asian fleets, although there is also activity in the home waters of 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 than they do for the total skipjack catch. 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 WCPO. There was evidence of this during 2001 ([Figure 15](#)) and for the most recent El Nino year (2002), despite it being considered an overall poor year for yellowfin catch (Langley et al., 2006). Yellowfin tuna comprised a slightly lower proportion of the total catch in 2006 than in 2005 ([Figure 14](#)), with fewer yellowfin available from unassociated sets in the eastern tropical WCP–CA ([Figure 15](#)–right).

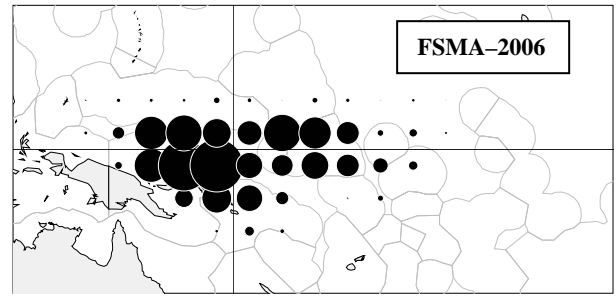
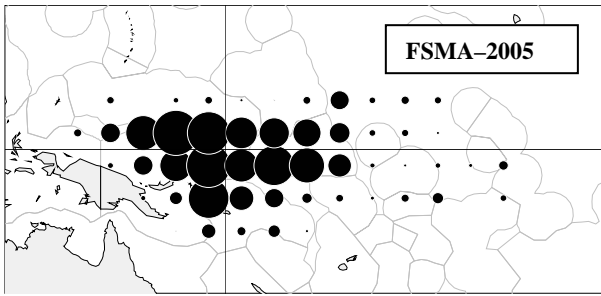
In contrast to yellowfin, associated-school sets usually account for a higher proportion of the skipjack and bigeye catch in the respective total catch of each species ([Figure 15](#)–left and [Figure 16](#)). The estimated proportion of bigeye in the “yellowfin plus bigeye” catch tends to be dominated by anchored FADs and logs in the area to the west of 170°E, and drifting FAD sets in the area to the east of 170°E ([Figure 16](#)), although there are certain conditions conducive to relatively large unassociated-school catches of bigeye in the east (for example, during 2001 and 2002 in [Figure 16](#)). The distribution of the estimated bigeye catch by set type for 2006 is based on very few data and should be treated as provisional at this stage.



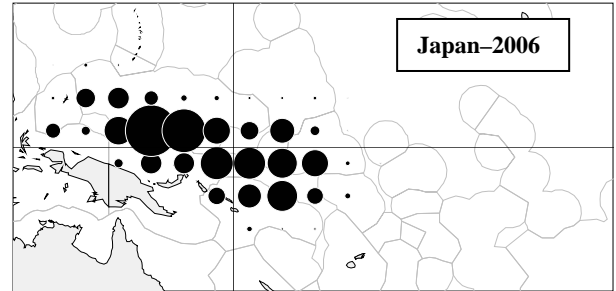
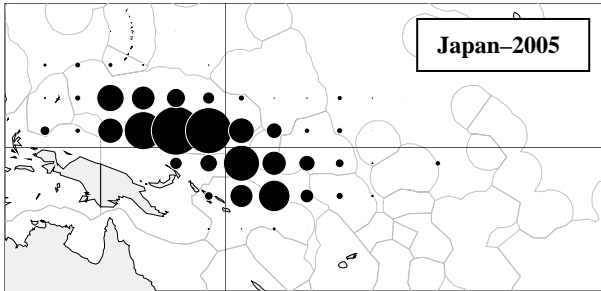


**Figure 8. Distribution of purse-seine effort (days fishing – left; sets by set type – right), 2000–2006. (Blue–Unassociated; Yellow–Log; Red–Drifting FAD; Green–Anchored FAD).**

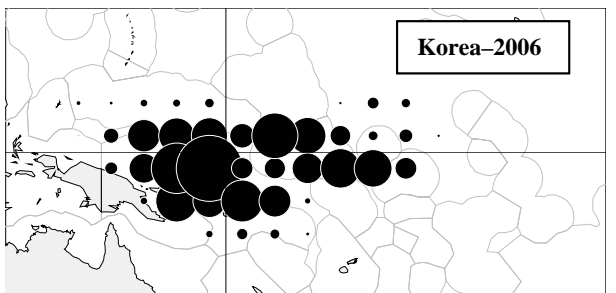
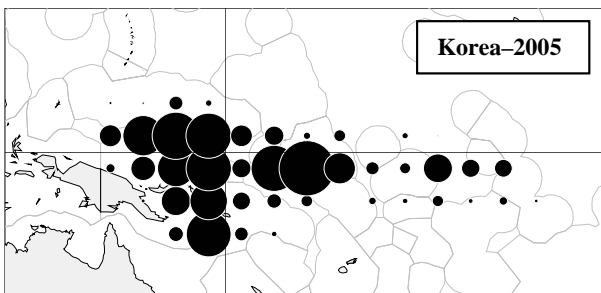
Pink shading represents the extent of average sea surface temperature > 28.5°C  
 ENSO periods are denoted by “+”: La Niña; “-”: El Niño; “--”: strong El Niño; “o”: transitional period.



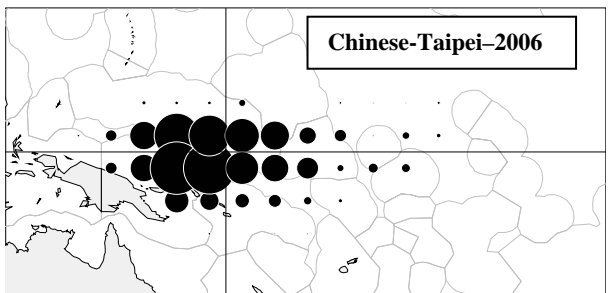
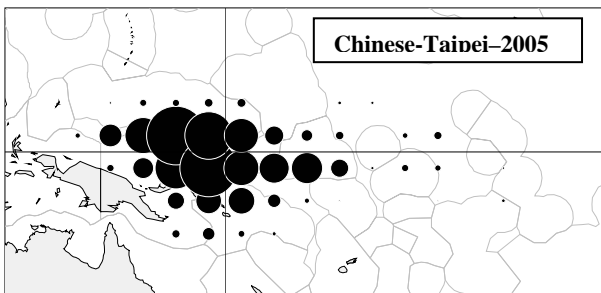
**Figure 9. Distribution of effort by fleets operating under the FSM Arrangement during 2005 and 2006**  
lines for the equator (0° latitude) and 160°E longitude included.



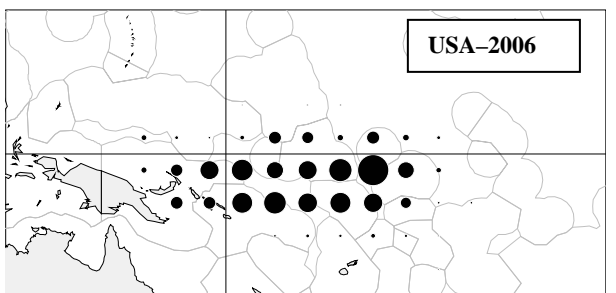
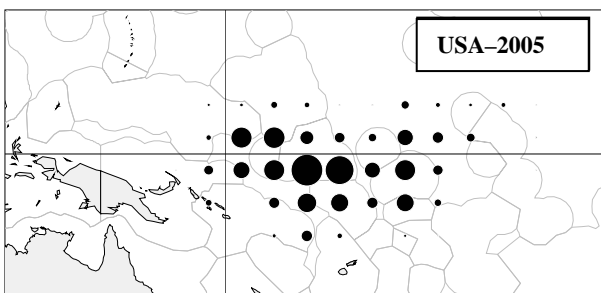
**Figure 10. Distribution of effort by the Japanese purse seine fleet during 2005 and 2006**  
lines for the equator (0° latitude) and 160°E longitude included.



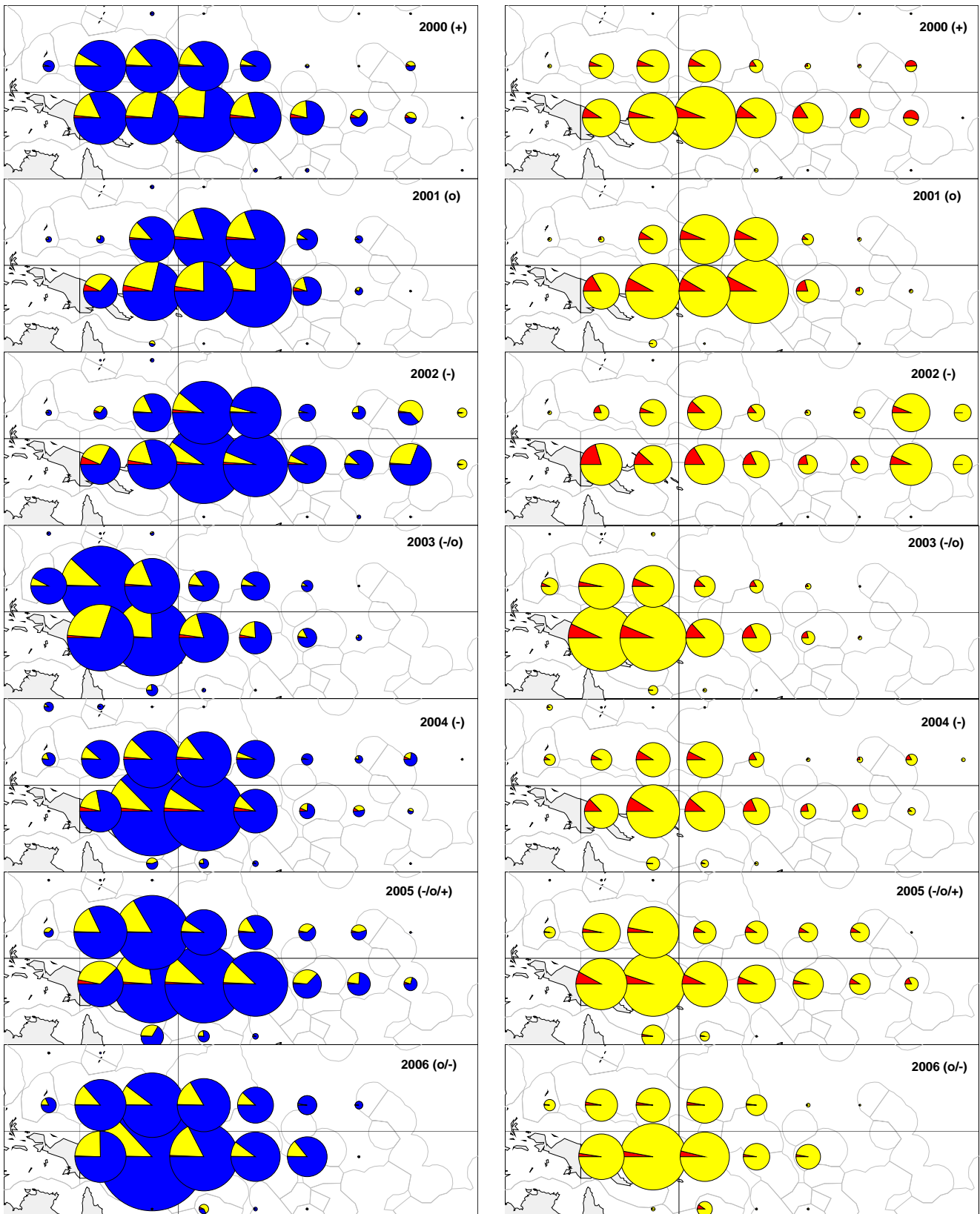
**Figure 11. Distribution of effort by the Korean purse seine fleet during 2005 and 2006**  
lines for the equator (0° latitude) and 160°E longitude included.



**Figure 12. Distribution of effort by the Chinese-Taipei purse seine fleet during 2005 and 2006**  
lines for the equator (0° latitude) and 160°E longitude included.

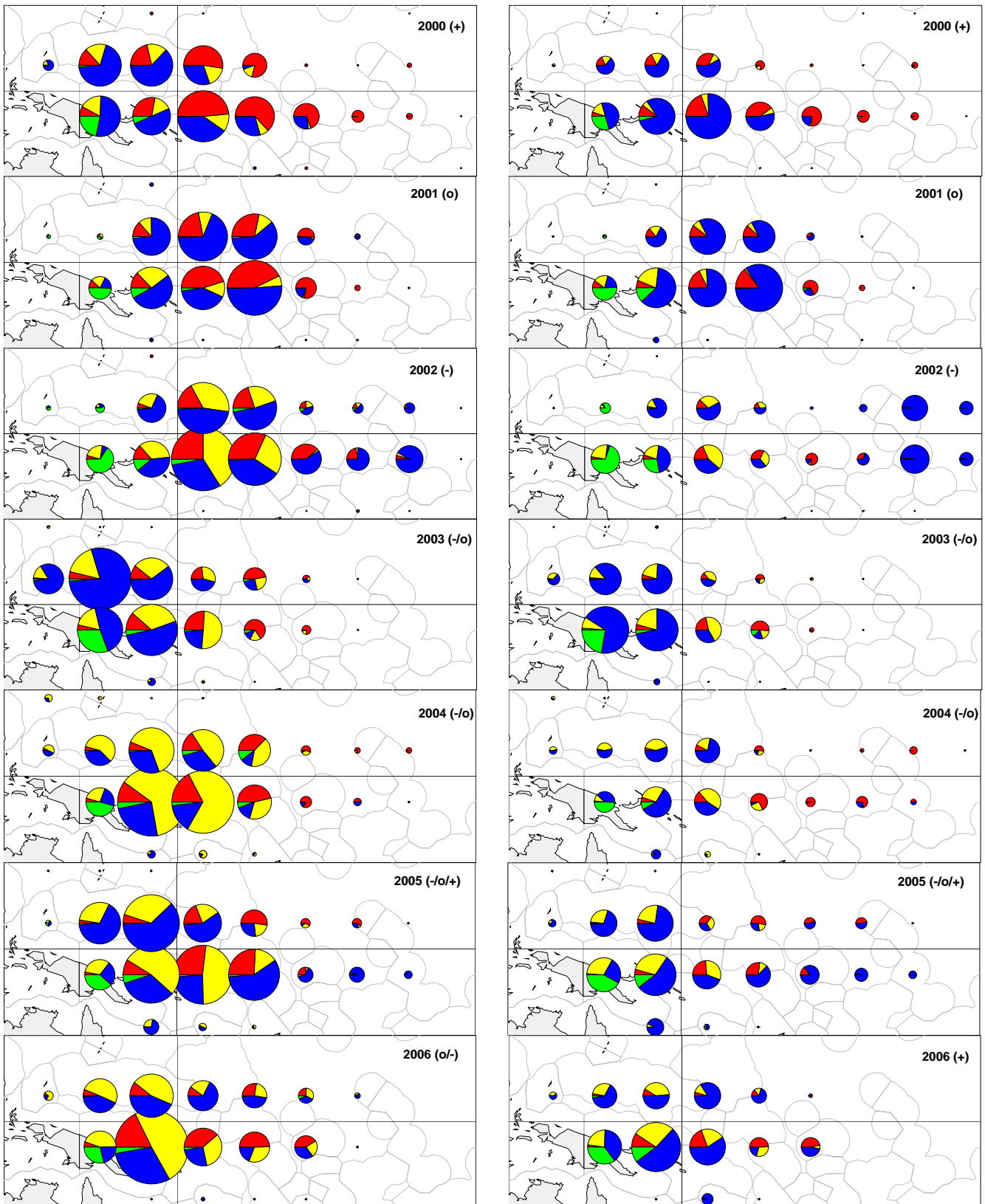


**Figure 13. Distribution of effort by the US purse seine fleet during 2005 and 2006**  
lines for the equator (0° latitude) and 160°E longitude included.



**Figure 14. Distribution of purse-seine skipjack/yellowfin/bigeye tuna catch (left) and purse-seine yellowfin/bigeye tuna catch only (right), 2000–2006 (Blue–Skipjack; Yellow–Yellowfin; Red–Bigeye).**

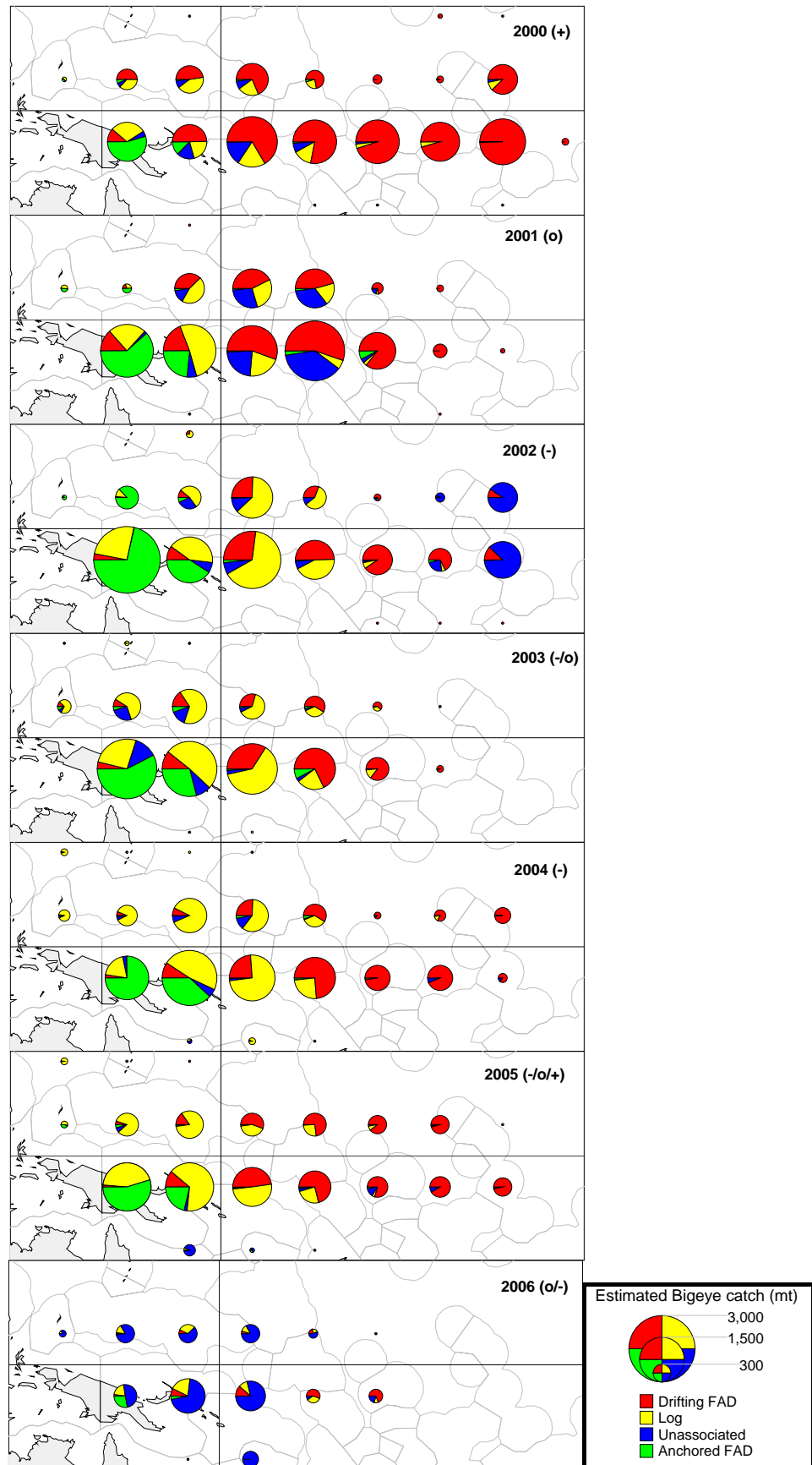
ENSO periods are denoted by “+”: La Niña; “-”: El Niño; “--”: strong El Niño; “0”: transitional period.  
Estimates of bigeye catch for 2006 are provisional.



**Figure 15. Distribution of skipjack (left) and yellowfin (right) tuna catch by set type, 2000–2006 (Blue–Unassociated; Yellow–Log; Red–Drifting FAD; Green–Anchored FAD).**

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

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

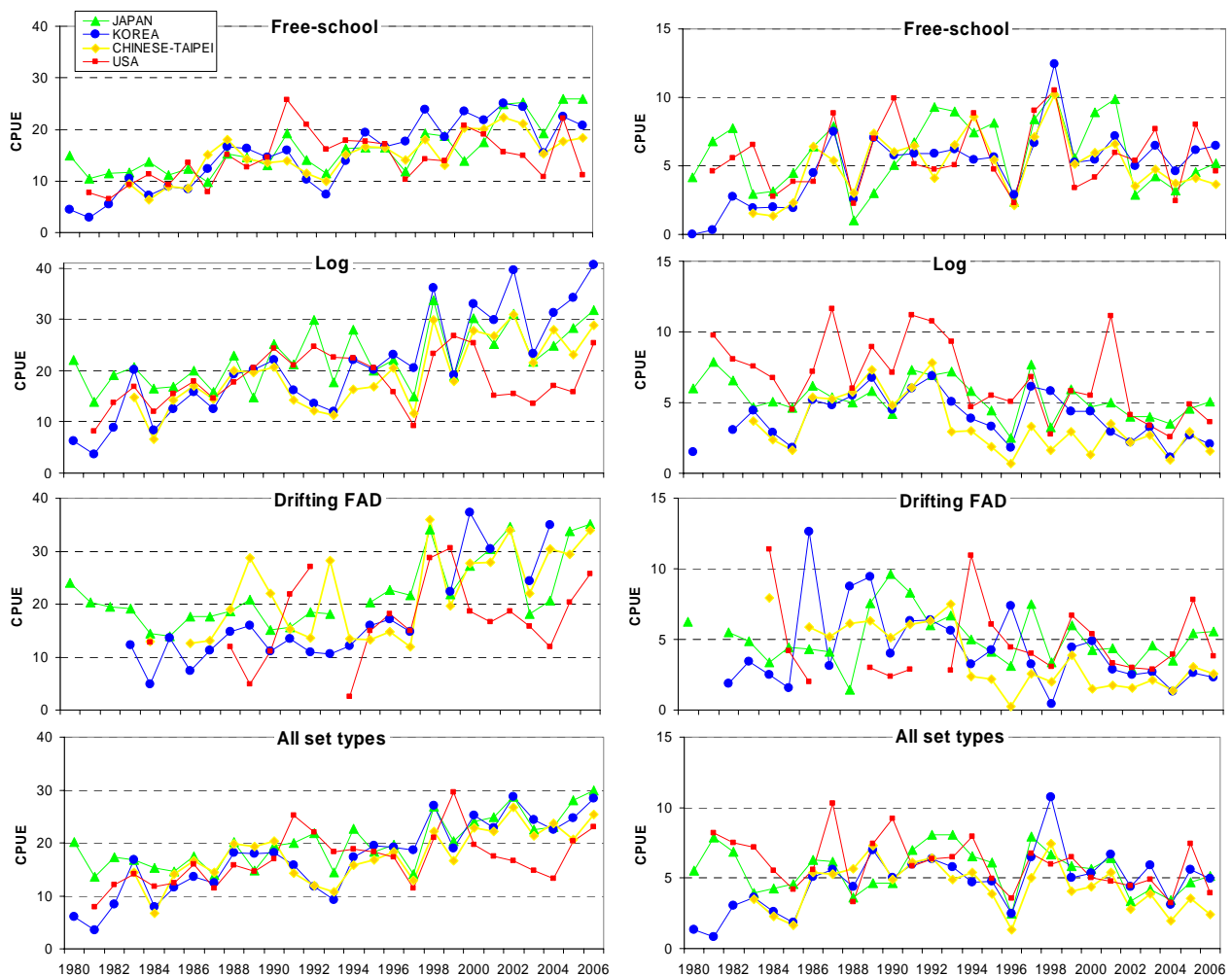


**Figure 16. Distribution of estimated bigeye tuna catch by set type, 2000–2006 (Blue–Unassociated; Yellow–Log; Red–Drifting FAD; Green–Anchored FAD).** ENSO periods are denoted by “+”: La Niña; “-”: El Niño; “-/-”: strong El Niño; “o”: transitional period. Estimates of bigeye catch for 2006 are provisional.

### 3.4 Catch per unit of effort

[Figure 17](#) shows the annual time series of CPUE by set type and vessel nation for skipjack (left) and yellowfin (right). The 2006 purse-seine skipjack CPUE for all set types was generally higher than in 2005, with the exception of the US and Korean fleets catches on unassociated (free-swimming) schools. Exceptional catch rates were experienced for log- and drifting FAD-associated schools of skipjack by all fleets during 2006, perhaps suggesting more efficiency with this style of fishing. The higher (overall) skipjack CPUE during 2006 resulted in a record catch, despite some decline in overall effort expended (see [Figure 6](#)). Contrary to the period 2000–2004, the skipjack CPUE for the US fleet returned to the level of the other major fleets in recent years. One of the main reasons for this situation is probably the greater overlap in areas fished by the US and other fleets during 2005 and 2006 (compared to previous years).

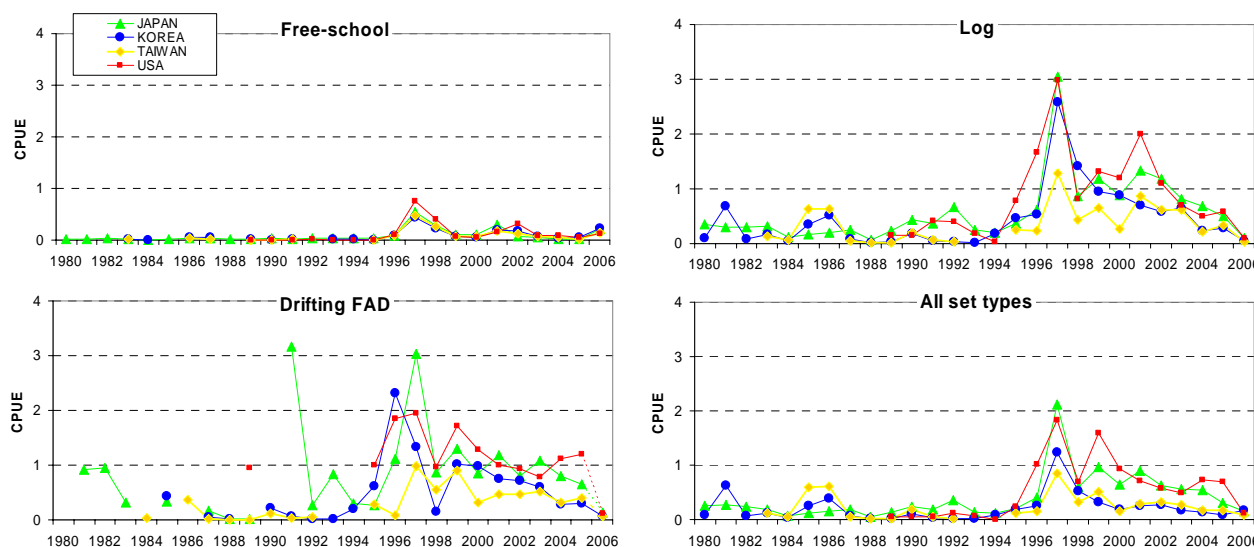
Yellowfin CPUE for 2006 was generally lower than in 2005, but not as low as in 2004, acknowledged to be a year with poor yellowfin catches ([Figure 17](#)). Associated (log and drifting FAD) sets generally produce higher catch rates (mt/day) for skipjack than unassociated sets, yet unassociated sets 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. yellowfin catch rates for the first half of 2006 were at a similar level for each of the set types (OFP, 2007), but the yellowfin CPUE for unassociated sets had improved by the end of 2006 ([Figure 17](#)–right), suggesting that unassociated schools with large yellowfin were perhaps available in the second half of 2006 (also refer to [Figure 19](#) and [Figure 20](#)).



**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 related to increased abundance and improved efficiency in fishing strategy and technological advances in equipment used to better locate schools of tuna. In contrast, the trend in total yellowfin tuna CPUE since 1998 has been gradually downwards ([Figure 17](#)).

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 decline in estimated bigeye tuna CPUE over the past 8 years tends to mirror the decline in yellowfin tuna CPUE.

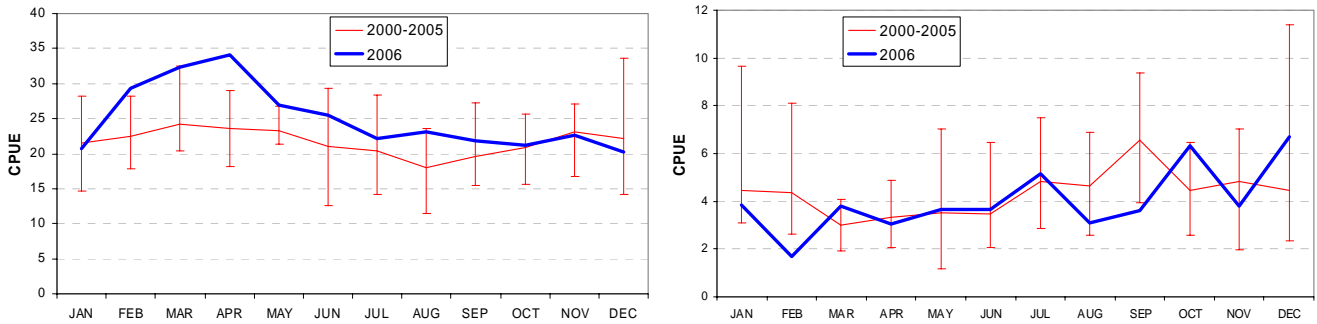


**Figure 18. Estimated Bigeye tuna CPUE (mt per day) by major set-type categories (free-school, log and drifting FAD sets) and all set types combined for Japanese, Korean, Chinese-Taipei and US purse seiners fishing in the tropical WCP-CA.**

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 2006 are provisional.

### 3.5 Seasonality

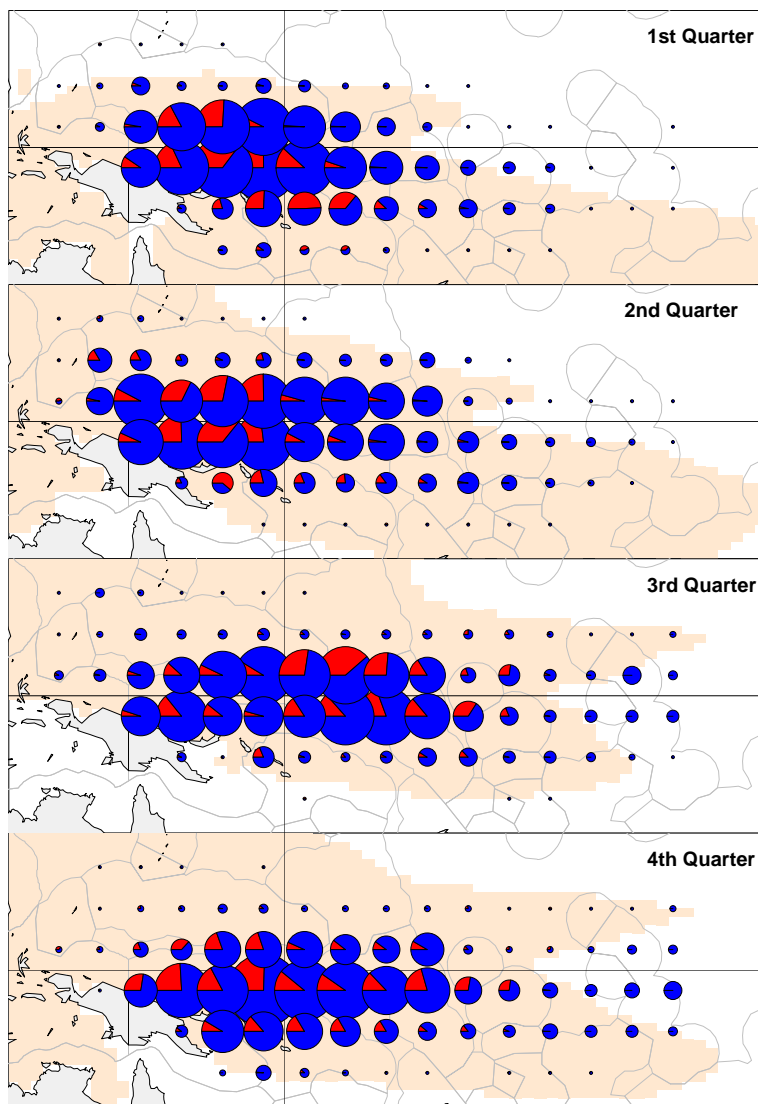
[Figure 19](#) shows the seasonal average CPUE for skipjack (left) and yellowfin (right) in the purse seine fishery for the period 2000–2006, and [Figure 20](#) shows the distribution of effort by quarter for the period 2000–2005 contrasting with 2006. Over the period 2000–2006, the average monthly skipjack 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 extension east of the fishery in the second half of the year ([Figure 20](#)), 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 thermocline. Evident in the CPUE graphs ([Figure 19](#)) are the exceptional catches of skipjack tuna experienced during the first half of 2006, with February–May 2006 producing the highest catch rates [for respective months] over the entire period 2000–2006. In contrast, the monthly Yellowfin tuna CPUE for 2006 was close to average for the period 2000–2006. Effort during 2006 was concentrated in the western areas of the fishery (e.g. PNG, FSM and Solomons) during the first two quarters, moved to the east (e.g. Nauru, Kiribati and the Marshall Islands) in the third quarter, and then was evenly distributed by the fourth quarter ([Figure 20](#)).



**Figure 19. Average Monthly Skipjack (left) and Yellowfin (right) tuna CPUE (mt per day) for purse seiners fishing in the tropical WCP-CA, 2000–2006.**

Red line represents the period 2000–2005 and the blue line represents 2006.

The bars represent the extent (i.e. minimum and maximum) of monthly values for the period 2000–2005.



**Figure 20. Distribution of purse-seine effort by quarter, 2000–2006.**

Blue – Total Effort for the period 2000–2005; Red – Effort for 2006 only.

Pink shading represents the extent of average sea surface temperature > 28.5°C for the period 2000–2006

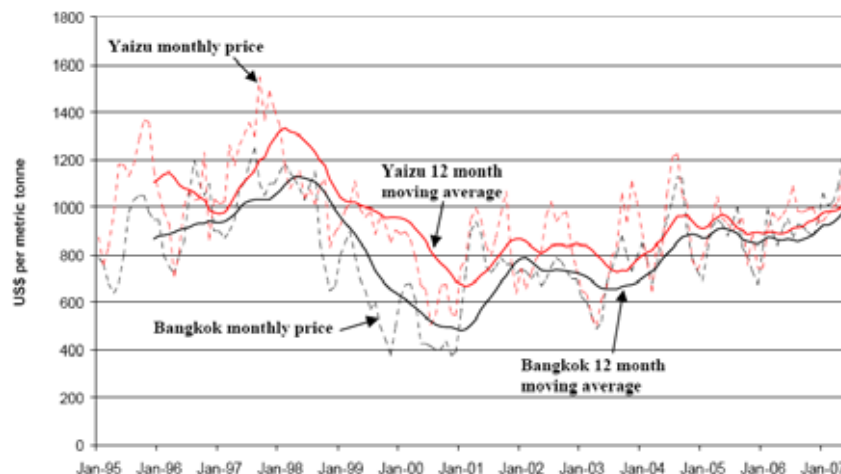


### 3.6 Economic overview of the purse seine fishery

#### 3.6.1 Price trends – Skipjack

Skipjack prices were relatively flat and stable through the first 3 quarters of 2006 before embarking on an upward trend which has continued through to the present (July 2007). In 2006, Bangkok benchmark skipjack prices (4-7.5lbs, c&f) traded in a range of US\$800-1000/Mt, Thai imports of frozen skipjack averaged US\$918/Mt and monthly prices at Yaizu for purse seine caught tuna varied between US\$744/Mt and US\$1091/Mt, averaging US\$963/Mt.<sup>3</sup>

Over the first half of 2007 skipjack prices have risen dramatically with Bangkok prices (4-7.5lbs, c&f) rising from just over US\$1000/Mt in January to around US\$1400/Mt by mid-July and Yaizu monthly averages prices rising from US\$943/Mt in January to US\$1395/Mt in June.

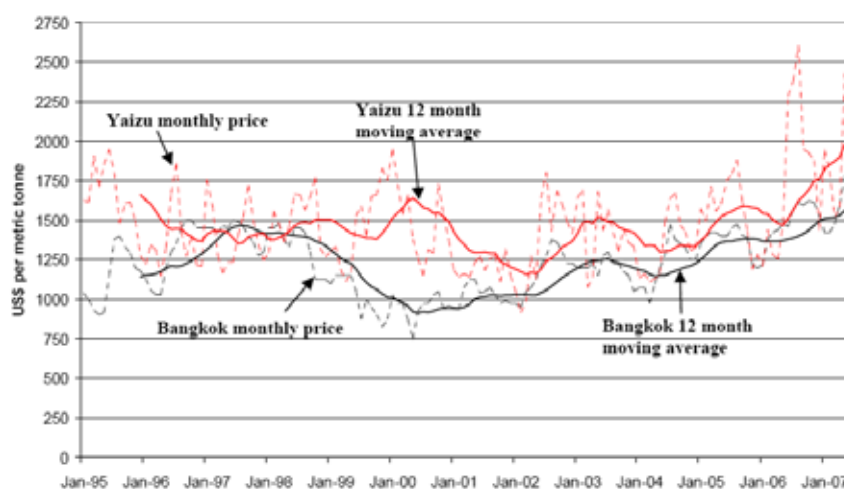


**Figure 21. Skipjack prices, Bangkok (4-7.5lbs, c&f) and Yaizu (ex-vessel) monthly and 12 month moving average**

*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

#### 3.6.2 Price trends – Yellowfin

Bangkok yellowfin prices (20lbs and up, c&f) over 2006 ranged from a low US\$1180-1200/Mt in early January to a high of US\$1600-1650/Mt from mid-September to early November. Bangkok yellowfin prices have been trending up for much of the period since 2000 when prices averaged around US\$950/Mt for the year. In 2006, prices average around US\$1500/Mt and have continued to increase in 2007 with the latest reports (mid-July) indicating prices are at US\$1850-1900/Mt. Yaizu purse seine caught yellowfin average monthly prices in 2006 in US\$ terms ranged from US\$1209/Mt in January to US\$2287/Mt in December. The average price over 2006 was US\$1805/Mt.



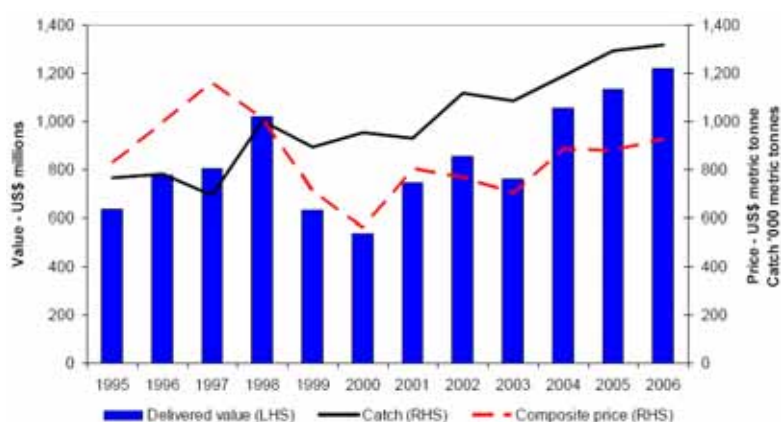
**Figure 22. Yellowfin prices, Bangkok (20lbs and up, c&f) and Yaizu (ex-vessel) monthly and 12 month moving average**

*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

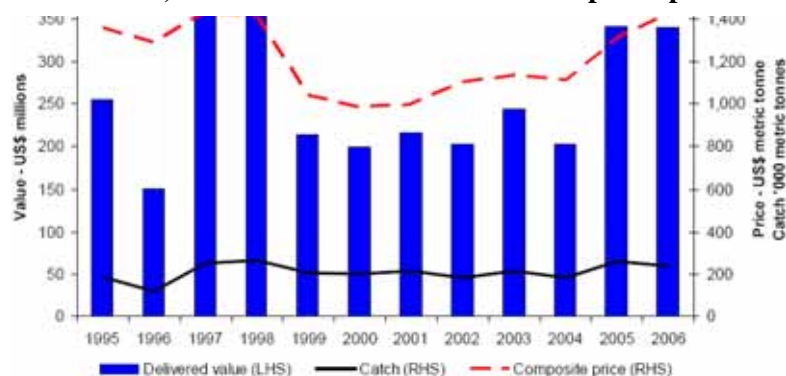
<sup>3</sup> Where prices are obtained in currencies other than US\$ they are converted using inter-bank exchange rates as given by [www.oanda.com/convert/fxhistory](http://www.oanda.com/convert/fxhistory).

### 3.6.3 Value of the Purse-seine Catch

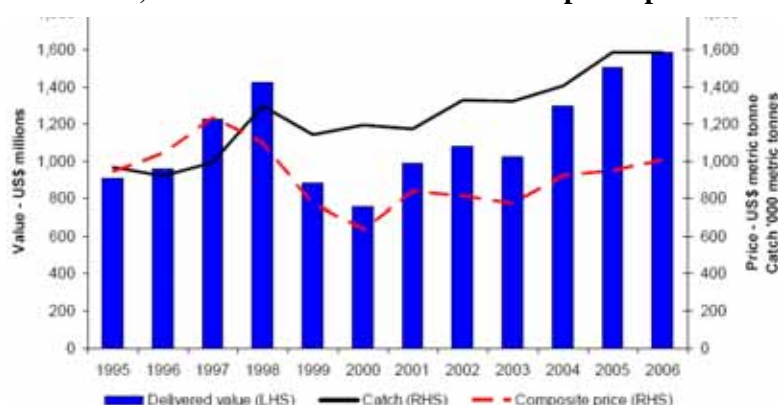
As a means of examining the effect of the changes to prices and catch levels estimate of the “delivered” value of the purse seine fishery tuna catch in the WCPFC Area from 1995 to 2006 are obtained (Figures 23–25). In deriving these estimates certain assumptions were made due to data and other constraints that may or may not be valid and as such caution is urged in the use of these figures.<sup>4</sup>



**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**

The estimated delivered value of the purse seine tuna catch in the WCPFC area for 2006 is US\$1,583 million the highest level since at least 1995. This represents an increase of US\$82 million or 5 per cent on the estimated delivered value of the catch in 2005. This increase was driven by a US\$89 million (8 per cent) increase in delivered value of the skipjack catch, which is estimated to be worth US\$1,219 million in 2005, resulting from a 2 per cent increase in catch and a 6 per cent increase in the composite delivered price. The value of the yellowfin catch was steady at around US\$341 million with a rise of 9 per cent in the composite price being offset by an 8 per cent decline in catch.<sup>5</sup>

<sup>4</sup> The delivered value of each years 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.

<sup>5</sup> 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](http://www.ffa.int/node/862)).

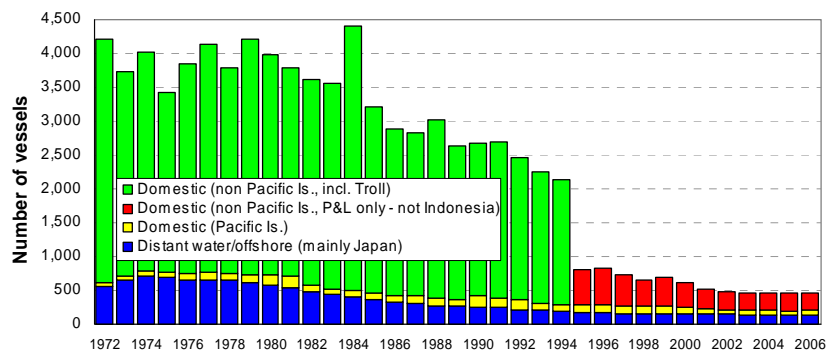
## 4 WCP-CA POLE-AND-LINE FISHERY

### 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 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).

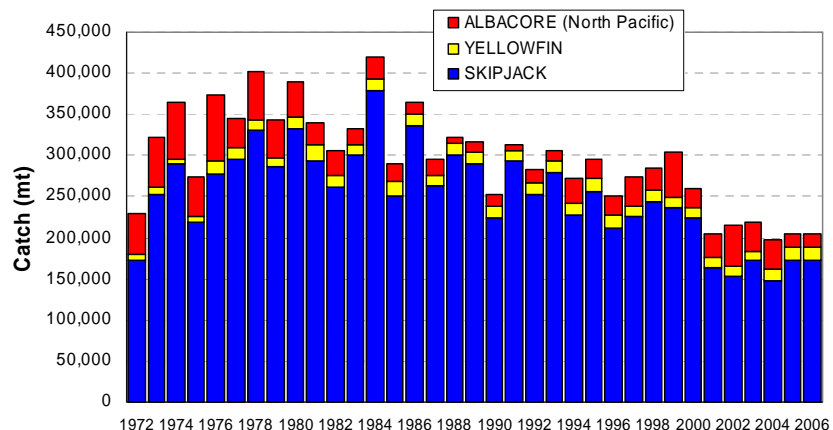
Economic factors and technological advances in the purse seine fishery (primarily targeting the same species, skipjack) have seen a gradual decline in the number of vessels in the pole-and-line fishery (Figure 26) and in the annual pole-and-line catch during the past 15–20 years (Figure 27). The gradual 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 Solomons fishery is very much reduced from the level experienced during the 1990s. Several vessels continue to fish in Hawai'i, and the French Polynesian *bonitier* fleet remains active, but more vessels have turned to longline fishing. Provisional statistics also suggest that the Indonesian pole-and-line has also declined over the past decade.



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

### 4.2 Provisional catch estimates (2006)

The 2006 catch estimates for the key pole-and-line fleets operating in the WCP-CA have yet to be provided, although the total catch estimate is expected to be similar to the level of recent years (i.e. 200,000–220,000 mt). Skipjack tends to account for the vast majority of the catch (typically more than 85% of the total catch in tropical areas), while albacore, taken by the Japanese coastal and offshore fleets in the temperate waters of the north Pacific, yellowfin (5–7%) and a small component of bigeye (1–4%) make up the remainder of the catch. The Japanese distant-water and offshore (144,012 mt



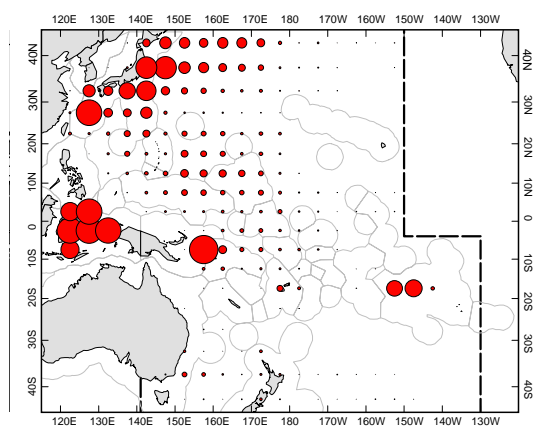
**Figure 27. Pole-and-line catch in the WCP-CA**

<sup>6</sup> (note that distinction between troll and pole-and-line gears in the Japanese coastal fleet was not possible for years prior to 1995)

in 2005) and the Indonesian fleets<sup>7</sup> (51,949 mt in 2005) account for most of the WCP–CA pole-and-line catch. The Solomon Islands fleet (6,988 mt in 2006) has recovered from low catch levels experienced in the early 2000s (only 2,778 mt in 2000 due to civil unrest), but is still far from the level (of over 20,000 mt annually) experienced during the 1990s.

[Figure](#) shows the average distribution of pole-and-line effort for the period 1995–2005. Effort in tropical areas is usually year-round and includes the 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 in the 2<sup>nd</sup> and 3<sup>rd</sup> 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 absent from this figure (spatial data are not available).

At this stage, 2006 data are incomplete, but the distribution of Japanese pole-and-line effort for 2006 will likely be similar to that presented in [Figure 28](#), but reduced for the other fleets.



**Figure 28. Average distribution of WCP–CA pole-and-line effort (1995–2005).**

<sup>7</sup> Indonesia has recently revised the proportion of catch taken by gear type for their domestic fisheries which 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.

### 4.3 Economic overview of the pole-and-line fishery

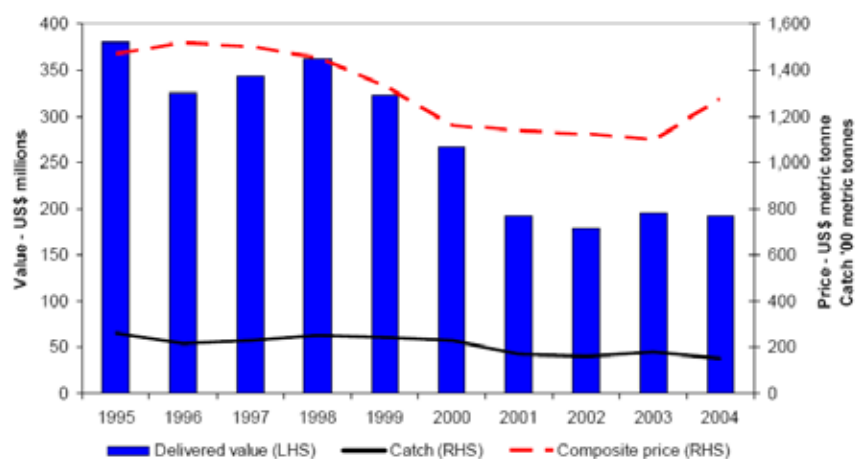
#### 4.3.1 Market conditions

During 2006 the Yaizu price of pole and line caught skipjack in waters off Japan averaged 231JPY/kg (US\$1986/Mt) an increase of 70 per cent on 2005. Similarly, the Yaizu price of pole and line caught skipjack in waters south of Japan increased dramatically averaging 212JPY/kg (US\$1822/Mt) during 2006, an increase of 45 per cent.

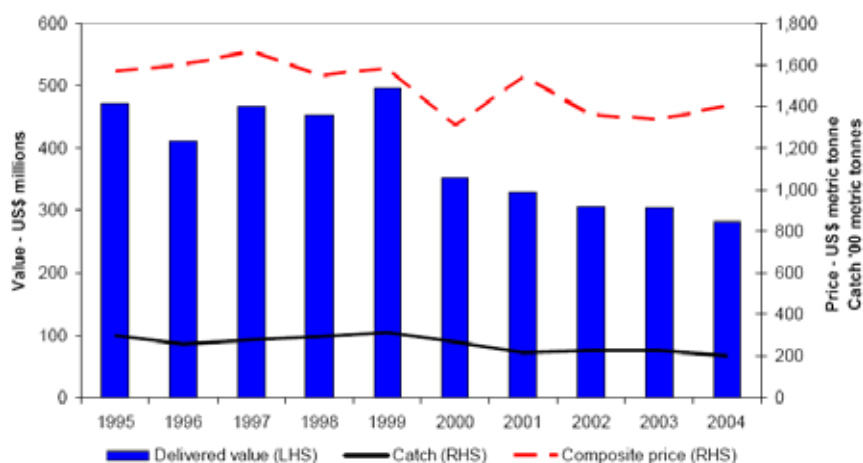
#### 4.3.2 Value of the pole-and-line catch

As a means of examining the effect of the changes to prices and catch levels over the period 1995-2005 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 [Figure 29](#) and [Figure 30](#). As catch estimates for the Japanese pole and line fleet for 2006 were not available at the time of writing of this report no catch value estimates have been derived for this year.<sup>8</sup>

The estimated delivered value of the total catch in the WCPFC pole and line fishery for 2005 is US\$269 million. This represents a decline of US\$29 million or 9 per cent on the estimated value of the catch in 2004. The estimated delivered value of the skipjack catch in the WCPFC pole and line fishery for 2005 is US\$199 million. This represents an increase of US\$4 million or 2 per cent on the estimated value of the catch in 2004 with a 2 per cent increase in catches driving the increase in value.



**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**

<sup>8</sup> 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 10–12% of the total WCP-CA catch (OFP, 2006), 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, 2006). The total number of vessels involved in the fishery has generally fluctuated between 4,000 and 5,000 for the last 30 years ([Figure 31](#)).

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 one at least one fleet has occurred in recent years;
- smaller (typically <100 GRT) **offshore** vessels which are usually **domestically-based**, undertaking trips less than one month, with ice or chill capacity, and serving fresh or air-freight sashimi markets, or [albacore] canneries.

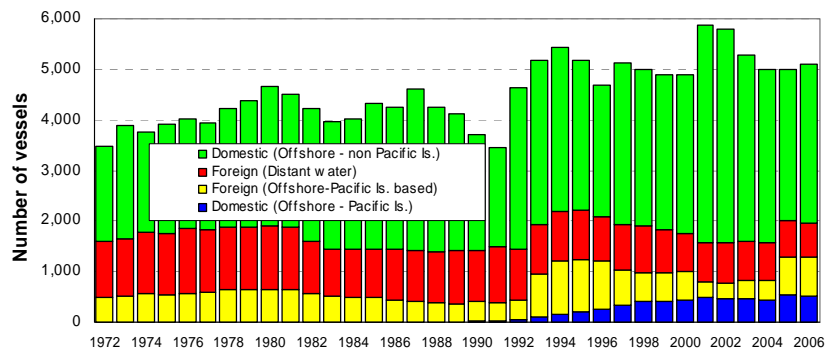


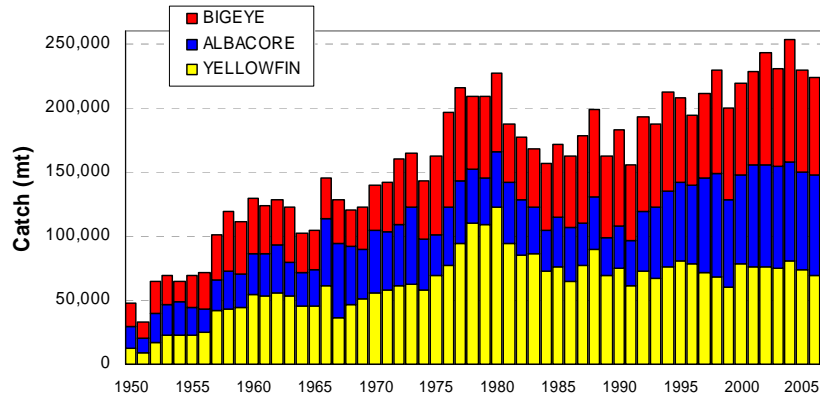
Figure 31. Longline vessels operating in the WCP-CA

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 in Papua New Guinea target yellowfin by handlining and small vertical longlines, usually around the numerous arrays of anchored FADs in home waters (although, not included in [Figure 31](#)). The commercial handline fleets target yellowfin tuna which comprise the majority of the overall catch (> 85%).

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 in the five years after this to 157,072 mt in 1984 (Figure 32). Since 1984, catches steadily increased over the next 15 years until the late 1990s, when catch levels were again similar to 1980. However, the composition of the catch in the late 1970s and early 1980s, a period when yellowfin tuna were targeted (e.g. ALB-19%;BET-27%;YFT-54% in 1980), has since become more balanced, particularly in recent years (e.g. ALB-35%;BET-33%;YFT-31%; SKJ-1% in 2006).



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

## 5.2 Provisional catch estimates and fleet sizes (2006)

The provisional WCP-CA longline catch (229,323 mt) for 2006 was the lowest since 2000 and around 10% lower than the highest on record which was attained in 2004 (261,038 mt). The WCP-CA albacore longline catch (78,921 mt – 34%) for 2006 was similar to the (high) catch levels experienced in recent years. The provisional bigeye catch (75,496 mt – 33%) for 2006 was the lowest for 5 years, and the yellowfin catch (70,021 mt – 31%), the lowest for 7 years.

A significant change in the WCP-CA longline fishery over the past 10 years has been the growth of Pacific Islands domestic albacore fishery, which has gone from taking 33% of the total south Pacific albacore longline catch in 1998, to accounting for over 59% of the catch in 2006. 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 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 went up to 8,741 mt, and by 2004 it was up to 16,888 mt. The 2006 bigeye catch by the Chinese-Taipei distant-water longline fleet declined to 7,841 mt which is thought to be related to a 12% drop in vessel numbers (133 vessels in 2005 to 117 vessels in 2006). 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 down to 130 vessels in 2006 (30% decline).

With domestic fleet sizes continuing to increase at the expense of foreign-offshore and distant-water fleets (Figure 31), the 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 are available in the WCPFC-SC3 National Fisheries Reports.

### 5.3 Catch per unit effort

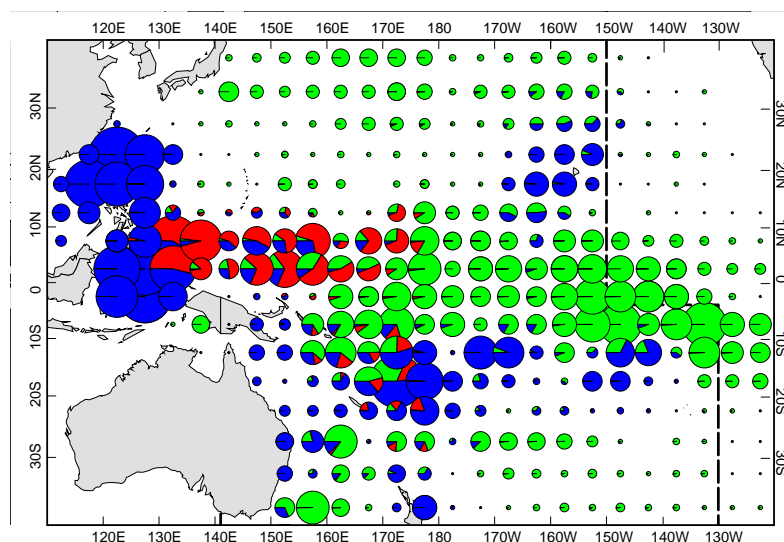
Time series of nominal CPUE provides a broad indication of the abundance and availability of target species to the longline gear, and as longliners target larger fish, the CPUE time series should be more indicative of adult tuna abundance. However, more so than purse-seine CPUE, the interpretation of 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, SC3 Information Paper **ME IP-1** (Hoyle et al., 2007) reports on the proceedings of the pelagic longline catch rate standardization meeting, held in Honolulu, Hawaii, June 2007.

### 5.4 Geographic distribution

[Figure 33](#) shows the distribution of effort by category of fleet for the period 2000–2005 (representing the most recently available data for all fleets, but reflecting the likely distributions for 2006).

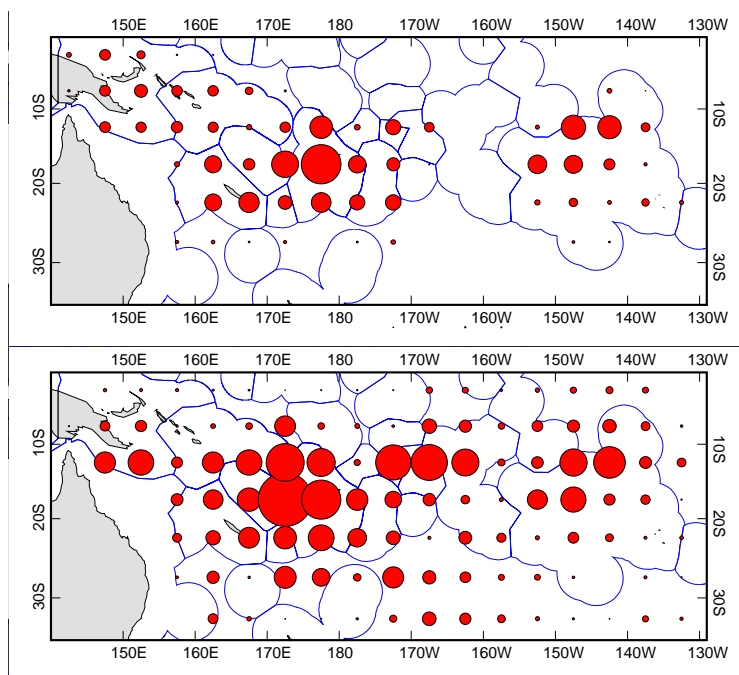
Effort by the **large-vessel, distant-water fleets** of Japan, Korea and Chinese-Taipei account for most of the effort but there has been some reductions in vessel numbers in some fleets over the past decade. Effort is widespread as sectors of these fleets target bigeye and yellowfin for the frozen sashimi market in central and eastern tropical waters, and albacore in the more temperate waters for canning. Activity by the **foreign-offshore fleets** from Japan, mainland China and Chinese-Taipei are restricted to the 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 recent years has been noted; the most significant examples are the increases in the American Samoan, Fijian and French Polynesian fleets and the recent establishment of the Niue fleet ([Figure 33](#)).



**Figure 33. Distribution of longline effort for distant-water fleets (green), foreign-offshore fleets (red) and domestic fleets (blue) for the period 2000–2005.**

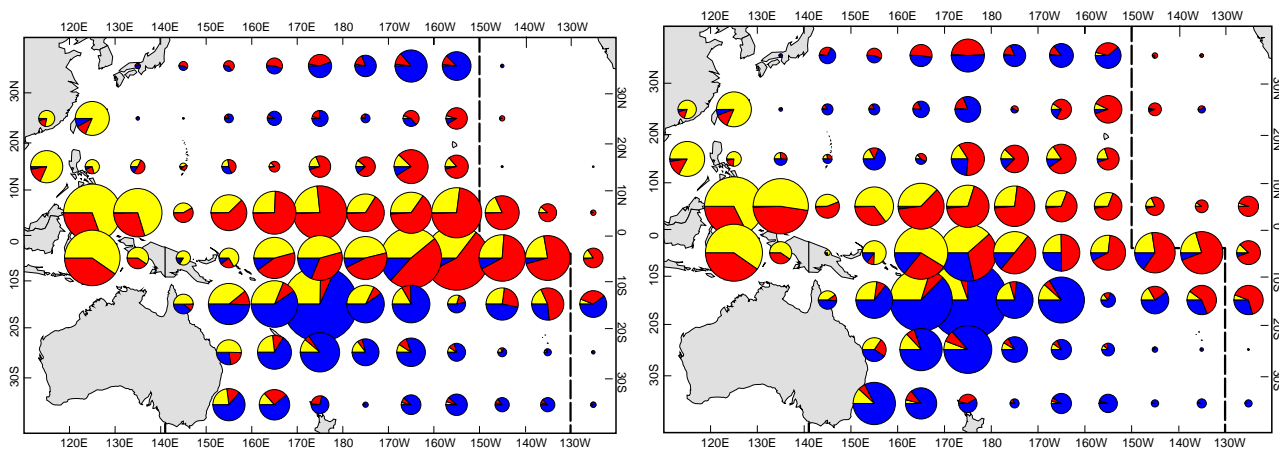
(Note that the domestic fleet effort excludes the Japanese coastal fishery and the Vietnam fishery; distant-water effort for Chinese-Taipei and other fleets targeting albacore in the North Pacific are poorly covered)





**Figure 34. Distribution of Pacific-islands domestic longline effort for 2000 (top) and 2005 (bottom).**

[Figure 35](#) shows species composition by area for 2004 and 2005 (2006 data 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. Species composition is likely to vary from year to year in waters where there is some overlap in species targeting, for example, in the latitudinal band from 10°–20°S. The apparent reduction in catch in the eastern tropical WCP-CA for 2005 is primarily due to incomplete data, although there was a considerable drop (25%) in the distant-water fleet catch estimates for bigeye in this area during 2005 (compared to 2004).



**Figure 35. Distribution of longline tuna catch by species during 2004 (left) and 2005 (right-provisional)**  
(Yellow–yellowfin; Red–bigeye; Blue–albacore)

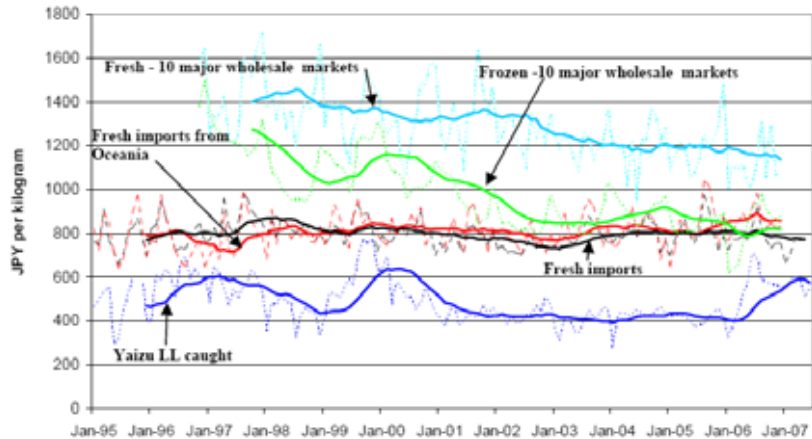
(Note that the domestic fleet effort excludes the Japanese coastal fishery and the Vietnam fishery; catches from some distant-water fleets targeting albacore in the North Pacific are not covered)

## 5.5 Economic overview of the longline fishery

### 5.5.1 Price trends – Yellowfin

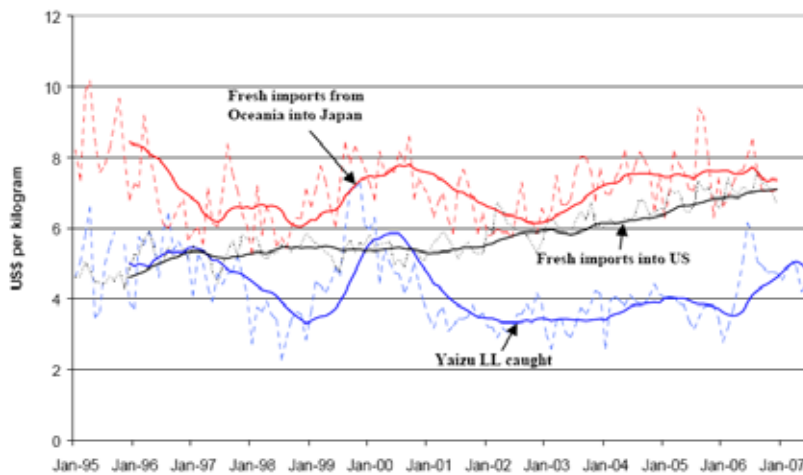
In 2006, fresh yellowfin prices at 10 major Japanese wholesale markets rose 10 per cent to 1097JPY/kg, while frozen yellowfin prices rose by 24 per cent to 799JPY/kg. Longline caught yellowfin prices (ex-vessel) landed at Yaizu rose by 33 per cent to 553JPY/kg and average fresh yellowfin prices (ex-vessel) at selected Japanese ports rose 7 per cent to 630JPY/kg. Fresh yellowfin import prices (c.i.f.) declined 3 per cent to 780JPY/kg, in US\$ terms the decline was greater as a result of the depreciation of the JPY against the US\$ with prices declining by 8 per cent to US\$6.71/kg. Japanese import prices for fresh yellowfin sourced from Oceania rose 3 per cent to 868JPY/kg (US\$7.46/kg).

Sales volumes at 10 major Japanese wholesale markets in 2006 declined with fresh yellowfin volumes declining by 11 per cent to 15,099Mt and frozen yellowfin volumes declining by 22 per cent to 16,135Mt. After steadily increasing over the period 1997 to 2001,



**Figure 36. Yellowfin prices on Japanese markets; Fresh on 10 major wholesales markets, frozen on 10 major wholesales 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](http://www.customs.go.jp)), FFA Tuna Industry Advisor, and US National Marine and Fisheries Service ([swr.nmfs.noaa.gov](http://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](http://www.customs.go.jp)), FFA Tuna Industry Advisor, and US National Marine and Fisheries Service ([swr.nmfs.noaa.gov](http://swr.nmfs.noaa.gov))

Japanese imports<sup>9</sup> of fresh yellowfin fell sharply in 2002 and continued to decline though to 2006. Japanese imports of fresh yellowfin were 19,011Mt in 2006 down 11 per cent compared with 2005 and at their lowest level since at least 1990. After declining sharply in 2005 Japanese imports of fresh yellowfin from Oceania recovered in 2006 rising 22 per cent to 5,003Mt.

US fresh yellowfin import volumes and prices (f.a.s) continued to rise in 2006 both increasing 4 per cent, to 17,791Mt and US\$7.11/kg

respectively.

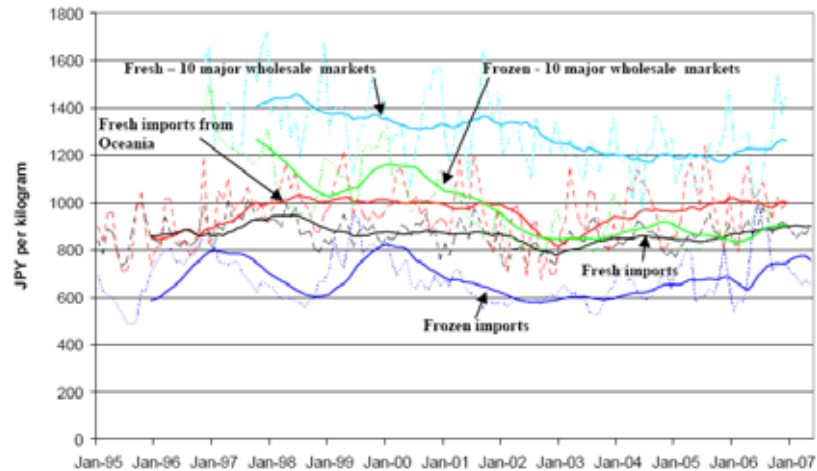
<sup>9</sup> Imports of tuna into Japan are defined to be tunas that are carried into Japan as imports. "That is, tuna which is caught by vessels of foreign nationality in the seas outside of territorial waters (including Japan's and other countries' exclusive economic zones) and carried into Japan, 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 regard as Japanese products)".  
[www.mof.gov.jp](http://www.mof.gov.jp)

### 5.5.2 Price trends – Bigeye

Prices at 10 major Japanese wholesale markets for fresh bigeye rose 5 per cent in 2006, averaging 1,262JPY/kg while for frozen bigeye prices rose 9 per cent to 915JPY/kg. Fresh bigeye sales volumes rose by 4 per cent to 10,677Mt while frozen sales volumes fell 6 per cent to 42,097Mt.

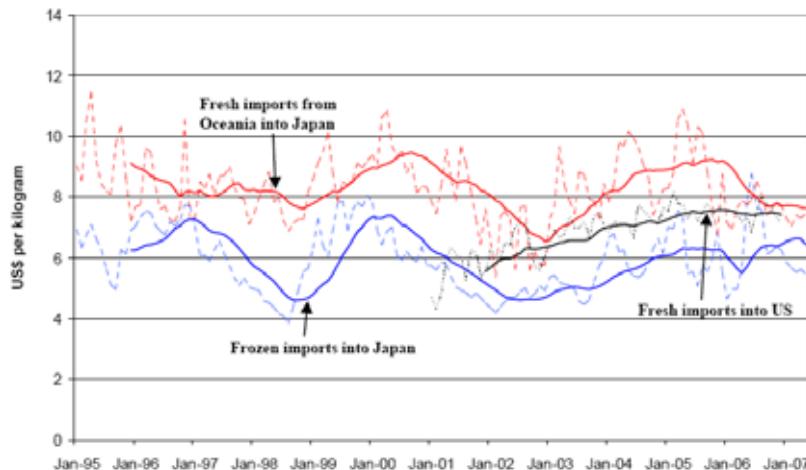
Frozen bigeye prices (ex-vessel) at selected major Japanese ports rose 18 per cent in 2006 to 728JPY/kg while fresh bigeye prices (ex-vessel) fell 16 per cent to 833JPY/kg. Fresh bigeye import prices (c.i.f.) rose 4 per cent to 897JPY while frozen bigeye import prices (c.i.f.) rose 12 per cent to 741JPY/kg. In US\$ terms, fresh bigeye import prices were down marginally at US\$7.71/kg while frozen bigeye import prices rose 6 per cent to US\$6.37/kg. Import volumes of fresh bigeye declined 7 per cent in 2006 to 15,790Mt of which 5,070Mt was sourced from the Oceania region. Average prices for fresh bigeye from Oceania declined marginally to 1013JPY/kg (US\$7.46/kg).

US fresh bigeye import volumes and prices (f.a.s) both declined 2 per cent to 4,920Mt and US\$7.43/kg respectively.



**Figure 38. Bigeye prices on Japanese markets; Fresh on 10 major wholesales markets, frozen on 10 major wholesales 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](http://www.customs.go.jp)), FFA Tuna Industry Advisor, and US National Marine and Fisheries Service ([swr.nmfs.noaa.gov](http://swr.nmfs.noaa.gov))

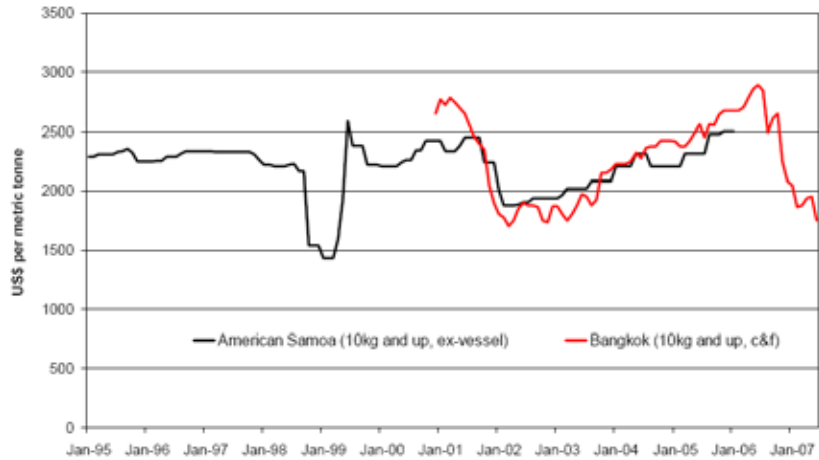


**Figure 39. Bigeye prices in US\$: US fresh imports, Japanese fresh imports from Oceania (c.i.f.) and Japanese frozen imports from Oceania (c.i.f.)**

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

### 5.5.4 Price trends – Albacore

The Bangkok albacore market price (10kg and up, c&f) was at US\$2650-2700/Mt in January 2006 and continued its upward trend through to mid-June when it peaked at US\$2900-2950/Mt. According to FFA database the price level reached in mid-June was the highest ever recorded<sup>10</sup>. By end of June prices fell to US\$2900 with the downward trend continuing to August when prices reached US\$2500-2600/Mt. Prices remained at this level through to mid-September before rising again to US\$2800-2900/Mt in the second half of September. Prices fell again thereafter and ended the year at US\$2000-2100/Mt. The price decline has continued through to July 2007 with latest prices at US\$1750/Mt.



**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.)**

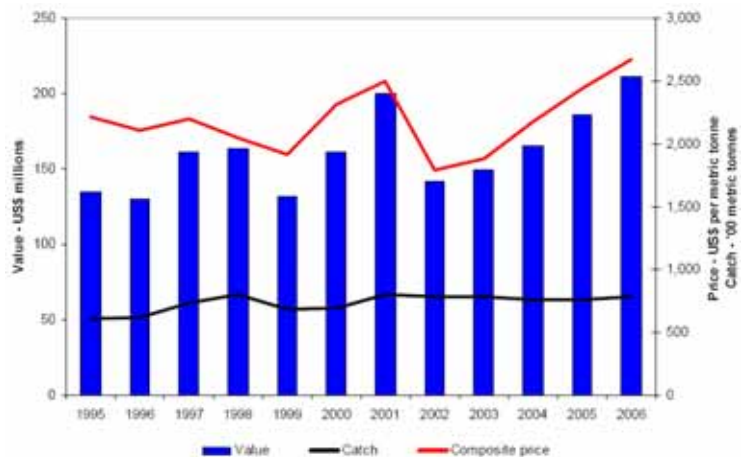
(Monthly price given by dashed lines, 12 month moving average price given by solid line)  
Sources: Thai Customs ([www.customs.go.th](http://www.customs.go.th)), FFA Tuna Industry Advisor, and US National Marine and Fisheries Service ([swr.nmfs.noaa.gov](http://swr.nmfs.noaa.gov))

Thai imports of frozen albacore rose 18 per cent in 2006 to 33,046Mt while prices rose 10 per cent to US\$2674/Mt (US\$2.67/kg). The US import price for fresh albacore rose 20 per cent to US\$4.05/kg while prices for fresh landings at selected Japanese ports declined 4 per cent to US\$3.00/kg.

### 5.5.5 Value of the longline catch

As a means of examining the effect of the changes to prices and catch levels since 1995 estimate of the “delivered” value of the longline fishery tuna catch in the WCPFC Area from 1995 to 2006 are 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.<sup>11</sup>

The estimated delivered value of the longline tuna catch in the WCPFC area for 2006 is US\$1,112 million. This represents a marginal increase of US\$5 on the estimated value of the catch in 2005. The value of the albacore catch increased by US\$25 million (14 per cent) while the value of the bigeye and yellowfin catch



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

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

<sup>11</sup> For the yellowfin and bigeye caught by fresh longline vessels it is assumed that 80 per cent of the catch is of export quality and 20 per cent 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.

decline by US\$17 million (3 per cent) and \$US4 million (1 per cent) respectively. The albacore catch was estimated to be worth US\$211 million in 2006 with the 14 per cent increase being driven by 10 per cent increase in the composite price and a 4 per cent increase in catch. The bigeye catch was estimated to be worth US\$504 million with the catch declining 6 per cent and the composite price increasing 3 per cent. The delivered value of the yellowfin catch was down marginally with a 7 per cent rise in the composite price being offset by a 7 per cent decline in catch.

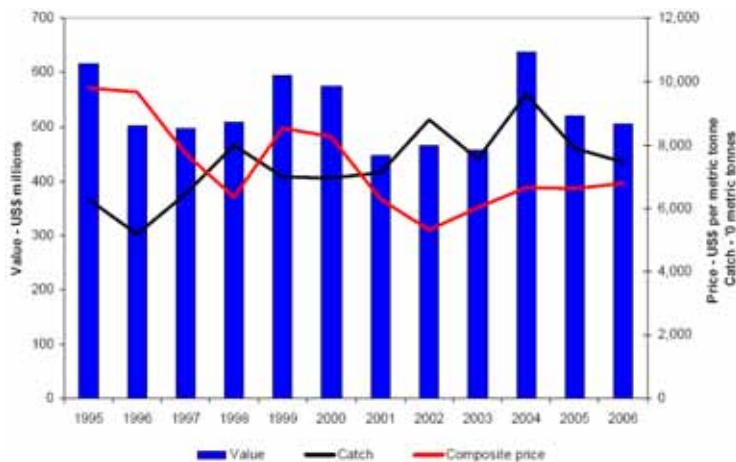


Figure 42. Bigeye in the WCPFC longline fishery – Catch, delivered value of catch and composite price

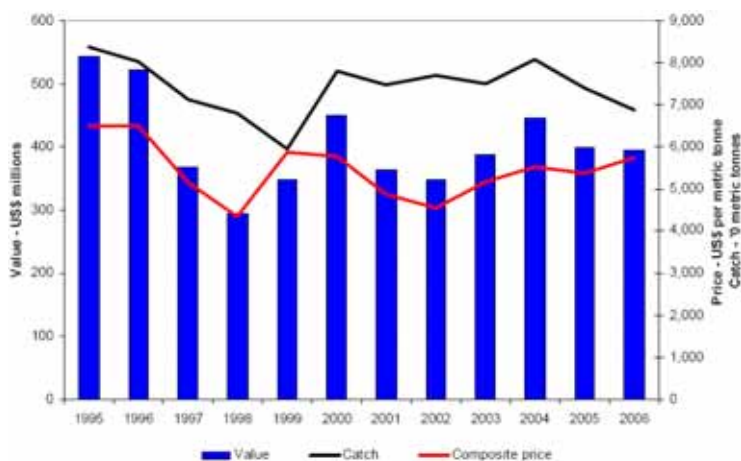


Figure 43. Yellowfin in the WCPFC longline fishery – Catch, delivered value of catch and composite price

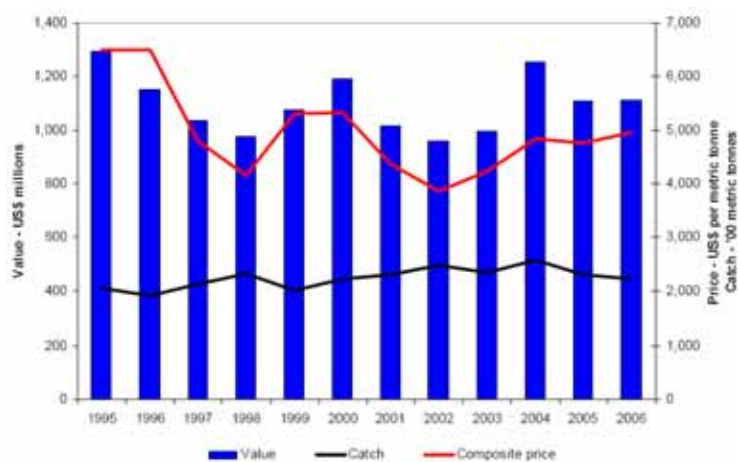


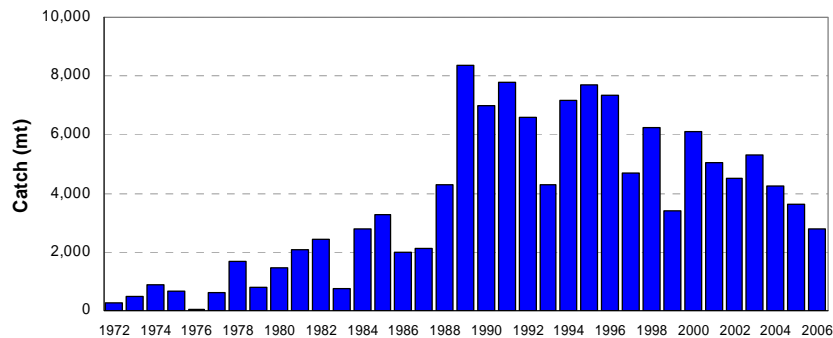
Figure 44. All tuna in the WCPFC longline fishery – Catch, delivered value of catch and composite price

## 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 NZ waters located near 40°S). The fleets of New Zealand and 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); since then, annual catches have gradually declined and have hovered in the range 4,500–6,000 mt over recent years. The level of effort expended by the troll fleets each year tends to reflect the price commanded for the product (albacore for canning) to some extent, and by expectations concerning likely fishing success.

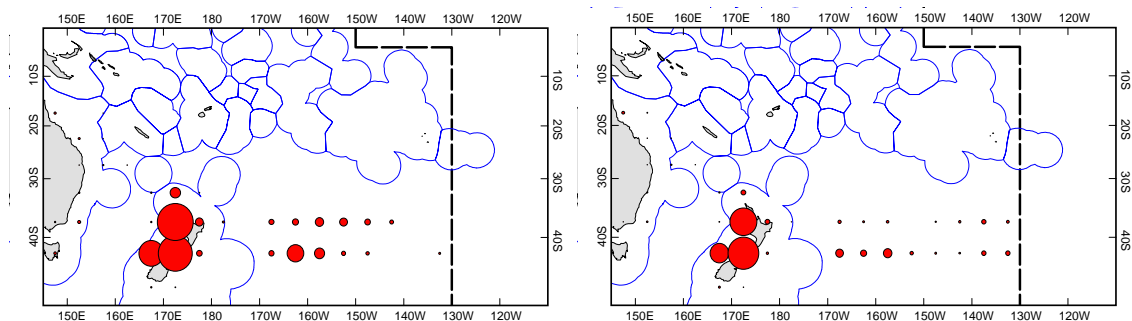


**Figure 45. Troll catch (mt) of albacore in the south Pacific Ocean**

### 6.2 Provisional catch estimates (2006)

The 2006 troll albacore catch (3,026 mt) was the lowest for nearly 20 years, and mainly due to a reduction in active vessel numbers and hence overall effort. The fleets of New Zealand (182 vessels caught 2,109 mt in 2006) and USA (8 vessels caught 600 mt 2006) typically account for most of the albacore troll catch, with minor contributions coming from the Canadian (2 vessels caught 135 mt in 2006) and the Cook Islands (2 vessels caught 254 mt in 2006) fleets.

[Figure 46](#) shows the distribution of effort for troll fleets for 2005 and 2006, with effort primarily off the coast of New Zealand and in the Sub-tropical convergence zone (STCZ).



**Figure 46. Distribution of South Pacific troll effort during 2005 (left) and 2006 (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 six of the last seven 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 this fishery, however, has declined over the years primarily due to economic constraints. The skipjack catch increased during the 1980s due to growth in the international purse seine fleet, combined with increased catches by domestic fleets from Philippines and Indonesia (which now make up 20–25% of the total skipjack catch in WCP–CA in recent years).

The 2006 WCP–CA skipjack catch of 1,537,524 mt was the fifth consecutive record catch and nearly 400,000 mt more than the 2001 catch. This new level was attained due to another record catch taken in the **purse seine** fishery (1,305,405 mt – 85%). The balance of the catch was taken by the **pole-and-line** gear (172,697 mt – 11%) and **unclassified** gears in Indonesia, Philippines and Japan (~55,000 mt – 4%), while the **longline** fishery accounted for less than 1% of the total catch.

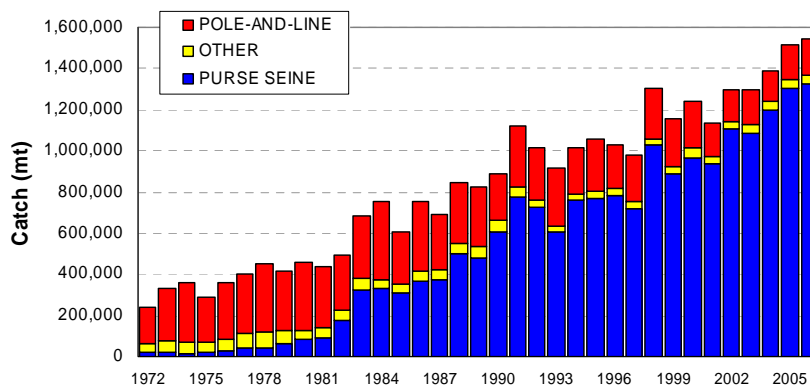


Figure 47. WCP–CA skipjack catch (mt) by gear

The majority of the skipjack catch is taken in equatorial areas, and most of the remainder is taken in the seasonal 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. The central tropical waters are dominated by the purse-seine catches from several foreign and domestic fleets. As mentioned in Section 3, the spatial distribution of skipjack catch by purse-seine vessels in the central and eastern equatorial areas is influenced by the prevailing ENSO conditions.

The Philippines and Indonesian domestic fisheries account for most of catch in 20–40 cm size range which represents a significant proportion of the WCP–CA skipjack catch, in numbers of fish (Figure 49). The dominant mode of the WCP–CA skipjack catch (by weight) typically falls in the size range 40–60 cm, corresponding to 1–2+ year-old fish (Figure 50). Unassociated (free swimming school) sets by purse seine vessels usually account for most of the large skipjack (i.e. fish over 70cm). There was a greater proportion of medium-large (60–80 cm) skipjack caught in the purse seine fishery during 2002, 2003 and 2005. In contrast, the WCP–CA skipjack purse-seine catch in 2004 and 2006 comprised younger fish, mainly from associated schools.

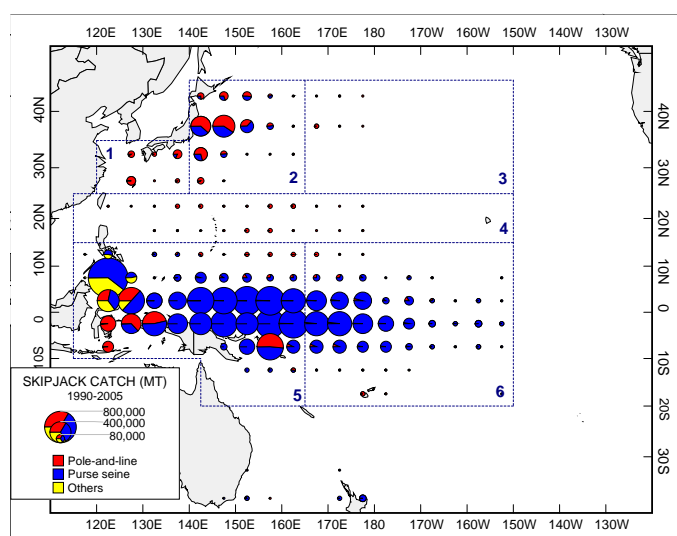
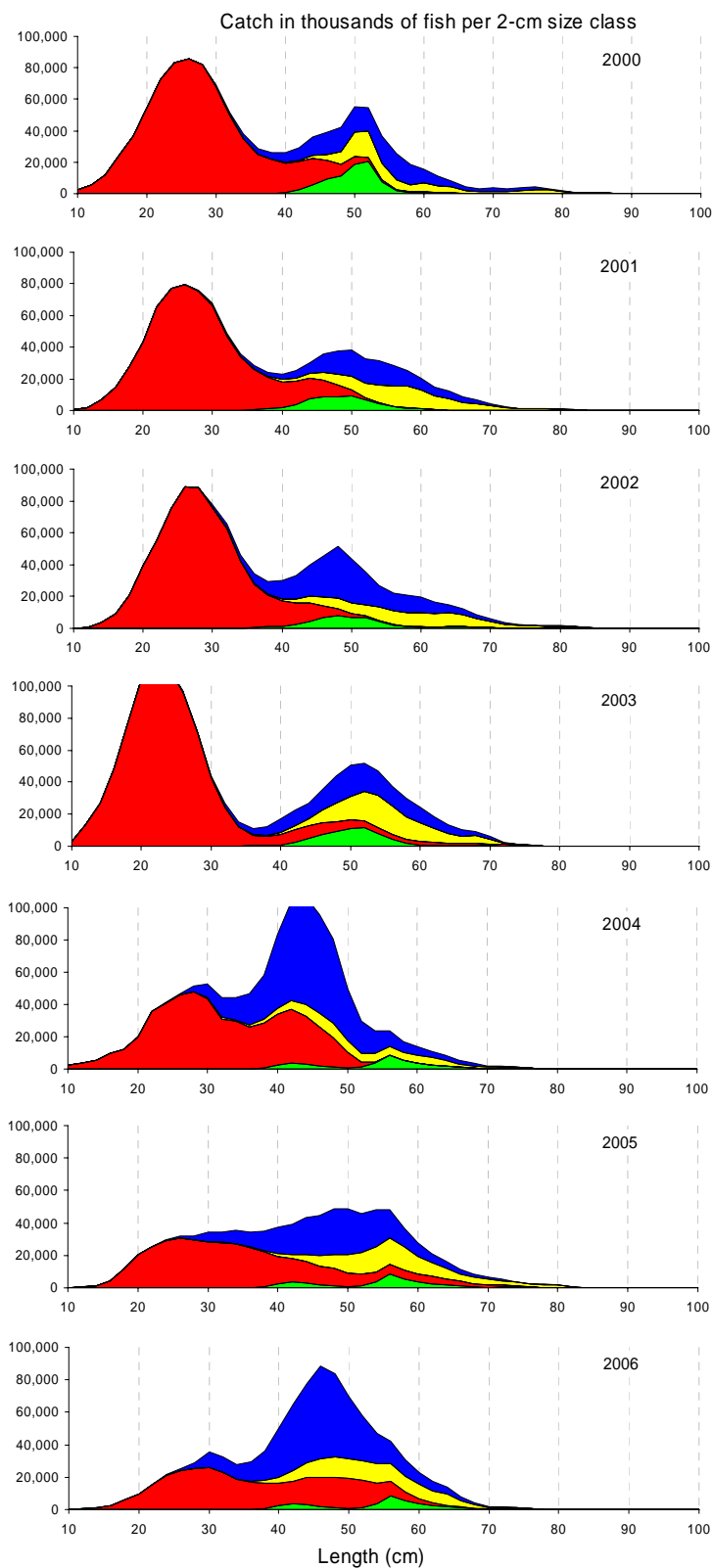


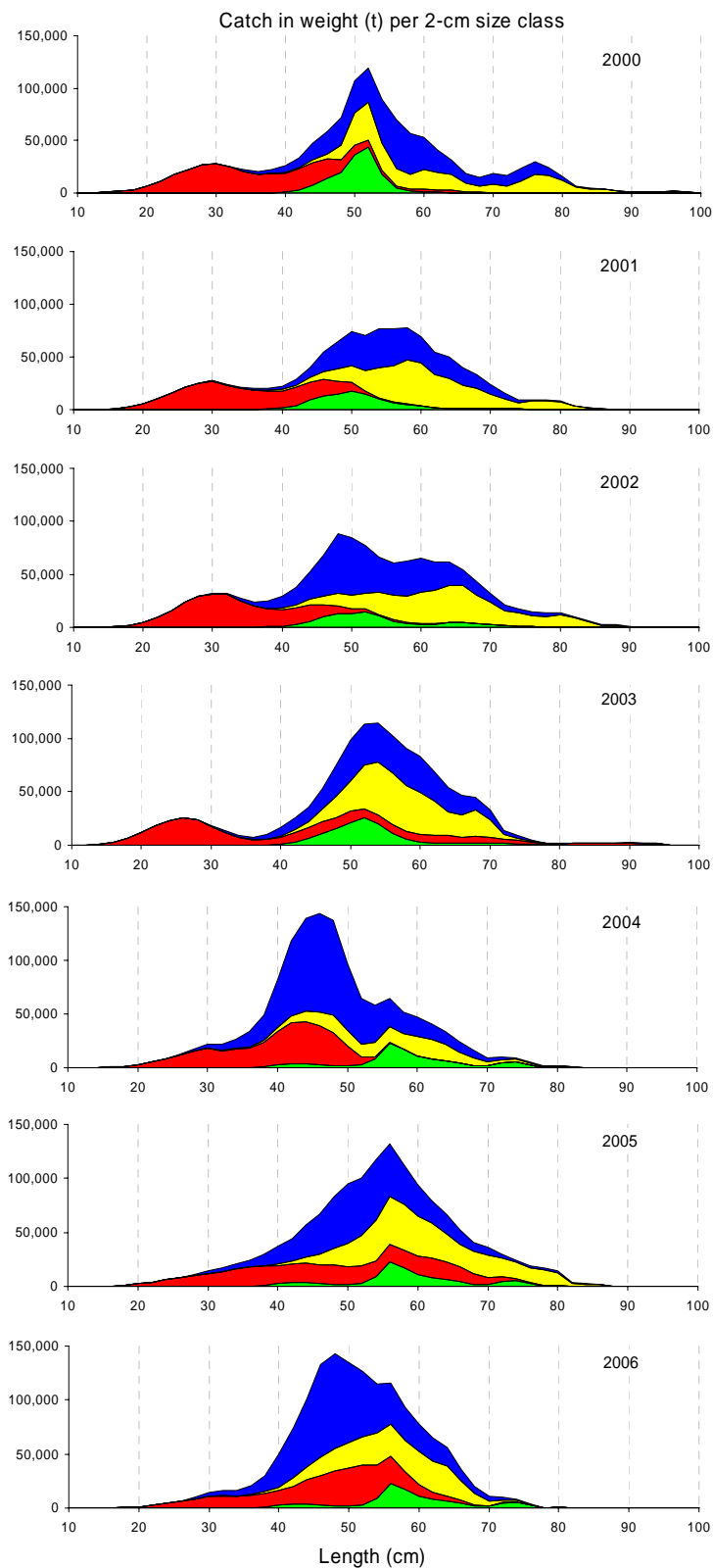
Figure 48. Distribution of skipjack tuna catch, 1990–2005.

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



**Figure 49. Annual catches (numbers of fish) of skipjack tuna in the WCPO by size and gear type, 2000–2006. (green–pole-and-line; red–Phil-Indo fisheries; blue–purse seine associated; yellow–purse seine unassociated)**





**Figure 50. Annual catches (metric tonnes) of skipjack tuna in the WCPO by size and gear type, 2000–2006.**  
 (green–pole-and-line; red–Phil-Indo fisheries; blue–purse seine associated; yellow–purse seine unassociated)

## 7.2 YELLOWFIN

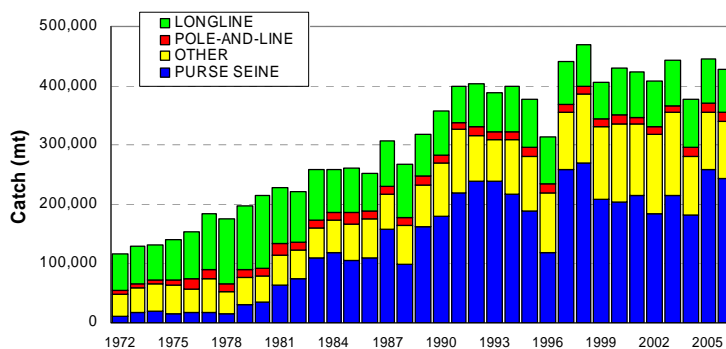
Since 1997, the total yellowfin catch in the WCP–CA has been generally between 400,000–470,000 mt ([Figure 51](#)). The 1998 catch was the largest on record (468,504 mt) and followed two years after an unusually low catch in 1996, primarily due to poor catches in the purse seine fishery – the poor yellowfin 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).

Catches in recent years have been relatively stable, although the 2004 catch (378,159 mt) was the lowest since 1996. The 2006 catch (426,726 mt) is around the average level for the last 10 years, with no significant deviation from recent catch levels in any of the fisheries. The **purse seine** catch for 2006 (243,620 mt – 57% of the total WCP–CA yellowfin catch) was lower than the 2005 level, but still one of the highest catches over the past ten years.

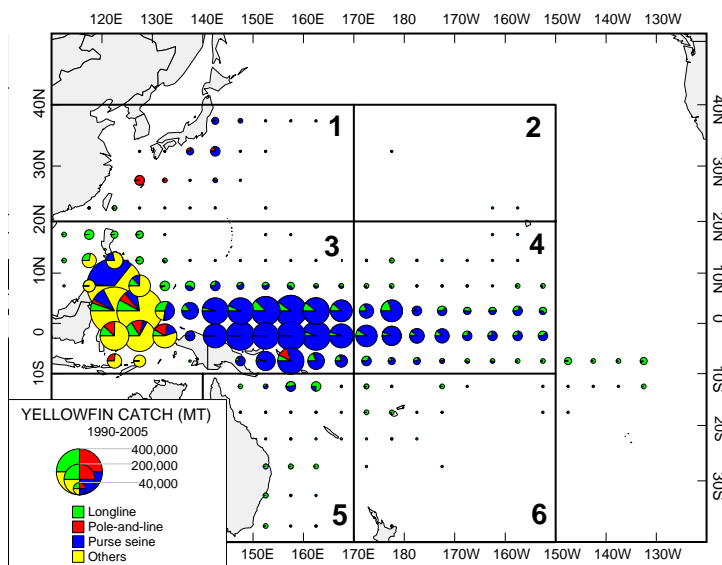
In recent years, the yellowfin longline catch has ranged 75,000–82,000 mt, which is well below catches taken in the late 1970s to early 1980s (90,000–120,000 mt), presumably related to changes in targetting practices by some of the large fleets and the gradual reduction in the number of distant-water vessels. The WCP–CA **longline** catch for 2006 was 71,021 mt (17% of the total WCP–CA yellowfin catch), the lowest catch since 1999.

The high catches of yellowfin experienced recently in the EPO (annual catches of over 400,000 mt for 2001–2003) were not sustained in 2004 and 2005, and dropped significantly in 2006 (181,246 mt) to a level not experienced since the mid-1980s. The reduction in vessels numbers from Asian fleets fishing in the tropical central Pacific is thought to be one of the main reasons for the decline in catches.

The **pole-and-line** fisheries took 16,130 mt (4% of the total yellowfin catch) during 2006, and **'other'** category accounted for ~100,000 mt (which was 22% of the total catch for all gears). Catches in the **'other'** category are largely composed of yellowfin taken by various assorted gears (e.g. ring net, bagnet, gillnet, handline and seine net) in the domestic fisheries of the Philippines and eastern Indonesia<sup>12</sup>. [Figure 52](#) shows the distribution of yellowfin catch by gear type for the period 1990–2005 (data for 2006 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 gears in the Indonesian and Philippine fisheries.



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

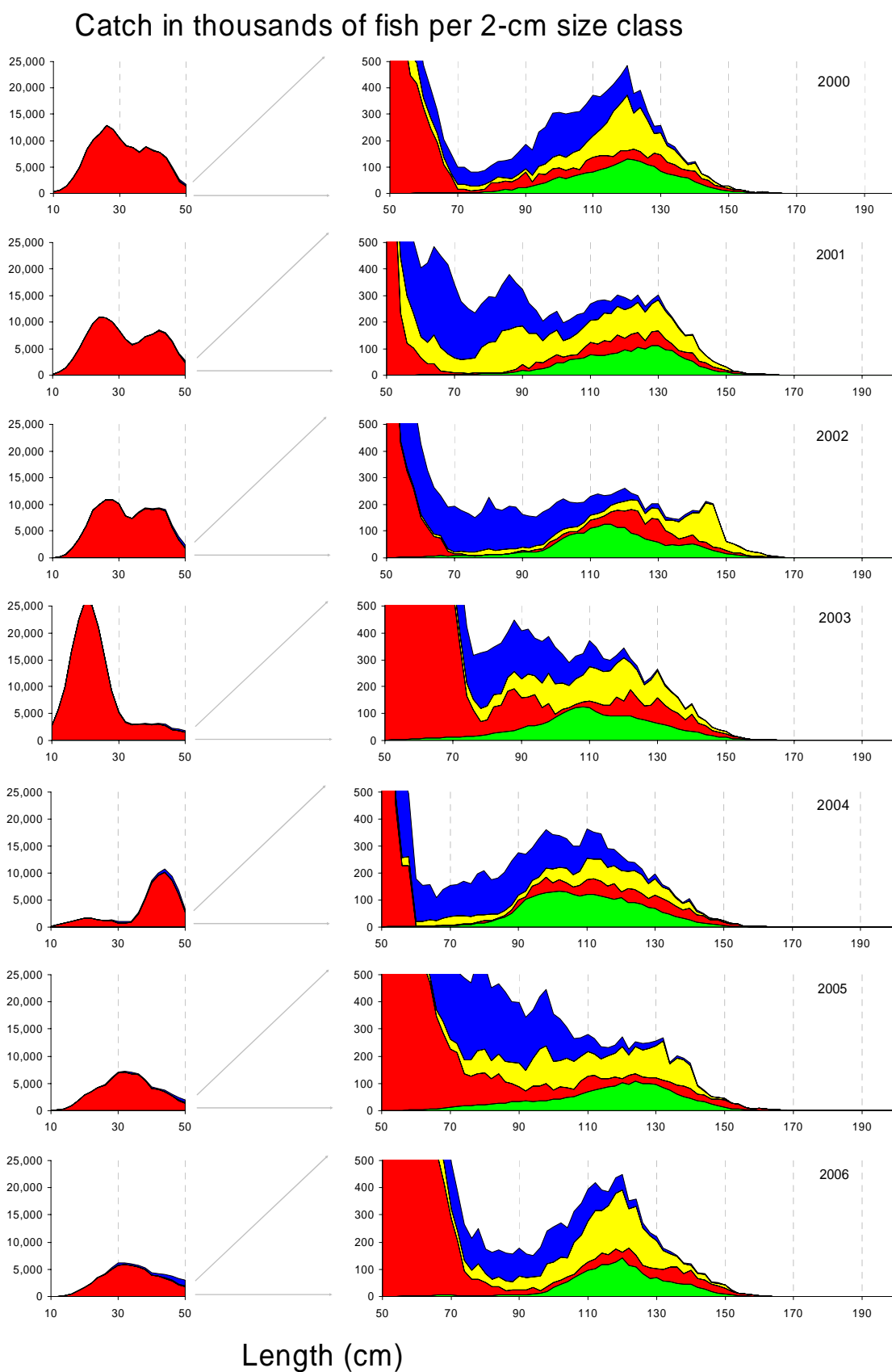


**Figure 52. Distribution of yellowfin tuna catch in the WCP–CA, 1990–2005.**

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

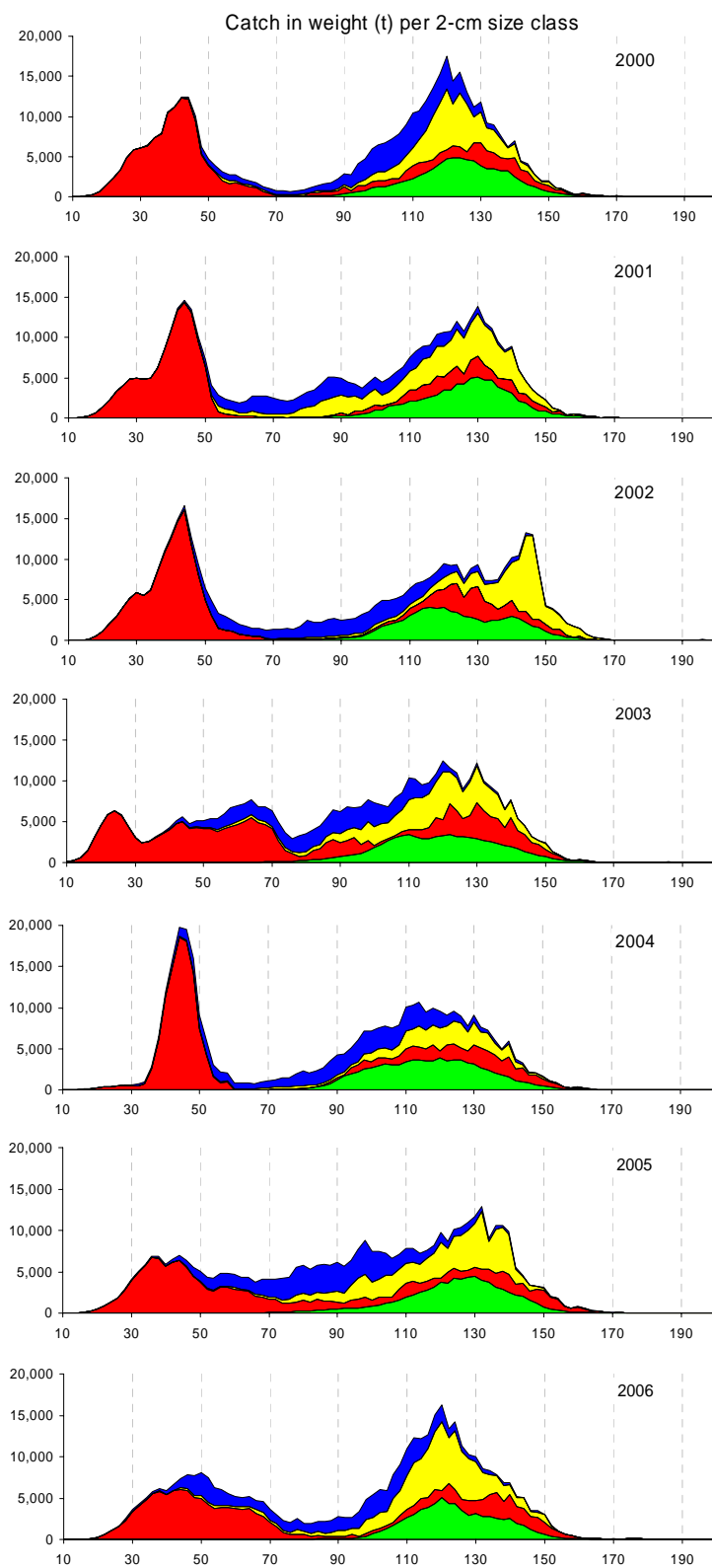
<sup>12</sup> Indonesia has recently revised the proportion of catch by species for their domestic fisheries which has resulted in differences in species composition by gear type since 2004 compared to what has been reported in previous years.

As with skipjack tuna, the domestic surface fisheries of the Philippines and Indonesia take large numbers of small yellowfin in the range 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 [Figure 54](#). 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. Note the strong mode of large (130–150cm) yellowfin from (purse-seine) unassociated-sets in 2002, which corresponds to the good catches experienced in the extreme east of the tropical WCPO ([Figure 15](#)–right). The purse seine fishery experienced relatively poor catches of yellowfin during 2004 and this appears to be due more to lower than normal catches of large fish from unassociated schools than catches of small fish from associated set types.



**Figure 53. Annual catches (in number of fish) of yellowfin tuna in the WCPO by size and gear type, 2000–2006.**

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



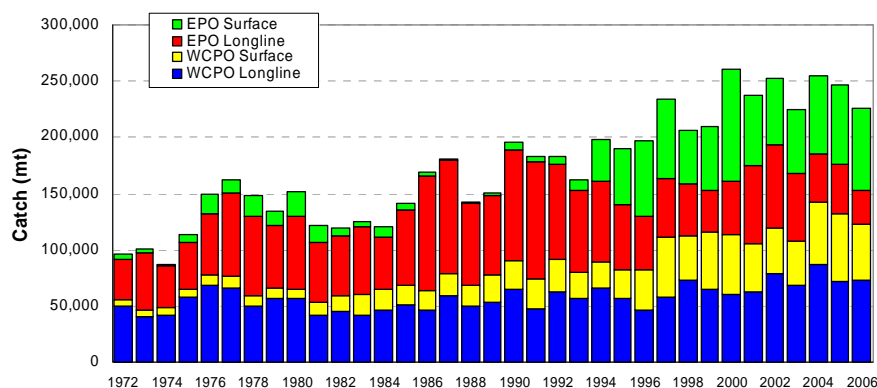
**Figure 54. Annual catches (in metric tonnes) of yellowfin tuna in the WCPO by size and gear type, 2000–2006.**

(green–longline; red–Phil-Indo fisheries; blue–purse seine associated; yellow–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 2006 bigeye catch for the Pacific Ocean (226,300 mt) is around the average level for the past ten years.

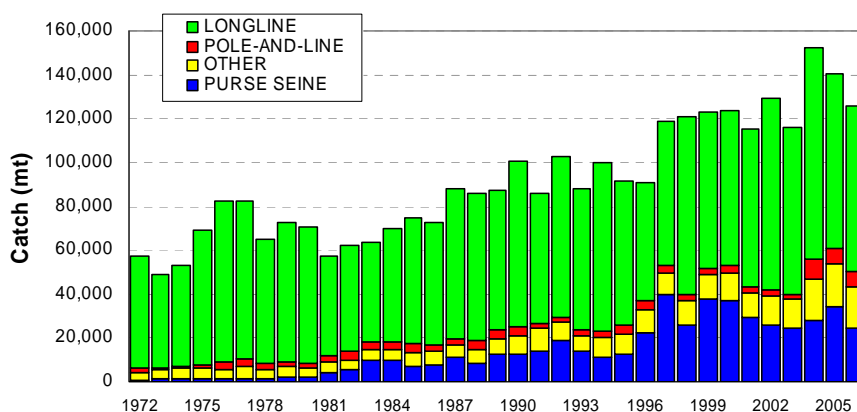
The **purse-seine** catch in the **EPO** (73,043 mt in 2006) continues to account for a significant proportion (71%) of the total EPO bigeye catch, although the provisional 2006 EPO longline bigeye catch (30,271 mt), at this stage, is the lowest since 1971 – the decline in the EPO longline catch in recent years is probably related to the reduction of vessels in distant-water fleets targeting this species. The **WCP-CA longline** bigeye catches have fluctuated between 70,000–96,000 mt since 1999, with the 2006 catch (75,496 mt) considered lower than average for this period. The provisional **WCP-CA purse seine** bigeye catch for 2006 was estimated to be 24,018 mt



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

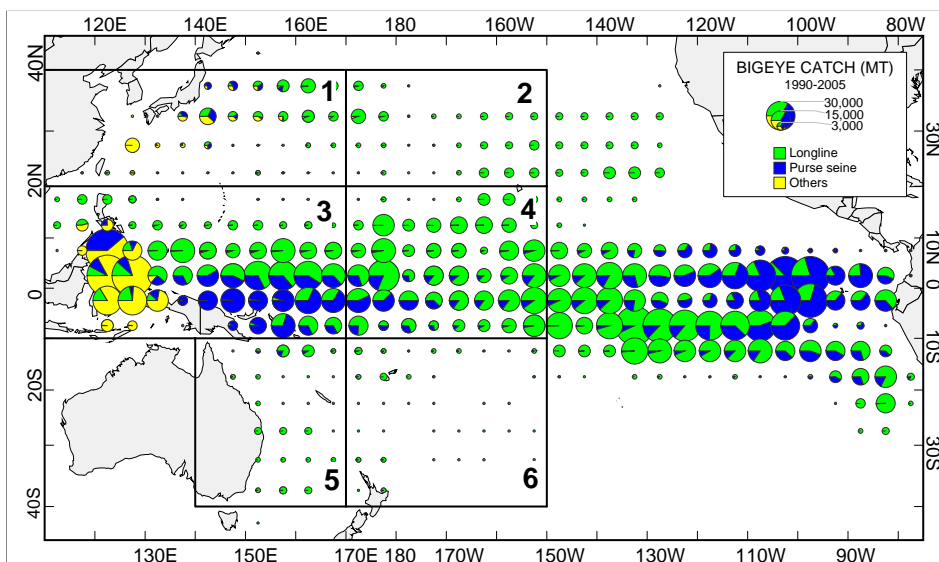
which is the lowest for more than 10 years ([Figure 56](#)). The **WCP-CA pole-and-line** fishery has generally accounted for between 2,000–4,000 mt of bigeye catch annually over the past decade, although recent revisions to the estimates for the Indonesian fishery have resulted in an increase (to 6,000–9,000 mt) since 2004. The "other" category, representing various gears in the Philippine, Indonesian<sup>13</sup> and Japanese domestic fisheries, has accounted for an estimated 11,000–20,000 mt (10–15% of the total WCP-CA bigeye catch) in recent years.

[Figure 57](#) shows the spatial distribution of bigeye catch in the Pacific for the period 1990–2005 (2006 data are incomplete). The majority of the WCP-CA catch is taken in equatorial areas, both by purse seine and longline, but with some longline catch in sub-tropical areas (e.g. east of Japan and off the east coast of Australia). In the equatorial areas, much of the longline catch is taken in the central Pacific, continuous with the important traditional bigeye longline area in the eastern Pacific.



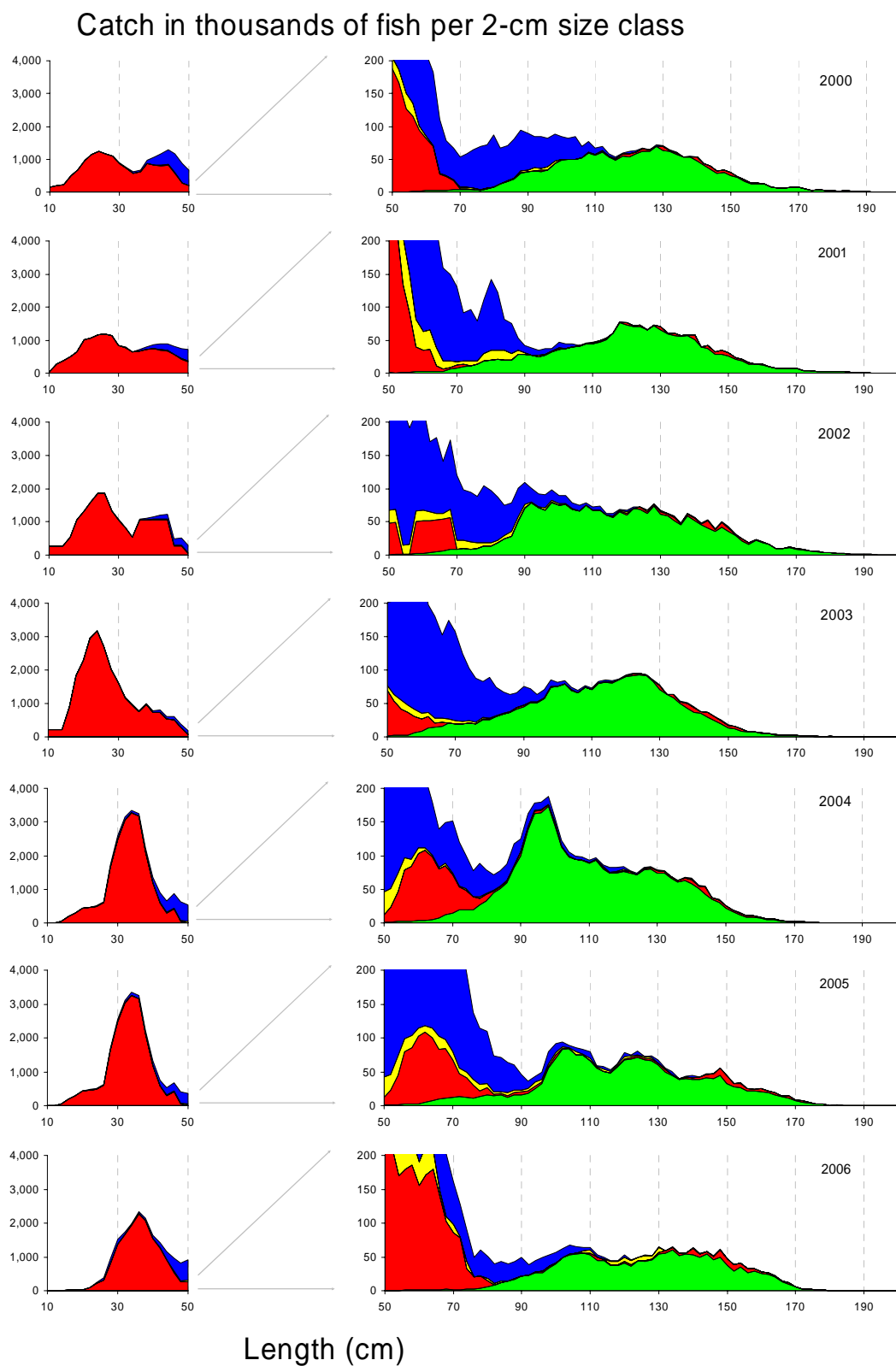
**Figure 56. WCP-CA bigeye catch (mt) by gear**

<sup>13</sup> 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 2004 compared to what has been reported in previous years.



**Figure 57. Distribution of bigeye tuna catch, 1990–2005.**  
The six-region spatial stratification used in stock assessment for the WCP–CA is shown.

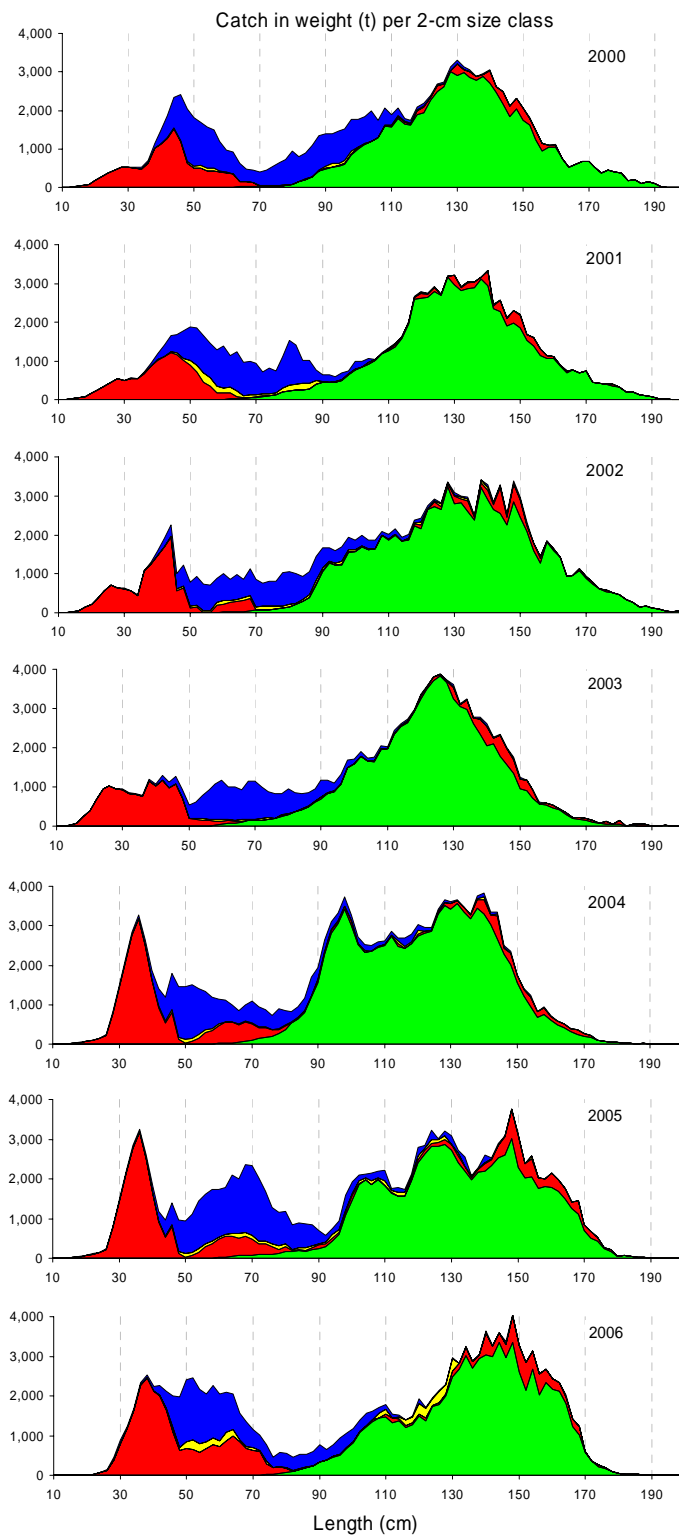
As with skipjack and yellowfin tuna, the domestic surface fisheries of the Philippines and Indonesia take large numbers of small bigeye in the range 20–60 cm (Figure 58). The longline fishery clearly accounts for most of the catch (by weight) of large bigeye in the WCP–CA (Figure 59). This is in contrast to large yellowfin tuna, which (in addition to the 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 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 60–70 cm during 2003 are probably represented as the clear mode of fish at size 95–100 cm in the longline fishery in 2004, and modes of larger fish in subsequent years.



**Figure 58. Annual catches (numbers of fish) of bigeye tuna in the WCPO by size and gear type, 2000–2006.**

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



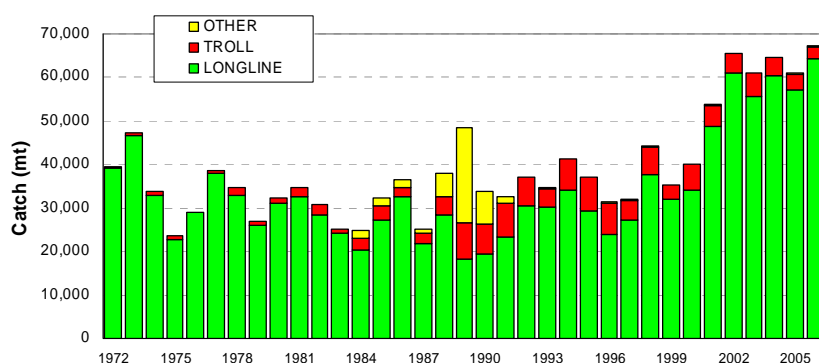


**Figure 59. Annual catches (metric tonnes) of bigeye tuna in the WCPO by size and gear type, 2000–2006.**  
 (green–longline; red–Phil-Indo fisheries; blue–purse seine associated; yellow–purse seine unassociated)

## 7.4 SOUTH PACIFIC ALBACORE

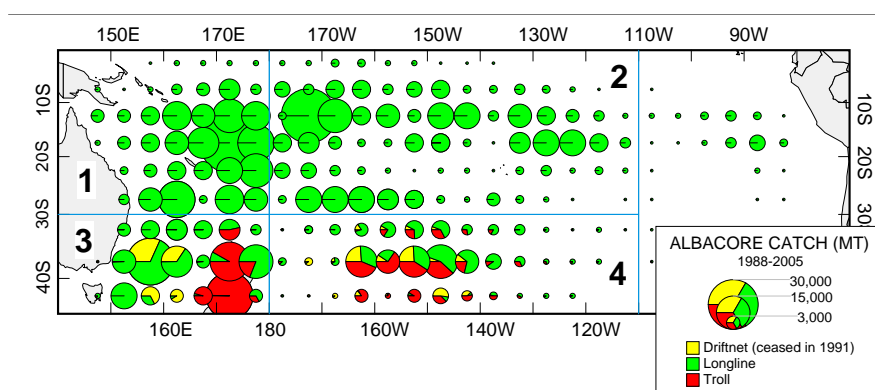
Prior to 2001, south Pacific albacore catches were in the range 25,000–40,000 mt, although a significant peak was attained in 1989 (48,562 mt), when driftnet fishing was in existence. Since 2001, catches have easily exceeded this range, primarily as a result of the growth in several Pacific Islands domestic longline fisheries. The south Pacific albacore catch in 2006 (67,530 mt,) was the highest on record, primarily due to a record catch in the longline fishery.

In the post-driftnet era, **longline** has accounted for most (> 75%) of the South Pacific Albacore catch, while the **troll** catch, for a season spanning November – April has been in the range 3,000–8,000 mt (Figure 60). The WCP–CA albacore catch (99,861 mt in 2006) includes north Pacific catches (from the longline, pole-and-line and troll fisheries) and typically contributes around 80–90% of the Pacific catch of albacore.



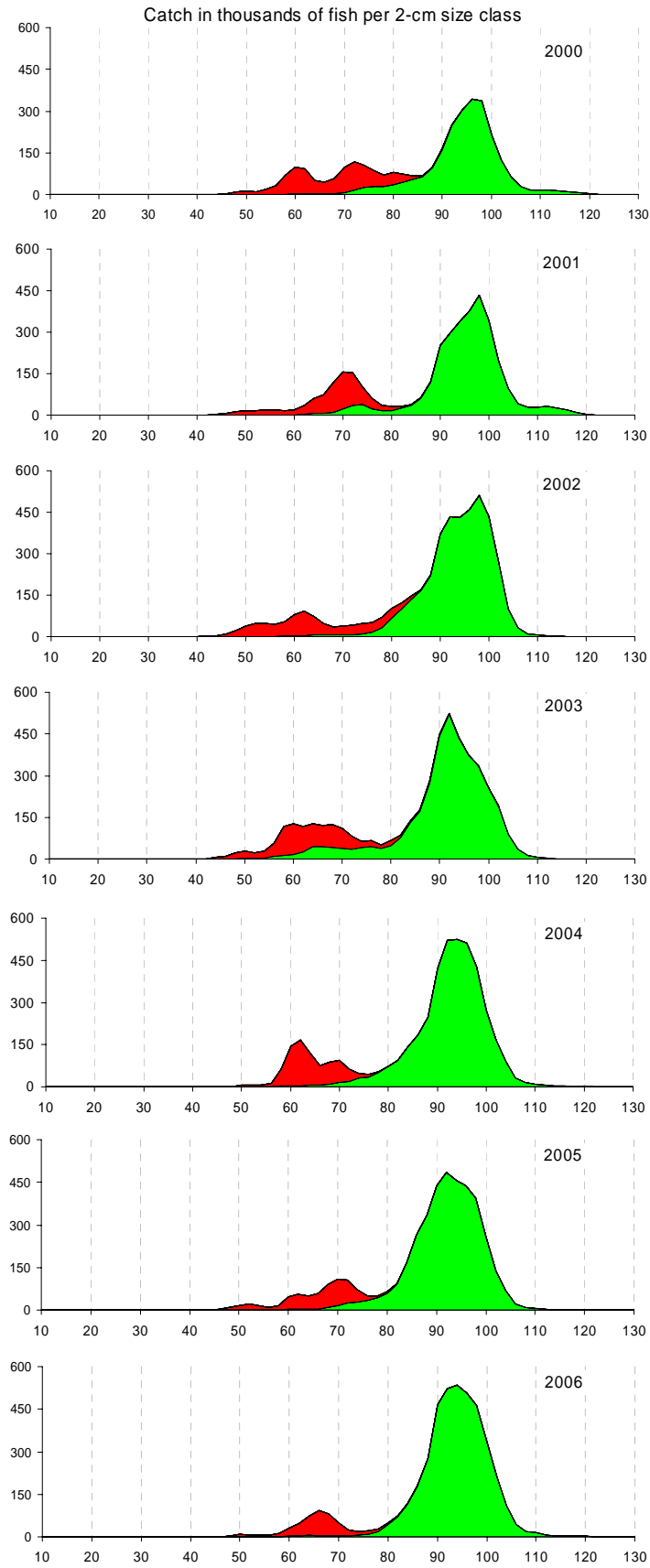
**Figure 60. South Pacific albacore catch (mt) by gear** ("Other" is primarily catch by the driftnet fishery.)

The longline catch is widely distributed in the south Pacific (Figure 61), but with catches concentrated in the western part of the Pacific. 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.

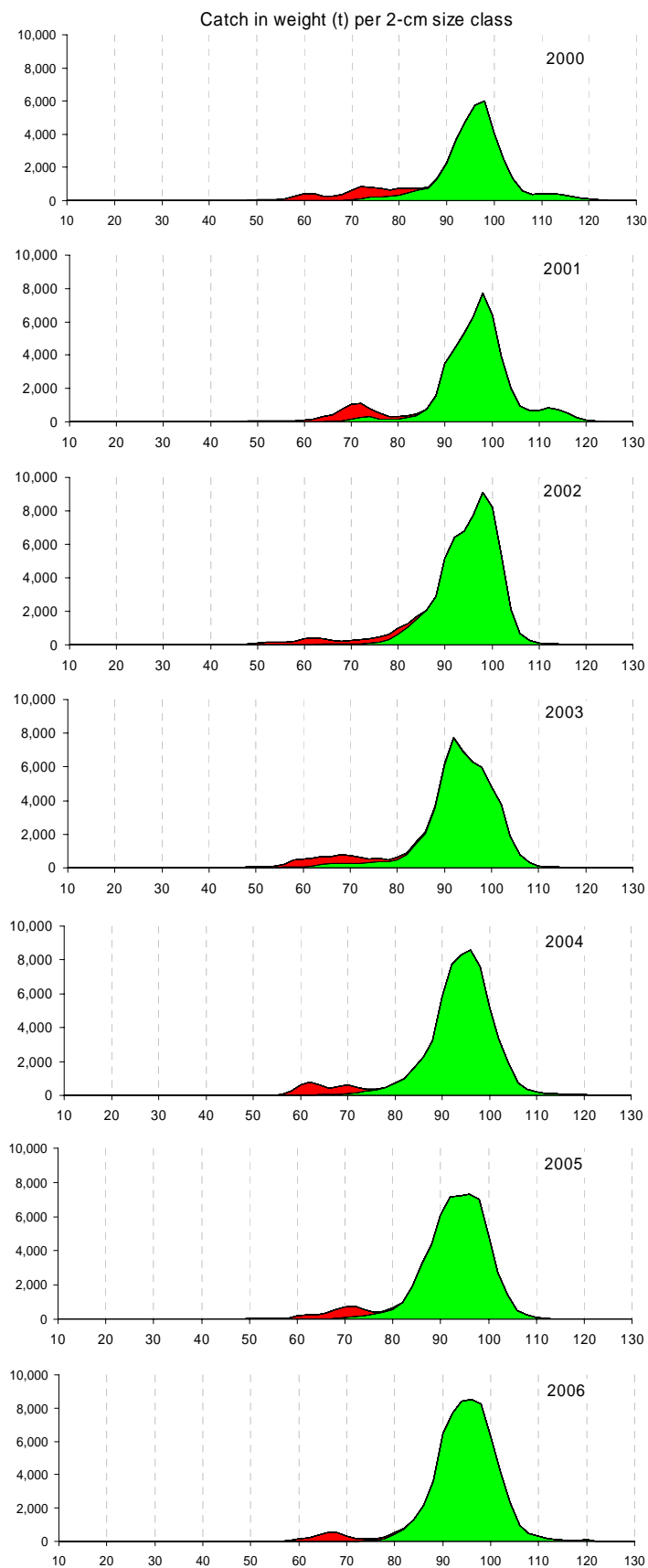


**Figure 61. Distribution of South Pacific albacore tuna catch, 1988–2005.**  
The four-region spatial stratification used in stock assessment is shown.

The longline fishery take adult albacore generally in the size range 90–105cm and the troll fishery take juvenile fish in the range 50–80cm (Figure 62 and Figure 63). Juvenile albacore also appear in the longline catch from time to time (e.g. fish in the range 60–80cm sampled in the longline catch during 2003).



**Figure 62. Annual catches (number of fish) of albacore tuna in the South Pacific Ocean by size and gear type, 2000–2006. (green—longline; red—troll)**



**Figure 63. Annual catches (metric tonnes) of albacore tuna in the South Pacific Ocean by size and gear type, 2000–2006. (green–longline; red–troll)**

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