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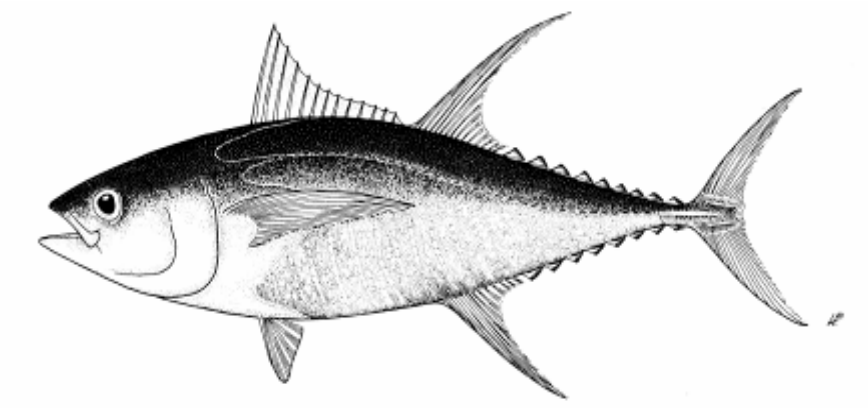
INDEPENDENT STATE OF PAPUA NEW GUINEA

Tuna Fisheries Report – Papua New Guinea

(Prepared for the 3rd Science Committee Meeting Honolulu, Hawaii August, 2007)



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Summary

Tuna Fisheries Report – Papua New Guinea

(3rd WCPFC Science Meeting Honolulu, Hawaii August 2007)

Papua New Guinea's Economic Zone (PNG EEZ), 2.4 million Km^2 in extent, is one of the largest and more productive in the Western and Central Pacific Ocean, producing on average 20% of the Western and Central Pacific Ocean purse-seine catch (300,000mt annual average in the past five years). Catch has being increasing and the current catch (2006) is for the first time over 400,000mt. Tuna is the largest of Papua New Guinea's fisheries and represents a balance of both domestic industry development and foreign Distant Water Fishing Nations (DWFN) access arrangements. A total of 186 purse-seine vessels fished in PNG waters in 2006, under various arrangements including; the bilateral access, the Multi-lateral Access with the US, the FSM arrangements and those PNG flagged and PNG sponsored under the FSM arrangement. Sixty-six (66) longline and Handline vessels were also licensed of which only 45 were active. Longline and Handline fisheries are domestic and no foreign vessels fish under this category. The operation of the tuna fishery is guided by the PNG National Tuna Fishery Management Plan since 1999. The Plan establishes an overall management structure, and an application frame-work for all tuna fisheries by gear including licence limits and TACs. The purse-seine fishery further operates within guidelines of several important regional and sub-regional arrangements such the Parties to the Nauru Agreement (PNA), the Palau Arrangement, and the Federated States of Micronesia Arrangement (FSMA) and now the WCPFC to which PNG tuna fishery is subjected to adhere to its requirements. The longline fishery includes 9 vessels targeting sharks, and operate under a shark fishery Management plan.

Papua New Guinea has one of the biggest and active observer programmes in the region. It has a current strength of 97 observers, covering all fisheries including 100% coverage on all purse-seine vessels that fish on FADs in PNG waters especially the archipelagic waters of PNG. PNG is taking proactive steps to address issues on the catch of small tunas on FADs, and in this regard has just completed a tuna tagging project with its partners the Secretariat of the Pacific Community (SPC) and the University of Hawaii and the funding agencies which include the government of PNG, the Glogal Environment Fund (GEF), the Australian government, New Zealand government and others. The broad objective of the project was to tag tuna to obtain a better understanding of their movements and behaviour especially around FADs. PNG is again collaborating with SPC and the Institute of Research for Development (IRD) based in Noumea, New Caledonia to carry out a study on Seamounts staring May 2008. One of the objectives will be to understand the role of seamounts on tuna production.

Finally, onshore investment in tuna processing for export is actively encouraged in PNG. Foreign and Domestic access by purse-seine vessels is as a result increasing linked to commitment to onshore investment, especially in the form of tuna processing.

1. Background to the fishery

Papua New Guinea's Exclusive Economic Zone (PNG EEZ), 2.4 million km^2 in extent, is one of the largest and more productive in the Western and Central Pacific Ocean. Industrial scale fisheries for tuna and associated species have operated since the 1950s, and in certain years, around 10% of the global catch of the main market species of tuna has been taken within the PNG EEZ. The tuna fishery is the largest of Papua New Guinea's fisheries and represents a balance of both domestic industry development and foreign Distant Water Fishing Nations (DWFN) access arrangements.

Currently, domestic longline vessels and purse seine vessels - domestic, locally-based foreign and foreign access - operate under various arrangements. A large domestic pole-and-line fishery operated in the past but has not been active since 1986.

Since 1999, the development of the tuna fishery has been guided by a National Tuna Fishery Management Plan which establishes an overall management structure, and an application framework for the longline, purse seine, tuna Handline line and pole-and-line fisheries, including licence limits and Total Allowable Catches (TACs). For the purse-seine fishery, licence limits will not be relevant anymore as of December 2007, when the purse-seine fishery management scheme implements the Vessel Day Scheme and drops the current by number of vessels.

The PNG purse seine fishery operates within the guidelines of several important regional and sub-regional arrangements eg PNA, Palau, and FSM Arrangements. With the entry into force of the Western and Central Pacific Fisheries Convention (WCPFC), PNG tuna fishery is subjected to the requirements of the Commission.

Under the present Government's export-driven economic growth strategy, onshore investment in tuna processing for export is being actively encouraged. Foreign and domestic access by purse seine vessels is, as a result, increasingly linked to commitment to onshore investment, especially in the form of tuna processing.

2. Annual Fisheries Information

2.1 National and foreign fleet structure

2.1.1 National Fleet

Domestic longline

Papua New Guinea's longline fishery is fully domesticated, meaning all vessels are owned or operated in partnership with citizens. This came about as a change in policy to see meaningful participation by citizens in the fishery in 1995.Since then, participation in the PNG longline fishery, has been restricted to national or citizen companies, with limited allowance for dry charter of additional foreign vessels. The longline fishery in PNG includes a distinct shark fishery which is managed under a separate management from the tuna longline. The shark fishery is managed under the shark fishery management plan adopted since 2002. Effort for this fishery is limited to 9 vessels setting 1,200 hooks per day and a TAC of 2,000mt dressed weight per year including shark catches by tuna longline vessels.
The Tuna longline sector is managed under the Tuna Fishery Management Plan, which limits effort (100 vessels and 1,200 hooks per set per day) and catch limit (10,000mt per year based on the combined catch of yellowfin and bigeye) for the tuna longline fishery sector.
The total number of longline vessels has however ever reached the 100 licenses allowed for but has been stable at about 50 vessels (41 tuna and 9 shark vessels) in the last four years. The actual number of active vessels was less than 20 (18) in 2006. Shark vessels have been

steady at 9 vessels as that is the limit in the fishery. Any change in licence numbers will most probably be a decrease in vessel numbers.

Handline fishery

After an initial trial fishing for a year involving two Philippine vessels (bancas or Pump boats) commencing in December 2002; interest in this fishing method, considered part of the longline/midwater fishery, grew. Such that this fishing method is now recognised as a fishery and is guided by a management guideline under the National Tuna Fishery Management Plan (this has being reviewed to include this fishing method). There are currently 10 smaller vessels, less than 1 tonne (fish + ice) carrying capacity are fishing inshore waters as an artisan fishery After an initial trial by 2 larger vessels.

Table 1 (a). Number of Papua New Guinea longline and handline vessels active in the WCPFC Convention Area, 2001-2005

—	**Longline (tuna)**		**Handline (tuna)**		**Longline (shark)**		**Total**	
Year	licensed	Active	licensed	Active	licensed	Active	licensed	Active
2000	36		0		21		57	
2001	39		0		12		51	
2002	40		2		10		52	
2003	39		2		9	9	50	
2004	40		0		9	9	49	
2005	42	27	0		9	9	51	36
2006	43	27	15	10	9	9	51	46
2007	42	26	15	10	9	9	66	45

Domestic purse seine
Six (6) purse-seine vessels are PNG flagged and therefore Domestic. These vessels are smaller medium sized vessels and fish in association with Fish Aggregating Devices (Fads), transfer catch to carrier motherships at sea and take most of their catch within archipelagic waters. They are now associated with a tuna cannery and are landing all their catch there.

Locally based foreign purse seine
A total of 33 vessels fish under this category. Fourteen (14) of these are associated with the tuna cannery, and land all their catch there. Most are smaller medium sized vessels fish in association with Fads, also transfer catch to carrier motherships at sea, and again take most of their catch within archipelagic waters. These vessels are Philippine flagged but are permanently based in PNG and fish only in PNG especially in the archipelagic waters and are not under the FSM arrangement. The other nineteen (19) are larger vessels, mostly flagged in Vanuatu operating widely throughout the region under FSM Arrangement licences (Figure 1), with the home party assigned to PNG. . These vessels are associated with present or planned onshore processing developments. They typically take around 30% of their catch in PNG waters.

2.1.2 Foreign Fleet – foreign access purse seine

PNG currently has bilateral purse seine access agreements with China, Korea, Japan, Taiwan and Philippine companies, as well as being a signatory to the United States Multilateral Treaty (USMLT). Several Vanuatu flag vessels are also under bilateral agreement with PNG. A total of 186 purse seine vessels are currently licensed (Table 1b). One hundred forty (140) of these are foreign, with fleets taking varying proportions of their regional catch in PNG waters. Vessels of other parties to the FSM Arrangement also fish in PNG waters to a limited

extent. The increase in 2006 is due to the licensing of Japanese vessels and the 2007 increased is due to increased entry into PNG waters by non PNG vessels under the FSM arrangement.

Table 1 (b). Number of purse-seine vessels licensed to fish in PNG waters, 2001-2005

Year	P/seine (local)	P/seine (locally based)	P/seine (bilateral access)	P/seine (USMLT)	P/seine (FSM Non PNG)	Total
2002	5	22	84	32	15	158
2003	4	25	80	26	16	151
2004	4	39	84	15	14	147
2005	9	39	84	14	13	159
2006	7	39	116	14	6	182
2007	7	39	117	11	12	186

2.2 *Coverage categories for catch, effort and size data*

Coverage of catch, effort and size data can now be categorized into three categories. They can either be high, medium or low. Where there is no data, it would be stated as "no data". For the catch/effort data coverage "high" represents coverage of greater than 80%, "medium" between 50-80% while "low"0-50%. For the size data coverage "high" is represented greater than15%, "medium" 5-15% and "low" 0-15% (see Table 2 (a)).

The percentage representation of the latter data coverage is so because the actual size data collection is not extensive (i.e. a sample representation is required only) and in many cases can only be partially carried out. Table 2 (b) tabulates the estimated annual coverage of catch, effort and size data for PNG fleets in the WCPFC Convention Area, 2003 – 2005. It shows that the estimated annual coverage of catch/effort data for both purse seine and longline PNG Fleets is high as well as for longline size data coverage. PNG fleets size data coverage is between 5 – 15%, medium. This is primarily being collected through the NFA observer programme.

Table 2 (a). Categories of coverage for catch, effort and size data.

Category	Catch/Effort data coverage	Size data coverage
HIGH	> 80%	> 15%
MEDIUM	50-80%	5-15%
LOW	0-50%	0-5%
–	No data	No data

LEGEND :

- "**Catch/Effort data coverage**" is determined by the comparing the annual catch from operational (logsheet) data to the **total** annual catch, as determined by unloadings or other types of data/information.
- "**Size data coverage**" is determined by comparing the number of trips covered by port sampling and observers (collecting size data) with the estimated number of **actual** trips undertaken by this fleet during that year.

PNG Fleet

Data coverage for PNG longline for years 2003-2004 and 2005 is high, for both catch effort and size data (table 2b). The purse-seine fishery data coverage is however high for catch/effort, but medium for size data in the same years(table 2b). Data coverage for PNG purse-seine fleet is similar to that of the foreign fleet operating in PNG waters (table2c).

Table 2 (b). Estimated annual coverage of catch, effort and size data for Papua New Guinea fishing fleets in the WCPFC Convention Area, 2003–2005.

Gear	Fleet	Year	Catch/Effort data coverage	% coverage	Size data coverage	% coverage
LONGLINE	PAPUA NEW GUINEA	2003-2004	HIGH	>80%	HIGH	>15%
		2005	HIGH	>80%	HIGH	>15%
PURSE SEINE	PAPUA NEW GUINEA	2003-2004	HIGH	>80%	MEDIUM	5-15%
		2005	HIGH	>80%	MEDIUM	5-15%

Foreign Fleet

For all purse-seine fleets by major countries (China, Korea, Chinese Taipei and Vanuatu) the catch/effort data coverage is high for the recent years (2003 – 2005). The size data coverage for foreign fleet has medium coverage. There are no foreign longline fleets operating in PNG EEZ therefore there is no data coverage for foreign longline.

Table 2 (c). Estimated coverage of catch, effort and size data for bilateral-arrangement, foreign fleets fishing in Papua New Guinea's EEZ.

Gear	Fleet	Year	Catch/Effort data coverage	% coverage	Size data coverage	% coverage
PURSE SEINE	CHINA	2003-2004	HIGH	>80%	MEDIUM	5-15%
		2005	HIGH	>80%	MEDIUM	5-15%
	KOREA	2003-2004	HIGH	>80%	MEDIUM	5-15%
		2005	HIGH	>80%	MEDIUM	5-15%
	Chinese Taipei	2003-2004	HIGH	>80%	MEDIUM	5-15%
		2005	HIGH	>80%	MEDIUM	5-15%
	VANUATU	2003-2004	HIGH	>80%	MEDIUM	5-15%
		2005	HIGH	>80%	MEDIUM	5-15%

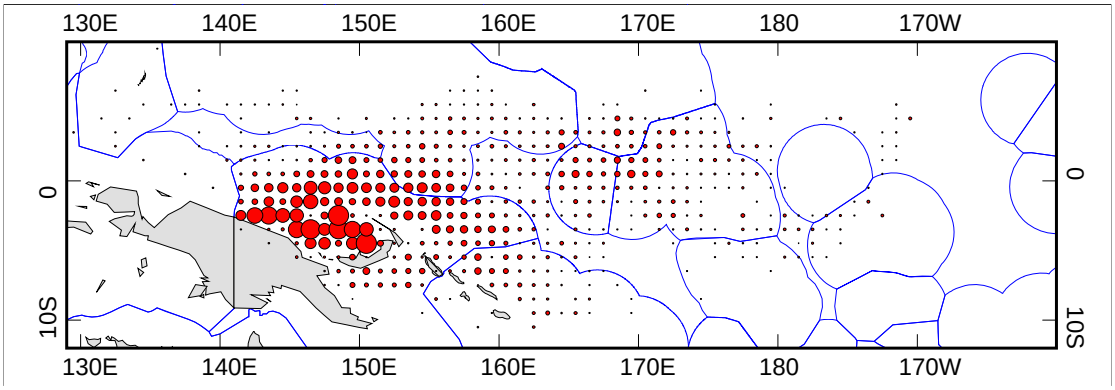
.3 Annual National Fleet Catch by species in the WCPFC Convention Area, 2001 - 2005

Catch by PNG- associated vessels in the convention area exceeded 220,000mt in 2005 (table 3), having increased steadily from just over 1,000mt in 1994 (SPC Year book 2001). PNG Domestic vessel and the smaller sized vessels under locally- based foreign fish entirely in the PNG EEZ whereas the larger sized vessels under the locally-based foreign category operate widely throughout the Western and Central Pacific Ocean (WCPO), mostly under FSM Arrangement licences. Figure 1 and 2 shows the wide distribution of the WCPO effort and catch by these vessels. The high effort and catch in the PNG EEZ is attributed to PNG domestic vessels and those small sized locally-based foreign vessels not under FSM arrangement.

Tables 3. Annual catch and effort estimates for the Papua New Guinea purse-seine fleet, by species in the WCPFC Convention Area, 2001-2005. (**Source** : Raised logsheet data; Data for 2005 are unraised and provisional, but coverage is "HIGH")

	Effort			**Catch (metric tones)**				
Year	**Days Fishing & Searching**	**UnAss. Sets**	**Assoc. sets**	**SKJ**	**YFT**	**BET**	**OTH**	**TOTAL**
2001	4,333	1,326	2,931	64,900	25,274	455	67	90,697
2002	4,789	1,052	3,721	91,671	30,693	143	287	122,793
2003	6,702	2,423	4,223	118,676	37,661	289	71	156,696
2004	7,623	2,042	5,519	172,375	25,537	148	79	198,139
2005	9,819	3,658	6,077	166,341	52,014	1,454	270	220,079
2006	8,297	2,285	5,412	158,950	47560	1741	992	209,242

* Total fishing days is inclusive of other unknown set types as well



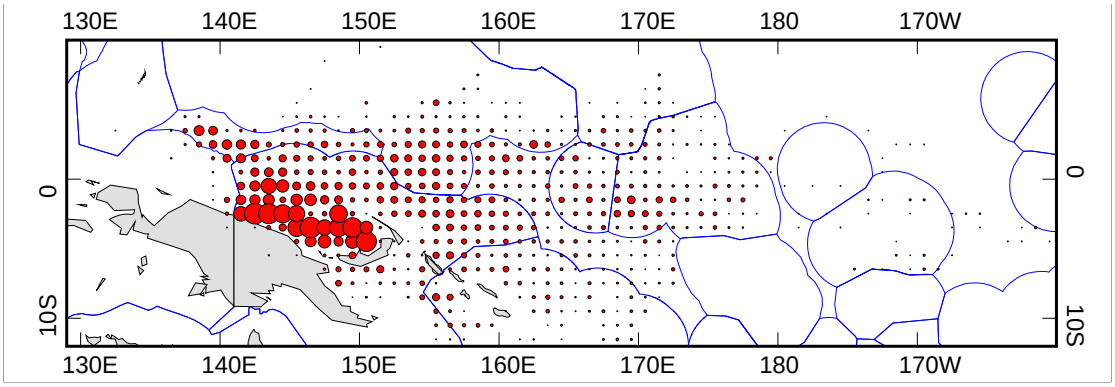
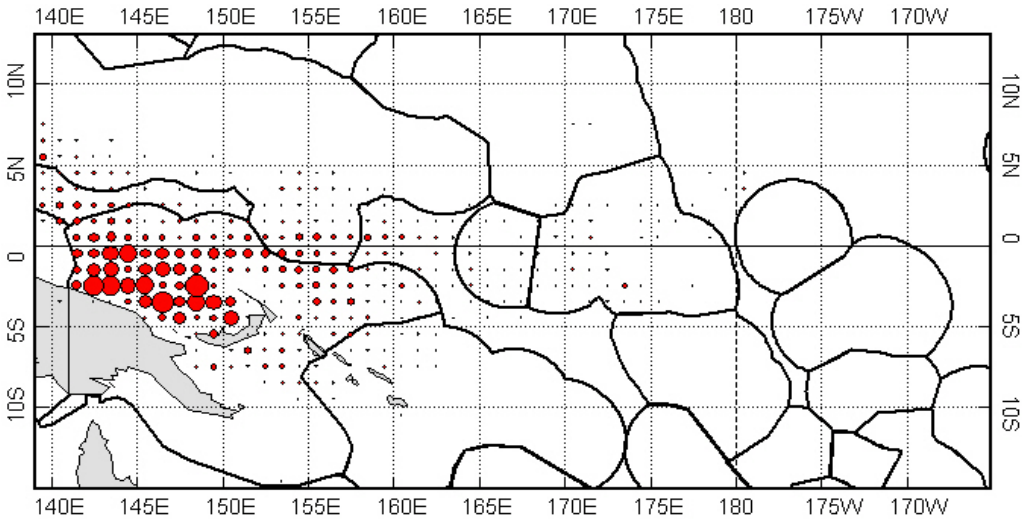


Figure 1a. Distribution of effort by the PNG-associated purse seine vessels for 2006 (top) and 2005 (bottom)

The PNG domestic and locally-based foreign purse seine fleet have most effort in associated sets. Most of the catches would be coming from Fad associated sets. The Papua New Guinea "Home-Party" FSM Arrangement purse-seine fleet's effort varies with associated and unassociated sets. Unassociated catches verses associated catches are similar (5 year average). Table 3 displays the annual catch and effort estimates for PNG purse seine fleet in the WCPFC Convention Area, 2002-2006. Figure 1, 2, 3&4 shows the annual distribution of effort for PNG Purse seine fleets and longline fleets respectively in the WCPFC Convention area for recent years.



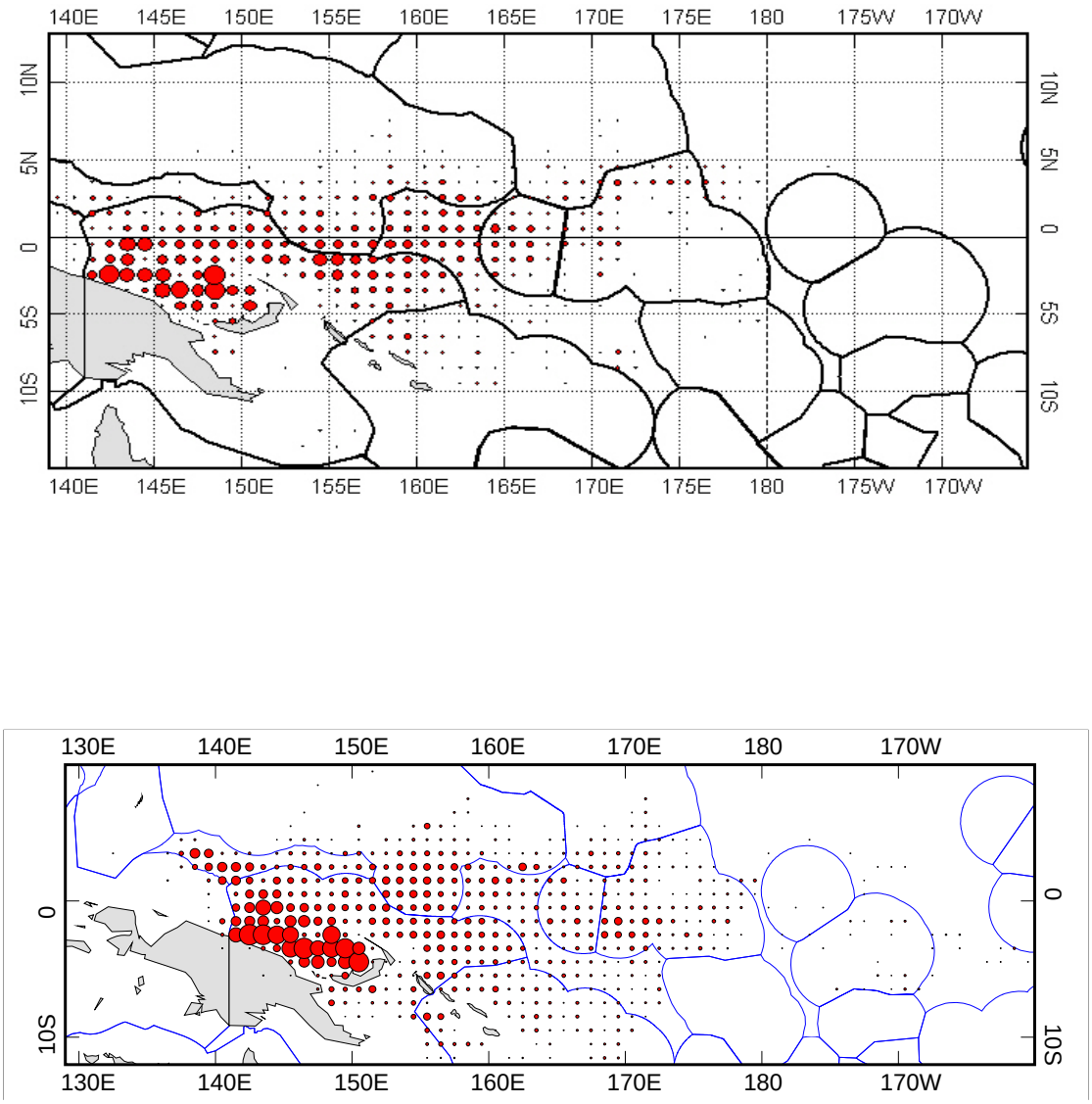


Figure 1 (b) Annual distribution of effort (days fishing and searching) for the Papua New Guinea purse seine fleet throughout the WCPFC Convention Area for 2003 (top), 2004 (middle) and 2005 (bottom)

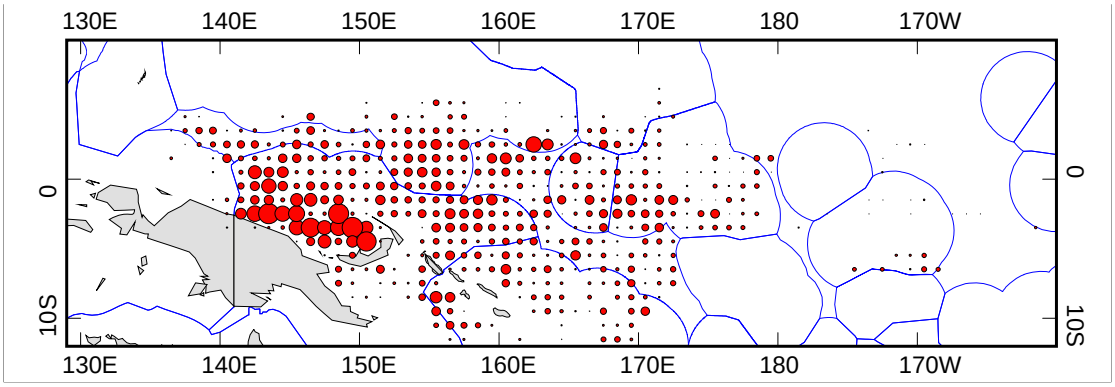


Figure 2. Distribution of total catch by the PNG-associated purse seine vessels for 2006 (top) and 2005 (bottom)

2.4 Annual Home EEZ Catch by gear, fleet and species, 2002 - 2006

Longline (tuna)

There has been no licensed access by DWFN longline vessels to PNG waters since 1995, with a peak historical catch of nearly 20,000t (1978) achieved by Japanese vessels during this earlier period. Domestic longline activity started in 1995, following the introduction of the domestication policy.

Prior to 2001, logsheet coverage of the domestic fishery has been poor and catches are difficult to estimate with any confidence. Table 2 (b) shows that catch/effort coverage (logbook data) for longline for 2003 – 2005 is high therefore this situation has improved; coverage has remained to be high for the last three recent years.

Estimates of the tuna longline catch for 2006 from available logsheet data indicate a total catch of 3,356mt (all species), of which 1,681m.t yellowfin, 134mt bigeye and 1,365t albacore and 176t of other fish. This is a decrease of 6% from 2005 total of 3,574. For the tuna species, catches for both Albacore and Bigeye slightly decreased from 2005, but was a slight improvement for catch of yellowfin during the same period.

Catch in 2006 was dominated by Yellowfin tuna (50%% of the total catch and 53% of the tuna catch) followed by albacore (41% of total catch and 43% of tuna catch) with lesser catches of bigeye. Catch of albacore has been high in recent years and this is due to a number of reasons, including favourable environmental conditions especially in the Coral Sea areas enabling albacore to be more available to the fishery plus some intentional targeting driven by improved prices of albacore. .

Tables 4. Annual catch and effort estimates for the Papua New Guinea tuna longline fleet, by species in the WCPFC Convention Area, 2002-2006 (**Source** : Raised logsheet data; Data for 2005 and 2006 are unraised and provisional)

	Effort	Catch (metric tonnes)								
Year	**hhooks**	**ALB**	**BET**	**YFT**	**BLM**	**BUM**	**MLS**	**SWO**	**OTH**	**TOTAL**
2002	59,602	142	318	1,738	61	125	8	35	1,050	3,477
2003	66,569	857	390	1,747	24	126	13	22	174	3,354
2004	93,188	1,903	392	2,267	26	81	12	26	123	4,810
2005	75,872	2,088	211	1,052	38	58	9	18	99	3,574
2006	58,872	1,365	134	1,682	20	37	13	8	98	3,356

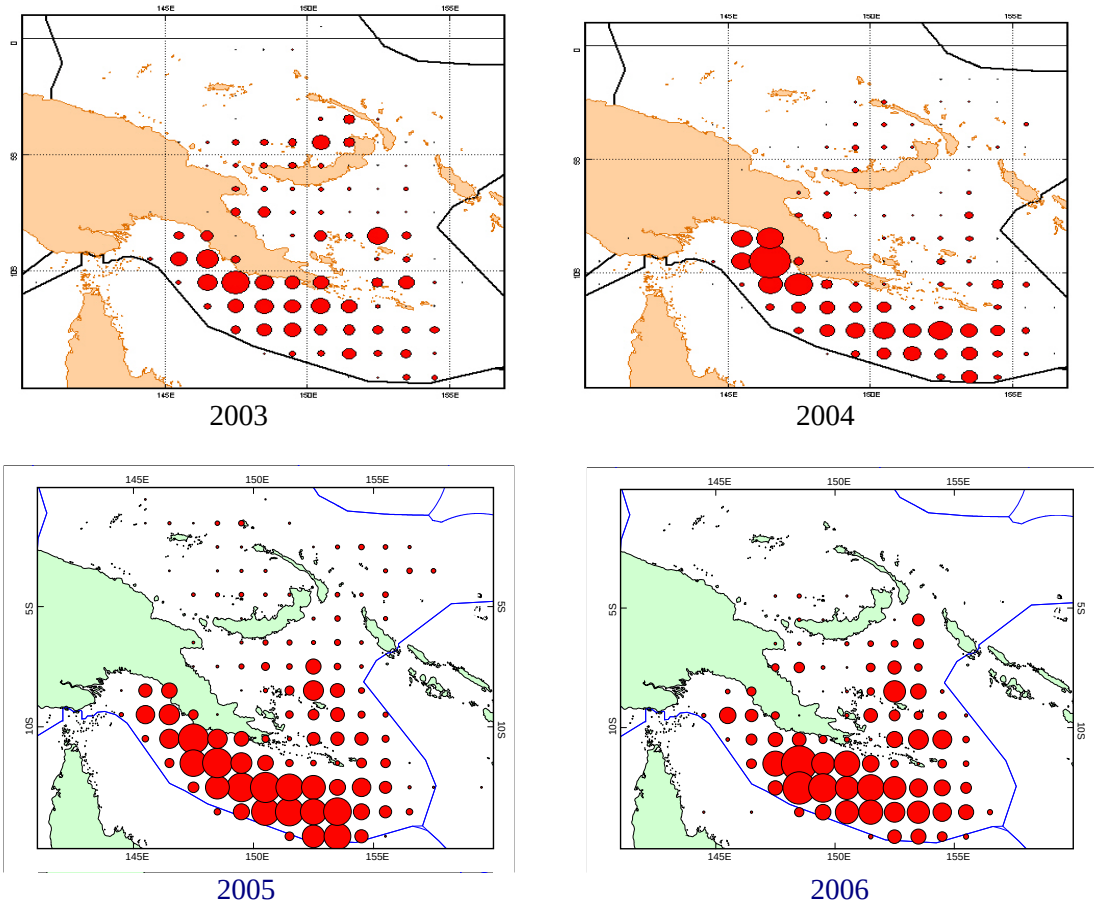
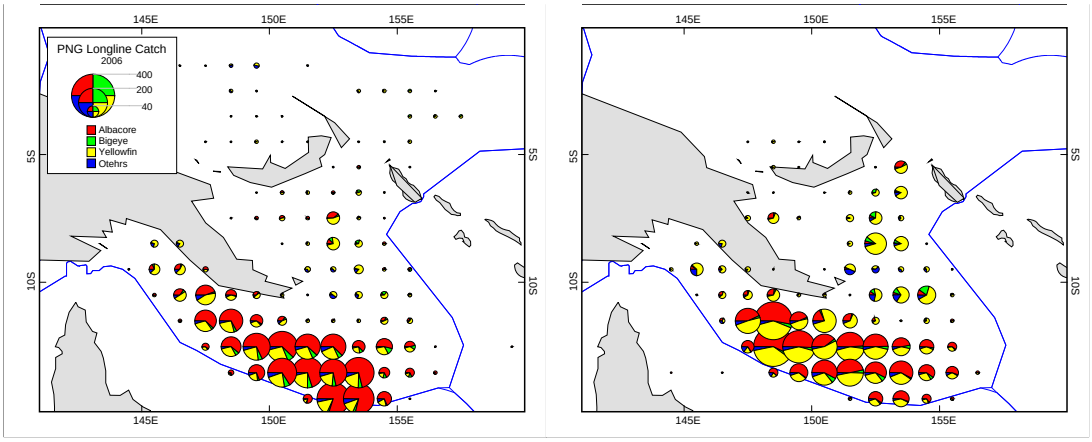


Figure 3 (a) Annual distribution of effort (100s of hooks) for the Papua New Guinea longline fleet throughout the WCPFC Convention Area for 2003 (top-left), 2004 (top-right), 2005 (bottom-left) and 2006 (bottom-right)



2005 2006

Figure 3(b). Distribution of catch by PNG tuna longline vessels, 2005 (top) and 2006 (bottom)

Longline (shark)

The fishery started on a significant scale in 1997, when vessels licensed as tuna vessels and with freezer capacity began targeting shark. This quickly expanded to over 20 vessels, although many of these did not fish for lengthy periods of time. Data coverage prior to 2002 is sparse (less than 30%) with poor facility on the existing tuna logsheets to record shark catch. Shark and tuna catches taken by longline vessels targeting shark, now limited to nine.

Estimates of the shark longline catch for 2006 from the available logsheet and landings data indicate a total catch (all species) of 1,234mt, with 1,123mt of shark (91%), and 24mt of tuna (2%). Dressed Billfish is 43t (4%); Swordfish is 43mt (4%)

The main shark species taken, based on extensive observer data, are silky shark, silvertip, grey reef, black tip and oceanic white-tip, although species composition of the catch varies considerably by area.

Based on available export data, only 316 mt of frozen shark meat was exported in 2006 suggesting that considerable and increasing quantities of shark are being processed and consumed locally.

Purse seine (local and locally based foreign)

The catch by domestic and locally based foreign vessels in PNG waters continues to increase (Table 5), reaching yet another record (>130,000mt) in 2006. It now makes up over 30% of the total purse seine tuna catch in the EEZ. Skipjack now contributes around 74% of the declared catch by species. Yellowfin still makes up most of the remainder. The proportion of yellowfin in the declared catch has dropped to less than 30%. . Observer data suggest that the percentage of yellowfin and bigeye in the catch in associated sets may be even higher, as much as 60% of the total by weight from these sets in some instances. Most of the catch by the locally licensed vessels has been taken in association with anchored Fads; recent adoption of an FAD Management policy now see restrictions placed on FAD numbers and operations, due to resource and gear conflict concerns.

Table 5. Domestic and locally based foreign vessel purse seine catch in PNG waters by species

Year	#. vls	Skipjack	%	Yellowfin	%	Bigeye	%	Other	%	Total
2001	22	35,068	64.6	18,700	34.4	451	0.9	67	0.1	54,286
2002	25	46,686	67	22,634	32.5	122	0.2	287	0.3	69,728
2003	33	82,880	72.7	30,948	27.1	94	0.1	69	0.1	113,991
2004	37	92,328	84.3	17,101	15.6	100	0.1	47	0	109,577
2005	42	73,350	65.1	37,998	33.7	1,056	0.9	199	0.3	112,602
2006	39	100,257	74.4	33,088	24.6	721	0.5	637	0.5	134,703

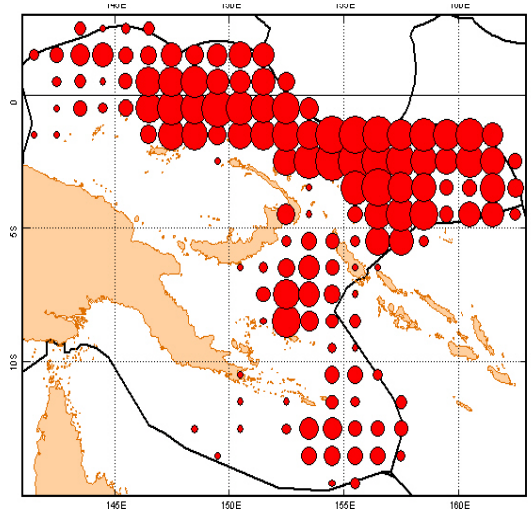
Purse seine (bilateral and multilateral)

Of the foreign access fleets, only the Philippines fleet of ten vessels (an eleventh vessels is flagged in PNG but fishes elsewhere) consistently takes virtually all of its catch in the PNG EEZ, with the other fleets (Taiwan, Korea, China, Japan and US) taking varying proportions of their catch in PNG waters, higher in La Nina years. Several of the Philippines vessels have access agreements with other Pacific Island Nations but have not fished there to any great extent.

The annual catches by foreign purse seine fleets in the Papua New Guinea EEZ, by flag and species, 2002-2006 is as shown in Table 6. In the last five years catches were dominated by Chinese Taipei (39%), Korea (31%) and the Philippine fleet (12%). The remaining 18% was caught by the other foreign fleets including the US and those fishing under the FSM arrangement. Figure 4 (a) displays distribution of effort by main foreign purse seine fleets active in PNG EEZ for 2004 and 2005 respectively

Table 6: Annual catches by foreign purse seine fleets in the Papua New Guinea EEZ, by flag and species, 2002-2006 (Source : Logsheets collected by NFA)

		CATCH (metric tonnes)				
FLEET	**YEAR**	**SKJ**	**YFT**	**BET**	**OTH**	**TOTAL**
China	2002	1,160	165	0	0	1,325
	2003	5,557	1,382	0	0	6,939
	2004	4,751	285	0	1	5,037
	2005	6,627	1,169	0	1	7,796
	2006	3,093	790	0	0	3,883
FSM Arrangement	2002	3,471	1,137	45	0	4,653
	2003	12,125	4,072	92	0	16,289
	2004	11,250	1,481	72	0	12,803
	2005	8,476	2,077	310	0	10,863
	2006	10,348	650	367	4	11,369
Japan	2002	0	0	0	0	0
	2003	0	0	0	0	0
	2004	0	0	0	0	0
	2005	90	10	0	0	100
	2006	20,460	5,322	479	2	26,263
Korea	2002	11,493	2,981	6	0	14,480
	2003	56,829	22,209	25	0	79,063
	2004	72,207	9,507	18	1	81,732
	2005	45,905	12,560	15	1	58,481
	2006	67,811	9,992	47	4	77,854
Philippines	2002	18,232	6,783	789	18	25,822
	2003	12,384	3,688	155	35	16,262
	2004	22,584	4,811	675	38	28,108
	2005	12,675	6,098	369	54	19,197
	2006	24,407	7,700	397	50	32,554
Chinese Taipei	2002	41,839	7,692	59	0	49,590
	2003	85,740	18,310	987	80	105,117
	2004	74,019	5,472	59	15	79,565
	2005	57,331	12,666	215	21	70,233
	2006	81,803	9,669	124	24	91,620
USA	2002	761	748	0	0	1,509
	2003	18,471	13,221	144	1	31,838
	2004	3,447	638	1	0	4,086
	2005	1,196	460	62	0	1,718
	2006	6,865	701	20	0	7,586
Vanuatu	2002	0	0	0	0	0
	2003	0	0	0	0	0
	2004	1,815	52	0	0	1,867
	2005	7,248	1,381	0	2	8,631
	2006	23,187	2,292	0	5	25,484
TOTAL EEZ	2002	76,956	19,506	899	18	97,379
	2003	191,106	62,882	1,403	116	255,507
	2004	190,073	22,246	825	54	213,197
	2005	139,548	36,421	971	79	177,019
	2006	**237,974**	**37,115**	**1,433**	**89**	**276,611**
Percentage composition (%)	2002	79 %	20 %	0.9 %	0 %	100 %
	2003	75 %	25 %	0 %	0 %	100 %
	2004	89 %	10 %	0 %	0 %	100 %
	2005	79 %	21 %	0 %	0 %	100 %
	2006	86 %	13 %	1 %	0 %	100 %



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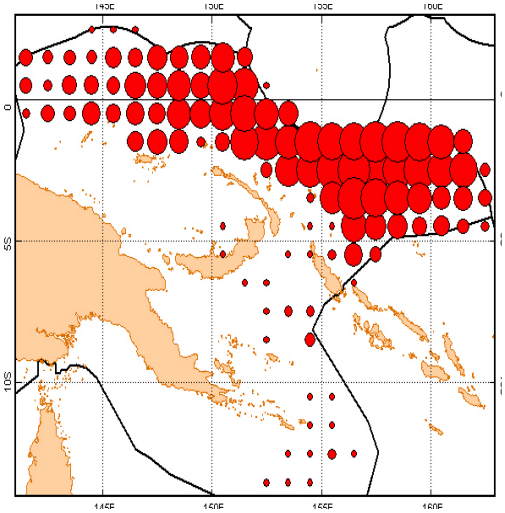

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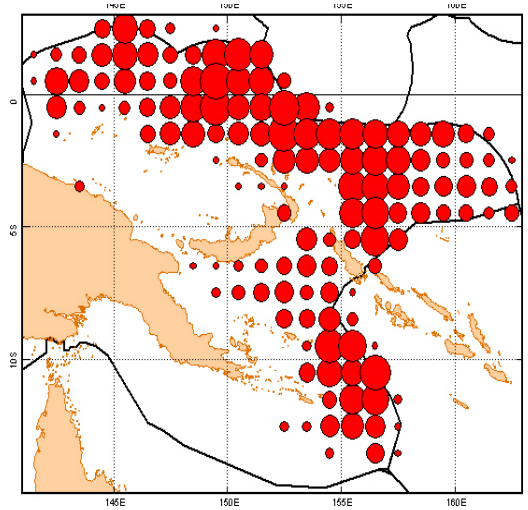

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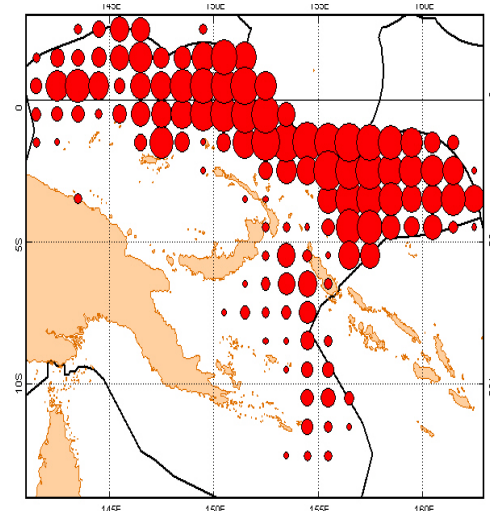

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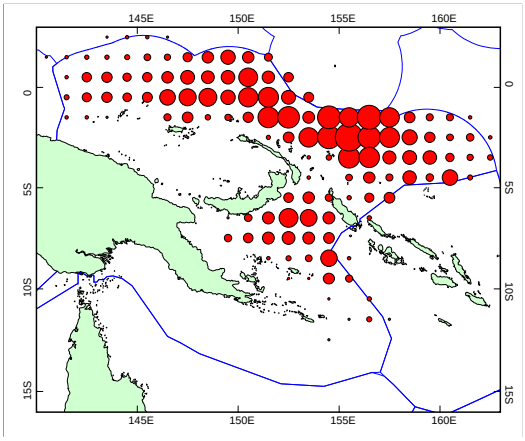

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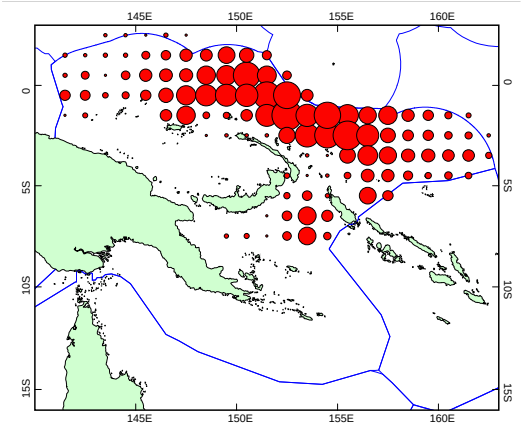


CHINESE TAIPEI 2006

Figure 4. Annual distribution of effort by the main foreign purse seine fleets active in the Papua New Guinea EEZ for 2004-2006 (Korea- left and Chinese Taipei-right)

2.5 Total home EEZ catch, for all species, all gears and all fleets combined 2001 – 2005

The estimated total catch by all vessels fishing in the PNG EEZ for the past five years (2002-2006 inclusive) is shown in Table 7, and is comprised for the most part of purse seine catches (99% of the total catch). The considerable inter-annual variations seen in these catches is the result of both large-scale environmental events (ENSO) affecting surface tuna availability in the PNG EEZ (higher in La Nina years). The most recent high catch (2006) is also a result of the Japanese fleet having access to PNG waters recently. The average annual purse seine catch in the EEZ has been around 300,000mt during this recent five-year period, roughly 20% of the regional purse seine catch.

Table 7 Total catch by all vessels fishing in PNG waters
(Source: Purse seine - SPC raised data (BEST) from logsheets and landings data, 2006 data unraised-source NFA; longline - NFA logsheet data; incomplete but including catches by tuna and shark longliners; some by-catch included)

Year	2002	2003	2004	2005	2006	Historical high
Purse seine	164,253	331,995	315,788	280,630	411,314	411,314 (2006)
Longline	3,341	3,354	3,948	3,574	3,204	19,584 (1978)
Pole&line	0	0	0	0	0	74,649 (1974)
TOTAL	167,594	335,349	319,736	284,204	414,518	414,518 (2006)

The purse seine catch in the EEZ by domestic vessels, and foreign vessels based in PNG, the latter now numbering about 39 in total, has increased steadily since the establishment of the Madang cannery in 1997, and through more recent association with onshore commitments (Table 5). It is now more 30% of the total purse seine catch in the EEZ and is expected to increase further as new onshore developments come on stream and concurrently, bilateral access arrangements are accorded lower priority.

2.5.1 Catch rates in PNG waters

Catch rates by the various Purse-seine fleets fishing in the waters of PNG is variable with those fishing mainly on free schools (Korea and Chinese Taipei)having a higher catch rate than those fishing predominantly on Anchored Fads (Philippines and PNG)(figure 6 (a & b). The catch trends for purse-seine also shows peaks in the first two quarters of the year and this collates to high rainfall in PNG within the first two quarters yearly, therefore high biomass during these periods. Trends in catch rates by species (Yellowfin, Bigeye and Albacore) for longline fleet operating in PNG EEZ, 1993 – 2006 is shown in Figure 5). Catch trends show that yellowfin catch rate dropped sharply from 1993 (3 fish per 100 hooks) to 1999 (Less than 1 fish per 100 hooks), stabilised between 2000 and 2003 (1 fish per 100 hooks)and declined again after 2003. Albacore catch rate on the other hand has steadily increased since 2003, after an initial rise between 1996 and 1998 and than a decline and a period of stability until 2003. Catch rate trends also show that yellowfin tuna was the main target species until 2003 when albacore took over as the main target species. The subsequent decrease in yellowfin catch rate from 2003 is a result of fishermen targeting albacore combined with area of fishing and may not necessarily be an indication of decrease in yellowfin biomass in the area.

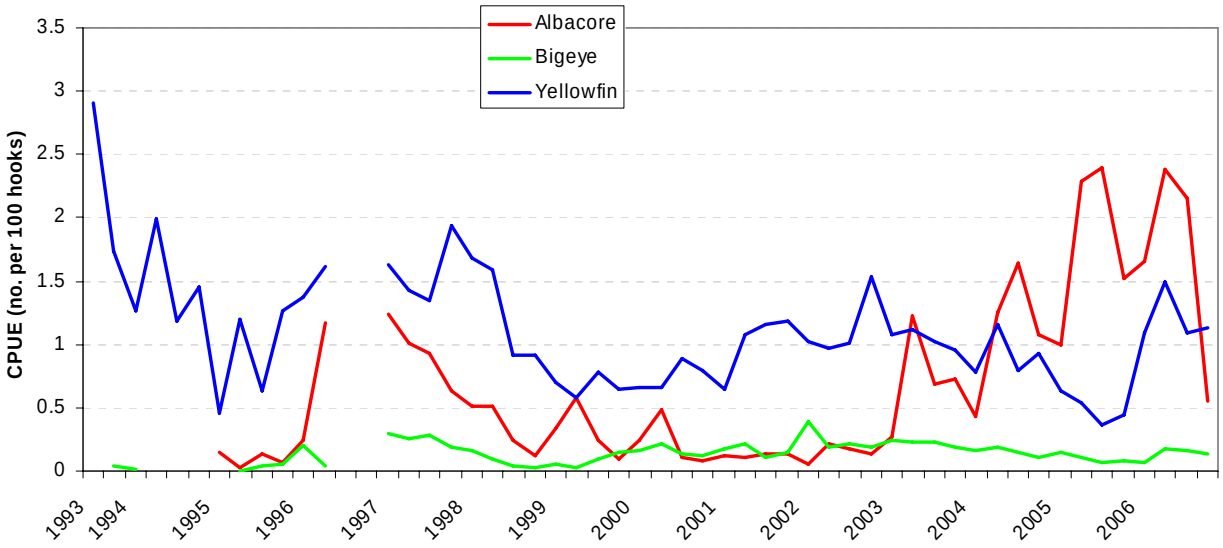


Figure 5. Quarterly trends in nominal catch rates of Albacore, Bigeye and Yellowfin tuna taken by the PNG longline fleet, 1993-2006

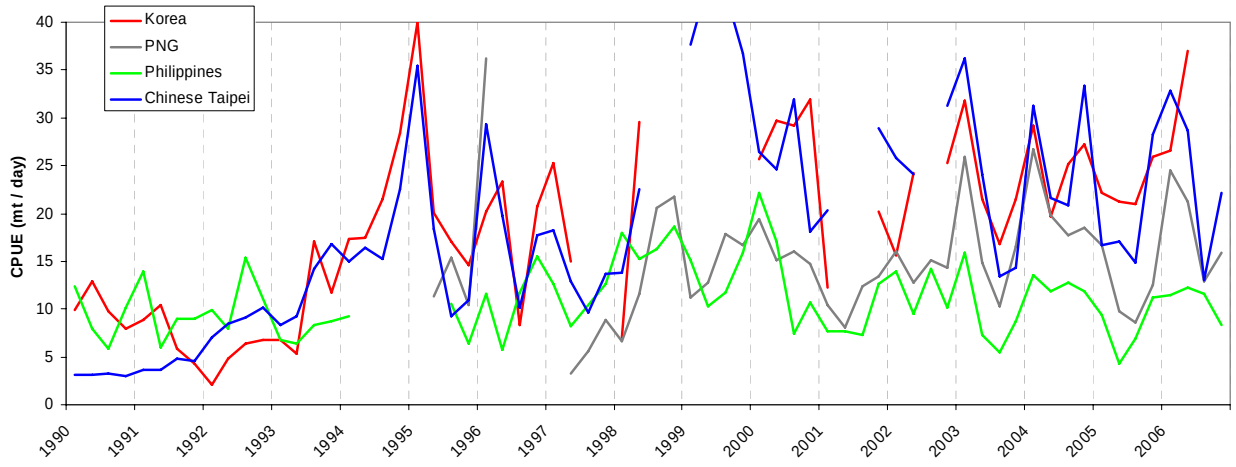


Figure 6 (a) Quarterly trends in nominal catch rates of Skipjack tuna taken by the purse seine fleets operating in the PNG EEZ, 1990-2006

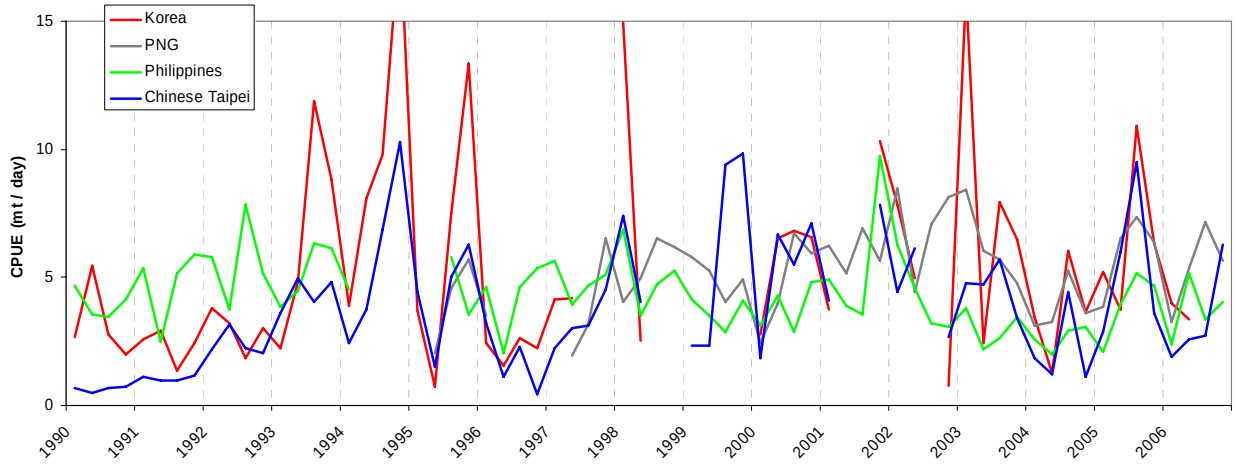


Figure 6 (b) Quarterly trends in nominal catch rates of Yellowfin tuna taken by the purse seine fleets operating in the PNG EEZ, 1990-2006

3. Research and Statistics

3.1 Tuna research and development

Observer programme

PNG operates a significant observer programme with monitoring and compliance functions, and funded by a combination of access agreement levies and direct cost recovery. Observers are stationed at major ports and landing points in the country, under the supervision of senior observers, and provide coverage of the purse seine fishery (domestic and foreign), the longline fishery (tuna and shark), as well as transhipment of purse seine catch to carrier vessels/mother ships, and FAD deployments. Non-tuna fisheries (prawn) and trial fishing operations also receive observer coverage.

Trained observers (now numbering 100) are currently available for deployment and made more than 203 trips totalling more than 6,608 sea days, in 2006. Purse seine trips account for 96% of this coverage. Table 8 summarizes details of the observer coverage achieved during 2002-2006. Early in 2002, the decision was taken to reduce observer coverage on mothership operations and alternatively target 100% coverage of purse seine vessels involved in the mothership operations. The implementation of this decision began in late 2003. Most of the coverage is on purse-seine vessels both foreign and PNG associated including 100% coverage on domestic, Foreign locally based and few under bilateral arrangements operating exclusively in PNG waters on FADs

Incident reports are filed by observers where compliance infractions occur and may lead to enforcement action. The biological data collected are sent to SPC/OFP for entry and verification for incorporation into regional databases. Biannual summaries for national application will be produced in the near future with SPC assistance.

Table 8. Observer activity summary for 2002-2006
(Source: NFA observer data)

Fishery/activity	Target coverage	Number of trips- (Sea days in brackets)				
		2002	**2003**	**2004**	**2005**	**2006**
PNG Purse-seine[1]	100%	16 (763)	27(1142)	20 (1030)	38(2152)	100 % coverage
Phils purse-seine[2]	100%	55(2470)	57(2886)	90 (3921)	32 (1530)	107 (4,199)
Foreign p/seine[3]	05%	10 (329)	14(475)	19 (719)	89 (3178)	52 (1,490)
Phils reefer[4]		7(252)	0	0	2 (24)	
PNG reefer/m'ship[5]		2(63)	0	0	2(19)	9 (119)
Tuna longline	05%	16(299)	13 (270)	22 (469)	9(489)	14 (418)
Shark longline	20%	3 (138)	3(119)	2 (66)	15(295)	6 (287)
FAD deployment	100%	2 (17)	10 (133)	12 (124)	0	5 (77)
Other fisheries (including trial fishing)	100%	23 (454)	18 (563)	3 (78)	0	10 (288)
TOTAL		134 (47850	142(5588)	168(6407)	187(7687)	203 (6608)

Port sampling activity was re-established during 2002, to gather information primarily on size and species composition of landed catches. The information is send to SPC. There are 22 port samplers who are also trained observers stationed in ports throughout the country. Currently port sampling activity especially for Domestic, Locally based foreign and Philippine purse-seine fishing in PNG waters only is minimal as these vessels have 100% observer coverage.

The estimated annual total catches of non-target species and species group by PNG purse seine fleets and longline fleet, 2004 – 2006 are tabulated in tables 9 and 10. Figure 7 and 8 show proportions of non-target species groups in the catch of PNG purse seine vessels and longline vessels respectively. The non-target species groups' proportion from total catch in PNG purse seine vessels has been decreasing over the last three years (Figure 7). In the longline there was a decrease in the proportion of nontarget species in 2005 as compared to 2004, but there was a slight increase in 2006(Figure 8). The increased catches of shark in the longline fishery is not necessarily reflective of the real situation as Shark is a target species in the PNG shark longline fishery and this data is not separated into Tuna longline and shark longline. The high catch of sharks (figure 8) is therefore from the shark fishery.

[1] Vessels flagged in PNG and operated by PNG companies
[2] Philippine-flagged vessels operated by PNG or Philippine companies
[3] Include Locally based foreign vessels under FSM Arrangement
[4] Philippine-flagged reefer carriers operated by PNG or Philippine companies
[5] Reefer carriers/Motherships flagged in PNG and operated by PNG companies

Table 9. Estimated Annual total catches of non-target species and species groups, by Papua New Guinea purse seine fleets, 2003-2005. (**Source of data** : Data collected under the Papua New Guinea Observer Programme (managed by NFA) and the FSM Arrangement Observer Programme (managed by FFA); Coverage of observer data : 2003– 23.7%; 2004–35.3%; 2005–18.1%; Coverage has been estimated by comparing observer-recorded target species catch to annual catch estimates for this fleet; '%' represents percentage of total catch which includes target tuna species catch)

		Species Composition					
		2004		2005		2006	
Category	Species	MT	%	MT	%	MT	%
Target Tuna	Skipjack	146,620	73.11%	144,034	64.81%	122,807	57.72%
	Yellowfin	41,393	20.64%	65,464	29.45%	74,130	34.84%
	Bigeye	10,045	5.01%	10,310	4.64%	11,263	5.29%
Billfish	Blue marlin	48.1	0.02%	70.4	0.03%	33.2	0.02%
	Black marlin	49.7	0.02%	42.6	0.02%	23.9	0.01%
	Other Billfish	20.4	0.01%	40.3	0.02%	7.4	0.00%
Sharks and Rays	Blue shark	0.0	0.00%	0.0	0.00%	0.0	0.00%
	Mako sharks	0.6	0.00%	0.0	0.00%	0.0	0.00%
	Oceanic white tip shark	1.7	0.00%	5.1	0.00%	0.0	0.00%
	Silky shark	92.5	0.05%	132.2	0.06%	129.3	0.06%
	Other sharks and rays	47.2	0.02%	44.6	0.02%	32.5	0.02%
Other finfish	Bullet/Frigate tunas	141.7	0.07%	231.5	0.10%	55.9	0.03%
	Kawakawa	72.8	0.04%	0.4	0.00%	28.9	0.01%
	Rainbow Runner	1,085.6	0.54%	536.0	0.24%	1,102.9	0.52%
	Wahoo	27.0	0.01%	16.7	0.01%	68.9	0.03%
	Common dolphinfish	72.7	0.04%	62.0	0.03%	162.1	0.08%
	Triggerfish	357.1	0.18%	156.2	0.07%	175.3	0.08%
	Barracudas	8.0	0.00%	16.0	0.01%	44.2	0.02%
	Escolars	0.0	0.00%	0.0	0.00%	0.0	0.00%
	Lanctfishes	0.0	0.00%	0.0	0.00%	0.0	0.00%
	Ocean sunfish	0.7	0.00%	0.3	0.00%	2.4	0.00%
	Oilfish	0.2	0.00%	0.1	0.00%	0.1	0.00%
	Opah	0.0	0.00%	0.0	0.00%	0.0	0.00%
	Pomfrets	2.6	0.00%	5.9	0.00%	2.1	0.00%
	Small baitfish	321.0	0.16%	173.1	0.08%	212.1	0.10%
	Other fish	133.0	0.07%	912.4	0.41%	2,475.9	1.16%
	Target tuna	198,058	98.76%	219,809	98.90%	208,200	97.86%
	Billfish	118	0.06%	153	0.07%	64	0.03%
	Sharks and rays	142	0.07%	182	0.08%	162	0.08%
	Other finfish	2,222	1.11%	2,111	0.95%	4,331	2.04%
	Total non-target	2,483	1.24%	2,446	1.10%	4,557	2.14%

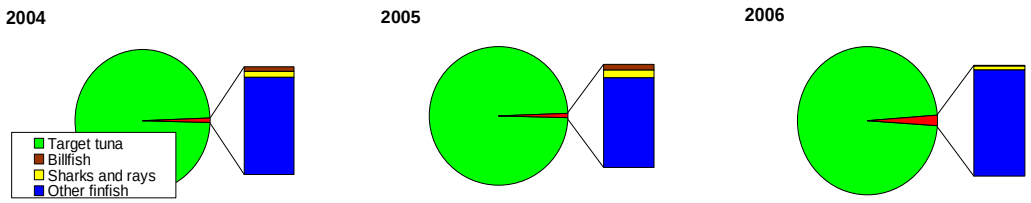


Figure 7. Proportion of non-target species groups in the catch of Papua New Guinea purse seine vessels, by year, 2004–2006. (**Source of data** : Data collected under the Papua New Guinea Observer Programme (managed by NFA) and the FSM Arrangement Observer Programme (managed by FFA)

Table 10. Estimated Annual total catches of non-target species and species groups, by Papua New Guinea longline fleet, 2003-2005. (**Source of data** : Data collected under the Papua New Guinea Observer Programme (managed by NFA); Coverage of observer data : 2003–1.5%; 2004–1.5%; 2005–0.5%; Coverage has been estimated by comparing observer-recorded target species catch to annual catch estimates for this fleet; '%' represents percentage of total catch which includes target tuna species catch)

		Species Composition					
		2004		2005		2006	
Category	Species	MT	%	MT	%	MT	%
Target Tuna	Albacore	1,285	24.28%	1,055	26.35%	1,068	22.29%
	Yellowfin	2,853	53.91%	2,110	52.69%	2,743	57.24%
	Bigeye	425	8.03%	185	4.62%	190	3.96%
Billfish	Blue marlin	30.1	0.57%	153.2	3.82%	117.9	2.46%
	Black marlin	19.4	0.37%	43.6	1.09%	26.4	0.55%
	Striped marlin	26.6	0.50%	18.0	0.45%	44.0	0.92%
	Swordfish	37.9	0.72%	43.0	1.07%	11.7	0.24%
	Other Billfish	42.8	0.81%	24.4	0.61%	29.7	0.62%
Sharks and Rays	Blue shark	36.4	0.69%	9.6	0.24%	24.7	0.52%
	Mako sharks	21.3	0.40%	0.0	0.00%	11.8	0.25%
	Oceanic whitetip shark	9.9	0.19%	18.7	0.47%	3.4	0.07%
	Silky shark	112.9	2.13%	43.5	1.09%	86.6	1.81%
	Other sharks and rays	69.3	1.31%	3.5	0.09%	138.9	2.90%
Other finfish	Bullet/Frigate tunas	0.2	0.00%	0.0	0.00%	0.0	0.00%
	Kawakawa	0.0	0.00%	0.0	0.00%	0.0	0.00%
	Rainbow Runner	0.3	0.01%	0.0	0.00%	0.0	0.00%
	Wahoo	17.5	0.33%	114.9	2.87%	98.0	2.04%
	Common dolphinfish	10.3	0.20%	6.2	0.15%	11.4	0.24%
	Triggerfish	0.0	0.00%	0.0	0.00%	0.0	0.00%
	Barracudas	23.9	0.45%	88.6	2.21%	38.5	0.80%
	Escolars	0.6	0.01%	3.9	0.10%	30.6	0.64%
	Lanctfishes	9.4	0.18%	0.0	0.00%	10.3	0.21%
	Ocean sunfish	0.0	0.00%	0.0	0.00%	5.8	0.12%
	Oilfish	25.2	0.48%	12.0	0.30%	24.6	0.51%
	Opah	145.3	2.75%	28.8	0.72%	21.7	0.45%
	Pomfrets	7.0	0.13%	1.1	0.03%	0.3	0.01%
	Small baitfish	0.0	0.00%	0.0	0.00%	0.0	0.00%
	Other fish	82.7	1.56%	41.6	1.04%	55.2	1.15%
	Tuna	4,562	86.22%	3,351	83.66%	4,000	83.48%
	Billfish	157	2.96%	282	7.05%	230	4.79%
	Sharks and rays	250	4.72%	75	1.88%	265	5.54%
	Other finfish	322	6.09%	297	7.42%	296	6.18%
	Total non-target	729	13.78%	655	16.34%	791	16.52%
	Billfish (non-Swordfish)		2.25%		5.97%		4.55%

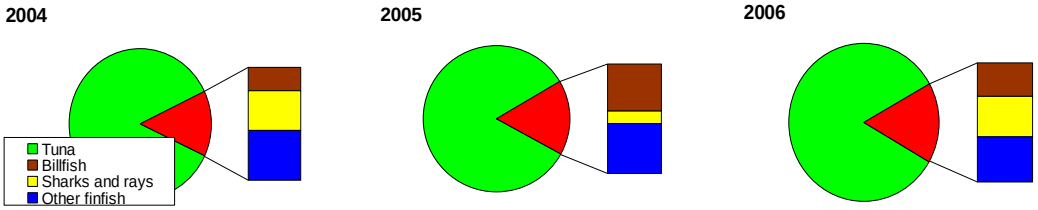
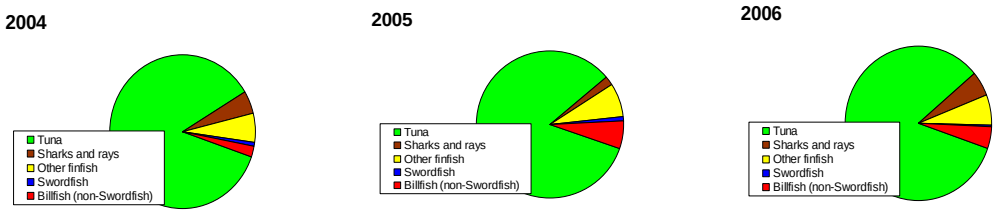


Figure 8. Proportion of non-target species groups in the catch of Papua New Guinea tuna longline vessels, by year, 2003–2005. (**Source of data** : Data collected under the Papua New Guinea Observer Programme managed by NFA



Tuna tagging project

PNG in partnership with the Secretariat of the Pacific Community (SPC), the University of Hawaii and the funding agencies recently completed a project on tuna tagging in PNG waters. The projected started in August 2006 with 2 cruises of 3months and the second phase just ended in May 2007. The broad objective of the project was to tag tuna to obtain a better understanding of their movements (vertical and horizontal) and behaviour especially around Fads. A total of 61,718 conventional plastic tags and 506 electronic (sonic and Archival) tags recording depth, temperature and position were released. Majority of the fished tagged were skipjack (65%), followed by yellowfin tuna (34%) and Bigeye (1%). About 8% of the conventional tags are already recovered. Although the project was very successful, not enough bigeye tunas were tagged especially with sonic tags, therefore work on sonic tags on Bigeye will be continued by PNG in collaboration with the University of Hawaii and SPC

Biological samples were also collected during the cruises. About 2,275 stomach, liver and muscle samples were collected.; 51% of the fish sampled were skipjack, 40% were yellowfin, 1% was bigeye and 8% was other fish. Analysis of these samples will help us assess the impact of anchored Fads on the trophic strategy of the fish.

Seamount study

PNG is also collaborating with SPC and Institute of Research for Development (IRD) based in Noumea, New Caledonia, to carry out a study on seamounts starting May 2008. One of the objectives of the study is to understand the role of seamounts on tuna production.

4. Final market destination of catches/disposal of catch

Domestic longline (tuna)
The majority of the fresh chilled tuna catch (yellowfin and bigeye) is exported by airfreight to markets in Japan and Australia. Exports have increased steadily since 1994 and based on available records, exceeded 2,000t dressed weight (est. 2,400t whole weight), valued at over USD 8 million, for the first time in 2002 (Table 11).
Frozen tuna (mostly albacore, now increased to more than 1,000t in last 2 years) is also exported.
Smaller amounts of lower grade tuna and by-catch species (Wahoo, mahimahi, some shark) are sold on local markets, and some sharkfin is (mostly frozen) exported.

Domestic longline (shark)
Shark meat has been exported since the fishery moved to a significant scale in 1998, with over 2,000t whole weight equivalent exported each year since then. During 2004, increasing amounts of shark meat were processed in PNG for sale to local food outlets. This has resulted in less export.
Frozen sharkfin export has been in excess of 100t since 2000 but has dropped to less than 100t in the most recent two years.
Tuna caught by the shark longline vessels (approx. 6% of the catch by weight) is also exported frozen (approximately 24 metric tonnes in2006).

Local licensed purse seine
In each of 2001, 2002 and 2003, over 30,000t of frozen tuna was exported by the three local companies, representing around 50% of the total catch taken by these vessels. Figures for frozen tuna have dropped as more tuna is now being processed in country. In 2004 only 10,000t was exported. In 2005, less than 10,000mt was exported and it can be seen that figures will further drop as the other plants come into production.
Limited quantities of by-catch species and small fish are sold locally.
The local market for canned tuna, in addition to exports, has expanded rapidly.

Locally based foreign purse seine catch
The 200mt/day loin plant in Wewak is in operation as of March 2003, and currently operating at a capacity of 100mt/day. It is hoped that the out put will increase further sometimes this year. All of the catch by these vessels is currently transhipped and exported, apart from small quantities unloaded to the RD cannery from time to time (< 1,000t in 2002). Much of the transhipment occurs in non-PNG ports.

Foreign purse seine vessels
All of the catch taken by foreign bilateral and multilateral access vessels is transhipped, some from PNG designated ports, and exported.
Unloading of by-catch during transhipment is encouraged.

4.1 Exports

Table 11 lists tuna fishery exports by main category and value for the period 2002-2006. The total value of tuna fishery related exports has increased in the last three years peaking at USD 66 million in 2005, but dropping by about 12% in 2006 but these figures may still be incomplete. The export figures do not include the value of tuna transhipped by PNG-based vessels.

Chilled tuna, as noted, is mostly exported to Japan and Australia, frozen tuna to Philippines, Japan and Taiwan, canned tuna mainly to the European markets (Germany, Great Britain), with small quantities to Pacific Island countries, tuna loins to Europe and US and fish meal to Australia and Japan. Shark products are mostly exported to Taiwan.

Table 11. Tuna fishery product exports by volume and value
(Source: NFA records; values in USD; frozen shark and frozen tuna weights are dressed; the 2005 figures may be incomplete; dried shark fins are not included)

	Chilled tuna		**Frozen tuna**		**Canned tuna**		**Loins tuna**		**Fish meal**		**Shark meat (frozen)**		**Shark fins (frozen)**		**TOTAL (USD Million)**
Year	Mt	value	Mt	Value	Mt	Value	Mt	Value	Mt	Value	Mt	Value	Mt	Value	
2002	2,106	8.4	33, 960	19.5	12,214	23.4	-	-	1,670	0.6	1,330	0.5	112	0.8	53.2
2003	2,092	9.3	31, 294	16.5	13,753	28	-	-	1,791	0.7	1, 312	0.5	86	0.5	55.5
2004	2,309	13.1	15,754	10.6	16,052	37.3	1, 749	1	3,174	1.5	1,317	0.5	135	0.7	64.7
2005	924	3.7	14,067	11.7	15,381	40.7	14,377	7.5	3,944	1.5	1, 271	0.4	179	0.7	66.2
2006	1,420	6.5	5,051	4.5	13,937	35.5	11,382	8.5	6,082	3.1	316	0.1	27	0.1	58.3

5. Onshore developments

Infrastructure

Under the Asian Development Bank (ADB) Fisheries Development Project, two wharves to primarily support longline fishery development were built in Kavieng and Lombrum (Manus) respectively. The former with an associated fish processing facility also completed. The Manus wharf was completed and opened in December 2003. A net mending facility was also built in association with the wharf. The net mending facility is now operational. An airport chillier facility (60t capacity), to allow consolidation and storage of chilled fish prior to export, was completed at the end of 2003 and is now in operation in Port Moresby.
Net repair facilities are available in Lae and Madang (Vidar) and have been proposed for at least one other location.

Processing

The RD tuna cannery, established in Madang in 1997, continues to enhance production capacity with daily throughput of 150t now being achieved. Plans have been announced for the construction of a second larger cannery/loining plant at Vidar, north of Madang (200t/day), in association with a 2,000t cold storage facility. A can making factory is under construction to compliment the cannery.
The South Seas Tuna Wewak loining plant (200t/day capacity), was completed in early 2004 and is currently operating at 100mt/day.
The proposed Frabelle cannery (100t/day) in Lae, with the associated 600t cold storage and ice plant is in operation having been commission in March 2006. One other smaller fish processing plants in Lae by Frescomer (PNG) is in operation processing Handline caught fish.

6. Future prospects and developments

Under the Government's export driven economic growth and recovery strategy, further onshore development is being encouraged, as a condition of access.

Proximity to and availability of the resource plus change in policy as relates to rights to access resource seems to be becoming a major factor influencing investment in onshore processing facilities in PNG, along with the prospect of improved access to key markets.
Should all of these plants come to fruition, up to 175,000t of raw material per annum might be required. Assuming that at least one third of this might be sourced outside PNG waters, and with the locally sourced material of 300,000t on average per annum, it would mean that there is room for further expansion in the processing sector. Further development of the longline fishery is currently constrained by logistical factors, particularly freight availability, high freight costs and high fuel cost, and growth in this industry is now stagnant. The nominal longline TAC of 10,000t (yellowfin and bigeye) remains some distance off.
The development of the handline fishery (which has attracted considerable interest) is being closely monitored and regulated, whereas artisanal tuna fishery development is being encouraged under forthcoming projects and as an adjunct to onshore developments.
The planned development of "frozen smoked" processing plants is seen as a positive development for the longline and handline sector, as it will preclude in part the need for increasingly expensive airfreight.
Other opportunities for value-adding to tuna products exist, and landing of by-catch by all vessels landing or transhipping is being encouraged.

PNG is pushing the idea of setting up a Marine Industrial Park to carter for the fishing industry. Work is under way to bring this idea to fruition.