



**SCIENTIFIC COMMITTEE
FIFTH REGULAR SESSION**

10-21 August 2009
Port Vila, Vanuatu

**SPECIES COMPOSITION AND LENGTH FREQUENCY OF PAPUA NEW GUINEA
PURSE-SEINE CATCH FROM THE 2008 INDEPENDENT TUNA PORT SAMPLING**

WCPFC-SC5-2009/EB- IP-16

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SPECIES COMPOSITION AND LENGTH FREQUENCY OF PAPUA NEW GUINEA PURSE SEINE FISHERY CATCH FROM THE 2008 INDEPENDENT TUNA PORT SAMPLING.

Abstract

An independent tuna port sampling was carried out in Papua New Guinea in 2008 to monitor the type and amount of fish caught by purse seiners within PNG waters. The sampling was also used to assess whether there are changes in the sizes of the fish caught. A total of 376, 358 tuna and non-tuna species were sampled. Species composition showed 70% skipjack, 26% yellowfin, 2% bigeye and 2% bycatch. Length frequency comparisons of 2008 results with previous studies showed that there is no difference in the mean length of skipjack and yellowfin tuna but there is a significant difference in the mean length of bigeye tuna.

Introduction

The Papua New Guinea (PNG) Exclusive Economic Zone (EEZ) is an extremely productive tuna fishing area in the Western and Central Pacific Ocean (WCPO). Catches in the PNG EEZ have averaged about 250,000 tonnes per year over the past decade peaking at approximately 466,000 tones in 2007 (Kumoru, 2008). Although a locally-based longline fleet operates in the southern part of the EEZ, most of the catches are taken by foreign-licensed and locally-based purse seiners.

Purse-seine fishing has been operating in PNG waters since the early 1980s (or for over 20 years now) and has grown to be the major exploiter of tuna in PNG's waters in terms of catch and the number of vessels. Purse seiners catch are mainly skipjack and yellowfin tuna with smaller catches of bigeye tuna. They employ two main operational modes – setting on free-swimming (or unassociated) schools of skipjack and medium-large yellowfin; and setting on schools associated with floating objects such as drifting logs and anchored or drifting fish aggregation devices (FADs). These associated sets tend to catch large quantities of small, juvenile yellowfin and bigeye tuna (Nicol *et al*, 2008).

Apart from its observer programme with high coverage rate on purse seiners, the National Fisheries Authority (NFA) of PNG has been collecting data on catch landings from purse seiners from major tuna ports in the country. This paper presents the results of the port sampling data for the year 2008. The objective is to assess possible changes in the type and amount of fish caught by purse seiners within PNG waters and also to assess whether there are changes in the sizes of the fish caught.

Methods

Port Sampling was carried out in Lae (March – October) and Madang (April, May, June July) in 2008.

Sampling

An estimated 20% by weight of all tuna catches that were taken to Lae and Madang ports by fishing vessels to either land or tranship were sampled. A Well in a vessel was divided into 3 layers (Top, Middle and Bottom) in which a number of nets were selected from each layer and were sampled. The number of nets per layer was selected or determined based on the total weight of the catch in the well to ensure that 20% of the catch was sampled. This was done for all storage wells on the vessel. All fish in the net were identified to species level and fork length (cm) measurements were taken of all the fish in the net.

Data Entry and Analysis

The data was entered into a Microsoft Access database specifically set up to include variables such as date of sampling, name of vessel, position of storage well, net number, layer names of fish sampled and length (fork length, cm). The analysis focused on evaluating species composition and length frequency of tuna and bycatch species.

Results

Species Composition

A total of 376 358 fish were sampled, 36, 696 of these were tuna species. 264 005 (70%) was skipjack, 98416 (26%) was yellowfin, and 7539 (2%) was bigeye while 6,398 were bycatch (Figure 1).

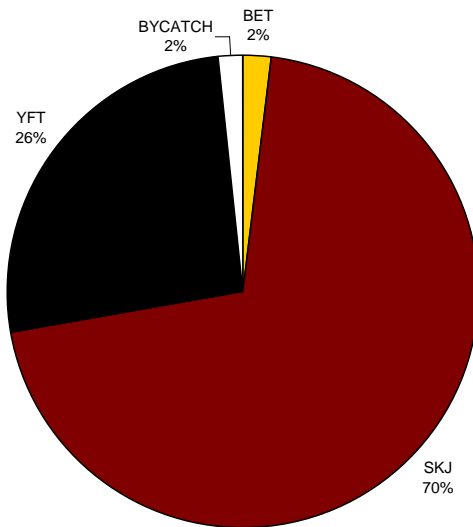


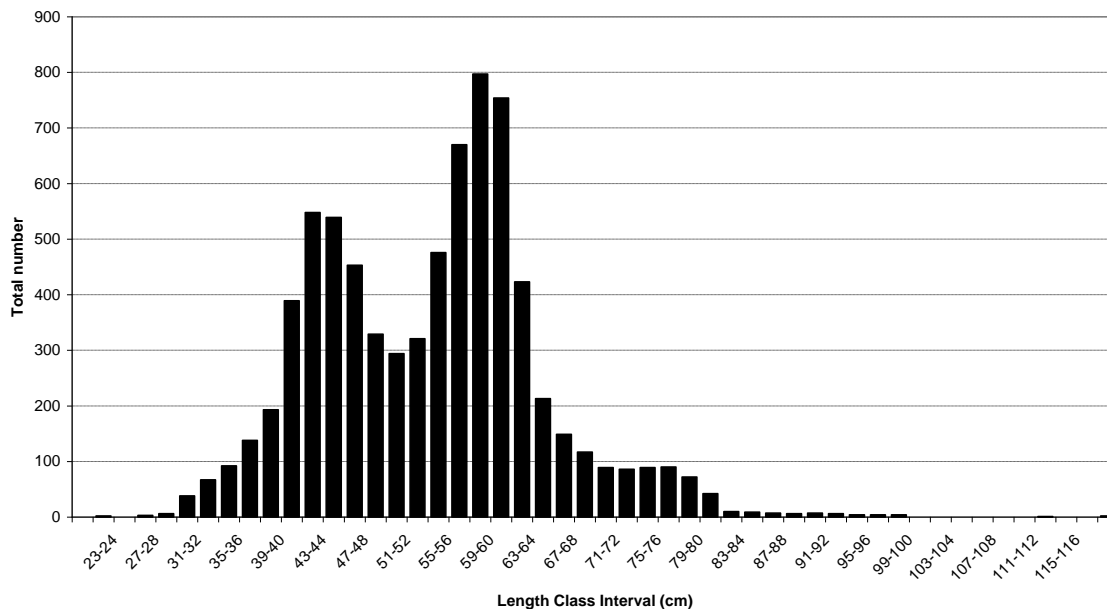
Figure 1: Species Composition of 2008 tuna port sampling

Length Frequency

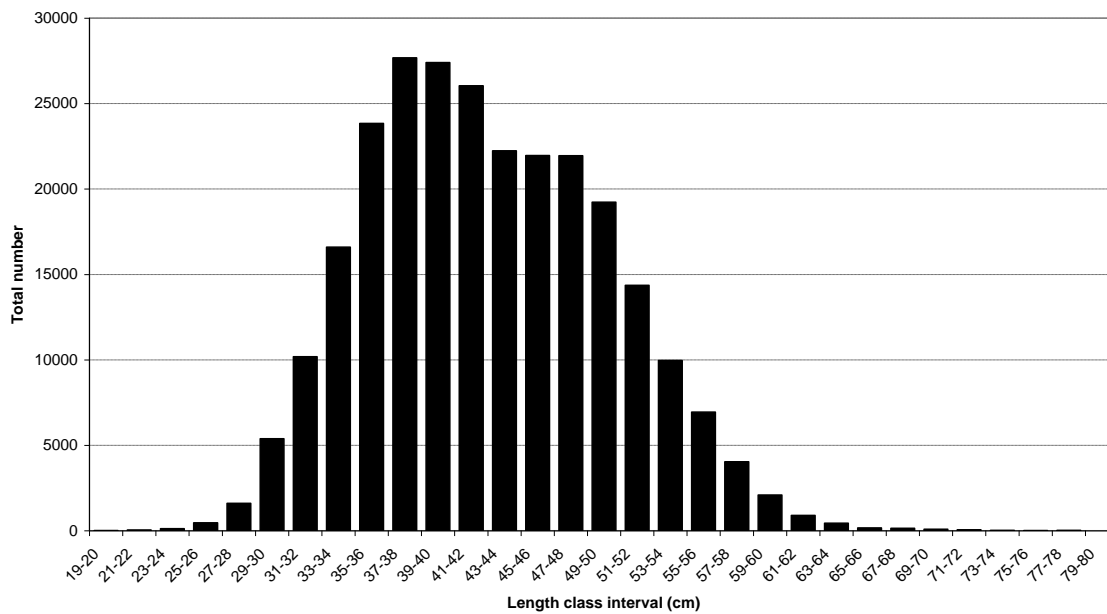
Bigeye had a size range from 20 – 118 cm, Skipjack had a size range from 19-80 cm and the Yellowfin size range was between 17 – 161 cm. Bigeye showed two distinct modal peaks at 41-42 cm and at 55-56 cm, Skipjack modal class was 37-38 cm and Yellowfin 57-58 cm (Figure 2).

A chi square test was used to compare the mean length of Skipjack, Yellowfin and Bigeye tuna sampled, and those sampled in 1999 and 2005 as reported by (Koren, 2007). There was no significant difference ($P < 0.01$) in the mean length of skipjack ($X^2_{\text{calc}} = 2.92$, $X^2_{\text{crit}} = 9.21$, $df = 2$) and yellowfin ($X^2_{\text{calc}} = 5.77$, $X^2_{\text{crit}} = 9.21$, $df = 2$) tuna, however there was a significant difference in the mean length of bigeye ($X^2_{\text{calc}} = 15.54$, $X^2_{\text{crit}} = 9.21$, $df = 2$) tuna sampled.

BIGEYE



SKIPJACK



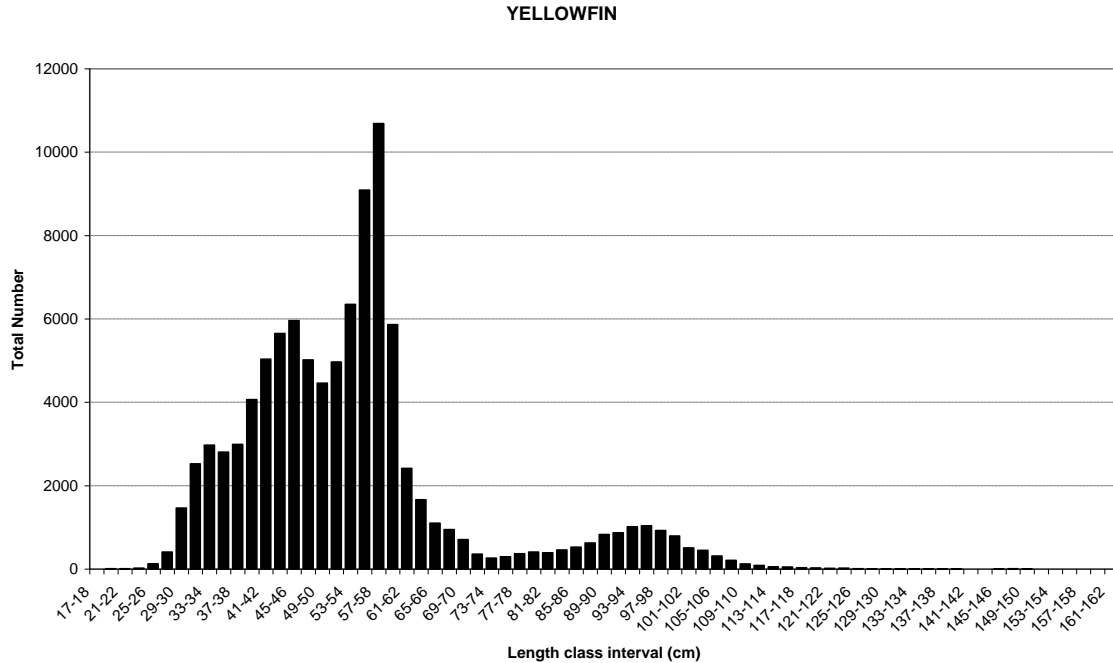


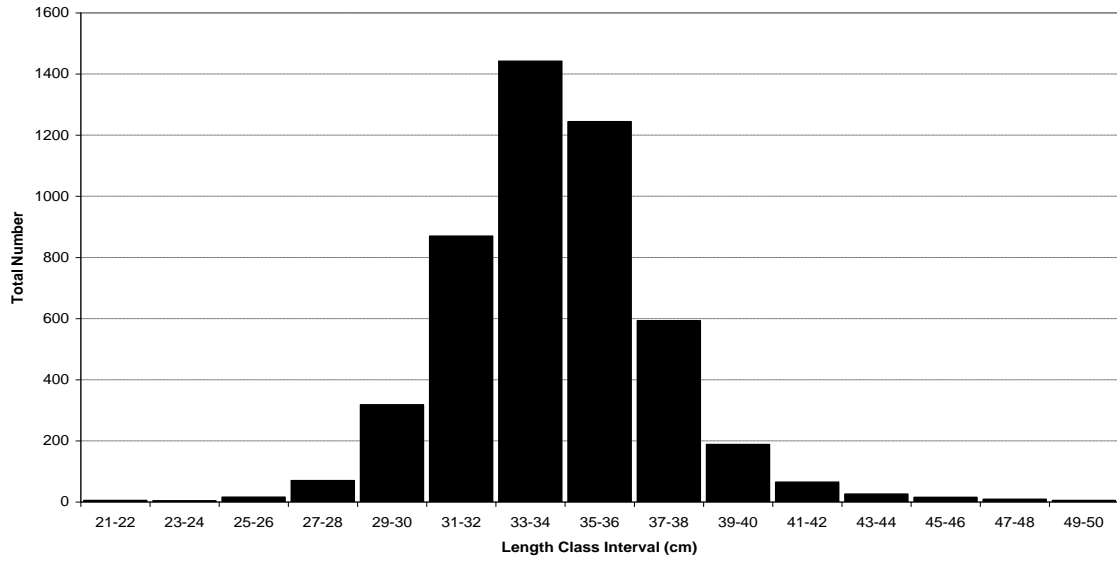
Figure 2: Length frequency of main tuna species

Other Species

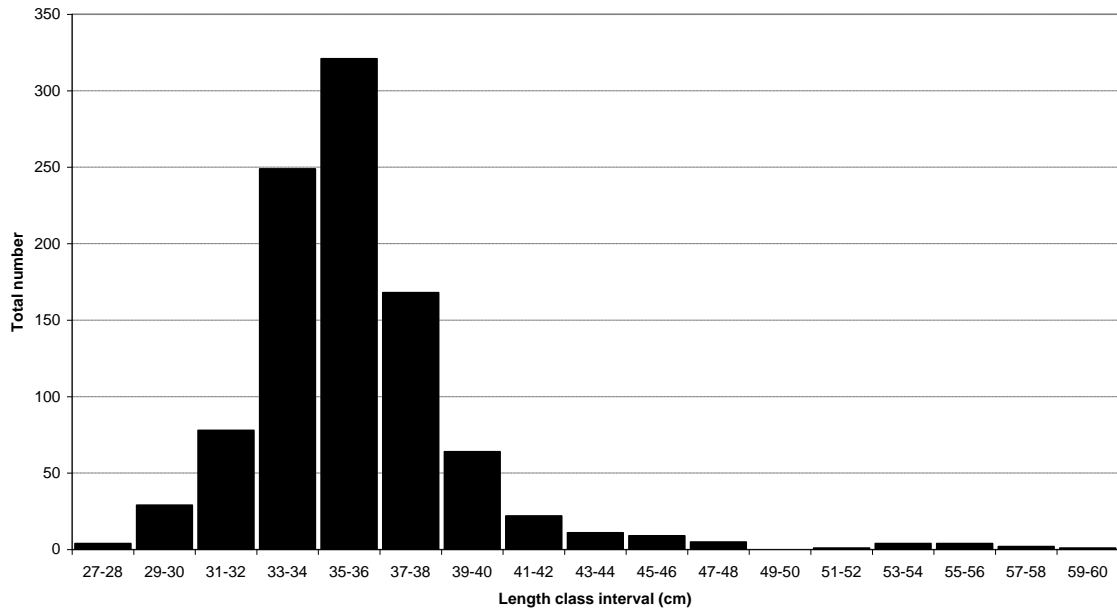
Bycatch comprised of mainly two tuna species which were Bullet Tuna (78.66%) and Frigate Tuna (15.30%). Other non tuna species comprised the remaining bycatch proportions these were Mackerel Scad (4.01%), Rainbow Runner (1.12%), Kawakawa (0.66%), Silky shark (0.09%), Batfish (0.08%), Oceanic white tip shark (0.05%) and Dolphin fish (0.03%).

Bullet Tuna ranged in size from 21-50 cm, Frigate Tuna from 27-59 cm, Mackerel Scad from 19-38 cm, Rainbow Runner from 21-78 cm, Kawakawa from 35-65cm, Silky Shark from 59-134 cm, Oceanic White Tip Shark from 80-95 cm and Batfish from 28-36 cm. The modal class for Bullet tuna was 33-34 cm, Frigate tuna: 35-36 cm, Mackerel Scad: 31-32 cm, Rainbow Runner: 65-66 cm and Kawakawa: 55-56 cm (Figure 3).

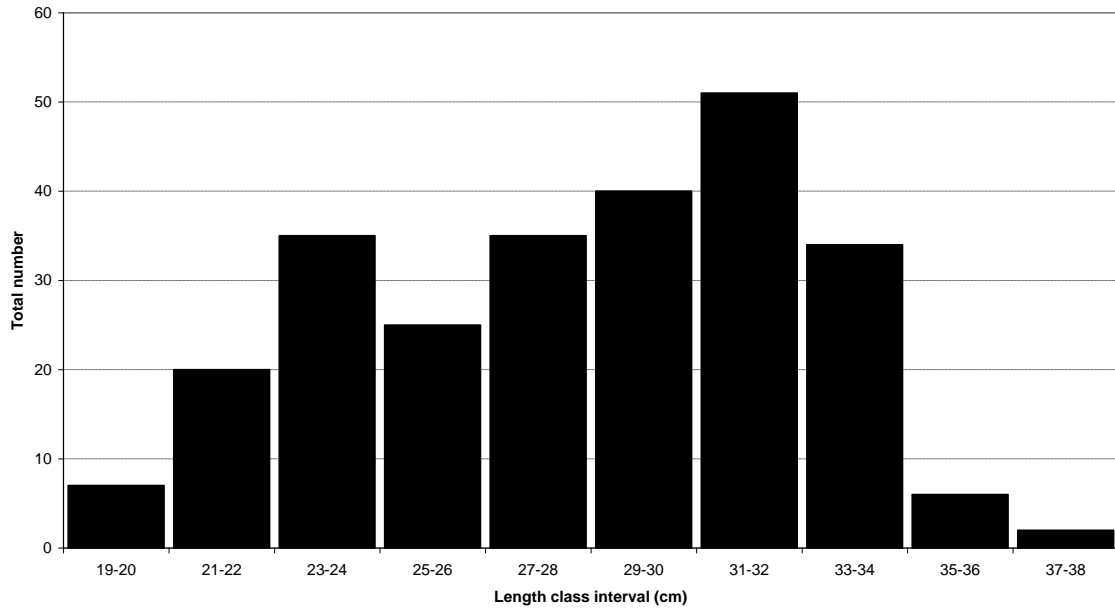
BULLET TUNA



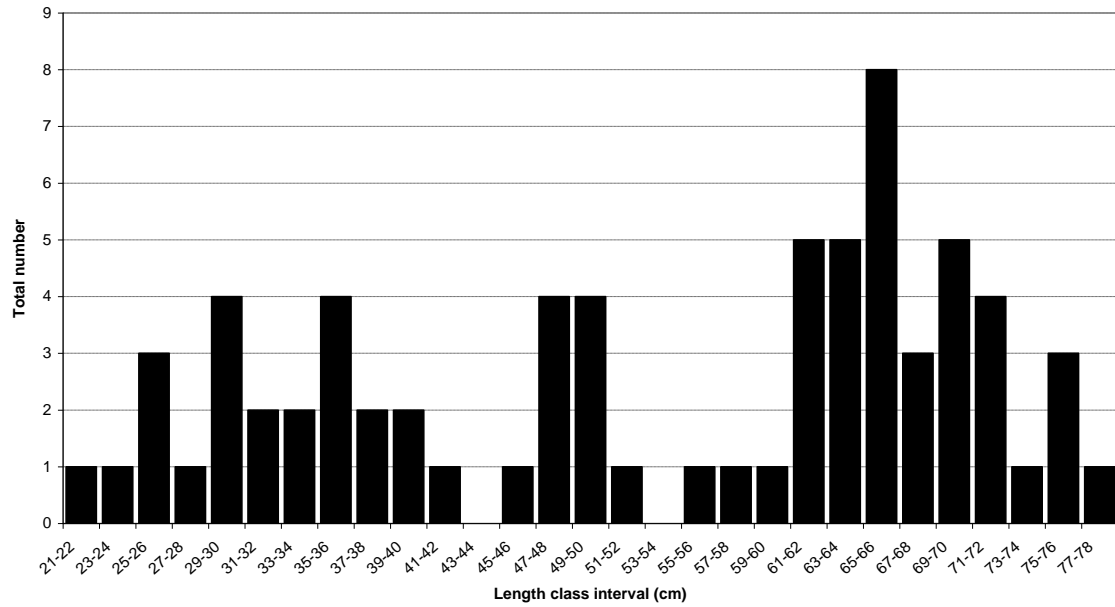
FRIGATE TUNA



MACKEREL SCAD



RAINBOW RUNNER



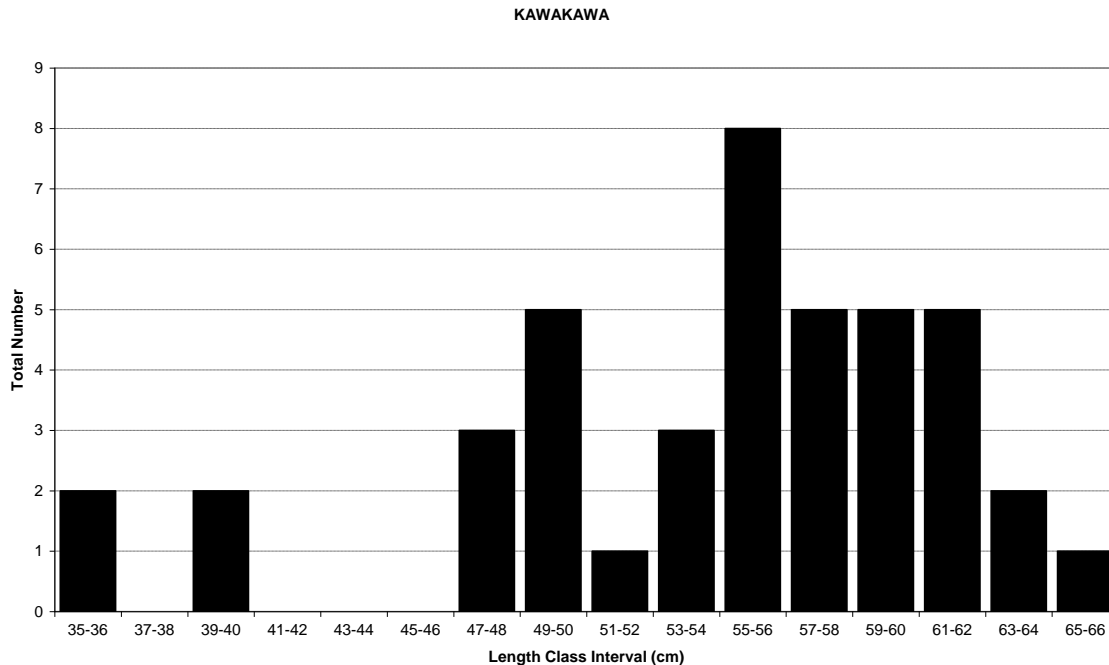


Figure 3: Length frequency of bycatch species.

Discussion

The species composition of 70% skipjack, 26% yellowfin and 2% bigeye are generally expected catch proportions of the main target species of the purse –seine fishery and are also similar to Kumoru (2007) which reported 75% skipjack, 23% yellowfin and 2% bigeye. Similar port sampling activities have been carried out in PNG in 2005 and 1999 as reported by Koren (2007). Species compositions from these years and 2008 show an increase in the percentage of skipjack tuna and decreases in the number of yellowfin and bigeye tuna sampled.

The mean length frequencies observed for skipjack tuna have shown a decrease in the average size class from 55-56 cm in 1999 to 39-40 cm, 41- 42 cm, 51-52 cm (three modal classes) in 2005 to 37-38 cm in 2008, the decrease implies that smaller skipjack are now being caught compared to previous years. There may be a number of reasons causing a decline in the average size of skipjack tuna caught in PNG waters such as increased fishing pressure, environmental factors and increased use of fish aggregating devices (FADs) or maybe seasonality. Despite this obvious trend there is no statistically significant difference in the mean length of Skipjack and Yellowfin tuna but there is a significant difference detected for Bigeye. Environmental factors particularly seasonality may be the main reason for this result taking into account the length of sampling periods.

The proportion of bycatch sampled was very low and made up only 2% of the total number of fish sampled, however the bycatch species composition is similar to that which was sampled by Kumoru (2007) and Koren (2007). In terms of individual species proportions Bullet Tuna comprised (78.66%), Frigate Tuna (15.30%), Mackerel Scad (4.01%), rainbow runner (1.12%), Kawakawa (0.66%), Silky Shark (0.09%), Batfish (0.08%), Oceanic white tip shark (0.05%) and dolphin fish (0.03%). This result is not a proper estimation of total bycatch since it is common practice for fishing vessels to discard bycatch at sea before returning to port.

The independent tuna port sampling carried out in PNG is a means of gathering data to monitor species composition and length frequency of tuna caught within PNG and surrounding waters. It will also help in validating catch information as recorded in catch logsheets especially against trip based sampling.

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