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Abstract

Philippine flagged purse seine and ringnet vessels operating in country's EEZ were boarded by Fisheries Observer for a period of 20 days in connection with the implementation of Fisheries Administrative Order (FAO) 236 & 236-1 "Rules and Regulations on the Operations of Purse Seine and Ring Net Vessels Using Fish Aggregating Devices (FADs) locally known as Payaos during the FAD Closure Period as Compatible Measures to WCPFC CMM 2008-01."

This study covers data collected in 2010-2012 and updates the preliminary assessment made on data in 2010 and 2011. Analysis was made on catch rates, species and size composition and catch variations in relation to fishing grounds, depth of nets and gear type. This study will serve as the basis to recommend workable measure/s to improve and amend the existing Fisheries Administrative Order and formulate other compatible measures/national regulations to WCPFC CMMs.

II. BACKGROUND

Being one of the major tuna fishing nations in the West Central Pacific Ocean (WCPO), the Philippines has been a Chief Party to the negotiation and adoption of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean that subsequently established the Western and Central Pacific Fisheries Commission (WCPFC). In the performance of its mandate to manage migratory fish stocks in the WCPO, the Commission implements various Conservation and Management Measures (CMMs) covering the Convention area. Conservation and Management Measure (CMM) 2008-01 seeks to implement compatible measures for the high seas and EEZs to maintain bigeye and

yellowfin tuna stocks at levels capable of producing MSY. Among the prescribed measures is for purse seine fishery in the area bounded by 20ºN and 20ºS closed to fishing on FADs August 1-Sept 30, 2009 and July 1-September 30 in 2010-2012. During these periods, all purse seine vessels were required to carry an observer from the Regional Observer Program.

The Philippines being a non-PNA country implemented Fisheries Administrative Order (FAO) 236/236-1 entitled "Rules and Regulations on the Operations of Purse Seine and Ring Net Vessels Using Fish Aggregating Devices (FADs) locally known as Payaos during the FAD Closure Period as Compatible Measures to WCFPC CMM 2008-01". The Order applied to all Philippine registered and licensed commercial purse seine and ring net catcher vessels that fish on FAD within Philippine EEZ from July 1 to September 30 of 2010-2012. It also required registration with BFAR for authorization to fish on FADs during the period and reduce depth of net to not more than 115 fathoms stretched to reduce the catch of bigeye tuna. It also entails vessels to carry on board Monitors/Observers to gather data and recommend further improvements of the measure. In addition, CMM 2007-01 also obliged the Commission to develop a Regional Observer Programme to, among others, collect verified catch data, and to monitor the implementation of the conservation and management measures adopted by the Commission.

This report analyses reports from Observers on board purse seines and ringnets operating within the Philippine EEZ during the period July 1 to September 30 in 2010, 2011 and 2012.

II. OBSERVER COVERAGE AND DEPLOYMENT

The deployment of observers covered the 3-months FAD fishing closure period from July 1 to September 31 in 2010-2012 involving purse seine and ring net catcher boats based in General Santos City. It was implemented in consultation with boat owners and affiliated Organizations particularly the SOCSKSARGEN Federation of Fishing and Allied Industry, Inc. (SAFAII). One Observer trip covered one catcher vessel for a period of 20 days inclusive of travel to and from fishing ground to port of fishing landing. Each trip was designated with a unique Observer trip number. Each registered vessel was

required with at least one observer trip during the entire 3-month period with compensation provided for by boat operators.

Table 1. Observer coverage by gear type, July-Sept, 2010-1013

YEAR/GEAR TYPE	PURSE SSEINE (PS)	RINGNET (RN)	TOTAL
2010	138	293	431
2011	78	165	243
2012	140	146	286
TOTAL	**356**	**604**	**960**

Covered in this report were a total of 960 fishing days from both purse seines and ringnets (Table 1). Observers recorded set and catch information, vessel activity, and other data using WCPFC standard Observer forms.

III. METHODS

A. Sampling

Mixed samples were taken randomly from the catch. Samples were collected by using plastic tubs as the brail was poured in wells or were scooped directly from the bunt. Samples were set aside in a secured area until the last brail. Sub-sampling was also conducted when necessary.

Samples were segregated according to species and group-weighed. The lengths of all tunas and mackerel scad from the sample were measured to nearest cm (fork length for tuna and large pelagic species and total length for mackerel scad). Species identification was conducted using species ID manuals and more detailed identification was done on yellowfin and big-eye tuna based on their distinctive morphological characteristics.

B. Catch estimation

Observers total catch estimates were derived from two methods. The main procedure was made by counting and estimating the capacity of brails as fish catch was transferred from the bunt to wells or fish holds of awaiting carriers. The other method was based on capacity and fullness of wells/fish holds. Catch rate was estimated as tons/fishing day.

Brail capacity was approximately 80% of its volume (dela Cruz, 2010) to account air and water space. Billfishes and large size tuna were normally landed on deck and separately measured and added to the total catch.

C. Data analysis

Data processing was done using MS Excel. Fishing operations were grouped according to fishing grounds which included Moro Gulf and Mindanao Sea in the Celebes (CEL), Southern Philippine Pacific seaboard (PAC), Sulu Sea (SUL) and the vicinities of Kalayaan Group of Islands and waters off Balabac Is. in West Philippine Sea (WPS).

Average catch was computed as tons/fishing day. Catch variation by fishing ground, depth of gear and gear type was also described.

III. RESULTS AND DISCUSSION

A. CATCH, SPECIES AND SIZE COMPOSITION

Figure 1 shows the catch for the three (3) years period. Total catch was 7,044 mt, composed of 46% SKJ, 21% MSD, 18% YFT, 2% BET, 1% KAW and 13% other species. Noticeably the fraction of BET is comparatively low compared to similar fisheries in the WCPO and EPO. For example, observer data on associated sets from the PNG vessels for years 2004-2006 averaged 59% SKJ, 34% YFT and 6% BET (Kumoru, 2007) while the WCPO provisional purse seine-catch estimate for 2011 indicated 4.5% BET (Williams, P and P.Terawasi, 2012). The EPO purse seine catch in 2011 was 52%:37%:10% SKJ:YFT:BET proportion (IATTC, 2012).

Other species caught in the order of dominance were rainbow runner (RRU) frigate & bullet tuna (BLT/FRI), bigeyed scad (BIS), shortfin scad (SFS), wahoo (WAH) and more than 13 other species.

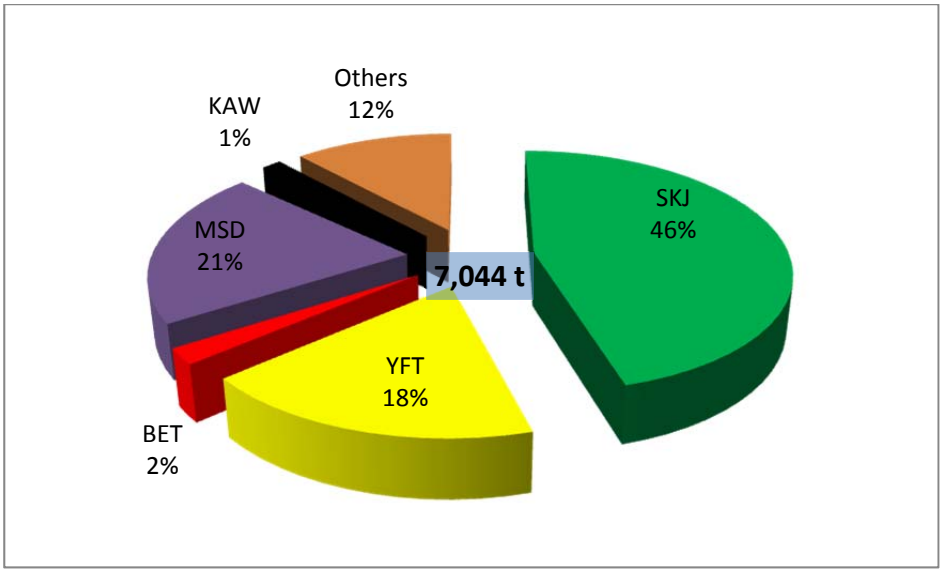


Figure 1 . Catch composition of purse seine/ringnet, July-Sept, 2010-2012

Catch rates indicated a decline from 7.1t/fishing day in 2010 to 5.6t/fishing day in 2011. However there was a significant increase in 2012 to 9.2 t/fishing day mainly due to increase on SKJ and YFT. On the other hand, the catch rate trend for MSD tend to be opposite with SKJ & YFT. Big-eye tuna (BET) was almost even at 0.154t/fishing day (Fig. 2, 3).

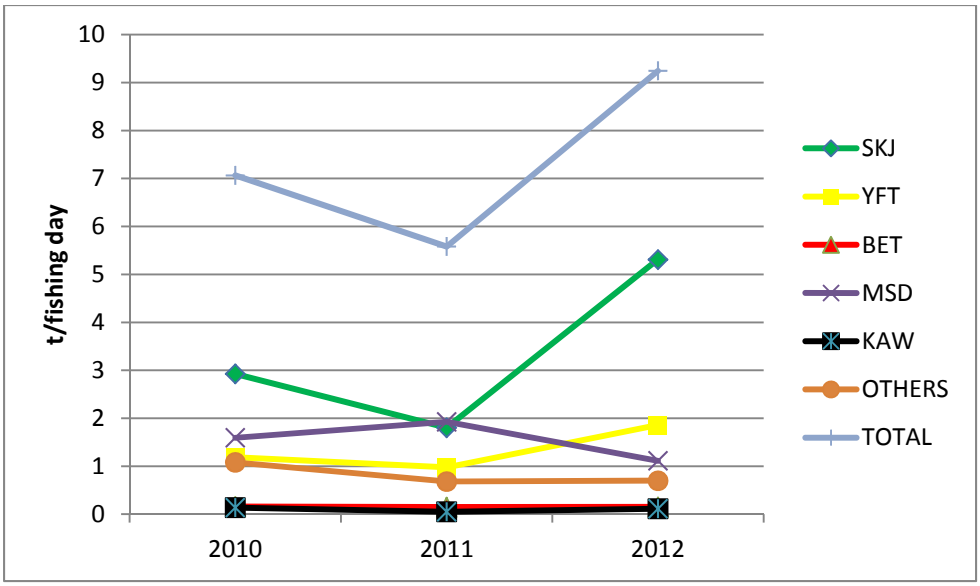


Figure 2. Catch rate, July-Sept, 2010-2012

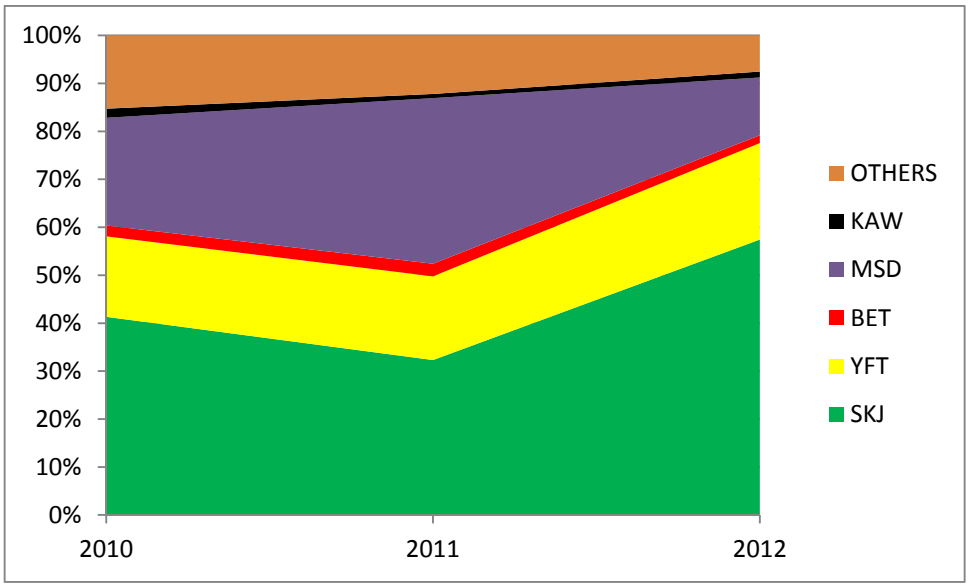


Figure 3. Relative catch composition.

Obviously, skipjack (SKJ) significantly impacts on the production of the fleet and the overall tuna production of the country. Catch rate trend based from Observers data concurred with reconciled tuna catch estimates in Philippine EEZ which declined by about 49% in 2011 and increase by 15% in 2012 when compared the previous year (Barut & Garavilles, 2010/2011/2012). Likewise, anecdotal reports also reported a

remarkable increase in landings, particularly in GSFPC, with about 42,631 MT for the first 10 months in 2012 which was 39.8% higher than the same period the previous year and the first time increase observed since 2008 (Espejo, 2012).

The length frequency distribution of SKJ, YFT, BET and MSD are shown in Fig. 4. For SKJ, size ranged from 10 to 87 cm with average length of 27 cm. The equivalent size ranges and average lengths for YFT, BET and MSD were 11-159 cm ksand 29 cm, 15-78 cm and 28 cm, and 9-40 cm and 24 cm respectively. This only emphasizes that bulk of tunas caught by the fleet were essentially small and of comparable sizes.

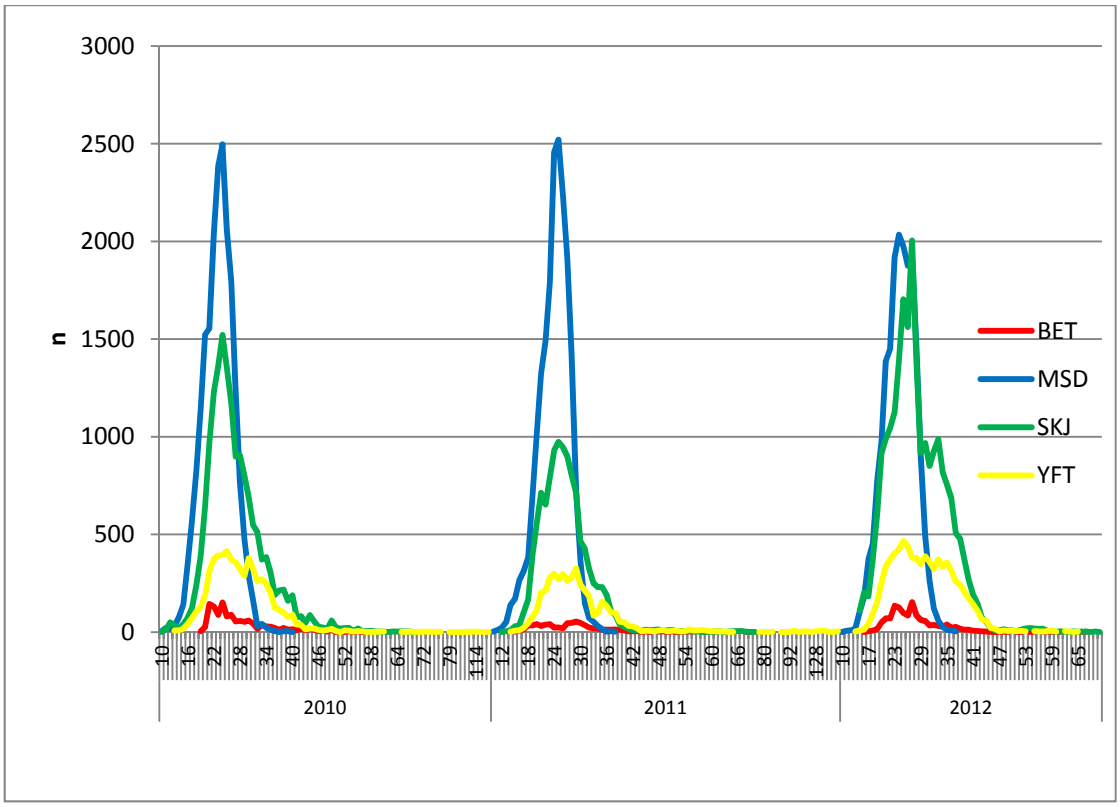


Figure 4. Length frequency distribution of major species caught

B. CATCH VARIATION BY FISHING GROUND

The fleet operated in four (4) fishing grounds, namely the Mindanao Sea in the Celebes (CEL), the southern portion of the Philippine Sea in the Pacific Seaboard (PAC), central-south Sulu Sea (SUL) and the West Philippine Sea (WPS) particularly in the Kalayaan Group of Islands. There was a total of observed 960 fishing days and CEL and PAC were the most frequented fishing grounds, obviously because of their proximity/accessibility from the fleet's homeport in General Santos. Observation was only possible in 2010 and 2012 in the WPS as a result of then ongoing seismic survey & reported harassment in the area during the period. The fleet rarely fished in Sulu Sea. In 2011, no observation was made in the WPS apparently due to ongoing seismic/energy resources surveys and harassment arising from territorial disputes with other countries (Table 2).

Table 2. Numbers of fishing days and catch by fishing ground, 2010-2012

YEAR/ FGROUND	CEL		PAC		SUL		WPS		TOTAL	
	Fishing days	Total catch	Fishing days	Total catch	Fishing days	Total catch	Fishing days	Total catch	Fishing days	Total catch
2010	293	2,086	119	739	4	45	15	174	431	3,045
2011	143	773	96	575	4	8		-	243	1,356
2012	141	1,133	114	1,106	-	-	31	405	286	2,644
Grand Total	577	3,991	329	2,420	8	53	46	580	960	,044

The average catch rate by fishing ground by year is illustrated in Fig. 5 where decline in 2011 and significant increase in 2012 are emphasized. The average catch rate over the period for Celebes Sea and Pacific Seaboard was 6.9t/fishing day and 7.4t/fishing day respectively while for West Philippine Sea in 2010/2012 was 12t/6t/fishing day. The limited observation in Sulu Sea averaged 6.6t/fishing day.

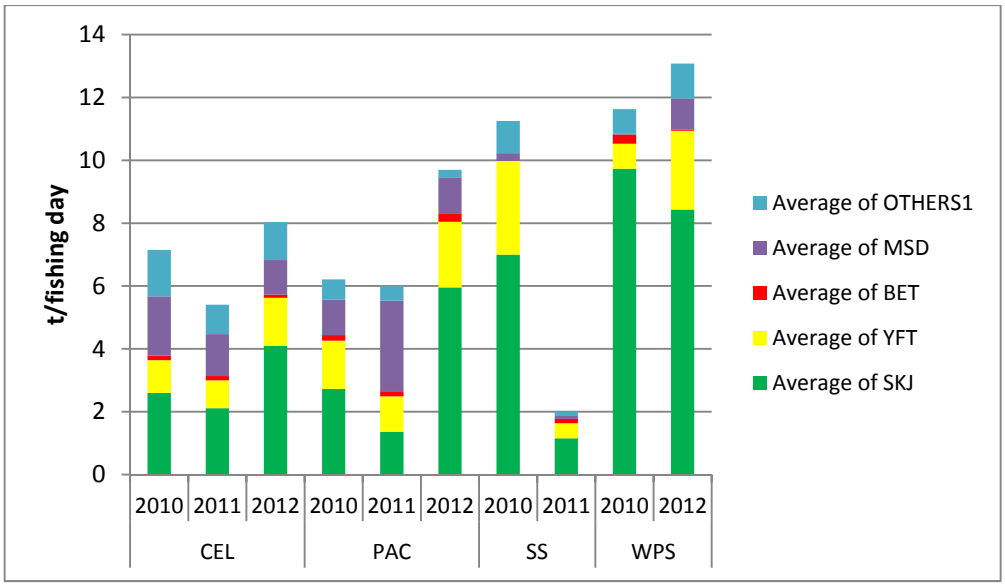


Figure 5. Catch rate of major species by fishing ground

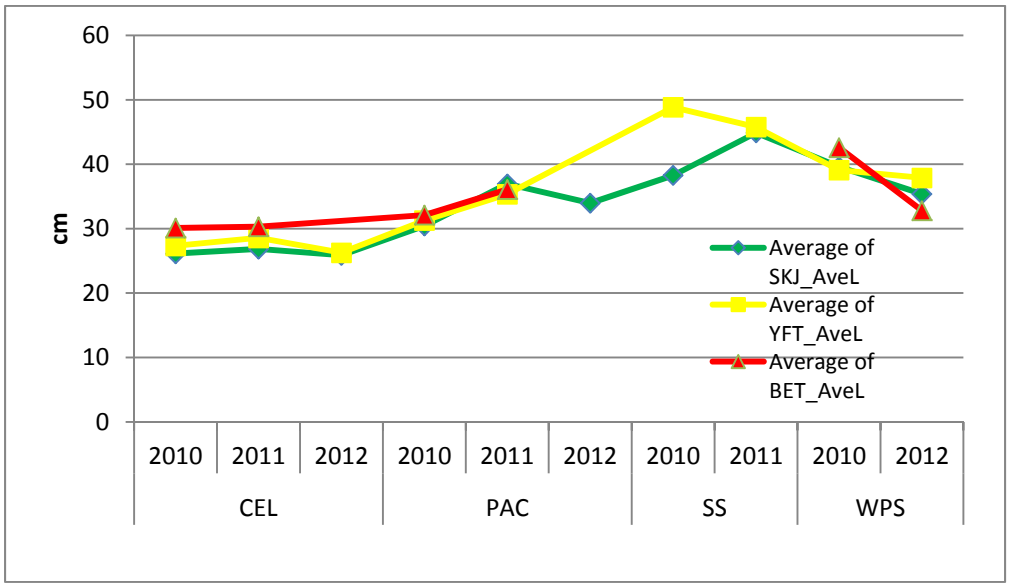


Figure 6. Average length of SKJ, YFT and BET by fishing ground

The variation on the average size of fish caught was likewise distinct across fishing ground (Fig. 6) with significantly smaller size of SKJ, YFT and BET in the Celebes Sea compared to the Pacific seaboard as well as the other fishing grounds. The average of average lengths of SKJ caught from CEL, PAC, SUL and WPS were 26.2cm, 33.6cm, 41.8cm and 36.8 cm while YFT were 27.4cm, 33.5, 47.1 and 38.3 respectively.

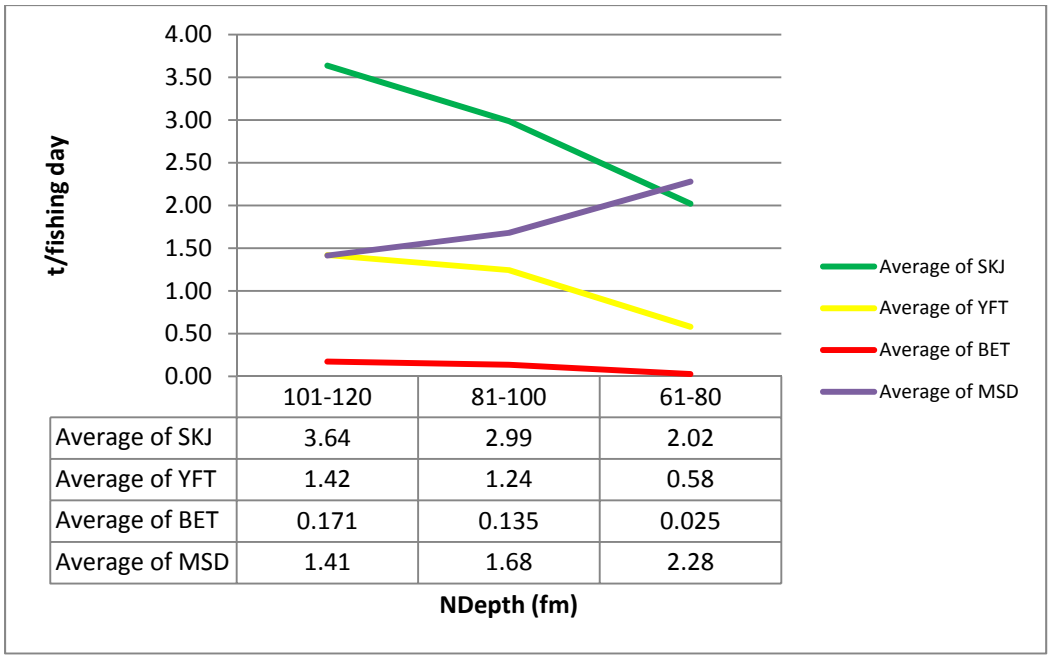
The average lengths of BET were 29.5cm in the CEL, 33.5 cm in the PAC and 38.8 in the WPS.

C. CATCH VARIATION BY DEPTH OF NET

Analysis on the variation of catch with depth of net was focused on sets made in the Celebes ad Pacific. The actual depth of nets ranged from 64 to 115 fathoms. The nets were classed by 20 fathoms, in particular 101-120 fm (Class 1), 81-100 fm (Class 2) and 61- 80 fm (Class 3). The distribution of observations by depth class is shown in Table 3.

Table 3. Number of observations by neth depth by fishing ground, 2010-2012

FGROUND / NDEPTH (fm)	2010	2011	2012	TOTAL
CEL	293	143	141	577
101-120	119	65	77	261
61-80	23			23
81-100	151	78	64	293
PAC	119	96	114	329
101-120	88	87	101	276
81-100	31	9	13	53
WPS	15		31	46
101-120	15		21	36
81-100			10	10
TOTAL	**427**	**239**	**286**	**952**



	101-120	81-100	61-80
Average of SKJ	3.64	2.99	2.02
Average of YFT	1.42	1.24	0.58
Average of BET	0.171	0.135	0.025
Average of MSD	1.41	1.68	2.28

Figure 7. Average catch by species by net depth

Catch variation across gear depths is shown in Fig. 7, indicating decline on the average catch of SKJ, YFT and BET and increasing MSD with decreasing depth of net.

Attempt was made to calculate reduction by forecasting (linear regression). Reduction of nets from depths of 125-130 fathoms to the maximum of 115 fathoms requirement of FAO 236 may indicate 33% catch reduction of bigeye tuna (Table 4). Further reduction of bigeye is possible with further cuts in net depth but may as well reduce catch of other tunas and the overall catch.

Table 4 . BET catch reduction by linear regression (forecast)

NDEPTH_range (fm)	NDEPTH _Midpoint	Mean Catch (t/set)	% Reduction
121-140	130	0.256*	
101-120	110	0.171	33.29
81-100	90	0.135	21.05
61-80	70	0.025	81.48

*Predicted value by linear regression (forecast)

D. CATCH VARIATION BY TYPE OF GEAR

The distribution of fishing days by gear type in 3 fishing grounds is shown in Table 5. The association of catch rate and size composition with the type of gear was unclear (Fig. 8, 9). This may indicate that gear type (purse seine or ringnet) for the fleet is not an important factor on catch efficiency. The only distinction is the use of power block or mechanized hauling in purse seine, but the size of boats and nets are mostly similar.

Table 5. Distribution of fishing days by gear type and fishing ground.

YR.FGROUND / GTYPE	PS	RN	TOTAL
2010	**134**	**293**	**427**
CEL	46	247	293
PAC	73	46	119
WPS	15		15
2011	**74**	**165**	**239**
CEL	27	116	143
PAC	47	49	96
2012	**140**	**146**	**286**
CEL	22	119	141
PAC	94	20	114
WPS	24	7	31
TOTAL	**348**	**604**	**952**

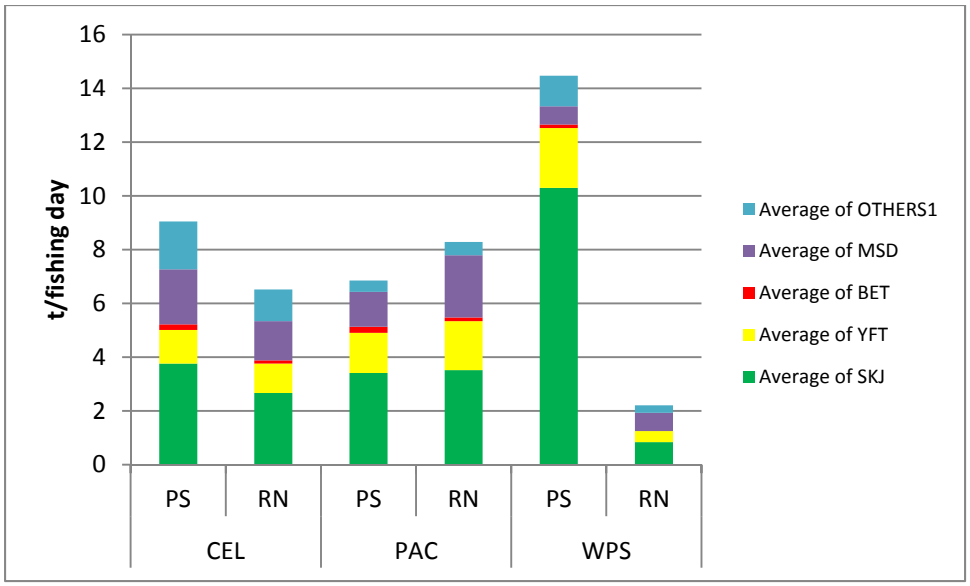


Figure 8. Average catch by gear type by fishing ground

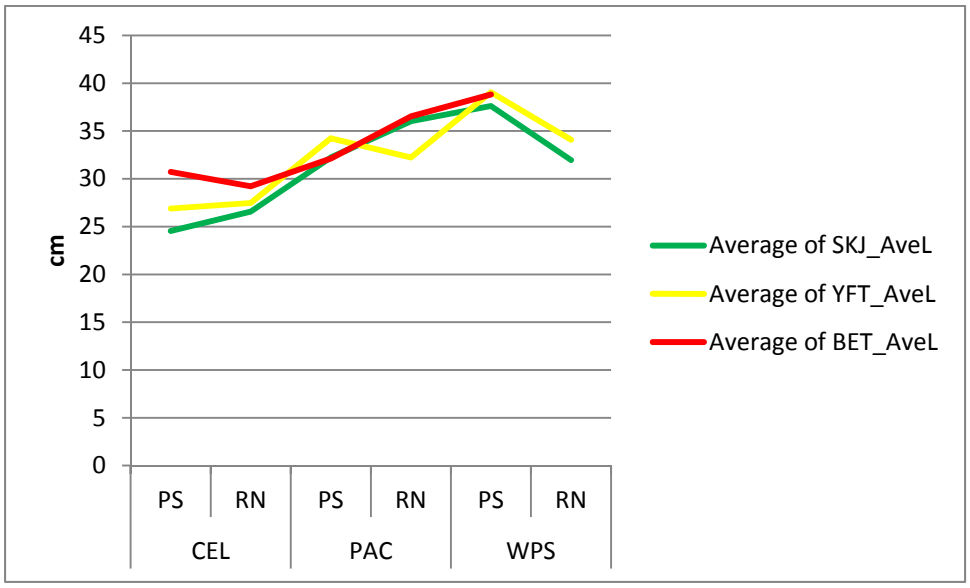


Figure 9. Average length of SKJ, YFT and BET by gear type

IV. SUMMARY AND CONCLUSION

The FADs closure and the resulting implementation of FAO 236 that required deployment of Fisheries Observers onboard provided the opportunity to collect information as foundation to the current measures and its succeeding improvement. Information on catch, species, size composition and their variations according to fishing ground, depth of nets and type of gear/operation can be drawn to devise control measures including closed areal/seasonal regulations well as gear and operational controls.

The study supports FAO 236 that reduction of net depths decreases catch of BET and such technical measure can be further to attain the objective of reducing catch of BET and YFT. It is however important to take into consideration that reduction of depth may not only decrease catch of BET and YFT but also SKJ that may impact on the economics of operations. Special attention should be made also on Celebes Sea where smallest size of offshore tunas is being caught by the fleet.

Continued decreasing catches have become more apparent and becoming obvious that current level of fishing is unsustainable. This situation of the fishery should be addressed only through rational management of fishing effort.

The implementation of FAO 236 and the Fisheries Observer Program have resulted in better working relations between BFAR and the industry that improved application and compliance to agreed measures and policies.

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