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Analysis of Purse Seine/Ring Net Fishing Operations in Philippine EEZ

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Analysis of Purse Seine/Ring Net Fishing Operations in Philippine EEZ

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Fisheries Observers are deployed on purse seine and ring net vessels operating within Philippine EEZ since 2010. This is in line with the implementation of WCPFC Conservation and Management Measures (CMM 2008-01) and the Philippine Fisheries Administrative Order 236 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 WCPFC CMM 2008-01" in order to check and validate the reduction of catch on bigeye and other tuna species by reducing the net depths of the inspected and accredited cooperating Philippine flagged vessels operating in the Philippine EEZ.

This study covers data collected by the Fisheries Observer from various Purse Seine and Ring Net Vessels in 2010 and 2011 and updates the report on preliminary assessment made in 2010. The paper contains the data analysis on catch rates, species, size composition and catch variations in relation to the fishing grounds, depth of nets and gear type. The results of which will serve as 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.

I. 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 and 2011. During this period, all purse seine vessels are required to carry an observer from the Regional Observer Program.

The Philippines being a non-PNA country implemented Fisheries Administrative Order 236entitled "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 applies 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 and 2011. It also requires 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 and 2011 respectively.

II. IMPLEMENTATION AND COVERAGE

The deployment of observers covered the 3-months FAD fishing closure period from July 1 to September 31 in 2010 and 2011 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 distinctive 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.

Covered were 431 sets made by 69 catchers in 2010 and 228 sets made by48 catcher vessels in 2011. Fishing grounds include the southern Pacific seaboard (PAC), Celebes/Mindanao Sea (CEL), Sulu Sea (SS) and West Philippine Sea (WPS). In 2011, there was no observation in the WPS apparently due to ongoing seismic surveys and increasing tension among claimant nations in disputed areas.

III. METHODS

1. Total catch estimation

Total catch estimate was derived basically from two methods. The main procedure was made by counting and estimating the capacity of brails as fish catch was transferred from the bunt of the net to wells/fish holds of awaiting carriers. Another method was also based on capacity and fullness of wells/fish holds.

Catch rate was estimated as kg/set. In general, only 1 set is made in one day.In the capacity and count of brail method, total catch was estimated using the following formula:

$$\text{Volume (V)} = \pi r^2 h$$

Brail capacity = Volume x 80%

Where;
$\pi = 3.14$
h= Brail height
r = Brail diameter (d)/ 2

The volume of fish is estimated approximately 80% of the volume of the brail or well to account open and water space. By using this method, a margin of +/- 2% error was observed (dela Cruz, 2010).

B. Catch Sampling

Random technique was carried out in sampling the catch. Samples were collected using tubs as the brail is emptied into the well or scooping the fish from the bunt during brailing or from fish holds/wells. Further sub-sampling procedures was conducted when necessary.

Samples were sorted according to group or species whenever possible and weighed to the nearest 0.1 kg. The lengths of tunas and mackerel scad were measured to nearest cm (fork length for tuna and large pelagic species; total length for mackerel scad).

The large size tunas, billfish and other species that were separated as brails were emptied into the wells. These were weighed and measured separately.

C. Species identification

Species identificationwas made by Observers based on available identification guides. Special attention was given on the distinctive characteristics of small size yellowfin and bigeye tunas.

D. Analysis

Sets or operations were classified according to fishing grounds (FGROUND). Fishing grounds included Mindanao Sea in the Celebes (CEL), Southern Portion of the Philippine Sea in the Pacific Seaboard (PAC), Central-South Sulu Sea (SS) and in the vicinity of the Kalayaan Group of Islands in the West Philippine Sea (WPS).

Depth of nets (NDEPTH) irrespective of gear type were grouped, with class intervals of 20 fathoms. Information on the depth of nets was taken from inspection reports conducted by the BFAR-Inspectors and verifications made while Observers were onboard.

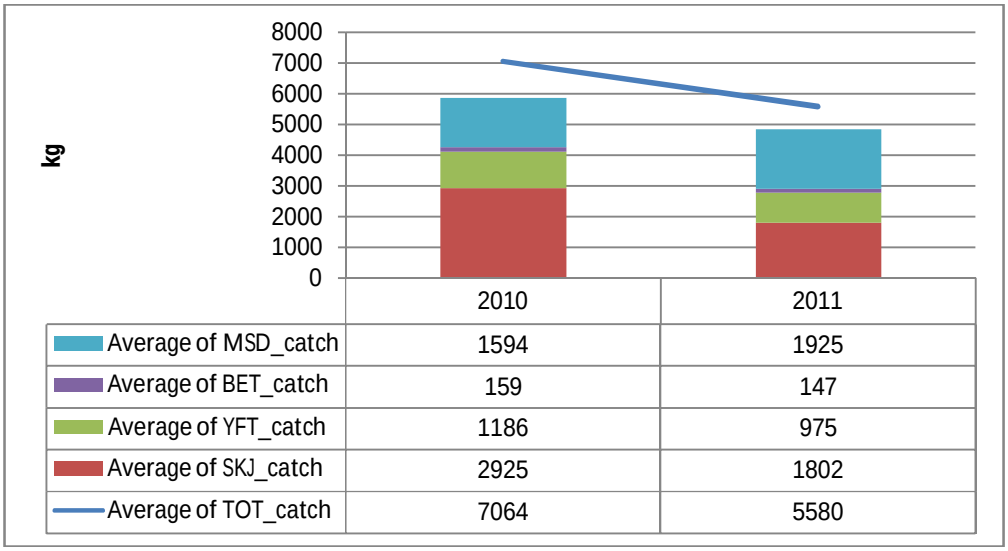
Comparison on average catch was madeby fishing ground (FGROUND), depth of net (NDEPTH) and type of gear (GTYPE). Average catch is presented in kg/set which included total catch (TOTAL), skipjack (sSKJ), yellowfin (YFT), bigeye (BET) and mackerel scad (MSD). Comparison on the average length (FL) of SKJ, YFT and BET was also made.

IV. RESULTS

A. Catch, species and size composition

Total catch in 2010 was 3,044 mt from 431 sets made by 69 catchers and in 2011 1,282 mt from 228 sets by 48 catcher vessels.

There was a general catch decline in the average catch per vessel, with overall average 7.1 tons/set 2010 and 5.6 tons/set in 2011. Catch rate reduction was observed specially in oceanic tunas (SKJ, YFT and BET) but there was increase in MSD (Fig 1).



	2010	2011
Average of MSD_catch	1594	1925
Average of BET_catch	159	147
Average of YFT_catch	1186	975
Average of SKJ_catch	2925	1802
Average of TOT_catch	7064	5580

Figure 1. Average catch (kg/set) of purse seine and ringnets, July-Sep 2010 & 2011

Tuna catch estimates in Philippine EEZalso indicated a decline in 2011, with landings frompurse seine and ringnet amounting to 125,756 mt 2010 and 79,107mt in 2011, or a decrease of about 37% (Barut and Garavilles, 2010/2011).

In terms of relative composition, there was also marked reduction of SKJ in 2011 although with significant increase in MSD. The relative composition of BET was consistent at just about 2% (Fig 2 and 3).

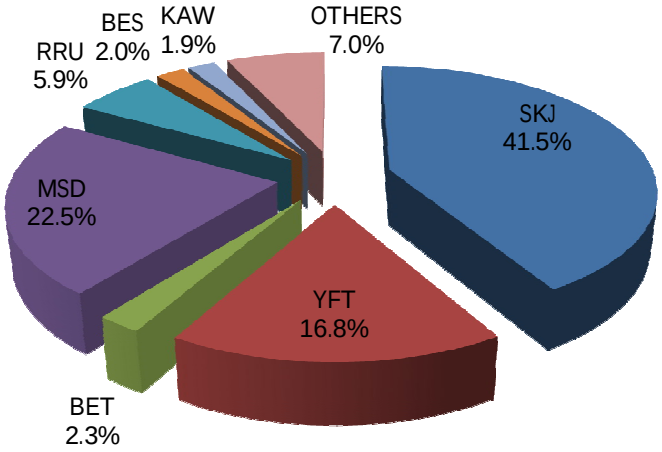


Figure 2. Catch composition in 2010

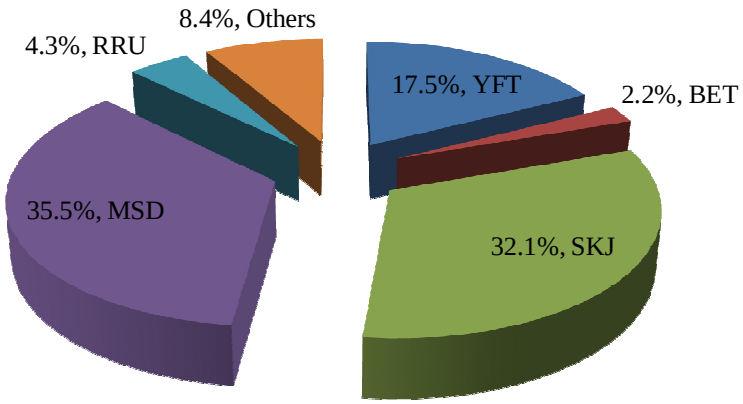


Figure 3. Catch composition in 2011

The length frequency distribution of skipjack, yellowfin, bigeye and mackerel scad are shown in Figure 4. For skipjack, size ranged from 10 to 87 cm with mean length of 27 cm. The equivalent size ranges and mean lengths for yellowfin, bigeye and mackerel scad were 11-159 cm and 29 cm, 15-78 cm and 28 cm, and 9-40 cm and 23 cm respectively. This emphasizes that bulk of tunas caught by the fleet were essentially small and of comparable sizes.

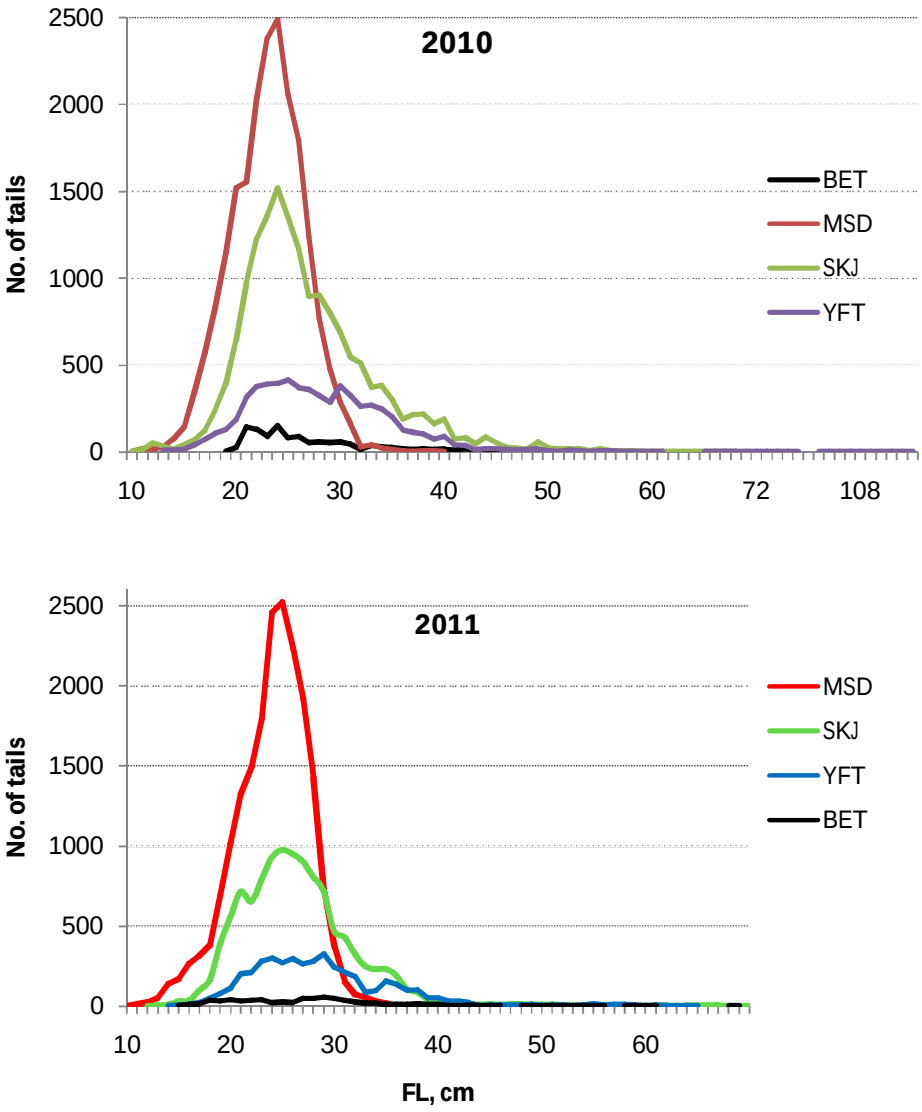


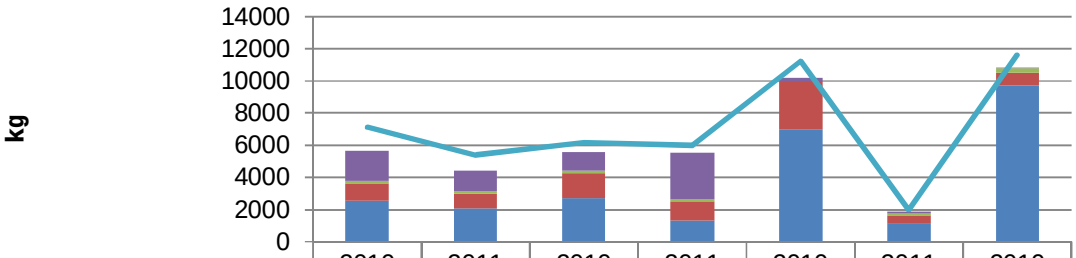
Figure 4. Length frequency distribution of major species

B. CATCH VARIATION BY FISHING GROUND (FGROUND)

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 (SS) and the West Philippine Sea (WPS) particularly in the Kalayaan Group of Islands. The CEL and PAC were the most frequented fishing grounds, obviously because of their proximity/accessibility from the fleet's homeport in General Santos. 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 1. Distribution of sets by fishing ground

FGROUND	CEL	PAC	WPS	SS	Total
No of Sets/obs (2010)	293	119	15	4	431
No of Sets/obs (2011)	143	96		4	243



	2010	2011	2010	2011	2010	2011	2010
	CEL		PAC		SS		WPS
Average of MSD_catch	1886	1335	1126	2880	250	117	23
Average of BET_catch	148	136	177	163	0	139	291
Average of YFT_catch	1040	886	1533	1127	2978	477	796
Average of SKJ_catch	2600	2114	2729	1365	6999	1157	9732
Average of TOT_catch	7119	5405	6212	5990	11250	2000	11627

Figure 5. Average catch (kg/set) in 2010 and 2011 by fishing ground

Among the fishing ground, the decline in catch rates was more apparent in the Celebes Sea with reduction on all of the major species caught. The decrease was less significant in the Pacific where catch of SKJ and YFT declined, howeverthere was an increase inthe average catch of MSD. There was also a marked decrease in Sulu Sea based on the very few observations made in the area (Fig 5).

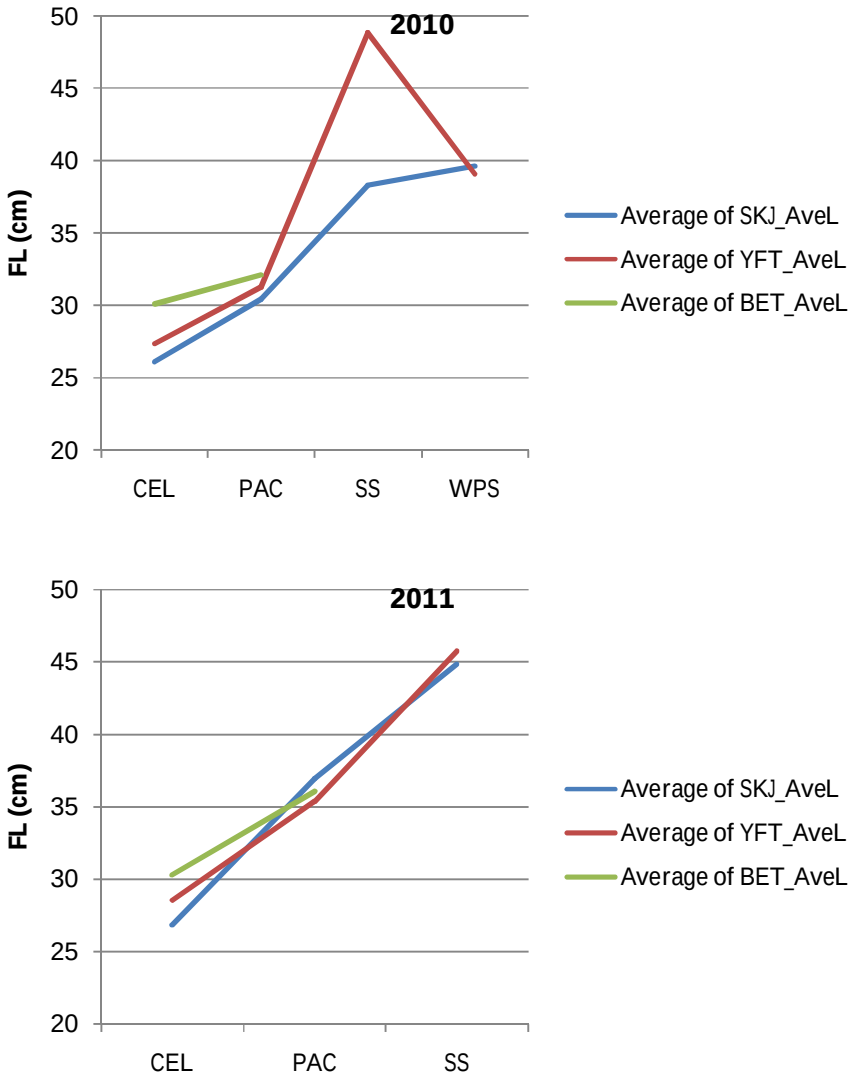


Figure 6. Average length (cm) of SKJ, YFT and BET by fishing ground.

The variation on the average size of SKJ, YFT and BET was more distinct across fishing ground, with significantly smaller SKJ, YFT and BET in the Celebes Sea compared to the Pacific or other fishing grounds (Fig 6).

C. CATCH VARIATION BY DEPTH OF NET (NDEPTH)

Analysis on the variations 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 4.

Table 2. Number of observation by year and fishing ground

FGround/Depth of net (fm)	2010	2011	Grand Total
CEL	**293**	**143**	**436**
101-120	119	65	184
81-100	151	78	229
61-80	23		23
PAC	**119**	**96**	**215**
101-120	88	92	180
81-100	31	4	35
Grand Total	**412**	**239**	**651**

Table 3. Number of observations by depth of net

Net depth	2010	2011	Total
101-120	207	152	359
81-100	182	87	269
61-80	23		23
Grand Total	**412**	**239**	**651**

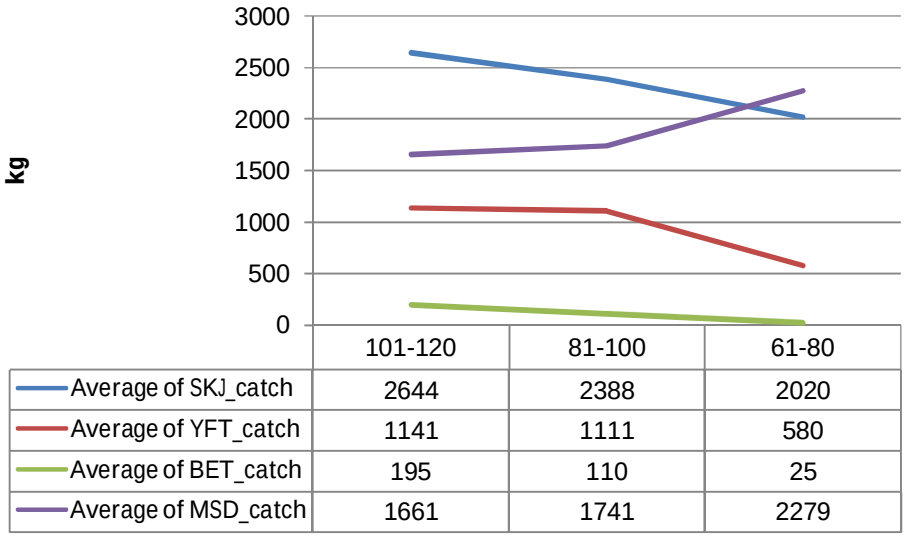


Figure 7. Mean catch (kg/set) by species by depth of net

Catch variations acrossgear depths are shown in Fig.7. There wasa noticeable decline on the average catch of tuna species and increasing MSD with declining depth of net.

Attempt was made to calculate reduction by forecasting (linear regression) based on pooled data from Celebes and Pacific in 2010 and 2011. Reduction of nets from depths of 125-130 fathoms to the maximum of 115 fathoms requirement of FAO 236 may indicate 30% catch reduction of bigeye tuna (Table 5).

Table 4. Mean catch of BET by depth of net (pooled Celebes and Pacific)

NDEPTH_range (fm)	NDEPTH _Midpoint	Mean Catch (t/set)	% Reduction
121-140	130	**0.2753***	
101-120	110	0.1914	**30.49**
81-100	90	0.1109	**40.06**
61-80	70	0.0252	**77.28**

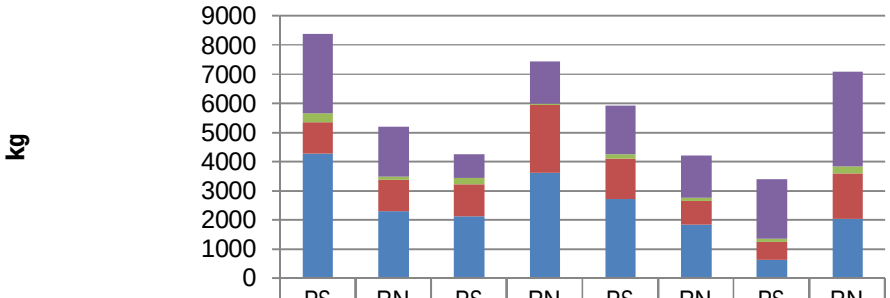
*Predicted value by linear regression

D. CATCH VARIATION BY TYPE OF GEAR

Table 5. Number of observations by gear type and fishing ground

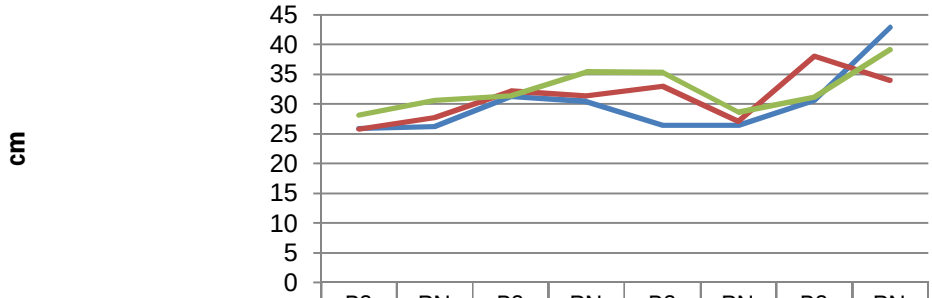
Year/FGround	PS	RN	Grand Total
2010	**119**	**293**	**412**
CEL	46	247	293
PAC	73	46	119
2011	**74**	**165**	**239**
CEL	27	116	143
PAC	47	49	96
Grand Total	**193**	**458**	**651**

The association of catch and type of gear was indistinct and with contrasting results (Fig. 11). This may indicate that gear type (purse seine or ringnet) is not as very 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.



Average of MSD_catch	2710	1705	826	1467	1674	1435	2044	3265
Average of BET_catch	300	117	232	50	152	115	102	235
Average of YFT_catch	1071	1071	1088	2313	1401	810	623	1565
Average of SKJ_catch	4293	2293	2109	3628	2701	1837	629	2033

Figure 8. Average catch (kg/set) by gear type, Celebes Sea& Pacific



Average of SKJ_AveL	26	26	31	30	26	26	31	43
Average of YFT_AveL	26	28	32	31	33	27	38	34
Average of BET_AveL	28	31	31	35	35	29	31	39

Figure 9. Average length (cm) by species and gear type

V. CONCLUSIONS

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/operaton can be drawn to devise control measures including closed areal/seasonal regulations as 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 undertaken 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 done also on Celebes Sea where smallest size of offshore tunas are being caught by the fleets.

Continued decreasing catches have become more apparent, hence the need to continuously monitor and validate if the current levelof fishing activities will still be sustainable. This situation of the fishery should be addressed only through rational management of fishing efforts.

The implementation of FAO 236 and the Fisheries Observer Program have resulted in better working relations between BFAR and the Fishing Industry to assess and update the implementations of the fisheries regulations and compliance to agreed conservation and management measures and policies.

VI. RECOMMENDATION

The extension of FAO 236 thru the implementation of FAO 236-1 must be continuously undertaken to establish more comprehensive data/information on catch, species and size compositions as well as the fishing gear performance which shall serve as the basis in formulating more applicable Fisheries Adminsitrative Orders to properly manage the tuna resources and tuna production in sustainable manner.

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