

# Relative Abundance of Finfishes Caught by Purse Seine and Ring Net in Moro Gulf, Southern Philippines

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**Abstract** – This study was conducted to determine the relative abundance of finfishes caught by purse seine and ring net operated in the Moro gulf landed in the Fish Complex in General Santos City, South Cotabato Philippines from January to December 2014. Results of the study showed that there were 14 species of finfishes belonging to 5 families caught by the purse seine and ring net in the Moro Gulf. Family Scombridae dominated the number of species with an aggregate percentage composition of 42.86%, followed by Carangidae (35.71%) while Balistidae, Coryphaenidae and Apogonidae had percentage share of 1% each. The relative abundance of species caught by purse seine and ring net was almost identical. *Katsuwonus pelamis* dominated the catch with a relative abundance of 63.53 % and 54.01% for the purse seine and ring net, respectively. With regard to the catch per unit effort, purse seine has higher CPUE with 73,503.5 kgs days trip<sup>-1</sup> than ring net with 51,278.4 kgs days trip<sup>-1</sup>.

**Keywords** – Relative abundance, Finfish, Purse seine, Ring net

## INTRODUCTION

Purse seine and ring net vessels are efficient gears used in catching schooling pelagic fishes, those that inhabit at the upper sea layer. The efficiency of purse seine and ring net gear used in catching tunas accounted to more than 74% of the volume of catch landed in 2011, 106,842 metric tons (Barut and Garaviles, 2012). It can be recalled that this great contribution of the two efficient gear to the volume of fish production triggered the establishment of canning factories and lately the development of the tuna fishing industry. Based on its contribution to production, tuna catches in 2011 were sourced from purse seine at 48% and from ring net 26% (Barut and Garaviles, 2012).

Earlier tuna studies in Mindanao waters reported that more than 90% of yellowfin and skipjack tuna landed by purse seine, bagnet and ringnet are less than twelve (12) months (Aprieto, 1995).

The effectiveness and efficiency of FADs (Fish Aggregating Devices) or *payaos* has become an issue, that is why continuous data collection to monitor the species composition and trend of catches by purse seine and ringnet using FADs is strongly encouraged to serve as basis for fisheries management.

Studies in one of the important catch of purse seine and ringnet, the skipjack (*Katsuwonus pelamis*) one of the six (6) abundant species of tuna out of the 21 species recorded in the Philippines, provide the status of its resources and other biological information. A study made by Tandog- Edralin et al. (1987) disclosed that the skipjack resource is overfished based on the exploitation rate of 0.7 and 0.72 of ringnet catch in Opol, where purse seine and ringnet are used. This exceeds the right exploitation level of 0.5 to what management measures can be formulated and implemented depends on the status of the resources. For the existing management measures especially the general ones, status of implementation is likewise needed. This study was undertaken to look into the present status of finfishes caught by purse seine and ring nets in Moro Gulf.

## MATERIALS AND METHODS

### Research Method and Design

This study employed a descriptive-survey method of research. Monthly catch landings of purse seine and ring net from Moro Gulf and landed in General Santos were monitored and recorded. The species composition and volume of catches including

the catch per unit effort expressed in kilograms in days per trip were taken and estimated.

### Location of the Study

This study was conducted in General Santos City Fishport Complex in Markets 2 and 3. Majority of the purse seine and ringnet catches are landed or traded in General Santos City Fishport Complex. General Santos City is the tuna capital of the Philippines. Tuna catches landed in this area are coming from Moro Gulf, Sulu Sea and some catches coming from the waters of Palawan, Samar and Mindoro. Only those landings from Moro gulf were considered.

### Data Instrument

To facilitate the data gathering, a modified catch landing form was used. The form includes the type of gear, date and time of landing, species caught, and weight (in kg) of each species caught.

### Data Gathering

Sampling was done at the port, schedule was undertaken every after 2 days regardless of Saturdays, Sundays and holidays with 10-11 days surveys each month per landing site.

At known landing time, observation regarding how many boats landed and the enumeration of their total catch was included. At least one (1) to three (3) boats PS/RN vessel were sampled every sampling day for a known weight for raising purposes. The modified form was utilized to facilitate the data collection. From the catch of the boat determined to be sampled, a small basin of sample was collected. The samples were sorted, weighed and recorded.

Monthly mean volume of catch was estimated using the following formula:

$$\text{Mean Volume (kg)} = \frac{\text{Total volume of catch (mt)}}{\text{No. of species}}$$

Likewise, the monthly mean volume of catch by species was calculated using the following formula:

$$\text{Mean Volume (kg)} = \frac{\text{Total volume of catch (mt) of species}}{\text{No. of months}}$$

In terms of relative abundance, the following formula was utilized:

$$\text{RA (\%)} = \frac{\text{Volume of catch (mt) of species} \times 100}{\text{Total No. of catch}}$$

The catch per unit effort was estimated based on the catch landings and effort. The following formula was used in the calculation of CPUE;

$$\text{CPUE} = \frac{\text{Volume of catch (Catch landings)}}{\text{No. of days per trip}}$$

### Treatment and Analysis of Data

Data on the catch and CPUE of purse seine and ring net were collated and analyzed using independent student t-test.

Data gathered from this study were summarized in graphs and tables. Histogram was used as graphical representation of catches by species gathered per month for purse seine and ringnet.

## RESULTS AND DISCUSSION

### Species Composition

There were 14 species of finfishes belonging to 5 families caught by the purse seine and ring net in the Moro Gulf in the 12-month sampling. Family Scombridae dominated the number of species with an aggregate percentage composition of 42.86%, followed by Carangidae (35.71%) while Balistidae, Coryphaenidae and Apogonidae had percentage share of 1% each. In terms of percentage composition by the family using purse seine, Scombridae had 46.15% followed by Carangidae (30.77%) and the rest (Balistidae, Coryphaenidae and Apogonidae) had 7.69% each. The percentage composition was almost similar to the ring net. Scombridae also had 46.15%, followed by Carangidae (38.46%) and both Balistidae and Coryphaenidae had 7.69% share. Apogonidae was absent in the catch of the ring net.

The identified species caught by purse seine and ring net were *Auxis rochei*, *Auxis thazard*, *Euthynnus affinis*, *Katsuwonus pelamis*, *Thunnus albacares*, *Thunnus obesus*, *Caranx sexfasciatus*, *Decapterus macarellus*, *Elagatis bipinnulata*, *Selar*

*crumenophthalmus*, *Seriola lalandi*, *Canthidermis maculata*, *Coryphaena hippurus* and *Astrapogon stellatus*.

The number of species caught by purse seine and ring net was identical with 13 each. In terms of the species composition of both gears, it was almost similar except for 1 species (*Astrapogon stellatus*) that was present in the catch of the purse seine and absent in the catch of ring net. This was also true with ring net with 1 species (*Seriola lalandi*) caught but missing in the catch of purse seine.

**Purse seine**

The species composition caught by purse seine by month is presented in Table 1. A total of 13 species namely; *Auxis rochei*, *Auxis thazard*, *Euthynnus affinis*, *Katsuwonus pelamis*, *Thunnus albacares*, *Thunnus obesus*, *Caranx sexfasciatus*, *Decapterus macarellus*, *Elagatis bipinnulata*, *Selar crumenophthalmus*, *Canthidermis maculata*, *Coryphaena hippurus* and *Astrapogon stellatus* were caught by purse seine in the 12-month sampling in the Moro Gulf. The Scombridae were almost apparent in

the whole months except for one species, *E. affinis*, which was absent in the catch during the months of March and May. For Carangidae, only the species *D. macarellus* was present in the catch in the whole months. *E. bipinnulata* was almost apparent in the whole months only disappeared in the catch during March and April. *S. crumenophthalmus* missed only two months (March and May) coinciding with the absence of *E. affinis*. *C. maculata* (Balistidae) was visible in the catch only in the month of January. Likewise, *A. stellatus*, the species that was missing in the catch of ring net, appeared only in the catch during the month of July. *C. hippurus* was absent during the first quarter (January, February and March) and emerged in the catch from April until December.

The number of species caught by purse seine in the Moro gulf fluctuated to 7 in March to 12 in July. January has 11 followed by February, June, August, September, October, November and December each with 10 number of species. The summer months, April and May have 9 and 8, respectively.

**Table 1**  
**Species Composition of Finfishes Caught by Purse Seine in the Moro Gulf**

Family	Species	Month											
		Ja	Fe	Ma	Ap	Ma	Jun	Ju	Au	Se	Oc	No	De
Scombridae	<i>Auxis rochei</i>												
Scombridae	<i>Auxis thazard</i>												
Scombridae	<i>Euthynnus affinis</i>												
Scombridae	<i>Katsuwonus pelamis</i>												
Scombridae	<i>Thunnus albacares</i>												
Scombridae	<i>Thunnus obesus</i>												
Carangidae	<i>Caranx sexfasciatus</i>												
Carangidae	<i>Decapterus macarellus</i>												
Carangidae	<i>Elagatis bipinnulata</i>												
Carangidae	<i>Selar crumenophthalmus</i>												
Channidae	<i>Canthidermis maculata</i>												
Coryphaenidae	<i>Coryphaena hippurus</i>												
Apogonidae	<i>Astrapogon stellatus</i>												
<b>Total</b>	<b>13</b>	11	10	7	9	8	10	12	10	10	10	10	10

 Present in the catch       Absent in the catch

### Ring Net

With regard to the species composition caught by ring net by month (Table 2), the result was almost identical with the purse seine. There were 13 species captured by ring net, namely; *Auxis rochei*, *Auxis thazard*, *Euthynnus affinis*, *Katsuwonus pelamis*, *Thunnus albacares*, *Thunnus obesus*, *Caranx sexfasciatus*, *Decapterus macarellus*,

*Elagatis bipinnulata*, *Selar crumenophthalmus*, *Canthidermis maculata*, *Coryphaena hippurus* and *Seriola lalandi*. Similar with the purse seine, the Scombridae were almost apparent in the whole months except for *E. affinis*, which was missing in the catch in May and *T. obesus* which was absent in January.

**Table 2**  
**Species composition of finfishes caught by Ring net in the Moro Gulf**

Family	Species	Month											
		Ja	Fe	Ma	Ap	Ma	Jun	Ju	Au	Se	Oc	No	De
Scombridae	<i>Auxis rochei</i>	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present
Scombridae	<i>Auxis thazard</i>	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present
Scombridae	<i>Euthynnus affinis</i>	Present	Present	Present	Absent	Present	Present	Present	Present	Present	Present	Present	Present
Scombridae	<i>Katsuwonus pelamis</i>	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present
Scombridae	<i>Thunnus albacares</i>	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present
Scombridae	<i>Thunnus obesus</i>	Absent	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present
Carangidae	<i>Caranx sexfasciatus</i>	Present	Absent	Absent	Absent	Absent	Absent	Present	Present	Present	Present	Present	Present
Carangidae	<i>Decapterus macarellus</i>	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present
Carangidae	<i>Elagatis bipinnulata</i>	Present	Present	Present	Absent	Present	Present	Present	Present	Present	Present	Present	Present
Carangidae	<i>Selar crumenophthalmus</i>	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present
Carangidae	<i>Seriola lalandi</i>	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present
Channidae	<i>Canthidermis maculata</i>	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present
Coryphaenidae	<i>Coryphaena hippurus</i>	Present	Absent	Absent	Absent	Present	Present	Present	Present	Present	Present	Present	Present
<b>Total</b>	<b>13</b>	9	9	9	8	8	8	11	12	12	11	12	12

Present in the catch      Absent in the catch

Likewise, *D. macarellus* was the only species of Carangidae which appeared in the catch in whole months. This was similar to the purse seine of which *D. macarellus* was visible the whole year. *S. crumenophthalmus* appeared the whole months except only in May. *E. bipinnulata* missed the months of January, April and June but appeared in the other months (February, March, May, and July to December). *C. sexfasciatus* appeared in January and disappeared from February to June and emerged from July to November. As compared to purse seine, *C. maculata* (Balistidae) appeared thrice in a year during the months of August, September and December. *C. hippurus* was present in January and disappeared from February to April and appeared in May and absent in June then emerged from July to December. *S. lalandi*, the species missing in the purse seine

catch, appeared only in the catch of ring net during the last 2 months (November and December) of the year.

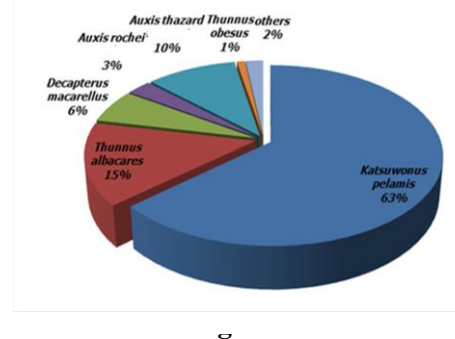
The number of species caught by ring net in the Moro gulf varied from 8 to 12. The half-year (July to December) has a higher number of species caught compared to the preceding months (January-June). The months of August, September, November and December had 12 species each while July and October had 11 apiece. The first quarter (January-March) has 9 species while the succeeding quarter (April-June) has 8.

Purse seine and ring nets are designed and operated primarily to capture oceanic and neritic tuna species which are highly valued species. Lewis (2004) listed the oceanic tuna species namely; skipjack (*K. pelamis*), yellowfin tuna (*T. albacares*),

bigeye tuna (*T. obesus*) while the coastal or neritic tunas are the frigate tuna (*A. thazard*), bullet tuna (*A. rochei*), eastern little tuna (*E. affinis*). The said tuna species are the common targets of purse seine and ring net in the Moro Gulf (Barut and Garvilles, 2009). In this study, these tuna species composed the bulk of the catch of purse seine and ring net. The capture of other species namely; *C. sexfasciatus*, *D. macarellus*, *E. bipinnulata*, *S. crumenophthalmus*, *C. maculata*, *C. hippurus*, *S. lalandi* and *A. stellatus* are categorized as incidental catch or bycatch. Bailey et al. (1996) listed mackerel scad (*D. macarellus*), rainbow runner (*E. bipinnulata*), mahimahi (*C. hippurus*), ocean triggerfish (*C. maculatus*), amberjack (*S. Rivoli*), drummer (*Kypho suscinerascens*) as bycatch of purse seine operating in the Western Pacific ocean. Recently, Hall and Roman (2013) investigated the bycatch of purse seine in the tropical oceans. They have accounted for about 1 to 5 percent of the catch are discarded. Several species including *C. hippurus* and *E. bipinnulata* composed the major bony pelagics as bycatch. *C. hippurus* had the lion share of 70% while *E. bipinnulata* had 7% of the total bony pelagics by catch. The inclusion of *C. maculata* in the catch may be related to their biology occupying diverse habitats such as coral reefs, rocky areas, seaweed beds and under floating objects in the open ocean regions (Fedoryako, 1981). The presence of fish aggregating devices (FADs) in the Moro gulf which are accessory devices to attract and aggregate fishes may have triggered the *C. maculata* to come nearer or stay within the FAD. Sobhana et al. (2013) observed unusual landings of *C. maculata* in the catch of trawl in Cochin Fisheries Harbor in India. Normally, these species were not part of the species caught by the gear.

### Relative Abundance

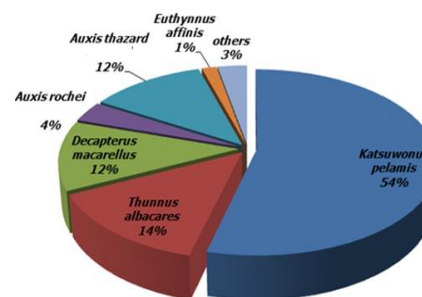
The relative abundance of species caught by purse seine and ring net was almost identical. For purse seine (Figure 1), *K. pelamis* dominated the catch with relative abundance of 63.53% followed by, *T. albacares* (14.81%), *A. thazard* (9.98%), *D. macarellus* (6.1%), *A. rochei* (2.73%), *T. obesus* (0.9%), *E. affinis* (0.77%), *E. bipinnulata* (0.67%), *S. crumenophthalmus* (0.27%), *C. hippurus* (0.21%), *C. sexfasciatus* (0.02%) and the 2 species *C. maculata* and *A. Stellatus*, have negligible percentage share.



**Figure 1**

Relative Abundance (%) of Species Captured by Purse Seine in the Moro Gulf

With regard to the relative abundance of species caught by ring net in the Moro Gulf (Figure 2), *K. pelamis* attained the highest relative abundance of 54.01%, followed by *T. albacares* (13.84%), *D. macarellus* (12.1%), *A. thazard* (11.86%), *A. rochei* (3.62%), *E. affinis* (1.52%), *S. crumenophthalmus* (1.41%), *E. bipinnulata* (0.66%), *T. obesus* (0.53%), *C. hippurus* (0.35%), *C. sexfasciatus* (0.03%), *C. maculata* (0.03%) and *S. lalandi* (0.02%).



**Figure 2**

Relative Abundance (%) of Species Captured by Ring Net in the Moro Gulf

The monthly relative abundance of the 5 dominant species caught by purse seine in the Moro Gulf is presented in Figure 3. *K. pelamis* dominated the catch with relative abundance above 50% in all months. The highest relative abundance was obtained in June with 82.30% and the lowest was in April with 50.13%. *T. albacares* showed a monthly trend with

the highest relative abundance in September (19.78%) and downed to May with 6.57%. *A. thazard* displayed monthly variation with highest relative abundance of 26.69% in April and downed to 3.51% in January. *D. macarellus* also depicted a monthly trend with the highest relative abundance of 9.91% in July and lowest of 1.09 in March. *A. rochei* showed monthly fluctuation with the highest relative abundance obtained in December with 11.41% and its lowest in February with only 0.18%.

On the other hand, the monthly variation of the 5 dominant species caught by the ring net in the Moro Gulf showed a similar trend (Figure 4). Consistently, *K. pelamis* dominated the catch with higher relative abundance over the other species. As compared to the purse seine, the relative abundance of *K. pelamis* caught by ring net was lower having values below 50%. The highest relative abundance was achieved in April with 80.17% and the lowest was in January with 27.00%.

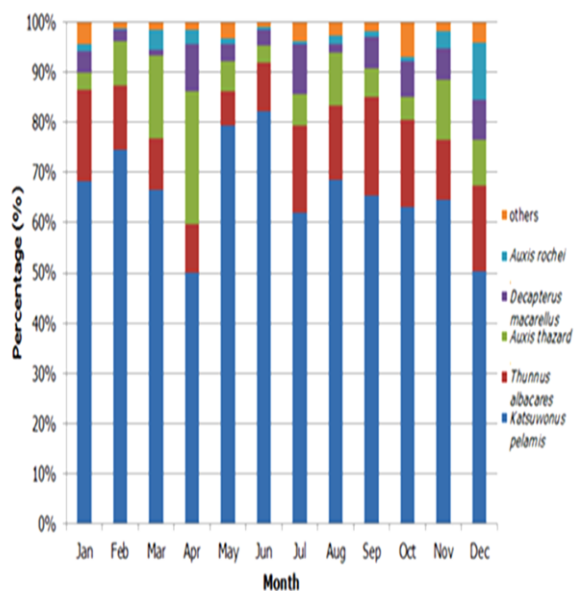


Figure 4

Monthly Relative Abundance of Species Caught by Purse Seine in the Moro Gulf

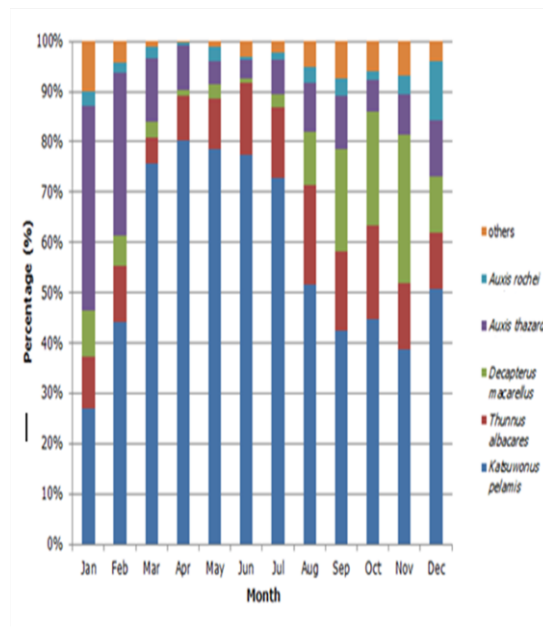


Figure 5. Monthly Relative Abundance of Species Caught by Ring Net in the Moro Gulf

### Catch Per Unit Effort (CPUE)

The catch per unit effort (CPUE) is one indicator of gear efficiency. The higher the CPUE, the higher the catchability coefficient of the gear used.

With regard to the monthly CPUE of purse seine, the highest aggregated CPUE was obtained in April with 11154 kgs days trip<sup>-1</sup>, followed by March (8257.3 kgs days trip<sup>-1</sup>), July (7478.1 kgs days trip<sup>-1</sup>), June (6994.6 kgs days trip<sup>-1</sup>), May (6730.2 kgs days trip<sup>-1</sup>), January (6407 kgs days trip<sup>-1</sup>), September (5989.7 kgs days trip<sup>-1</sup>), August (5807.3 kgs days trip<sup>-1</sup>), November (5080.4 kgs days trip<sup>-1</sup>), October (4097.5 kgs days trip<sup>-1</sup>), February (4044.5 kgs days trip<sup>-1</sup>) and December (1462.9 kgs days trip<sup>-1</sup>).

With respect to the CPUE by species, *K. pelamis* has the highest CPUE by species and by month, followed by *T. albacares*, *A. thazard*, *D. macarellus* and *A. rochei*. *K. pelamis* obtained the highest mean CPUE of 4059.1 kgs days trip<sup>-1</sup>, followed by *T. albacares* (799.7 kgs days trip<sup>-1</sup>), *A. thazard* (662.0 kgs days trip<sup>-1</sup>), *D. macarellus* (325.3 kgs days trip<sup>-1</sup>), *A. rochei* (116.8 kgs days trip<sup>-1</sup>), *T. obesus* (59.9 kgs days trip<sup>-1</sup>) while the rest had an aggregated mean CPUE of 102.4 kgs days trip<sup>-1</sup>. *K.*

*pelamis* CPUE ranged from 2581.7 kgs days trip<sup>-1</sup> in October to 5756.9 kgs days trip<sup>-1</sup> in June while *T. albacares* varied from 524.7 kgs days trip<sup>-1</sup> in February to 1291.7 kgs days trip<sup>-1</sup> in July. *A. thazard* CPUE ranged from 224.7 kgs days trip<sup>-1</sup> in January to 2975.6 kgs days trip<sup>-1</sup> in April and its relative *A. rochei* from 7.3 kgs days trip<sup>-1</sup> in February to 334.5 kgs days trip<sup>-1</sup> in March. The carangid, *D. macarellus* CPUE climbed from 90.0 kgs days trip<sup>-1</sup> in March to 1042 kgs days trip<sup>-1</sup> in the succeeding month. The scombrid, *T. obesus* increased from 6.7 kgs days trip<sup>-1</sup> in November to 163.8 kgs days trip<sup>-1</sup> in May.

On the other hand, monthly CPUE of ring net also showed variation. The highest aggregated CPUE was obtained in May with 8348.2 kgs days trip<sup>-1</sup>, followed by June (5826.4 kgs days trip<sup>-1</sup>), February (5810 kgs days trip<sup>-1</sup>), April (5453.1 kgs days trip<sup>-1</sup>), July (3999.7 kgs days trip<sup>-1</sup>), December (3792.3 kgs days trip<sup>-1</sup>), October (3343.5 kgs days trip<sup>-1</sup>), September (3131.9 kgs days trip<sup>-1</sup>), January (3054.9 kgs days trip<sup>-1</sup>), March (2965.9 days trip<sup>-1</sup>), November (2910.8 kgs days trip<sup>-1</sup>) and August (2641.7 kgs days trip<sup>-1</sup>).

Regarding the CPUE by species, again *K. pelamis* obtained the highest CPUE by species and by month. *K. pelamis* obtained the highest mean CPUE of 2602.3 kgs days trip<sup>-1</sup>, followed by *A. thazard* (526.1 kgs days trip<sup>-1</sup>), *T. albacares* (524.2 kgs days trip<sup>-1</sup>), *D. macarellus* (345.4 kgs days trip<sup>-1</sup>), *A. rochei* (119.9 kgs days trip<sup>-1</sup>), *T. obesus* (19.6 kgs days trip<sup>-1</sup>) and the other species had an aggregate mean CPUE of 135.6 kgs days trip<sup>-1</sup>. *K. pelamis* CPUE varied from 825 kgs days trip<sup>-1</sup> in January to 6558.8 kgs days trip<sup>-1</sup> in May while *T. albacares* ranged from 158.5 kgs days trip<sup>-1</sup> in March to 836.2 kgs days trip<sup>-1</sup> in May. *A. thazard* CPUE increased from 213.3 kgs days trip<sup>-1</sup> in October to 1889.8 kgs days trip<sup>-1</sup> in February while *A. rochei* ranged from 29.8 kgs days trip<sup>-1</sup> in June to 258.7 kgs days trip<sup>-1</sup> in May. *D. macarellus* CPUE varied from 53.1 kgs days trip<sup>-1</sup> in April to 856.8 kgs days trip<sup>-1</sup> in November. The CPUE of the scombrid, *T. obesus* climbed from 0 kgs days trip<sup>-1</sup> in January to 49.68 kgs days trip<sup>-1</sup> in May.

### Comparative Catch and CPUE of Purse Seine and Ring Net

The summary of the total landings and CPUE of purse seine and ring net from January to December 2014 in the Moro Gulf is presented in Table 3.

Based on the table, the total landings of ring net was higher with 18014.71 mt than purse seine's 12143.08 mt. However, independent t-test using SPSS v.17 revealed no significant difference ( $P>0.05$ ) on the total catch landings of the two fishing gears (Appendix Table 3). With regard to the catch per unit effort, purse has higher CPUE with 73503.5 kgs days trip<sup>-1</sup> than ring net with 51278.4 kgs days trip<sup>-1</sup>. Independent t-test using SPSS v.17 disclosed significant difference ( $P<0.05$ ) on the total catch landings of the two fishing gears.

A report by WCPFC (2007) on the catch of oceanic tuna species in the Western and Central Pacific oceans bared that the tuna landings differed by gear type. Purse seine had higher catch landings of tuna than ring net from 2003 to 2007. Purse seine generated catch landings of tuna from 127,999 mt in 2003 to 170,904 mt in 2007 while ring net harvested 17,792 mt in 2003 to 23,994 mt in 2007.

Barut and Garvilles (2009) reported monthly CPUE of skipjack tuna and yellowfin tuna for ring net from 1,000 to 7,000 kg/trip day and 100 to 3,000 kg/trip day, respectively. The CPUE of skipjack tuna and yellowfin tuna using purse seine ranged from 2,500 to 12,500 kg/trip day and 500 to 3,500 kg/trip day.

Guanco et al. (2009) observed a decreasing catch and CPUE of purse seine and ring net in the Visayan sea from 1998-2002. Ring net harvested 4810 mt (CPUE=909.36 kg/day) in 1998 and declined to 2200 mt (CPUE=484.58 kg/day) while the purse seine hauled 200,690 mt (CPUE=13,127.02 kg/day) in 1998 and dropped to 71,500 mt (CPUE=8,933.24 kg/day) in 2002.

The data showed that purse seine has upper hand over ring net in terms of catch and CPUE. Purse seine has been described as the most efficient gear in the catch of pelagic fishes.

**Table 3**  
**Total Landings (mt) and CPUE (kgs days trip<sup>-1</sup>) of Purse seine and Ring net in the Moro Gulf**

Month	Catch Landings (mt)		CPUE ( kgs days trip <sup>-1</sup> )		
	Purse Seine	Ring Net	Purse Seine	Ring Net	
1	<b>January</b>	387.5	784.34	6407	3054.9
2	<b>February</b>	1461.69	1486.56	4044.5	5810
3	<b>March</b>	197.33	614.99	8257.3	2965.9
4	<b>April</b>	1487.68	1162.38	11154	5453.1
5	<b>May</b>	435.9	580.74	6730.2	8348.2
6	<b>June</b>	588.12	800.87	6994.6	5826.4
7	<b>July</b>	1920.35	2177.83	7478.1	3999.7
8	<b>August</b>	1440.2	2036.95	5807.3	2641.7
9	<b>September</b>	1475.83	1468.93	5989.7	3131.9
10	<b>October</b>	598.54	2462.89	4097.5	3343.5
11	<b>November</b>	394.49	1846.63	5080.4	2910.8
12	<b>December</b>	1755.45	2591.6	1462.9	3792.3
<b>Total</b>		12143.08	18014.71	73503.5	51278.4
<b>Mean</b>		<b>1011.92<sup>ns</sup></b>	<b>1501.23<sup>ns</sup></b>	<b>6125.29<sup>*</sup></b>	<b>4273.20<sup>*</sup></b>

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