

Catch Composition and Volume of Purse Seine from the Clusters of Payaos Deployed in the Coast of Zambales and Ilocos Provinces

Dante M. Mendoza^a, Gerondina C. Mendoza^a and Sotero M. Aban^b

^aPampanga State Agricultural University

^bPangasinan State University – Binmaley Campus

Abstract - The study was undertaken to determine the catch composition and actual landed biomass of purse seine from the clusters of *payaos* located in the coast of Zambales and Ilocos Provinces. An experimental fishing with the aid of two commissioned purse seine vessels was made from September to November 2013. The result indicates that the catch of purse seine in the 2 clusters of *payaos* is composed of 14 species belonging to 8 families of fish. Of this number, purse seine caught 12 species in Cluster 1 while 11 species were recorded in Cluster 2. Comparing the landed biomass, vessel fished from Cluster 1 *payaos* recorded a landed biomass that is significantly higher.

Key words: Payaos, purse seine, catch, biomass, coast

INTRODUCTION

Payao or fish aggregating device (FAD) in general, is an accessory to many fishing gears used in capturing small and large pelagic fishes. As of date, *payaos* are commonly deployed in municipal waters with the aim to increase the economic contribution of capture fisheries. In partnership with private companies, the government is actively deploying *payaos* to maximize the opportunity and benefits derived from the fishing grounds of the country [1]. However, the number of *payaos* in such area is regulated and fishing around *payaos* is closely monitored to prevent overfishing.

The concept of using *payao* in fishing is to reduce the effort in finding schools of fish and to increase the economic viability of each fishing operation [2]. *Payaos* do not increase the abundance of fish, but only redistribute them into a smaller area. The efficiency of the device to aggregate fish basically depends on the abundance of fish migrating in the area. Similar to other developing countries, the construction of *payao* in the country is basically consists of four major parts, the buoy or float, the mooring line,

anchor and attractant (known locally as *habong*) [3]. Modern *payaos* are equipped with radar reflectors and solar-powered lights. In the western territorial waters of the country, various types of *payaos* are still used. This was linked to the preference of the fishers, availability of materials and cost of fabrication and deployment. The fish aggregated in *payaos* are commonly harvested by purse seine and ring net fishers. However, these devices are also showing great importance to small-scale commercial handline fishers [4].

Purse seining is considered the most productive fishing method employed in commercial fishing grounds. This method is commonly used to capture fish aggregated from clusters of *payaos*. Setting of gear is usually carried out during dawn and hauling is done after closing the bottom of the net. The principal species associated with *payaos* gather near the device and can be found closer to the surface especially during night time. Hence, *payaos* are lighted at night to maximize its attracting efficiency prior to purse seining. In the Zambales-Ilocos coast, *payaos* are patrolled by “ranger

bancas” to maintain the volume of aggregated fish during the night [5].

The absence of information related to fishing is often cited as principal gap in identifying appropriate action for conservation and management of our communal resources. Hence, this study was taken into consideration to provide benchmark information that is highly indispensable for future plans and actions to achieve sustainable fishing.

MATERIAL AND METHODS

The study was carried out for a period of 3 months. Fishing operations were carried out in the clusters of *payaos* located in the coast of Zambales and Ilocos Provinces. Specifically, two commissioned small purse seine vessels based in Sta. Cruz, Zambales and Bolinao, Pangasinan conducted the fishing activity in the same period. Fishing operation was carried out monthly and this was used as replications of the study. *Payaos* deployed by these vessels were made from cylindrical steel buoys. *Payaos* located in the coast of Zambales were treated as Cluster 1 while those *payaos* located in the coast of Ilocos Provinces were treated as Cluster 2.



Figure 1. A *payao* deployed in the study area.

The fishing vessels usually leave from the port in the afternoon and arrived at the fishing ground in the early morning of the following day. At night, the light boats detached the attractants or *habong* of 5 *payaos* and tied to a single *payao* that will maintain the fish aggregation. All the lights of fishing vessels were turned-off after the

light boats gained their position. Shooting of purse seine was taken at dawn. Swimmers pulled the net into the water as the vessel surrounds the fish. Hauling was done by dragging the net towards the central part of the vessel using a hydraulic machine of which the fishers called “Ferris wheel”. Then, the catch was gradually moved to the vessel’s compartment using a brail. Crushed ice was applied after the brailing process to prevent spoilage.

Preliminary sampling was made while travelling back to the landing site. Samples of common catches were requested from the fishers for documentation. Photos were taken and identification was based on description and comparison with published works and FishBase online identification guide. Data on landed biomass was obtained by requesting a copy from the landing site checker. The landed biomass was expressed in kilograms. Comparison on the purse seine’s landed biomass in the two clusters of *payaos* was made using a Student’s T-test.

RESULTS AND DISCUSSION







The study revealed a total of 14 species belonging to 8 families were caught in the two clusters of *payao*. The species include *Katsuwonus pelamis*, *Thunnus albacares*, *Thunnus obesus*, *Auxis thazard*, *Acanthocybium solandri*, *Decapterus macarellus*, *Elagatis bipinnulata*, *Seriola rivoliana*, *Canthidermis maculata*, *Tylosurus pacificus*, *Coryphaena hippurus*, *Thyrsitoides marleyi*, *Kyphosus cinerascens* and *Aluterus monoceros*. Of these, 12 were present in the catch of purse seine in Cluster 1 while 11 were observed in Cluster 2.





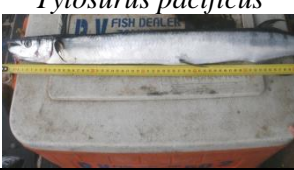



Most of the harvested catch of purse seine belonged to the tuna group, though only *K. pelamis*, *T. albacares* and *T. obesus* are considered target species. Other species found in the catch of purse seine are regarded as bycatch. The review made by Dickson and Natividad [5] on the *payao* fisheries in the Philippines showed the dominance of scombrid species. The primary purpose of deploying FADs in offshore fishing grounds is to increase catches of tuna [6]. Also, it

was stated that the concept of FAD deployment is to attract highly migratory pelagic species such as skipjack and yellowfin tuna that gives fishers the opportunity to find the target species without incurring huge expenses in searching for their

schools [7]. Hence, the presence of these species in the clusters of *payao* covered in this study is not surprising.

Table 1. Species caught in the clusters of payaos in the coast of Zambales and Ilocos Provinces.

Family	Species	Periodic Occurrence					
		Cluster 1			Cluster 2		
		Sep	Oct	Nov	Sep	Oct	Nov
Scombridae	<i>Katsuwonus pelamis</i> 	√	√	√	√	√	√
	<i>Thunnus albacares</i> 	√	√	√	√	√	√
	<i>Thunnus obesus</i> 					√	
	<i>Auxis thazard</i> 	√	√	√	√	√	√
	<i>Acanthocybium solandri</i> 	√				√	
Carangidae	<i>Decapterus macarellus</i> 	√	√	√	√	√	√

	<p><i>Elegatis bipinnulata</i></p> 	√	√	√	√	√	√
	<p><i>Seriola rivoliana</i></p> 	√					√
Coryphaenide	<p><i>Coryphaena hippurus</i></p> 	√		√	√		√
Balistidae	<p><i>Canthidermis maculata</i></p> 	√					
Belonidae	<p><i>Tylosurus pacificus</i></p> 	√					
Gempylidae	<p><i>Thyrsitoides marleyi</i></p> 						√
Kyphosidae	<p><i>Kyphosus cinerascens</i></p> 						√
Monacanthidae	<p><i>Aloterus monoceros</i></p> 	√				√	

Legend: √ - Present

Table 2 shows the landed biomass of each species identified in the catch of respective purse seiner in the two clusters of *payaos*. Species-wise, *K. pelamis* dominates the landed biomass of purse seine from Cluster 1 (15,262 kg) and 2 (8,200 kg). This was followed by *T. albacares*. Considerable volume was also recorded by *A. thazard* and *D. macarellus* in the catch from both *payaos* clusters. For other species, their proportion in the catch is insignificant.

Table 2. Landed biomass of the identified species during the period of the study.

Species	Landed Biomass (kg)	
	Cluster 1	Cluster 2
<i>K. pelamis</i>	15,262.00	8,200.00
<i>T. albacares</i>	7,167.00	3,620.00
<i>A. thazard</i>	2,444.00	1,570.00
<i>A. solandri</i>	6.00	13.90
<i>D. macarellus</i>	3,871.00	1,555.00
<i>E. bipinnulata</i>	372.00	45.54
<i>S. rivoliana</i>	0.80	0.50
<i>C. hippurus</i>	17.00	20.65
<i>C. maculata</i>	0.25	-
<i>T. pacificus</i>	0.60	-
<i>T. marleyi</i>	-	1.55
<i>K. cinerascens</i>	-	0.30
<i>A. monoceros</i>	1.28	0.80

The territorial waters of the Philippines including its exclusive economic zone (EEZ) were considered as important migratory path and recruitment area of large and small pelagic fishes including skipjack and yellowfin tunas. The recorded biomass of these species in the catch of purse in the clusters of *payaos* suggests their abundance in the study area. The result is in agreement with the previous reports. Previous reports also indicated the significant contribution of the two species in the catch of purse seine in Philippine waters [8]. As reviewed, purse seine fisheries produce 70 to 90% of the world's production of skipjack, yellow fin tuna and big eye tuna [9]. Further, this production of purse seine fisheries is associated with FADs.

Meanwhile, a study conducted in port of Zambales indicates that skipjacks caught by purse seiners in the western fishing ground the country are relatively larger than those individuals caught in Moro Gulf [10].

Comparing the overall landed biomass of purse seine from the two clusters of *payaos* during the period of the study (Table 3), biomass in Cluster 1 is significantly higher over Cluster 2 ($P < 0.05$). Although there is similarity in the *payaos* structures deployed in the two areas, the result can be linked to the migration activity of the fishes, particularly the target species and the sea condition during the period of the study. In relation to the migratory activity of the target species, Cluster 1 *payaos* could aggregate higher number of individuals due to its proximity to the probable nursery grounds of tunas in the country, the Moro Gulf and Sulu Sea [10]. During the migration of these fishes, they have immediately encountered the *payaos* in Cluster 1 and some schools that were not accommodated by these *payaos* had moved further and reached Cluster 2. Also, the difference observed in landed biomass can be attributed to the sea surface condition. It was observed that the crew members of the purse seiner operated in Cluster 2 had experienced difficulty in setting their gear due to the rough surface during this period. Hence, this condition may affect the efficiency of the gear resulting to lower landed biomass from this cluster. An experimental fishing was conducted in the coast of Ilocos provinces and the research vessel encountered opposite direction of wind and current that significantly affected their catch [11].

Table 3. Total and mean landed biomass of purse seine vessels during the period of the study.

Payao Cluster	Total Landed Biomass (kg)	Mean Landed Biomass (kg)
Cluster 1	29,143.03	9,714.34 ^a
Cluster 2	15,028.24	5,009.43 ^b

CONCLUSION AND RECOMMENDATIONS

Based on the result of the study, there were 14 species of fish caught in the purse seine operations in the clusters of *payaos* deployed in the coast of Zambales and Ilocos Provinces. Of this number, 12 species were found in Cluster 1 and 11 were identified in Cluster 2. Scombrid species dominated the catch during the period of the study. Highest landed biomass in both clusters was obtained by *K. pelamis*. Meanwhile, overall landed biomass is significantly higher in Cluster 1 *payaos*.

The result can be used as reference for future studies related to *payao* and purse seine fisheries. Overfishing of tuna species is the main issue that is linked to the deployment of *payao* and utilization of purse seine in Philippine fishing grounds. Therefore, it is recommended that another study in these clusters of *payaos* must be carried particularly on the dynamics of fish populations aggregated and caught around this appurtenance device.

REFERENCES

- [1] Estabillo, A.V. 2013. Nationwide 'payao' deployment for municipal fishing starts. <https://www.mindanews.com/top-stories/2013/03/nationwide-payao-deployment-for-municipal-fishing-starts/>. Accessed date: March 3, 2014
- [2] Macusi, E.D., Nugroho-Satrioajie, W., van Zwieten, P.A.M. and J.J. Poos. 2013. Fish aggregating devices as efficient fishing aid: Impact on catch trends. DOI:10.13140/RG.2.1.2521.9927
- [3] Aprieto, V.L. 1991. Payao: Tuna aggregating device in the Philippines. <https://agris.fao.org/agris-search/search.do?recordID=XF201603900> 2. Access date: March 3, 2014
- [4] Babaran, R. and M. Ishizaki. 2010. Profile of Payao (Floating Artificial Reef or Fish Attracting Device) Fisheries of the Philippines. In: Ceccaldi H.J., Dekeyser I., Girault M., Stora G. (eds) Global Change: Mankind-Marine Environment Interactions. Springer, Dordrecht. https://doi.org/10.1007/978-90-481-8630-3_9
- [5] Dickson, J. and Natividad A. 2000. Tuna fishing and a review of payaos in the Philippines. Pêche thonière et dispositifs de concentration de poissons, Caribbean-Martinique, 15-19 Oct 1999 15-19 Octobre 1999. <https://archimer.ifremer.fr/doc/00042/15284/>
- [6] Taquet, M. 2013. Fish aggregating devices (FADs): good or bad fishing tools? A question of scale and knowledge. *Aquatic Living Resources* 26(1): 25-35. <https://doi.org/10.1051/alr/2013043>
- [7] Sri, R. and Kirubakaran, R. 2015. A brief report on the various hypotheses of fish aggregating devices. <http://dx.doi.org/10.13140/2.1.1331.0243>
- [8] Resma, S.E., Dealteris, J. and Rice, M. 2006. Size selectivity of purse seines in the Southern Philippines multispecies tuna fisheries. *Journal of Aquatic Science* 3: 1-21.
- [9] Hall, M. and Roman, M. 2013. Bycatch and non-tuna catch in the tropical tuna purse seine fisheries of the world. *FAO Fisheries and Aquaculture Technical Paper 568*. Food and Agriculture Organization, Rome, Italy.
- [10] Barut, N.C. 1999. Catch of experimental longline, purse seine and handline in the South China Sea, Area III: Western Philippines, pp. 65-75. In: Proceedings of the Third Technical Seminar on Marine Fishery Resources Survey in the South

China Sea, Area III: Western Philippines, 13-15 July 1999. Bangkok, Thailand: Secretariat, Southeast Asian Fisheries Development Center: 65-75.

[11] Pastoral, P.C., Escobar Jr., S.L., and N.J. Lamarca. 2000. Round scad exploration by purse seine in the South China Sea, Area

III: Western Philippines, pp. 49-64. In: Proceedings of the Third Technical Seminar on Marine Fishery Resources Survey in the South China Sea, Area III: Western Philippines, 13-15 July 1999 Bangkok, Thailand: Secretariat, Southeast Asian Fisheries Development Center.