International Journal of Advanced Research in Biological Sciences
ISSN : 2348-8069
www.ijarbs.com

Research Article

Catch Composition of Bag Net used in Palaemon fishery in River Nun Estuary, Bayelsa State Niger Delta, Nigeria.

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Abstract

Despite the importance of thePalaemon shrimp in the Niger Delta, the fishery is poorly known in Bayelsa State of the Niger Delta and there is no published literature on the catch composition of Bag Nets in the River Nun Estuary. A study was thus conducted between May 2005 and April 2006 to assess the composition of Bag Net used in Palaemon shrimp fishery in the River Nun Estuary, Bayelsa State, Niger Delta. This was done in order to gauge the catch composition and status of the fishery in Bayelsa State of the Niger Delta. Results from the study reveal that three families of shrimp were recorded. The families are *Alpheidae, Palaemonidae* and *Penaeidae.* Eleven families of fishes were also recorded namely; Carangidae, Clupeidae, Cynoglossidae, Diodontidae, Drepanidae, Haemulidae, Muraenesocidae, Polynemidae, Sciaenidae, Sphyraenidae and Trichiurdae. The Bag Net landed 90% of the target catch (Palaemon shrimps) in the River Nun Estuary. The non-target catch constituted 10%, comprising of juvenile fishes (8%), macro-invertebrates (1.55%) and other shrimp (0.45%).Most of the non-target catch were landed during the peak of the rainy season from both estuarine and coastal shrimping operations while landing of the target catch from the estuary and coast were low during the rainy season. Although the gear was effective at catching the targeted shrimps, it could be said to be also destructive because most of the fishes caught are juveniles that are highly valuable for the continuity of the ecosystem. It is therefore important to introduce management measures such as closed season to check the rate at which these juvenile fishes are caught.

Keywords: Catch composition, Estuary, Bag net, palaemon, Fishery, River nun,Bayelsa State.

1.0.Introduction

The Palaemon fishery is a major industry in the River Nun Estuary, involving almost all residents of the area. Palaemon shrimps or “crayfish” as they are locally called is open water fishery resource that allows people to enter the fishery. Shrimp fishery provides employment for both young and old irrespective of age and sex.

Due to increase in population and high demand for fish and shrimps, there has been a considerable increase in the rate of shrimp exploitation in the estuary. This has led to increasing pressure on the fishing ground and a decline in catch rates. Increasing pressure on coastal resources has caused decline of many marine fish and shrimp stocks in Nigeria (Sotolu, 2010).

River Nun Estuary is known to be rich in Palaemon shrimps, locally known as “crayfish”. The fishery is mostly composed of *Palaemon maculatus* and *Nematopalaemon hastatus* and they occur in the ratio of 2:3(Abowei et *al*,2008).Palaemon fishery which is a major industry in the River Nun Estuary of the Niger Delta (Waribugo and Alfred-Ockiya, 2000), constitute

a valuable seafood for both the local community and Nigeria in general. They are used for the preparation of food because of their high protein value which are considered very cheap and an important source of livelihood for the coastal communities (Sotolu, 2010). They are highly priced and in high demand in Nigerian markets(Deekae and Abowei,2010) and are either sold fresh for immediate consumption or smoke dry before selling to commercial shrimp traders.

The fishery has been exploited for centuries, first with basket traps and later in the 70's, the gear was changed to the bag net(Abowei *et al*,2006). Although estuary Set Bag Net has been in use in the River Nun Estuary for decades but the catch composition and status of the fishery is still unknown. Despite the importance of the shrimp in the Niger Delta, the fishery is poorly known in Bayelsa State of the Niger Delta. Although, some studies on shrimps of the Niger Delta have been reported(Ofor,2000;Nwosu and Enin,2004),there have been no published report on catch composition of Bag Net in the River Nun Estuary of the Niger Delta. Therefore this study was conducted to ascertain the catch composition of Estuary Set Bag Net in the River Nun Estuary of Bayelsa State of the Niger Delta, Nigeria.

2.0. Materials and Methods

2.1 Study Area

The study area extends from Akassa at the river mouth to about 12.5km north and lies between longitude $5^{o}5$'N and latitude 4^{0} 20' E (Fig 1).

2.2 Sample collection and Description of Gear.

Monthly samples were collected from May 2005-April 2006 from fishermen who employed the BagNet to fish along the River Nun Estuary. Samples collected were then stored in 9% formalin (formaldehyde) and taken to the laboratory for further analysis.

The bag-net or stow net is the gear employed in the fishery. It is a conical nylon bag net measuring between 40 and 50m. The mouths of the net are about 2.5m wide and 2m high and oriented to filter the on-coming currents. Fishing activities were carried out during the day time both in the estuary and coast.
Dug–out canoes measuring between 8-10m and powered by 8HP were employed in the coastal fishery, while the dug-out canoes measuring between 4-7m and manually operated were employed in the estuary. It took an average of 90minutes for coastal shrimpers to get to their fishing ground, while estuarine shrimpers spend 10 minutes to get to the fishing ground.

Estuarine shrimpers; age between 10and 60years employ between 2-10 bag-nets and obtained landing catches ranging between 0.2kg-40kg/boat/day mostly for household consumption. Coastal shrimpers' fish mostly for commercial purposes with landing ranging between of 0.4kg-220kg/canoe/day while employing from 20-24 bag nets. Their ages mostly range between 27-45years.

2.3 Sampling technique

In the laboratory, 100g of sub-samples were taken with three replicates from the original sample of each month. The sub-samples were then sorted out and classified into four major groups of *Palaemon* shrimps, other shrimps, juvenile fishes and other macro-invertebrates

2.4 Species Identification:

Shrimps were identified based on the use of standard keys by Holthius (1980),Powell (1983),while the juvenile fish were identified according to Tobor and Ajayi (1979)

2.5 Data analysis:

Each separate group was then counted individually. Then the average percentage composition of the different groups was estimated from monthly sub-samples data. Data was analyzed with the aid of Microsoft Excel Statistical Software.

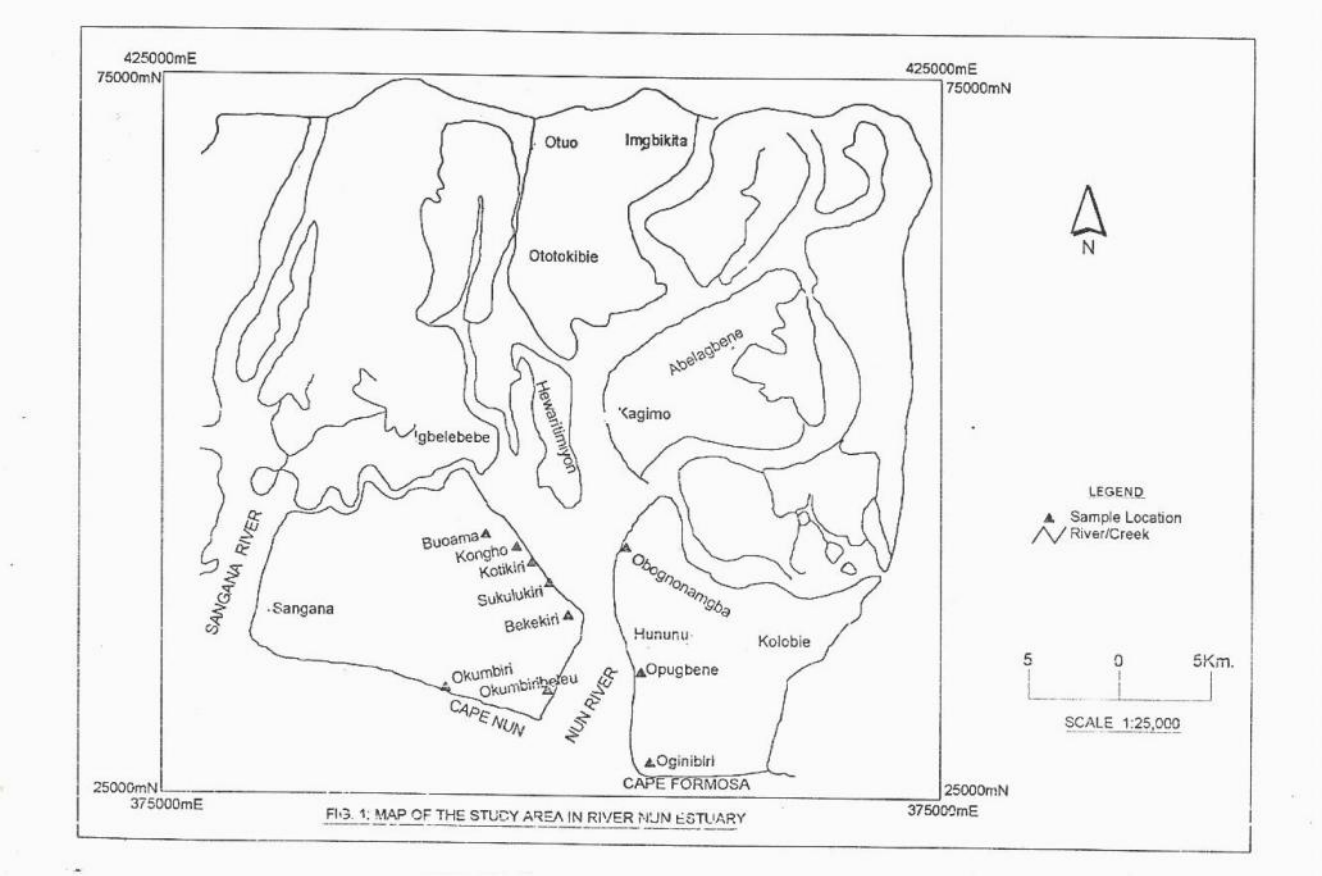
3.0 Results

3.1 Species composition:

Three major categories of species were observed from the landings of the Bag net in the River Nun Estuary. The dominant species were the *Palaemon* shrimps followed by juvenile fishes, jellyfish and other shrimps.

3.1.1 Composition of Palaemon shrimps:

Two species of *Palaemon* shrimps were identified to occur in the River Nun Estuary of the Niger Delta.



These are represented by *Palaemon maculatus* and *Nematopalaemon hastatus* and they occur in the ratio of 2:3 all through the year. The highest percentage of shrimp recorded from the estuarine sample was in June and March (97%), while the lowest (60%) was in October (Fig 2). The highest percentage of shrimp in coastal sample was in January (99%) and the lowest (81%) was in September (Fig 3). The average percentage of Palaemon shrimp landed during the study period was estimated as 90%.

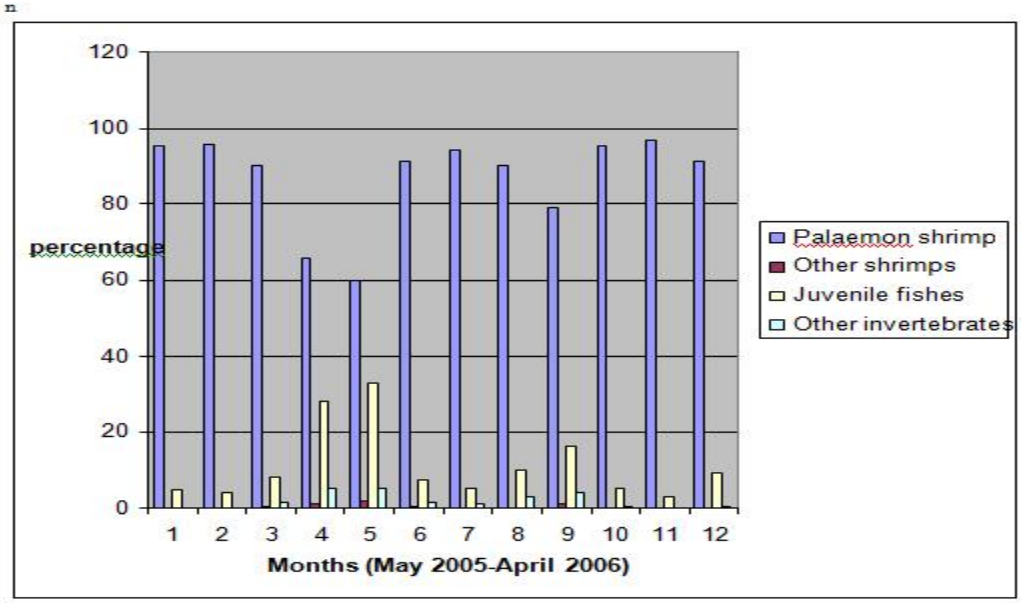


Fig 2: Estuarine monthly percentage composition of Bag Net in River Nun Estuary, Bayelsa State, Niger Delta

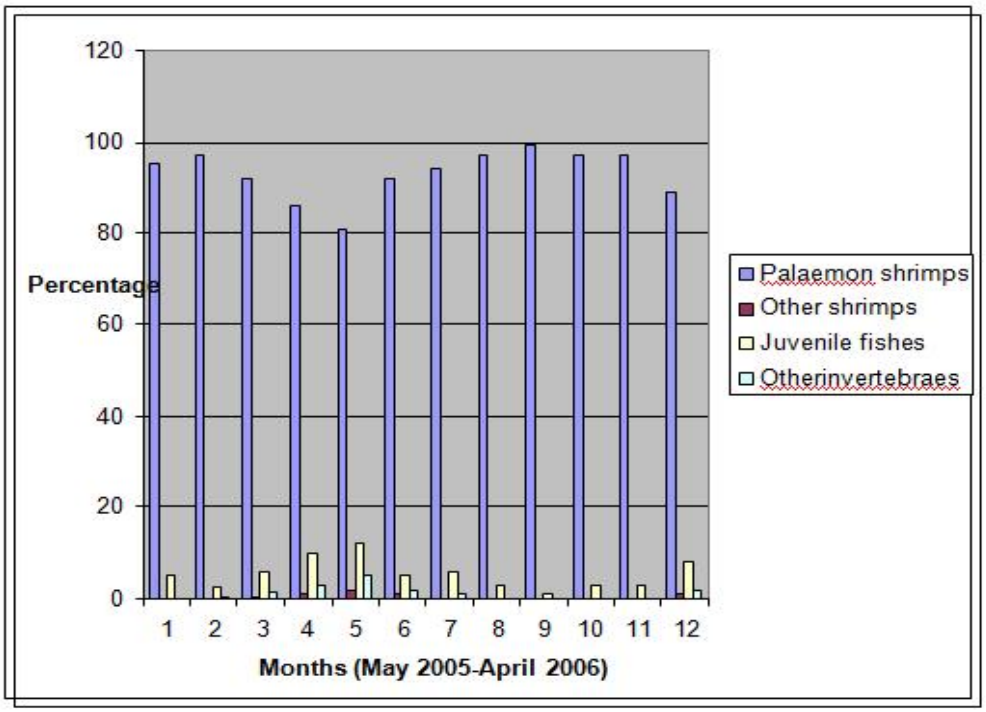


Fig 3: Coastal monthly percentage composition of Bag Net in River Nun Estuary,Bayelsa State, Niger Delta

3.1.2 Composition of other shrimp species:

Other shrimp species observed are comprised of two families. The Penaeidae represented by *Penaeus notialis* and the snapping shrimp of the Alpheidae family, represented by *Alpheus pontederiae*. The brackish water prawn, *Macrobrachiumm acrobrachion* of the same Palaemonidae family as the *Palaemon* shrimp also occurred in the catch. Average percentage of other shrimps was recorded at 0.45%. The highest percentage (5%) from both estuarine (Fig 2) and coastal (Fig 3) samples occurred in September and the lowest (0.1%) was during the dry season.

3.1.3 Composition of juvenile fishes:

Thirteen families of finfish were represented in the catch. From Table 1, it is apparent that the croaker is the most caught fish species of the Sciaenidae family. The family is represented by *Pseudotolithu selongatus, P.senegalensis and P.typus. P.elongatus* was most abundant amongst the three representatives of the Sciaenidae and also most abundant in the landings. Other fish species common in the catch includes: *Trichiurus lepturus* (silverfish), *Pentanemus quinquarius* (threadfin), and *Ilisha Africana* (shad). *Ilisha Africana* was the only gravid fish observed. Others include: From the study, Carangidae, Cynoglossidae, Diodontidae, Drepanidae, Haemulidae, Muraenesocidae, and Sphyraenidae represented by: *Caranx hippos*, (Horse mackerel), *Cynoglossus goreensis* (tongue sole), *Chilomycterus recticulatus* (puffer fish),*Drepane Africana* (sickle fish), *Plectorhinchus macrolepsis, Cynoponticus ferox*(eel) and *Sphyraenid sphyraena.* The highest percentage of juvenile fishes in estuarine (Fig 2) and coastal (Fig 3) samples were recorded in September (33% and 12 %(respectively)and the lowest for estuary was in March (2.6%) and June (2.5%) from coastal landings. The average total percentage of juvenile fishes was estimated at 8%.Thepercentage of juvenile fishes were highest during rainy season for both estuarine and Coastal samples.

Table 1:Composition of Juvenile Fishes from Bag net in River Nun Estuary, Niger Delta.

Family	Species	Common name	Index of abundance
Carangidae	*Caranx hippos*	Horse mackerel	xx
Clupeidae	*Ilisha africana*	Shad	xxx
	Sardinella maderensis	Sardine	xx
Cynoglossidae	*Cynoglossus goreensis*	Tongue sole	x
Diodontidae	*Chilomycteru sreticulatus*	Pufferfish	x
Drepanidae	*Drepane Africana*	Sicklefish/spadefish	x
Haemulidae	*Plectorhinchus macrolepsis*	-	x
Muraenesocidae	*Cynopontiticus ferox*	Eel	x
Polynemidae	*Pentanemus quinquarius*	Threadfin/shinenose	xxx
Sciaenidae	*Pseudotolithu selongatus*	Drum	xxxx
	Pseudotolithus senegalensis	Short nose croaker	xx
	Pseudotolithus typus	Long nose croaker	xx
Sphyraenidea	*Sphyraenids phyraena*	Barracuda	xx
Trichiurdae	*Trichiurus lepturus*	Silverfish	xxx

X –Scarce xx---- abundant xxx --- very abundant xxxx ---- superabundant

3.1.4 Composition of other invertebrates:

Jellyfish which was the most frequent was represented by one species *Aurelia aurit*. Others includedare *Sepiella ornate* (squid) and *Callinectis palidus*(swimming crab). The highest percentage of other invertebrates from both estuarine (Fig 2) and coastal (Fig 3) samples occurred during the rainy season and the lowest was during the dry season. The average percentage calculated during the study was 1.55%

4.0 Discussion

The bag net is the common gear used for Palaemon shrimping in the River Nun Estuary of the Niger Delta. Palaemon shrimps showed the highest constitution of the total catch and the highest percentage. This was followed by the Juvenile fishes, which was followed by the jellyfish, other invertebrates and the least was other shrimp species recorded. Apart from the *Palaemon maculatus* and *Nematopalaemon hastatus* twenty species belonging to sixteen families were recorded. This finding corroborates those of Ambrose *et al* (2005).In their study of the assessment of fish by-catch species from coastal artisanal shrimp beam trawl fisheries in Nigeria, twenty five species belonging to twenty families were recorded. Prominent amongst these sixteen families is the Sciaenidae family, represented by *Pseudotolithus elongatus, P.senegalensis and P.typus* of which *Pseudotolithu selongatus* was the most abundant. This finding also agrees with those of Nwosu(2009). The high of percentage of juvenile fishes during the rainy season is probably due to the fact that their food materials are abundant during that period. The shrimp go in search of their food *Rhophalopthalum africana* (mystid) between July and August in the continental shelf of Nigeria (Abowei *et al, 2008*)and the juvenile fishes are attracted to the fishing ground by the abundance of the shrimp.

A second reason could be attributed to their distribution. Most of these other organisms are found within the same geographical location as the Palaemon shrimp. According to Arimoro *et al.,* (2007) nature of habitat, water condition and substratum affects distribution of organisms. The study showed that most of the landings were Palaemon shrimps (90%), while the remaining 9% were made up of juvenile shrimps (8%), other shrimps (0.45%) and other invertebrates (1.55%).

This result follows a similar trend recorded by Amin *et al.,(*2008) using of Estuarine Push Net in *Acetes* operations in Malacca State, Malaysia and Amani *et al.,(*2011) in the study of Catch composition of a set bag net used for *Acetes t*rapping in the estuarine waters of Kedah, Peninsular also in Malaysia. Amin *et al.,(*2008) recorded 90% of the target catch (*Acetes* shrimp),while none target catch such as the juvenile fishes (9%) and other shrimps (1%) were estimated at 10%. Amani *et al., (*2011) recoded the target shrimp (*Acetes*) at 89%,juvenile shrimps (9%) and other shrimps (2%).This study also corroborates those of Oh *et al.,* 2010 fishing in Johor State, Malaysia.All studies suggest the gear used as being selective, because the target catches constituted about 90% of the landing. On the contrary, the gear could also be described as destructive, since most of the non-target catch are juveniles of thirteen families of the most priced fish species in the Niger Delta. It is therefore important to introduce closed season during the rainy season when the percentage of Palaemon shrimp (target catch) landing is low and the percentage of non-target catch is high.

5.0 Conclusion

From the result of the study conducted the Bag Net landed 90% of the target catch (Palaemon shrimps) in the River Nun Estuary. The non-target catch constituted 10%, comprising of juvenile fishes (8%),invertebrates (1.55%) and other shrimp (0.45%).Most of the non-target catch were landed during the peak of the rainy season from both estuarine and coastal shrimping operations while landing of the target catch from the estuary and coast were low during the rainy season. The gear could be termed to be selective since, on the average 90% of the landings during the study were the target catch. But on the contrary, it could be said to be destructive because most of the fishes caught are juveniles that are highly priced in the Niger Delta. It is therefore important to introduce management measures such as closed season to check the rate at which these juvenile fishes are caught.

Acknowledgments

We wish to thank the numerous shrimpers operating along the River Nun estuary for their cooperation during the study. We also wish to thank Mr. Nalagoa Alagoa for granting us the opportunity to carry out this research work under Akassa Development Programme, without which sponsorship would have been impossible. Most of all we wish to thank Prof. John Alfred-Ockiya for his tutelage.

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