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Catch Composition and Discards of Stationary Liftnet Fishery in Panay Gulf, Philippines

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Key words: Discards, Stationary liftnet, Panay Gulf, Philippines

Abstract

A stationary lift net fishery that primarily targets paste shrimps, sardines and anchovy annually operates off the southern coast of Iloilo in Panay Gulf over a period of six months from the second half of November to the first half of May. The catch of stationary lift nets was monitored from December 2005 to March 2006 to determine their catch composition and discards, and to estimate the level of discards from the fishery. A total of 83 species, including six unknown species, belonging to 38 families of finfish, crustaceans, mollusks and annelids were identified; 56 of these were commercial species whereas the other 27 species had no commercial value. Almost all non-commercial species (25) form part of the discards, but juveniles of nine commercial species were also noted. The level of discards was not correlated with the retained landings ($r=0.3$). Moreover, median discards per fishing trip did not vary across months. The mean ratio of discards to retained landings per unit of effort was 0.031. The number of deployed stationary lift nets increased from 28 in December 2005 to 44 in March 2006. Average catch per unit effort was similar in December and January, which were both significantly lower compared to corresponding values in February and March, which were similar. The degree of discarding was proportional to the volume of landed catch. Based from a monitoring of the fishery during the 4-month observation period, retained landings were about 74 tons, and the estimated total of discards was 2.29 tons.

Introduction

Discards are part of fisheries by-catch that are merely thrown away because they seem to have no use at all. They are considered as unnecessary waste of fishing (Isa, 1992). Discards by global fisheries are serious concerns because of their implications to fisheries management. Some estimates of discards for global fisheries are available (Alverson, 1994; Matsuoka, 1997; Matsuoka, 1998), but similar information in the Philippines is limited (Babaran *et al.*, unpubl. data).

Stationary liftnet is a passive gear normally deployed in the coastal waters of the Philippines. The gear is largely made of a screen netting and its operation is dependent on the use of light to attract fish. These are factors that apparently lead to a high percentage of incidentally captured species. The aim of this paper is to present the catch composition and estimate the level of discards of the stationary liftnet fishery operating in Panay Gulf, Philippines.

Materials and Methods

Fishing gear and operation

A stationary liftnet was operated from a square, stationary platform made of bamboo with a side dimension of 10 m. Two improvised bamboo winches bearing ropes attached to the corners and side midsections of square netting were used to raise the gear to the surface. The net also had a side measurement of 10 m and its mesh size was 5 mm.

In a typical operation of the liftnet, two fishermen lower down the net at a depth of 10 m at dusk. Three lighted Petromax lamps are then hung from the center of the platform at about 1 m from the water surface to attract fish and make them gather above the net. When schools of fish are detected, the fishermen gradually pull up the net using the improvised winches. The catch is brailed from the net using a dip net and placed in an open space on the bamboo platform where sorting takes place.

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Sampling

A total of 13 sampling trips were conducted for the entire duration of the study. During each trip, a sample of the catch was taken right after each hauling activity. The number of samples varied from one to five, depending on the number of hauls made. Sample size also varied depending on the amount of catch; when the total catch was small, the entire catch was treated as a sample but when the catch was substantial, at least 10% of the total catch was taken as sample. The fish samples were sorted by species and categorized into target species or bycatch, which was further classified to separate the discard species. The count and weight of each species were recorded.

Catch monitoring

Daily total landing from the stationary liftnet fishery in this part of Panay Gulf were estimated from the number of operating gears and the average catch of three randomly selected fishermen who agreed to collaborate by recording their daily catch. Daily catch was recorded from December 2005 to March 2006, except on occasions without fishing operation near the full moon period.

Estimation of discards

From sampling, the ratio of discards to the total landed catch r_i was estimated from

$$r_i = E[d_i / c_i] \quad (1)$$

where d_i is the summed discards and c_i is the summed landing during sampling i . The result of Eq. 1 was then multiplied by the total landed catch to estimate the level of discards D_i ; thus,

$$D_i = r_i C_i \quad (2)$$

where C_i is total landed catch of the stationary liftnet based from the product of the average landed catch and number of operating fishermen.

Results

Sampling

A total of 83 species, including six unknown species, belonging to 38 families of finfish, crustaceans, mollusks and annelids were identified; 56 of these were commercial species whereas 27 other species had no commercial value. (Table 1). Among the target species, sardines (*Ambligaster leiogaster*, *Sardinella spp.*), anchovies (*Stolephorus indicus*, *S. buccaneeri*, and *Encrasicholina heteroloba*), and paste shrimps (*Acetes spp.*) formed part of the catch. Almost all non-commercial species (25) comprised the discards, but juveniles of nine commercial species were also noted (Table 2). The level of discards was not correlated with the retained landings ($r=0.3$). Moreover, median discards per fishing trip did not vary across months. The mean ratio of discards to retained landings per unit of effort was 0.031.

Catch monitoring

The number of deployed stationary lift nets increased from 28 in December 2005 to 44 in March 2006. Figure 1 shows the production of stationary liftnets per day. Average catch per unit effort was similar in December and January, which were both significantly lower compared to corresponding values in February and March, which were similar. The degree of discarding was proportional to the volume of landed catch. Based from a monitoring of the fishery during the 4-month observation period, retained landings were about 74 tons. Using Eq. 2, the estimated total of discards was 2.29 tons.

Discussions

Stationary liftnets are generally set in shallow coastal waters because of the limits imposed by the length of bamboo poles used for the gear's structure. Unlike most fishing grounds where this gear is set, Panay Gulf is deep but fishermen link several pieces of bamboo poles together in order to operate in this fishing ground. Target species like sardines, anchovies and paste shrimps are pelagic species while incidentally captured species are from deeper waters, reflecting the nature of the fishing

ground. The number of species captured by the gear (83) was typical of tropical conditions and comparable to the representation of species caught by the same gear in other fishing grounds in the Philippines, but this number was lower than that of coastal setnets (Babaran, unpubl. data 1999, Babaran and Selorio, unpubl. data, 2003).

The target species are basically used for human consumption or are fed to livestock while incidental catch comprised the discards of this fishery. Fish discards, which have no commercial value, are excluded from the catch because fishermen are sometimes not familiar with the species. Some organisms are also thrown away or simply ignored because they are rare, few, or impractical to eat, probably due to the nature of body structure. And still others are inedible because they are poisonous.

The inclusion of numerous species in the catch of the stationary liftnet implies that the gear is not selective. Apparently, this is due initially to the attraction of fish to light, including those from deeper waters, because they are strongly phototactic. However, their inclusion in the catch is also clearly due to the small mesh size of the net (5 mm) that retains not only target species as small as paste shrimp, which is inherently small in size, but also many other species, including juveniles of commercial ones. These factors clearly explain the occurrence of numerous incidentally captured species and wide size range in the catch of this coastal fishing gear, and are mainly responsible for the increase of the by-catch of similar fishing gears as explained by Borges *et al.* (2006).

Incidental catch is a cheap source of human and animal protein. For the liftnet fishery in Panay Gulf, the proportion of discards tends to increase with increasing catch but the level of discards is relatively low. This implies that the level of utilization of the catch is very high, just like in other Southeast Asian countries (Staples and Smith 2005).

Conclusions

Little information is known about the composition and level of discards in many tropical fisheries. Stationary liftnet is a non-selective gear that captures mostly non-commercial species. The proportion of discards to

retained catch is very high, suggesting a high level of utilization of incidentally captured species. However, the discards include juveniles of some commercial species. These results are significant because they provide new information on the possible impacts of stationary lift nets on marine resources, which is essential for fisheries management.

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Tables and Figures

Table 1. Catch composition of stationary liftnets in Panay Gulf, Philippines.

Classification	Family	Species	Commercial	Non-commercial	
Fish	Acanthuridae	<i>Acanthurus sp.</i>	x		
	Amblystidae	<i>Ambassis gymnocephalum</i>		x	
	Apogonidae	<i>Apogon kienis</i>		x	
		<i>Apogon sp.</i>		x	
	Siphonidae	<i>Siphonia sp.</i>		x	
		<i>Aulostoma chinensis</i>			x
	Balistidae	<i>Abalistes stellaris</i>		x	
		<i>Balistes sp.</i>		x	
	Belontiidae	<i>Tylosaurus acus melanotus</i>		x	
	Brachyidae	<i>Brama arcini</i>			x
	Bregmaceraidae	<i>Bregmaceros japonicus</i>			x
		<i>Bregmaceros nectabanus</i>			x
		<i>Bregmaceros sp.</i>			x
	Caesionidae	<i>Caesio caeruleus</i>		x	
		<i>Caesio sp.</i>		x	
	Carangidae	<i>Dipterogonotus balteatus</i>		x	
		<i>Alpes djedaba</i>		x	
		<i>Carangoides kedandensis</i>		x	
		<i>Caranx sexfasciatus</i>		x	
		<i>Caranx tille</i>		x	
		<i>Decapterus kurroides</i>		x	
		<i>Decapterus macroroma</i>		x	
		<i>Decapterus murusdsi</i>		x	
		<i>Megalaspis cordyla</i>		x	
		<i>Chaetodon sp.</i>			x
	Clupeidae	<i>Amblygaster leiogaster</i>		x	
		<i>Sardinella gibbosa</i>		x	
		<i>Sardinella longiceps</i>		x	
		<i>Sardinella melanura</i>		x	
		<i>Sardinella sp.</i>		x	
	Diondidae	<i>Spratelloides gracilis</i>			x
		<i>Diodon histrix</i>			x
	Engraulidae	<i>Diodon holocanthus</i>			x
		<i>Encrasicholina heteroloba</i>		x	
	Exocoetidae	<i>Stolephorus buccaneeri</i>		x	
<i>Stolephorus indicus</i>			x		
<i>Cypselurus oligolepis</i>			x		
Gobiidae	<i>Cypselurus oxycephalus</i>		x		
	<i>Hirundichthys albimaculatus</i>		x		
Hemiramphidae	<i>Gobius sp.</i>			x	
	<i>Hemiramphus far</i>		x		
Leiognathidae	<i>Gazza minus</i>		x		
	<i>Leiognathus binus</i>		x		
	<i>Leiognathus equalus</i>		x		
	<i>Leiognathus sp.</i>		x		
	<i>Leiognathus splendens</i>		x		
	<i>Leiognathus sp.</i>		x		
Lethrinidae	<i>Lethrinus karak</i>		x		
Lutjanidae	<i>Lutjanus lineolatus</i>		x		
	<i>Lutjanus vitta</i>		x		
Menniidae	<i>Mene maculata</i>		x		

Table 1. (continued)

Classification	Family	Species	Commercial	Non-commercial
Muraenidae	<i>Paralichthys nasicornis</i>			x
	<i>Parapeneus barberinus</i>		x	
Mullidae	<i>Upeneus nagula</i>		x	
	<i>Upeneus vittatus</i>		x	
Myciophidae	<i>Benihosema pierarum</i>			x
	<i>Benthosema sp.</i>			x
Paralichthidae	<i>Myctophum nitidulum</i>			x
	<i>Lestidiops jakayari jakayari</i>			x
Platycephalidae	<i>Platycephalus indicus</i>		x	
	<i>Priacanthus kamur</i>		x	
Priacanthidae	<i>Priacanthus taylori</i>		x	
	<i>Priacanthus taylori</i>		x	
Scombridae	<i>Axius rockie</i>		x	
	<i>Rastrillegger brachysoma</i>		x	
Siganidae	<i>Rastrillegger kangyarta</i>		x	
	<i>Siganus canaliculatus</i>		x	
Tetraodontidae	<i>Canthigaster valentini</i>			x
	<i>Lagocephalus scleratus</i>			x
Trichuridae	<i>Trichurus lepturus</i>		x	
	unknown			x
Crustacea	<i>Eelver 1</i>			x
	<i>Eelver 2</i>			x
Penaeidae	<i>Parioglossus sp.</i>			x
	<i>Plagioremus rhinorhynchus</i>			x
Scyllaridae	<i>Metapenaeus sp.</i>		x	
	<i>Penaeus monodon</i>		x	
Sergestidae	<i>Penaeus semiculatus</i>		x	
	<i>Ibacus atlanticus</i>		x	
Squillae	<i>Acetes sp.</i>		x	
	<i>Oratosquilla sp.</i>			x
Mollusk	unknown			x
	<i>Megalopa</i>			x
Loliginidae	<i>Enoplateuthis</i>		x	
	<i>Abraia sp.</i>		x	
Sepioidae	<i>Photololigo edulis</i>		x	
	<i>Sepiotheutis lessoniana</i>		x	
Annelida	<i>Sepioteuthis lessoniana</i>			x
	unknown			x
		<i>Polychaeta</i>		x

Table 2. Commercial species that sometimes became part of discards because either their sizes were small or the number of individuals was few.

Scientific Name	English name	Discards in sample	Discards ratio	Estimate of total discards (kg)
<i>Abalistes stellaris</i>	Starry triggerfish	0.98	1.26E-05	0.93
<i>Balistes sp.</i>	Triggerfish	1.79	2.30E-05	1.70
<i>Ibacus atlanticus</i>	Sculptured mitten lobster	1.6	2.06E-05	1.52
<i>Metapenaeus sp.</i>	Greasyback shrimps	23.12	2.98E-04	22.00
<i>Photololigo edulis</i>	Swordtip squid	13.04	1.68E-04	12.41
<i>Sepiotheutis lessoniana</i>	Bigfin reef squid	6.38	8.21E-05	6.07
<i>Trichurus lepturus</i>	Largehead hairtail	8.22	1.06E-04	7.82
<i>Tylosaurus acus melanotus</i>	Aqujon needlefish	4.5	5.79E-05	4.28
<i>Upeneus vittatus</i>	Striped goatfish	0.64	8.24E-06	0.61

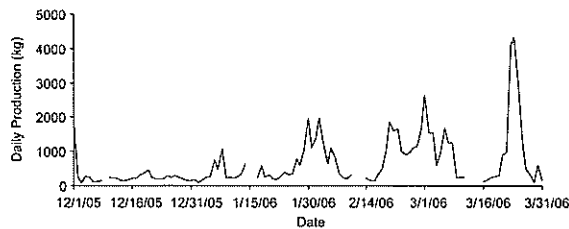


Fig. 1. Production by stationary lift nets from December 1, 2005 (N=28) to March 31, 2006 (N=44).

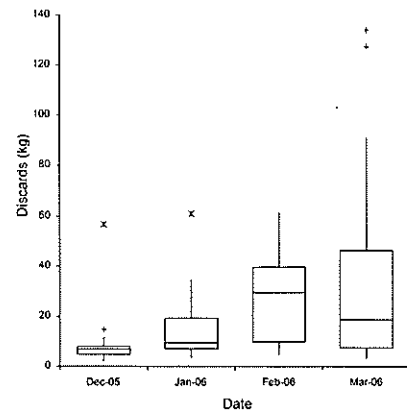


Fig. 2. Box plots of monthly discards of stationary liftnets in Panay Gulf. Outliers > 1.5 and < 3 of IQR are indicated by +, while outliers >3 IQR are marked by *.