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Species composition and relative abundance of aspidochirote holothurians in Panglao, Bohol, Philippines

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Abstract
There were 17 species of holothurians identified among the 94 individuals observed in Danao, Panglao, Bohol. The collection of species was done during the lowest low tide using a 200-meter belt transect covering an area of 800 square meters. The holothurian species identified are namely: *Holothuria atra*, *Holothuria aff atra*, *Holuthuria coluber*, *Holothuria fuscocineria*. *Holothuria hilla*, *Holothuria impatiens*, *Holothuria lineata*, *Holothuria pervicax*, *Holothuria rigida*, *Holothuria scabra*, *Holothura turriscelsa*, *Bohadscia argus*, *Bohadscia marmorata*, *Bohadscia vitiensis*, *Aactinopyga caroliniana*, *Actinopyga echinites* and *Personothuria graffei*. Among all species, *Holothuria atra* had the highest abundance with 56% relative to other species. Followed by *H. fucocineria* with 18% and *H. scabra* with 12%. The relative abundance of these species were due to their fast reproducing ability. However, majority of these sea cucumbers species are of high commercial value, hence, there is a need for continuous monitoring for conservation, preservation and sustainability of these important fishery resource.

Keywords: Burrowing, commercial**,** deposit-feeders, monitoring, population

1. Introduction
Sea cucumbers are marine organisms which make up Class Holothuroidea under Phylum Echinodermata. They are named for their appearance similar to a vegetable. They have soft cylindrical bodies with dull-colored, warty skins. Microscopic ossicles are embedded in their muscular wall. Their ambulacral grooves are closed, tube feet with suckers, circumolar tentacle, pedicellariae absent and internal madreporite [1]. There are approximately 1,400 reported species of sea cucumbers worldwide [2]. According to Kerr *et al*., 2006, there are 170 species of sea cucumbers in the Philippines. Forty-two species are commercially important [3]. These commercially harvested species belonged to Aspidochirotida under family Stichopodidae and Holothuriidae [4]. Among the commercially exploited species almost half of them belong to genus *Holothuria*. Other genera traded in the Philippines are Actinopyga, *Bohadschia*, *Stichopus* and *Thelenota* [5]. Commercial sea cucumbers are detritivores, a role in marine ecosystem that conducts functions like nutrient recycling and bioturbation [6]. Several species of sea cucumbers are symbionts of molluscs and pearl fishers that may disappear once a species is overexploited [7]. They are also considered as a good source of protein for humans containing 55% and lower in fat compared to other food. They are also used in pharmaceutical and cosmetic industries [8]. Moreover, they served as an important source of livelihood for many of the coastal communities in the archipelago by exporting trepang or dried sea cucumber [7]. Despite their ecological and economic importance, sea cucumber populations are vulnerable to decline because of rampant exploitation, ever-increasing market demand and inadequacy of fishery management [3]. Philippines is one of the important sea cucumber fishing countries that have no pertinent national management or regulatory measures for sea cucumbers [9]. And data on the abundance of the cucumber population is still limited [10]. In Panglao particularly in Danao, there are no studies on sea cucumber documented. Thus, baseline studies on the species composition and relative abundance of sea cucumbers is important to provide information needed for conservation and management of sea cucumbers in the said area.

2. Materials and Methods

Study site

The Municipality of Panglao (Figure 1) is a fourth class municipality in the province of Bohol. It is located in the south western part at 9º34'44" North, 123º 44'45" East with an area of 5, 537. The island is politically divided into two municipalities: Dauis and Panglao. The town of Panglao consists of ten barangays and Danao is the largest barangay.

Barangay Danao, Panglao, Bohol is located at 9°34'44''N and 123°45' 00''E with a total land area of 789.65 hectares. It has an intertidal area of approximately 280,000 m² (1400m width x 200m length). In most of the littoral zone, dense sea grasses and some patches of algae were found.

Fig 1: Map of the Philippines, Bohol and Panglao, with a dot indicating the sampling sites (Bohol Information Communication Technology Unit, 2011).

The method used in the collection of sea cucumbers was the belt transect method [11]. In this study the work of Bourgoin *et al*. 2005 with 50-meter belt transect was modified to 200-meter belt transect laid perpendicular to the shore. All sea cucumbers present within two meters to the right and two meters to the left of the transect were collected. The total area of the belt transect is 800 m^2. Identification of the specimens was based on FAO Identification Keys of Holothuroidea by Conand (1990), Illustrated Key to Sea cucumber by Pawson *et al*. 2008 a Sea Cucumbers of American Samoa by Atafua *et al*. 2008 and Survey on Shallow -Sea Cucumber of Central Philippines by Kerr *et al*. 2006. Spicules preparation for identification purposes has to be made in different parts of the body of the specimen. These were: anal papillae, dorsal tegument, ventral tegument and tentacles. For fast preparation of spicules, a sample was taken from the desired tissue of about 2 mm thick. The samples were placed in small vials with house bleach and were left for 5-15 minutes for the tissue to dissolve. The samples were then washed carefully.

Commented [M1]: Of the with distilled water for about 2-3 times to remove the bleach. Using a dropper, a drop of samples was placed in a glass slide and was viewed under a compound microscope [12].

3. Results and Discussions

Figure 2 showed that the species *Holothuriaatra* had the highest relative abundance value with 20%. It was observed that this species was collected on sandy substrates that were associated with sea grass beds. This result on the abundance of *Holothuria atra* was also the same result in the study of Tardy *et al*. 2009 in which *Holothuria atra* was among the most abundant species recorded at Yap State. This was because their habitat range was larger compared with other species. These species were also one of those sea cucumber species who can reproduce asexually by fission [13]. These could be the reasons why they were the most abundant species. The second most abundant were *Holothuria fuscocineria* with 18% which were commonly observed on sea grass beds. This could be because coastal sea grass beds were greatly influenced by terrestrial nutrients on which these detritivorous sea cucumber species feed on [14]. This species ejects cuvierian tubules when disturbed on their habitat. It also contains triterpene glycosides which are secondary metabolites of holothurians and are responsible for general toxicity [15]. This could be the reason on their abundance. The third most abundant species in station one were *Holothuria scabra* with 12% relative abundance value. This was found in sandy areas with sea grass beds. *Holothuria scabra* exhibit binary fission as observed in the study of Lokani *et al*., 1995. This could explain why they were the third most abundant among the seventeen species collected in the intertidal area of Danao, Panglao, Bohol.

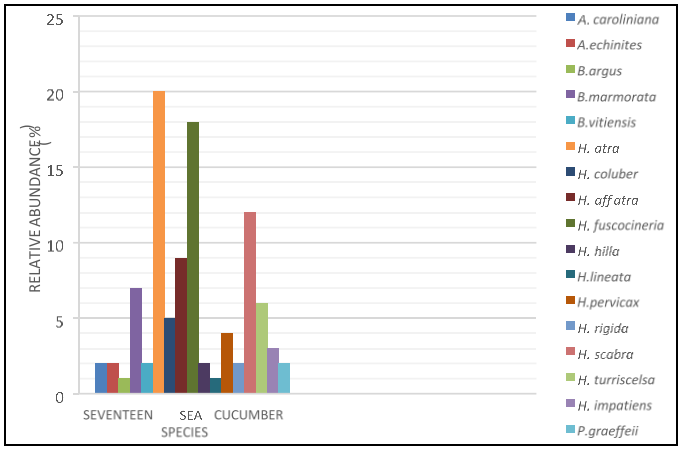

Fig 2: Relative Abundance of Aspidochirote Holothurians

Holothuria affatra was the fourth with 9% abundance. It was observed in this study that majority of these species collected on sea grass beds. Their abundance could be attributed to the organic matter on sea grasses which they feed on [15]. Moreover, these species also secrete toxin which is burgundy in color that served as their defense mechanism against predators [16]. This could further explain their abundance in the area. The fifth most abundant species was *Bohadschia marmorata* with 7% relative abundance. This species was nocturnally active. In this study, this was observed on muddy substrate associated with sea grass. Nutritional composition of muddy sediment will be one of the important factors in their abundance since they are detritivores [17]. The species that showed average abundance in the area were *Holothuria turriscelsa* (6%), *Holothuria coluber* (5%) and *Holothuriapervicax* with 4%. These species were commonly found in sea grass beds also. *Holothuriapervicax* and *Holothuria turriscelsa* readily eject their Cuvierian tubules when disturbed that serve as their defense mechanism against their predators [2]. The least abundant species were *Actinopyga caroliniana*, *Actinopyga echinites*, *Holothuria lineata*, *Holothuria impatiens*, *Holothuria rigida*, *Bohadschia argus*,

Bohadschia vitiensis and *Pearsonothuria graeffeii* with only 1-3% relative abundance value. According to Francour (1997), sea cucumbers were considered the prey of the vast array of predators like sea stars, crabs and other gastropods, these could be the culprits of their decline in number.

4. Conclusion

The species of *H. rigida, H. impatiens, Actinopyga echinites, Bohadschia argus, Bohadschia vitiensis, Actinopyga caroliniana, Pearsonothuria graeffeii, H. lineata, H. rigida* and *H. hilla* were the species with low relative abundance and in the area. These are sea cucumber species with high commercial value. Hence, it is evident that abundance of these sea cucumbers is influenced by their marketability value.

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