

AGGREGATION OF *Holothuria (Metriatyla) albiventer* SEMPER (1868) (ECHINODERMATA: ASPIDOCHIROTIDA) ON SEAGRASS AREA OF MEDANA BAY, WEST LOMBOK

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ABSTRACT

Mapping technique has not been popular in holothurian monitoring procedures. We introduced the use of global positioning system to determine the local distribution pattern and estimate the individual number of *Holothuria albiventer* at Medana Bay, West Lombok, Indonesia. During ebb tide in the afternoon, when *Holothuria albiventer* were exposed, each individual found was marked and their positions were subsequently overlaid on a thematic map of Medana Bay. The results showed that 408 individuals of the species aggregated on a specific site of 894,47 m², where coverage area of the sea grass reached 90%. Map of the distribution of holothurian populations in particular areas facilitated accuracy in estimating the potential of any holothurian species, and efficiency in monitoring efforts.

KEYWORDS: *Holothuria albiventer*, mapping technique, aggregation, density, Medana Bay, West Lombok

INTRODUCTION

Different methods applied to estimate the density and abundance of holothurians may give different results. Besides, timing of data collection *in situ* holothurian observation should be considered essentially important as several holothurian species are cryptic and/or nocturnal as species mentioned by Mercier *et al.* (2000); Wiedmeyer (1992); Purwati (2006a).

Most publications on holothurian abundance including Mendes *et al.* (2006); Uthicke (2001); Yusron (2001); Wagiyono *et al.* (1999); Triana (1996); Aziz & Sugiarto (1994); Radjab & Yusron (1994); Hartati & Wahyuni (2003); Banjar *et al.* (1988), applied transect methods on seagrass areas. Considering that each holothurian species may require specific microhabitat (Purwati *et al.*, 2006a), applying transect methods on a heterogeneous environments to estimate the individual density may need as many quadrants as could be done. Otherwise, the result may not be reliable. Manta tow technique has also been popular for holothurian monitoring such as that at the Great Barrier Reef for *Holothuria nobilis* (Uthicke & Bezie, 2000). In comparison, global positioning system marking technique to estimate density of holothurians has never been reported.

Similar to other holothurians such as *Bohadchia marmorata*, *Holothuria albiventer* shows burying behavior. However, the first mentioned species from Micronesian waters keeps emerge until dawn (Clouse,

1997), while the second mentioned species at Medana Bay back to uncover coincidentally with the raising tide (Purwati *et al.*, 2006a).

Holothuria (Metriatyla) albiventer Semper, 1868 has been reported to distribute throughout west Indo Pacific, and Ambon in Central Maluku is the type locality (Clark & Row, 1971; Semper, 1868). Among the limited reports on the presence of this species in other Indonesian waters, Sluiter (1901) describes specimen collected from Labuan Tring, Lombok during Sibolga Expedition 1899 to 1900. Whilst, holothurian collections from Ambon and Spermonde waters which have been taxonomically studied by Massin (1996; 1999) lack of this species. At Medana Bay, West Lombok, Nusa Tenggara Timur, this species shares habitat with other 21 holothurian species, which uncover themselves during lowtide in the afternoon (Purwati *et al.*, 2006a).

MATERIALS AND METHODS

Species Confirms

Because reports on the presence of *Holothuria albiventer* in Indonesian waters was rare, specimen of *Holothuria albiventer* was necessary to be identified through their integument spicules. The spicules were isolated from the dorsal and ventral skin. Domestic bleaching commonly sold in the supermarkets was used to dissolve the flesh tissue and collect the spicules. The technique and species identification referred to Clark & Rowe (1971); Semper (1868).

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Distribution and Density

Medana Bay, Pemenang, West Lombok is located at 116°7'24.30"-8'9.9" W and 8°21'54.6-31" S. The area is influenced by semi diurnal tide. Periodic monitoring previously conducted in Medana Bay showed that the holothurians appeared during low tide in the afternoon (Purwati *et al.*, 2006a; 2008 *in press*). In view of that, in situ observation was conducted on July 2007 when tide was about ebb. While reef walking, each individual found was identified and recorded in global positioning system. Collected data were then overlaid on a thematic map to locate the preferred areas of *Holothuria albiventer*. By applying this technique, the number of individuals and area of the

given species were provided.

RESULTS AND DISCUSSIONS

Species Confirms

All specimen were in medium size (less than 15 cm), tapering on both posterior and ventral tip. Skin (integument) was rough and firm. Integument was light brown with 2 rows of dark blotches on the dorsal. Papillae were short, and mainly on the lateral side, the papillae enlarged on the base. Ventral sides were slightly flattened, tube feet were not in rows, mainly emerged from the rounded white areas.

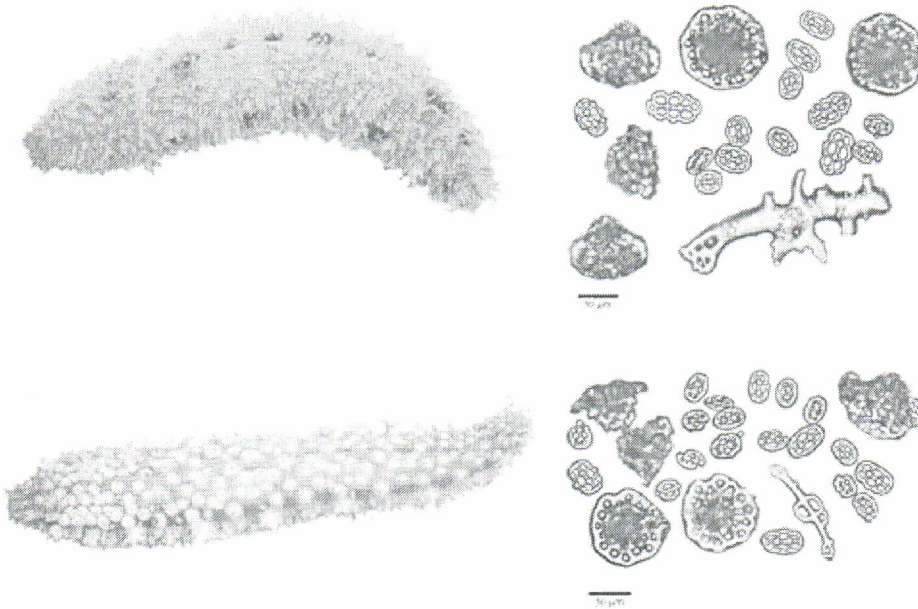


Figure 1. *Holothuria (Metriatyla) albiventer* Semper, 1868: dorsal view and spicules from the dorsal integument (above); ventral view and spicules from the ventral integument (below).

Spicules were dominated by buttons and tables which characterized members of genus *Holothuria*. Buttons were knobbed, the edge was smooth. Tables were stout, disc was with many small holes or with 4 central larger holes encircled by smaller holes. Spire was short, crown was spinous. Tables formed tackle-like in several specimens. Rods enlarged at the middle containing holes, rarely branching. Tips enlarged with holes. These characteristics suited *Holothuria (Metriatyla) albiventer* Semper, 1868 (Figure 1).

Distribution and Density

A total of 408 positions of *Holothuria albiventer* was marked. The outermost positions were bordered area of 894,47 m² (Figure 2). The density was estimated 0.44 ind. m⁻² Three individuals were found

far away from the aggregation. Other species found in the same habitat were *Holothuria scabra*, *B. similis*, *Stichopus vastus*, and *S. quadrifasciatus*.

Discussion

More than one third of national publications on holothurians give information on population density (Purwati & Darsono, 2007), which part of it was showed in Table 1. Most of them estimated densities of multi species in seagrass habitats through transect procedures. Type of distribution patterns was not clear.

Holothuria albiventer density of 0.44 ind.m⁻² or abundance of 408 individuals in area of almost 900 m² at Medana Bay may or may not be considered

dense. Fishing on this species has never been recorded during 2 year project, and the environment destruction in terms of pollution and significant habitat disturbance were minimum. Possibly, the density was ideal for the carrying capacity of study site for the *Holothuria albiventer* population. Whilst, comparison was not possible to do as this species had never been studied except in taxonomy by Sluiter (1901); Semper (1868).

The use of global positioning system to locate *Holothuria albiventer* prevented from repeated count. Map which was developed from the individual locations illustrated the distribution pattern on the habitat, and gave specific area of their microhabitat. Furthermore, the potential of given population in particular heterogenous area can be estimated more accurately. By developing such map, monitoring could be done more efficiently.

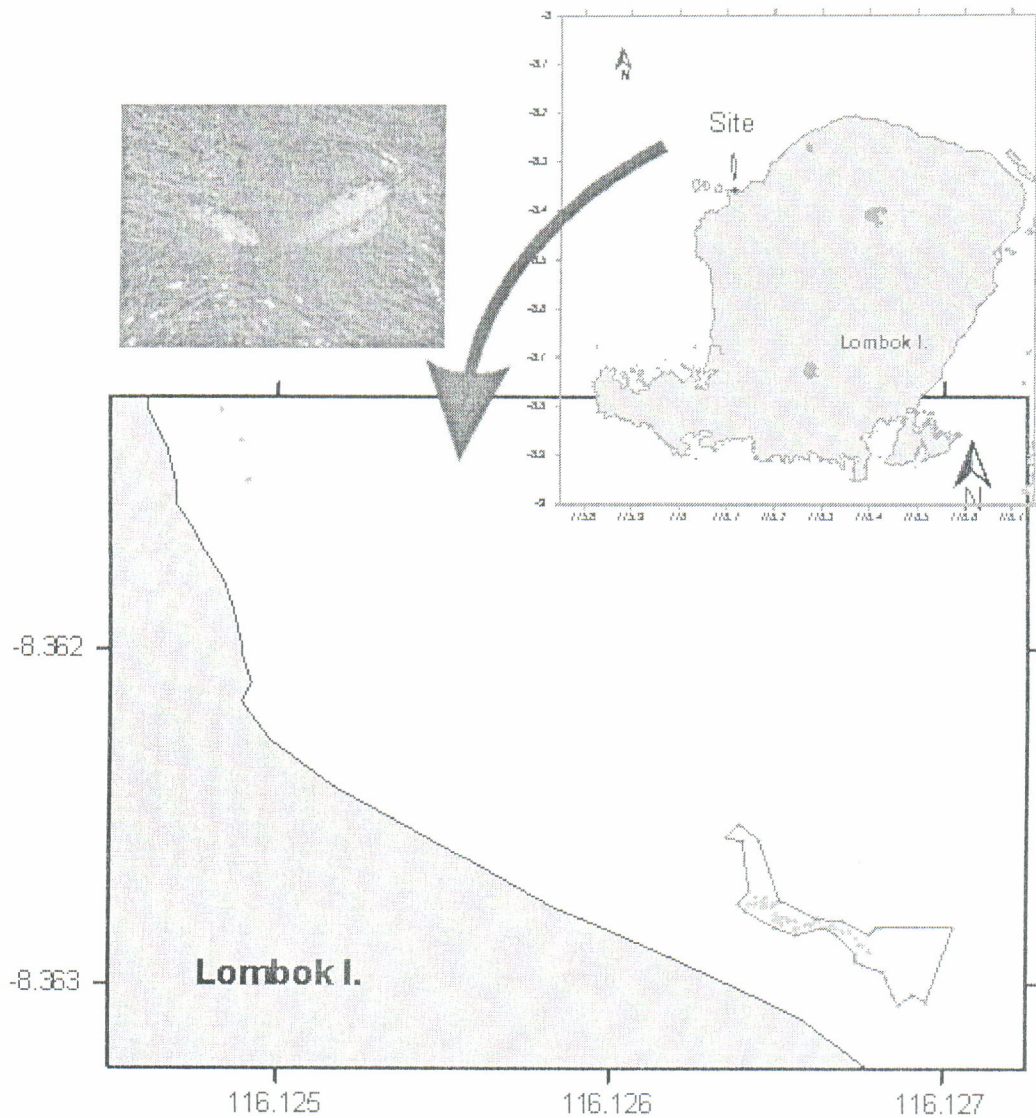


Figure 2. Map of location and local distribution of *Holothuria albiventer* at Medana Bay, west Lombok. Inset: *Holothuria albiventer* during low tide.

At Madana Bay, *Holothuria albiventer* occupied relatively small area, and habitat shared with other species including *B. similis* and *S. vastus*. This was different from *Holothuria atra* which were found inhabiting exclusive area north ward of the *Holothuria albiventer*'s (Purwati et al., 2006a). This may illustrate that a practice of transect methods may not be effective if the distribution patterns of the given species

were not knowing. In larger areas, more global positioning system operators may be needed to cover the whole area and do potitioning records simultaneously.

External factors such as water current, shelter, and food availability which play important roles on the distribution of *Holothuria albiventer* population may

change. Therefore, area occupied by this population is possible to alter, and will be an interesting area for future research to discover the clue factors of preferred microhabitats.

Mendes *et al.* (2006) differs intertidal and subtidal strata on estimating the density of *Holothuria grisea* at Santa Catarina Coast, southern Brasil. Not less than 25 quadrants (1 m² each) have been set up on 400 m² of each area. Subtidal stratum shows higher density (4.4 to 8.04 ind. m⁻²) than the intertidal stratum (1.6 to 3.8 ind. m⁻²) in all seasons except in autumn. Aggregation of the individuals are correlated with the high rock rugosity and the presence of holes and crevices. This species, unlike *Holothuria albiventer*, lives on rocky bottom.

Purwati *et al.* (2006a; b) uncovered the distribution patterns of several holothurian species at Medana Bay. At least 16 species (more than 700 individuals) occupied southern side of the bay, and aggregated into 5 groups. Using multi dimensional scalling

analyses on their sediment particle size, total organic matters, and coverage area of seagrass, it was obvious that those groups represented four microhabitats. The site where *Holothuria albiventer* lived was composed of >60% medium size particles (0.25 to 2.0 mm) and <17% fine particles (up to 0.125 mm), with total organic matters 2.62 to 4.94% (\bar{x} 3.81%). Seagrass was 40 to 62,5% coverage with dominant species *Thalassia hemprichii* and *Enhalus acoroides*. In the case of Medana Bay, such characteristics of the habitat may provide more holothurian requirements, as more species (13 species) and individuals (more than 400 individuals) were habitat shared, compared to the other microhabitats. More detailed results will be presented in a separate paper.

While mapping technique for holothurian monitoring gave more information on shallow waters, in deeper zones where global positioning system may not be reliable due to limited satellite connections, modification on the technique is necessary.

Table 1. Estimated densities of holothurian populations reported from several locations throughout Indonesian waters

Locations	Survey year	Density	Reference
Papua			
Biak, Papua	1992	<1 ind.m ⁻²	Sloan & Uktolseya (1993)
Nusa Tenggara			
Manggarai, NTT		116-250 ind. per ha	Wagiyo & Wasilun (1994)
Weri and Larantuka	1993	20 ind. per are	Prahoru & Nurasa (1994)
Ekas, Batu Ampar, NTB	1991	0.19 ind.m ⁻²	Prahoru & Suprpto (1991)
Lombok Selatan	1993	0.03-0.34 ind.m ⁻²	Aziz & Sugiarto (1994)
Medana Bay, West Lombok	2006	408/894.5 ind.m ⁻² 11 ind.m ⁻² **	Present study
Maluku			
Kulur, Saparua	1987	0.05-0.54 ind.m ⁻²	Andamari <i>et al.</i> (1988)
Morella, Ambon	1997	0.12-1.03 ind.m ⁻²	
Bay of Un, Tual	1993-1994	0.06-0.5 ind.m ⁻²	Radjab (1996)
Sulawesi			
Kolaka, Souteast Sulawesi	1988-1989	6 ind. per 8 ha 0.22-2.02 ind.m ⁻²	Nuraini <i>et al.</i> (1990)
Bunaken, north Sulawesi	1997	17 ind. 3,750 m ⁻² *** 0.96-1.02 ind.m ⁻²	Lane (1999) Tamanampo <i>et al.</i> (1989)
North Sulawesi	1992-1993	0.055-0.8 ind.m ⁻² ****	Radjab & Yusron (1994)
Sumatera			
Mentawai, west Sumatera	1997	1-29 ind. 300 m ⁻² (0.003-0.09 ind.m ⁻²)	Djamali <i>et al.</i> (1998)
Jawa			
Karimun Jawa	1992	0.009 ind.m ⁻²	Wagiyo <i>et al.</i> (1999)
Sapeken, Madura	1992	30 ind. per ha	Suprpto <i>et al.</i> (1992)
Pari I., Seribu i.	1976-1979	0.36-0.78 ind.m ⁻²	Aziz & Darsono (1997)
	1980-1994	0.13-0.18 ind.m ⁻²	

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