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Sympatric occurrence and population dynamics of *Scylla* spp. in equatorial climate: Effects of rainfall, temperature and lunar phase

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ABSTRACT

Mud crabs (*Scylla* spp.) are known to exist sympatrically in the wild. However, information on their population dynamics and the influence of climate parameters and lunar phase, especially along the equatorial region, are limited. Four sampling stations representing three seas (the Strait of Malacca, South China Sea and Sulu Sea) along the equator were selected. Mud crabs were collected using baited traps during spring tides from April 2012 to July 2013. All three *Scylla* species, *S. olivacea, S. tranquebarica* and *S. paramamosain* live in sympatry in the three seas. *Scylla olivacea* is the most prevalent species in the Strait of Malacca and South China Sea, whereas *S. paramamosain* dominates the Sulu Sea. The total crab abundance was not affected by rainfall or temperature. The abundance of *S. tranquebarica* in Strait of Malacca was negatively correlated with temperature and positively correlated with rainfall whereas the abundance of *S. paramamosain* positively correlated with temperature only at South China Sea. *Scylla tranquebarica* was the largest in terms of body size and it showed interchanging abundance trends with *S. paramamosain*. The average body size of *S. paramamosain* did not differ significantly with that of *S. tranquebarica* and *S. olivacea*. This decrease is most likely attributed to overfishing. Significant seasonal fluctuations in mean carapace width were detected in *S. tranquebarica* and *S. paramamosain*, but not in *S. olivacea*. The monthly sex ratio of all three species occasionally fluctuates above the equal sex ratio value. Lunar phase did not affect species abundance, but males and females were significantly heavier during full moon. These findings serve as a baseline of seasonal variation in crab population dynamics that are useful in mud crab fisheries and resource management.

1. Introduction

Mud crab genus *Scylla* (Portunidae) inhabits mangrove forests, estuarine and coastal intertidal zones throughout the Indo-West Pacific region (Keenan et al., 1998; Alberts-Hubatsch et al., 2016). Four species are recognised under this genus (Keenan et al., 1998) but only three of them (i.e. *Scylla tranquebarica, S. paramamosain* and *S. olivacea*) are commonly found in the coastal areas of Malaysia (Ikhwanuddin et al., 2011; Waiho et al., 2016b; Fazhan et al., 2017b). These three species are popular in the fisheries sector (Ma et al., 2006; Baylon, 2009; Fazhan et al., 2017a; Waiho et al., 2017b). Despite having the widest geographical distribution (from South Africa to Australia) (Alberts-Hubatsch et al., 2016), *S. serrata* is yet to be reported in Malaysian waters. Together with other crab species such as blue swimming crab *Portunus pelagicus*, *Scylla* spp. makes up approximately 2% of the total landing in the coastal fishery zone of Malaysia (Department of Fisheries Malaysia, 2016). However, distribution and abundance, biological information and interaction with the environment of the three *Scylla* species present in

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