

# Biometric indices and population parameters of three polynemid fishes from Batang Lassa Estuary of East Malaysia

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## ABSTRACT

The length-weight relationships (LWRs), condition factor (Kn), growth, mortality and exploitation status of three polynemid fishes, *i.e.*, *Filimanus xanthonema* (Valenciennes, 1831), *Polynemus melanochir* (Valenciennes, 1831) and *Polynemus paradiseus* (Linnaeus, 1758) from Batang Lassa River estuary were estimated. Fish samples were caught during April 2019 to September 2020 using the ESBN (locally called *Gnian*) having 1.25 to 4.00 cm mesh size. The total length (TL) and body weight of each individual fish was measured to the nearest 0.1 cm and 0.01 g respectively. The growth coefficients (*b*) for *F. xanthonema*, *P. melanochir* and *P. paradiseus*, were 2.880, 2.717 and 2.724 with the  $R^2$  values 0.956, 0.972 and 0.936 respectively. Estimated growth coefficients indicated a negative allometric growth pattern for all three threadfin fishes. To date, information regarding length-weight relationships for *F. xanthonema* and *P. melanochir* is insufficient whereas the information is available for *P. paradiseus*. About 40–48% of fishes exhibited flat or thin body shape ( $Kn < 1$ ), 48–50% were rounded or fat ( $Kn > 1$ ) and only 1–3% of fishes showed proportional body shape ( $Kn = 1$ ). The growth parameters  $L_{\infty}$ ,  $K$  and  $\phi'$  were estimated at 15.75 cm,  $0.95 \text{ yr}^{-1}$  and 2.37 for *F. xanthonema*; 27.61 cm  $0.87 \text{ yr}^{-1}$  and 2.82 for *P. melanochir*; and 27.30 cm,  $0.58 \text{ yr}^{-1}$  and 2.64 for *P. paradiseus*; respectively. The estimated natural mortality ( $M$ ) included 2.10, 1.69 and  $1.30 \text{ yr}^{-1}$ ; the fishing mortality ( $F$ ) 0.57, 0.67 and  $0.60 \text{ yr}^{-1}$ ; and exploitation ratio ( $E$ ) 0.21, 0.28 and 0.31 for *F. xanthonema*, *P. melanochir* and *P. paradiseus* respectively. The study concluded that the stocks are still under exploitation ( $E < 0.5$ ) condition. However, the studied Batang Lassa estuary could be a potential nursery ground considering the minimum lengths of 5.0, 3.8 and 4.0 cm for *F. xanthonema*, *P. melanochir* and *P. paradiseus* respectively. Therefore, management initiatives are needed to escape juvenile catches.

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## INTRODUCTION

Batang Lassa, a deltaic estuary, is situated in the North-West area of Borneo Island, East Malaysia, which meets directly in the South China Sea (Pacific Ocean). The estuary is a dynamic ecosystem which supports multitudes of fish and other aquatic organisms. Malaysia is identified as one of the world's mega diversity centers with 1951 fish species (Chong, Lee & Lau, 2010) where East Malaysia (part of Borneo Island) contributes to a substantial share of fishery resources. Batang Lassa estuary, a part of the outfall of the large catchment river 'Rajang', supports a variety of commercial fishes.

Polynemids are an important fishery resource in Malaysia and in other tropical and sub-tropical regions. The species under the family Polynemidae are commonly known as threadfins. *Filimanus xanthonema* (Valenciennes, 1831), a small sized species, commonly known as the yellowthread threadfin is mainly distributed in the eastern part of the Indian ocean and the western part of the Pacific Ocean (Motomura, 2004) which extends toward the Bay of Bengal coast, Indonesia as well as Malaysia including the Borneo Island. *Polynemus melanochir* (Valenciennes, 1831), commonly known as the blackhand paradise fish, is a medium sized species, distributed from lower Mekong and Borneo Island (East Malaysia and Indonesia) (Motomura, 2004). *Polynemus paradiseus* (Linnaeus, 1758) or commonly known as paradise threadfin is a medium sized species, with known distribution from the eastern Bay of Bengal and Pacific Ocean coast including Thailand and Indonesia (Motomura, Kullander & Yoshino, 2002).

Length-weight relationship (LWR) and condition factors (Kn) are important parameters for fish life and population biometric characteristics. They provide valuable information about the condition factor of fish and the robustness, and are useful for species management and conservation of any ecosystem (Arshad, Amin & Nuradiella, 2012; Lawson, 2011; Yu-Abit, 2011).

Knowledge on the population parameters of fishes is a prerequisite for better planning and management. The primary aspect of stock assessment is to provide guidelines for optimum exploitation of any important aquatic living resources (Sparre & Venema, 1998). Scientific documents and databases use biological data for fisheries management. However, the availability of data on population parameters is still lacking with respect to many species and geographical variations which leads to data-poor fish stock management. To date, information on the population dynamics of *P. paradiseus* is available for sub-tropical regions (Nabi, Hoque & Rahman, 2007; Hossain, Sayed & Rahman, 2015; Chaklader, Siddik & Ashfaqun, 2016; Hossen, Hossain & Ali, 2017) but not so much on *F. xanthonema* and *P. melanochir*.

There are several studies conducted by different researchers on biometric and population dynamic parameters of different species under polynemidae which included *F. xanthonema* (Feltes, 1991), *P. paradiseus* (Hossain, Sayed & Rahman, 2015;