

ABSTRACT

The present thesis describes the stock structure, reproductive biology and trophodynamics of *Penaeus monodon* (Fabricius) landed at Digha coast, West Bengal, India, during January 2011 to December 2013. The average annual catch of *P. monodon* was 281.29 ± 9.67 t, which contributed 0.41% to the total trawl net catches and 1.94% contribution to total shrimp catches at Digha coast. Monthly mean landing of 28.13 ± 0.97 t was recorded from trawl nets. Peak landing was observed from June to November. A total of 633 numbers of *P. monodon* were collected and examined of which 391 were females and 242 were males. The length – weight relationship of the species for males, females and pooled population were: $W=0.076636L^{2.40936}$, $W=0.026828L^{2.38872}$ and $W=0.018629L^{2.60916}$. Highest average condition factor observed was 1.5 ± 0.54 in June for males and 1.65 ± 0.05 in January for females. The overall annual sex ratio was 1:1.6 (males: females). The Gonado Somatic Index (GSI) was higher between January to July. The highest maturity percentage was observed in February (88.89%) and June (85.4%) and the length at first maturity for females was 163.5 mm.

In males, Gastro Somatic Index (GaSI) was high in March – April and again in July, August and September. Similarly, females exhibited high GaSI from July to September. The feeding intensity was studied in relation to months and active feeding was observed in November – February. Highest feeding was in February and lowest feeding was in June. The feeding intensity in relation to maturity stage was studied and active feeding was observed in maturing females, in comparison to immature and spent females. The feeding intensity in relation to size was reported with active feeding noticed from 170 - 179 mm size group. Highest feeding intensity was

observed in 230 – 239 mm group, whereas from 260 - 269 mm sizes and onwards, stomachs were empty.

The growth parameters 'L α ' and 'k' estimated using the ELEFAN I programme for males and females were 24.89 cm and 29.3 cm and 1.24 year⁻¹ and 0.94 year⁻¹, respectively. The asymptotic weight was 170.48 g for males and 294.85 g for females and size at first capture (L_c) was 16.91 cm at an age (t_c) of 0.72 year for males and 19.36 cm at an age of 1.05 year for females. The growth performance index (ϕ) was 2.94 and 2.91 for males and females and t₀ was -0.097 years for both sexes. The von Bertalanffy growth equation derived was $L_t = 24.89 [1 - e^{-1.24(t + 0.097)}]$ for males and $L_t = 29.3 [1 - e^{-0.94(t + 0.097)}]$ for females. The longevity was 2.05 years for males and 3.09 years for females. The length at first capture was 16.86 cm for males and 19.36 cm for females. Natural mortality (M), fishing mortality (F) and total mortality (Z) computed were 2.35, 3.94 and 6.28 for males and 1.73, 3.12 and 4.85 for females, respectively. The exploitation rate (U) was 0.46 and exploitation ratio (E) was 0.63 for males and the exploitation rate (U) was 0.42 and exploitation ratio (E) was 0.64 for females. The probability of capture (L₅₀) was 19.36 cm. The average annual total stock (P) biomass (B) and MSY were 308 t, 36 t and 112 t for males and 331 t, 45 t and 109 t for females. The major peak in recruitment for males was from April – August and for females, the major peak in recruitment was from May - August. The smallest length of recruitment was 12.25 cm for male and 15.25 cm for female. Annually, 10.78 million were recruited into the fishery.