ANALYSIS

4(10), April 1, 2013

ISSN 2278–5469 EISSN 2278–5450

Discovery

Length frequency analysis of the great clam, *Meretrix Meretrix* along south west coast of Maharashtra, India

Sawant PP[1], Mohite SA[2]☼

1. Research Scholar. Dept. of Fisheries Biology, College of Fisheries Biology, Ratnagiri, Maharashtra, India
2. Assistant Professor, Dept. of Fisheries Biology, College of Fisheries Biology, Ratnagiri, Maharashtra, India

☼Corresponding author: Assistant Professor, Dept. of Fisheries Biology, College of Fisheries Biology, Ratnagiri, Maharashtra, India, Mail: sa_mohite@yahoo.co.in

Publication History
Received: 19 February 2013
Accepted: 24 March 2013
Published: 1 April 2013

Citation
Sawant PP, Mohite SA. Length frequency analysis of the great clam, *Meretrix Meretrix* along south west coast of Maharashtra, India. *Discovery*, 2013, 4(10), 19-21

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ABSTRACT

Vast beds of the venerid clam, *Meretrix meretrix*, known as the "great clam", are found along the south west coast of Maharashtra. Though this clam is harvested on a subsistence level, it supports a good fishery. The continuous exploitation is exerting a pressure on this clam. During the present work, the clam stock was studied on the basis of length frequency analysis using ELEFAN – II software of FAO. Length of the specimens ranged between 21- 55 mm. The asymptotic length (L_∞) obtained in the present study was 58.80 mm. The Length at first maturity was estimated at 30 mm. This clam attained the length of 30 mm at first year, 42 mm at second year and 45 mm at third year. The analysis showed a curve indicating the spawning period in September with the recruitment in October.

Keyword: *Meretrix meretrix*, length frequency, ELEFAN II, asymptotic length.

1. INTRODUCTION

Among the exploited bivalve resources of India, clams are by far the most widely distributed and abundant. The clam catch is supported by Genus *Paphia, Meretrix, Katelysia* and *Villorita* belonging to Family Veneridae. Though it has such a tremendous demand in export, these clams are fished on a subsistence level on the west coast of India. Many bivalve species contribute to the subsistence fisheries, with some of these species are being considered as the candidate species for coastal aquaculture. The venerid clam, *M. meretrix*, known as the "great clam" supports good fisheries along the Maharashtra coast and the North Kanara coast (Mohite and Mohite, 2012). The present work was therefore undertaken to study the length frequency distribution *M. meretrix* along the south west coast of Maharashtra. Information about these aspects of clam is essential to understand the growth pattern and subsequent gonad developments leading to spawning. This information would be beneficial in the culture programmes and in determining the best season for the fishery, spawning and growth patterns.

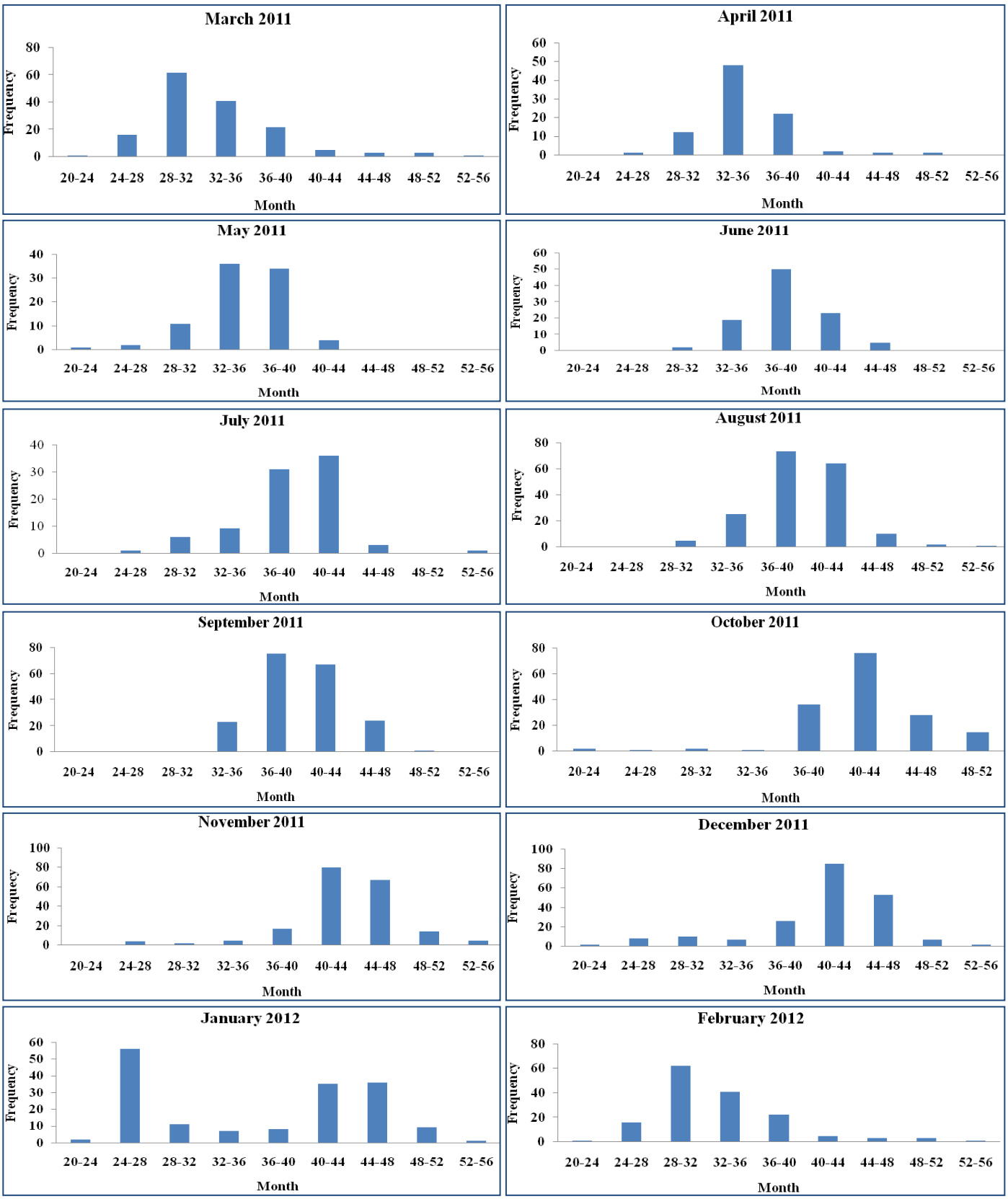

Figure 1

Monthly length frequency distribution of *M. meretrix*

2. MATERIALS AND METHODS

The data was collected from March 2011 to February 2012, i.e. for one year and interpreted by using modal progression analysis by Bhattacharya (1967) method. For this, total 2400 specimens were collected, at weekly intervals from the selected stations. Shell length of each specimen was measured with accuracy of 0.1 mm using vernier calipers. The clams were grouped into class intervals of 3 mm. The length frequencies were converted in to percentages for

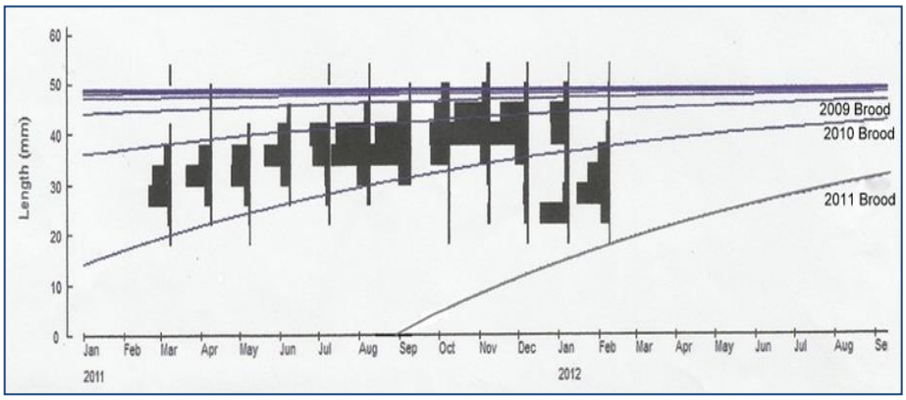

Figure 2

Modal progression of the length frequency observed, drawn by using ELEFAN – II method

further analysis. Modes recognized in the length frequency data for the period of one year were represented in the form of scatter diagram, following the method used by Devaraj (1983). The size frequencies and the length classes were represented by area graph. From the size frequency analysis, dominant modes of size distribution of *M. meretrix* were noted and the value of the growth line at every third month was taken as growth for a quarter (Appukkuttan, 1996). The shifting of the mode values in the graphs for different months was used as the base for interpretation of growth. The length frequencies are used for separating the polymodal length frequency distribution into modal lengths of different year classes. The estimation of growth parameters was also supplemented by analyzing the data by using FiSAT (FAO - ICLARM Stock Assessment Tools) computer software package developed by Gayanilo et al. (1996), which includes Direct fit of length frequency data by ELEFAN – II (Electronic Length Frequency Analysis) method introduced be Pauly and David (1981) and developed into a computer software package by Gayanilo et al. (1988).

3. RESULTS

Monthly random samples of clams collected from the clam beds ranged between 20 – 55 mm, mainly clustering between size groups 28 – 32, 32 – 36, 36 – 40 mm and 40- 44 mm. It was observed that modal groups of 36– 40 mm, 40- 44 mm size clam was caught during all the months along the south west coast of Maharashtra, India (Fig. 1). Shifting of the modes to next modal class was evident from the ELEFAN- II analysis. The analysis showed a curve indicating the broods or spawning periods. The recruitment was observed in October (Projected values). The length of 30 mm was attained at the end of the first year, 42 mm at second year and 45 mm at the end of third year (Fig. 2).

4. DISCUSSION

Length of the specimens of *M. meretrix* collected from the collected from clam beds of estuarine areas of south west coast of Maharashtra ranged from 21- 55 mm. The asymptotic length (L_∞) obtained in the present study was 58.80 mm. The Length at first maturity was estimated at 30 mm. The length of 30 mm was attained at the end of the first year, 42 mm at second year and 45 mm at the end of third year. In the Vellar estuary, according to Jayabal and Kalyani (1986) *M. meretrix* attains 47 and 61.5 mm in the first and second years respectively. The estimated growth coefficient K and $L\infty$ for *M. casta* from Mulky estuary, Dakshin Kannada was 0.0051/day and 53 mm respectively. And t_0 in the von Bertallanffy growth equation was derived as -49 days. Hence von Bertallanffy growth equation for *M. casta* was written as $Lt = 53\ (1\text{-}e)^{-0.0051(t + 49)}$. *M. casta* attains a length of 36.6 mm in 6 month, 42.6 mm at the end of one year, while. Simillarly, growth coefficient K, t_0 and $L\infty$ for *P. malabarica* was given 0.0039/day, = -62 days and 59 mm respectively. The von Bertallanffy growth equation was written as $Lt = 59\ (1\text{-}e)^{-0.0039(t + 62)}$. The estimated length of *P. malbarica* is 36.3 mm in 6 months, 43.1 mm in 9 months and 48.1 mm in one year (Rao, 1987).

Balasubramnian and Natarajan (1988) have reported the age and growth of *M. casta* and observed a mean growth of 17 mm in six months and the growth at the end of one year was found to be about 24 mm. Narasimham et al., (1988) studied the clam bed environmental conditions, reproductive biology, condition index, sex ratio and age and growth of *M. meretrix*. Monthly samples of about 20 clams varying in length from 14.6 to 91 mm were collected during November, 1987 to October, 1988 by hand-picking from the Korampallam creek. The growth coefficient K was estimated at 0.0263 (monthly) and the asymptotic length, $L\infty$ as 99.1 mm. The arbitrary origin of the growth curve, t_0 was estimated as – 0.0745 year. The Von Bertalanffy growth equation for growth in length in *M. meretrix* was achieved as $Lt = 99.1\ (1\text{-exp})^{-0.3221\ (t + 0.0745)}$.

Thangavelu and Poovannan (2007) observed the size of *M. casta* were larger which ranged between 44 and 55 mm with a mean size of 49.44 mm. Thangavelu et al., (2008) observed the size of *M. meretrix* ranged between 39 and 63 mm with a mean size of 51.6 mm. Growth and population dynamics of the short-neck clam *P. malabarica* from Dharmadom estuary in north Kerala was studied for one year (December 2003-November 2004). The age and growth of *P. malabarica* were studied by continuous sampling of the population and analyzing the changes in size frequency distribution. The growth parameters of the von Bertalanffy growth function was $L\infty$ = 59 mm, annual K= 0.92, and t0 = -0.1596. The life span was estimated as 2.5 to 3 years. *P. malabarica* in the estuary attains a length of 35.5 mm and 49.6 mm respectively at the end of the first and second year. The length at first maturity (Lm) was estimated at 22 mm (Sujitha and Nasser, 2009).

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