



Age and growth studies of the Thinspine Marine Catfish *Plicofollis tenuispinis* (Day, 1877) landed along the Veraval centre of the Saurashtra coast, India

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Abstract

The present instigation on Thinspine sea catfish, *Plicofollis tenuispinis* during the year March 2016 to February 2017 were undertaken for the estimation of age and growth of this species. Were $K = 0.35$, $L_{\infty} = 66.5$ cm.

Keywords: Age, growth, marine.

Introduction

The one of the largest fish order Siluriformes which represents Species richness of Catfishes of the world by at least 3,407 species in over 37 families and represents approximately 10.8% of all fishes and 5.5% of all vertebrates of the world^{1,2}.

The studies along the Dakshina Kannada coast carried out by Vasudevappa and James³, their investigations on *Tachysurus dussumieri*, were estimated age and growth. The Von Bertalanffy⁴ growth equation was $L_t = 1027 [1 - e^{-0.1666(t+0.50)}]$. Reveled that the estimated life span of this Species was about seven years.

Chidambaram⁵ worked out on the development of *Arius jella* (Day) reported that the development of the egg of the species was very slow and the time taken for was 2 months. The embryo was marked out in the egg from third day. The eyes were appeared on the following day. The growth of the embryo was gradual up to 1-20 days and later 10 days the growth was rapid. The young hatches on or after 30 days from the time of hatching it takes another month to develop as a young one.

The present study undertaken to estimation the age and growth parameters based on length data using the Von Bertalanffy growth equation (VBGF) equation.

Materials and methods

This investigation were undertaken along the coastal waters at Veraval (21°35'N, 69°36'E), which is situated along the Saurashtra coast, India, during the year March 2016 - February 2017.

Materials: Thin spine sea catfish samples harvested and freshly Marketed at Veraval fishing harbor, Immediately the Collected Samples were transported in Thermocoal box and Insulated plastic crates were utilized for specimens transportation from the Landing site to the Laboratory, specimens similarities was

carefully observed with that of Food and Agricultural Organization of the United Nation (FAO) species identification sheet of the western Indian Ocean area FAO 57^{2,6}. Materials utilized for this Research investigation were is Measuring board with 1 Meter standard Scale reader in mm, Electronic weighing balance (capacity = 5kg, sensitivity = 50g), Electronic weighing balance (capacity = 200g, sensitivity = 10mg), Thermocoal and Insulated Ice box (5kg, capacity), Specimen recording sticky labels, wet absorption cloth for wiping out surface slime and wastes toxic and exogenous wasted materials, specimen bottles, forceps, formalin (4-10%) based on the size of individual specimen, personal computer with installed FiSAT II software.

Methodology: This investigation data collection along the marine fish landing centre of the Veraval fishing harbor which located at Saurashtra coast. The multi stage stratified random sampling method developed by CMFRI were followed Srinath *et al*⁷.

Von Bertalanffy growth parameters: The collected length frequency data were analyzed by following Von Bertalanffy growth parameters such as asymptotic length (L_{∞}) and growth co-efficient (K) were estimated using the ELEFAN I (Electronic Length Frequency Analysis) module of FiSAT software Gayanilo *et al*⁸.

Length at Age ($L_t = L_{\infty} (1 - e^{-k(t-t_0)})$)

Growth performance index (Φ): The growth performance index was calculated from final estimates of Asymptotic length (L_{∞}) and Growth coefficient (K) Pauly and Munro⁹ adopted the formula:

Growth Performance Index (Φ) = $\log K + 2 \log L_{\infty}$

Where: Φ = growth performance index, L_{∞} = asymptotic length, K = growth coefficient.

Age at zero length: The age at zero length (t_0) was calculated from Pauly's empirical equation Pauly¹⁰, given below:

$$\text{Log}(-t_0) = -0.392 - 0.275 \log L_{\infty} - 1.0381 K$$

Where: t_0 = age at zero length, L_{∞} = asymptotic length, K = growth coefficient.

Results and discussion

Details of the monthly size of the sampling and length range of individual specimens in monthly sampling. The lowest length

class observed during present study was 160 to 180mm, which considered as length at recruitment and first capture. The maximum length of the Specimen were recorded is 630mm during the month of December and its estimated average weight were using FiSAT-2 software was 2521.95g and lowest length mid class was 17mm and its mean weight 52.52g.

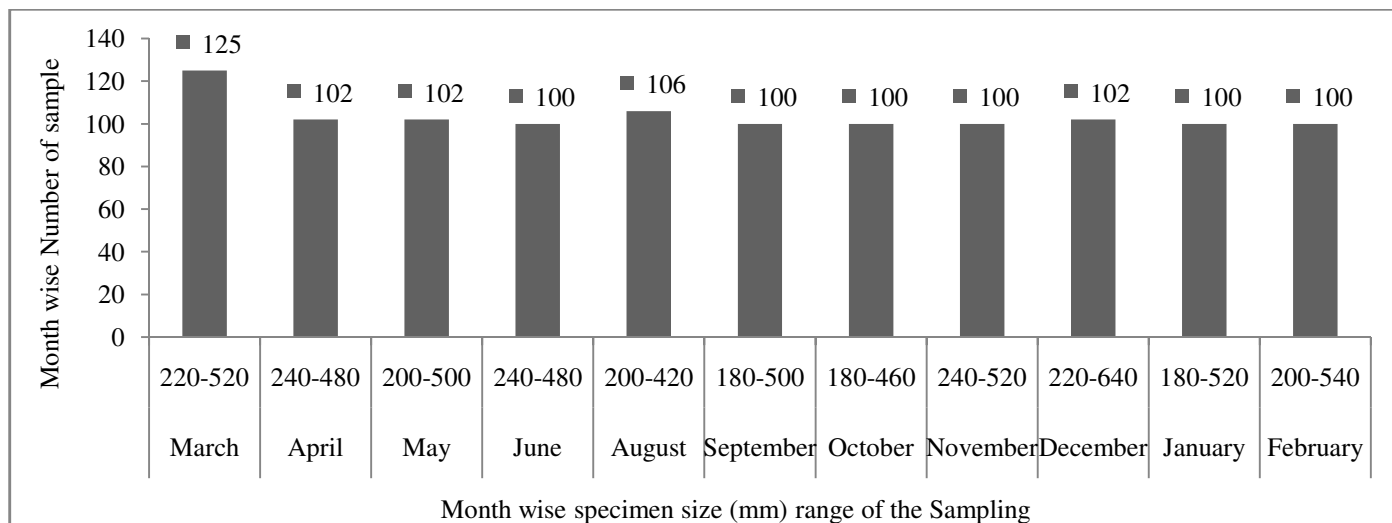


Figure-1: Month wise size (number/month) and length (mm) range of the Samples.

Table-1: Length (mm) range of the *P. tenuispinis* samples/month.

Month of sampled	Length (mm) range of samples/month	Sample numbers/month
March 2016	220-520	125
April	240-480	102
May	200-500	102
June	240-480	100
August	200-420	106
September	180-500	100
October	180-460	100
November	240-520	100
December	220-640	102
January 2017	180-520	100
February	200-540	100
Total (year)		1137

Note: samples were not available during the month of the July at landing centre of Veraval due to actively participation of the fishermen in seasonal closure of the fishing ban.

Estimation of age and Growth parameters of *P. tenuispinis*:

The population growth parameters are required to estimate the major dynamic changes in population at present level exploitation impacts on the stock. growth parameters of this Species were estimated using ELEFAN I (Electronic length frequency analysis) computer programme were as asymptotic length (L_{∞}) and Growth coefficient (K) were 66.5cm (665mm) and 0.35. The estimated growth performance index (Φ) was 3.189711 and the age at theoretical zero length was -0.09 years and size in at birth 20mm. The estimated length at age was showed in and growth curve plotted as figure. 4.10. The VBGF

equation adopted for estimation as; $L-t = 66.5[1 - e^{-0.35(t+0.09)}]$.

The estimated length at first capture (L_{c50}) was at 27.48cm (274mm) age 1.3 year. Lowest length class recorded during present study was 16-18cm (160-180mm) its age 0.7-0.9 year.

Raje *et al*¹¹ noticed that estimated values of L_{∞} and K were 518 mm and 0.65 yr⁻¹ respectively long the Mumbai waters, present study observed L_{∞} is higher K were slightly less it is may be due to poor feeding behavior, slow growth rate.

Table-2: Comparison of population growth parameters of *P. tenuispinis* from different localities with present study at Veraval.

Species	t_0	L_{∞} (cm)	K	Location	Reference
<i>P. tenuispinis</i>	-0.63	58	0.22	Persian gulf (Iran)	12
<i>P. tenuispinis</i>	-0.69	61	0.2	N-W Persian gulf	13
<i>P. tenuispinis</i>	-0.18	82	0.21	India	14
<i>P. tenuispinis</i>				India	15
<i>P. tenuispinis</i>				Oman	16
<i>P. tenuispinis</i>	-0.09	66.5	0.35	Veraval, India	current study

Note: t_0 =Theoretical age at zero, L_{∞} = Asymptotic length, K= growth constant.

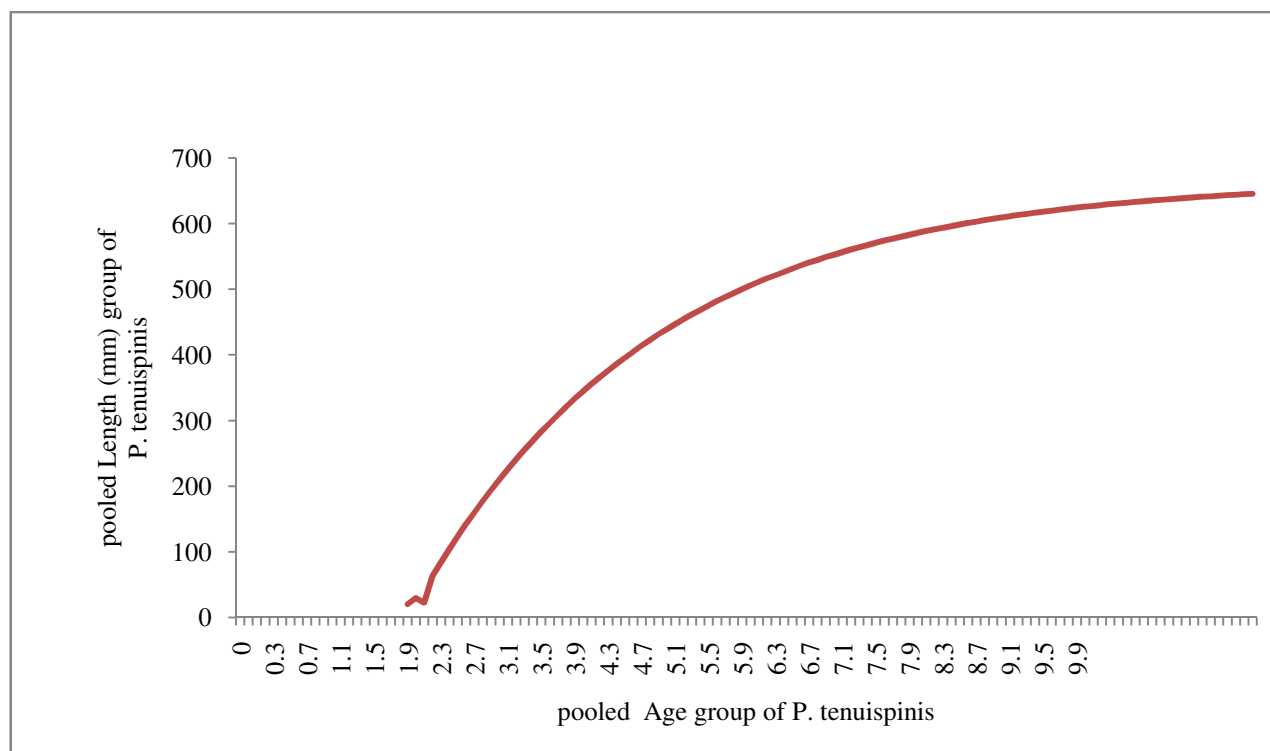


Figure-2: Growth curve of length at age of *P. tenuispinis*.

Table-3: Length (mm) with respect at age of the *P. tenuispinis* estimated using VBGF equation.

Age (year)	Length (mm)
0	20
1	210.48
2	344.7
3	439.29
4	505.94
5	552.92
6	586.02
7	609.34
8	625.78
9	637.36
10	645.52

Table-4: Estimated population parameters.

Parameters Specific indication	Values
L_{∞} (mm)	665
K	0.35
t_0	-0.09
$t_{\max}(\text{year})$	8.48
M	0.54
Estimated size at birth (mm) age at Zero year	20
Age at first maturity t_{m50} (year)	2.1
M/K	1.54
Length at 1 st capture L_{c50}/L_{∞}	0.41
Growth performance Index (ϕ)	3.18
Age at Maturity (year)	2.1

Vasudevappa and James³ investigations on *Tachysurus dussumieri*, estimated age and growth studies revealed that this species attains 23; 35; 47.1; 55.7; 61.3 and 66.2 cm respectively at the end of first to sixth year. While the during the present studies estimated that *P. tenuispinis* attain 20mm Length at age birth and year wise starting from first year to nine year length

group of *P. tenuispinis* which is noticed during the Current studies as 210.48mm, 344.70mm, 439.29mm, 505.94mm, 552.92mm, 586.02mm, 609.34mm, 625.78mm, 637.36mm. While asymptotic length calculated from present investigation were is 645.52mm, represents the species Asymptotic Age 10year (t_{∞}).

Conclusion

The present studies at Veraval centre of Saurashtra coast along the maritime state of Gujarat which had longest coastline along the India Coast. Thinspine seacatfish locally known as Kaggada, this species available throughout the year of study and there is a demand for large size group for edible eggs in domestic market, The Estimated Population growth parameters during the Current studies were, L_{∞} and K were 665mm and 0.35 respectively. The age at birth were (t_0) was -0.09 years. Over harvesting efforts were observed at Veraval centre for both Larger sizeand Smaller young ones to the domestic market as fresh and dry fish consumption, as most of the Local population of the Veraval Vegetarians locally harvested fish catch were transported from Veraval to Different cities of the India.

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