

Length-weight relationship in the marine fish *Sphyraena jello* (Cuvier, 1829) collected from Karaikal south east coast of India

¹M. Bharathi*, and ²Dr. A. Christy Ponni

Research Scholar, P.G and Research Department of Zoology, TBML College, Porayar - 609 307, Tamil Nadu, India.

Head of the Department P.G and Research Department of Zoology, TBML College, Porayar - 609 307, Tamil Nadu, India.

Corresponding author: Dr. A. Christy Ponni, P.G and Research Department of Zoology, TBML College, Porayar - 609 307, Tamil Nadu, India.

Abstract: Length-weight relationship of marine fish *Sphyraena jello* was studied for one year in Karaikal marine area south east coast of Pondicherry India. In the present observation, 80 specimens were collected during January 2016 to December 2016. The samples composed of 40 male and 40 female fishes, respectively. The relationship between body weight, total length and standard length in total specimens were measured maximum and minimum. The body weight varied male fishes 255.25 to 1297.5 grams and female fishes 354.25 to 1509.25 grams. Total length of male fishes ranged from 30.47 to 65.75 cm and female fishes 32.45 to 71.57 cm respectively. The standard length of male fishes varied from 25.87 to 58.32 cm and female fishes 27.65 to 64.57 cm respectively. The maximum body weight, total length and standard length were noted September 2016 and minimum body weight, total length and standard length were reported October 2016 during the study period.

Index Terms: Total weight, Total length, Standard length, Maximum and Minimum.

1. INTRODUCTION

Length-weight relationship is important in studying fish biology. The evaluation of the general condition and well being of the fish is also determined, the absolute growth is the daily increment in weight of fish. This relationship serves three purposes viz. i) to determine the type of the mathematical relationship between two variables so if one variable is known, the other could be computed; ii) the relative condition can be estimated to assess the general well being of the fish and type of growth, i.e., whether isometric or allometric and iii) it helps to estimate the potential yield per recruit in the study of fish population dynamics. In fishes, generally the growth pattern follows the cube law. Such relationship for the fishes will be valid when the fish grows isometrically.

Fish can attain either isometric growth, negative allometric growth or positive allometric growth. Isometric growth is associated with no change of body shape as an organism grows. Negative allometric growth implies the fish becomes more slender as it increases in weight while positive allometric growth implies the fish becomes relatively stouter or deeper-bodied as it increases in length¹.

Length-weight data of fish have in general used moreover to systematically express the relationship between weight and length for purposes of exchange from one to another or measuring individual difference from an expected weight at a given length as an dial of condition. Asian seabass, *Lates calcarifer* (Bloch) - a catadromous centropomid perch, is a competitor species for brackish water aquaculture in India and its prospective for farming has increased after the successful induced propagation². Length – weight relationship (LWR) parameters are valuable in fisheries science in several ways, to estimate weight of individual fish from its length, to calculate condition indices, to evaluate life history and morphology of populations belonging to diverse regions³. Length-weight relationship is of great importance in fishery assessments. The relationship indicates the taxonomic differences and events in the life history, such as metamorphosis and the onset of maturity. It also denotes the fatness and general well-being of a fish or groups of fishes.

To obtain the relationship between total length and other body weight are also very much essential for stabilizing the taxonomic characters of the species⁴. Length-weight relationships are important in fisheries science, notably to raise length frequency samples to total catch, to estimate biomass from underwater length observations, to evaluate fish growth and body condition *etc.* Length and weight data are a useful and standard result of fish sampling programs. Biswas *et al.*⁵ were observed that Culture of Asian seabass *Lates calcarifer* (Bloch) in brackish water tide-fed ponds growth and condition factor based on length and weight under two feeding systems. Besides this, LWR can also be used in setting yield equations for estimating the number of fish landed and comparing the population in space and time⁶. Length – weight relationship (LWR) of fishes are important in fisheries and fish biology because they allow the estimation of the average weight of the fish of a given length group by establishing a mathematical relation between them^{7&8}.

II. MATERIALS AND METHODS

Fish samples *Sphyraena jello* were collected from Karaikal area, south east coast of Pondicherry, India, which is located at latitude 11° 05' North South and longitude 79 ° 5' East West on Southern part of India. These characters include variations measurements of fish body weight, total fish length and standard length. Conventionally, the measurements are taken with the help of shape, pointed needle-like dividers or dial-reading calipers. For accurate readings, a stainless steel ruler with measurements to millimeters is recommended (Gupta and Gupta). The morphometric measurement of the study fish *Sphyraena jello* were recorded from January 2016 to December 2016. The lengths (cm) of fishes were measured by using scale and weights (g) of fishes were measured by using electronic digital top-pan balance (Chyo, Japan).

III. RESULTS

In the present study, the fish samples were collected from Karikal area, south east coast of Pondicherry, India. Morphometric study of the experimental fish's *Sphyraena jello* body weight, total length and standard length values are presented in Table 1.

The length and weight relationship of fish *Sphyraena jello* were recorded and presented in Table 1 and Fig. 1 - 3. The relationship between body weight, total length and standard length in total specimens were measured maximum and minimum. The body weight varied male fishes 255.25 to 1297.5 grams and female fishes 354.25 to 1509.25 grams (Fig. 1). Total length of male fishes ranged from 30.47 to 65.75 cm and female fishes 32.45 to 71.57 cm respectively (Fig. 2). The standard length of male fishes varied from 25.87 to 58.32 cm and female fishes 27.65 to 64.57 cm respectively (Fig. 3). The maximum body weight, total length and standard length were noted September 2016 and minimum body weight, total length and standard length were reported October 2016 during the study period. The comparatively highest values of body weight, total length and standard length of fish *Sphyraena jello* were observed in female fishes.

Table 1: Length and weight relationship of fish *Sphyraena jello* collected from Karikal south east coast of Pondicherry India (January 2016 to December 2016).

Month and Year	Body weight (g)		Total Length (cm)		Standard length (cm)	
	Male	Female	Male	Female	Male	Female
Jan. 2016	424 ± 8.84	605 ± 5.38	38.55 ± 0.73	47.88 ± 1.23	32.44 ± 0.89	44.69 ± 0.69
Feb. 2016	507.75 ± 7.36	653 ± 7.18	43.15 ± 0.64	50.42 ± 0.66	37.97 ± 1.15	45.61 ± 0.78
Mar. 2016	612.25 ± 9.98	753.25 ± 8.77	49.52 ± 0.60	55.22 ± 0.81	44.52 ± 0.88	49.15 ± 0.53
Apr. 2016	708.25 ± 8.92	853.75 ± 7.76	55.52 ± 0.97	57.45 ± 0.97	48.35 ± 0.94	50.22 ± 0.69
May 2016	822.25 ± 6.18	930.75 ± 17.02	58.2 ± 2.03	60.52 ± 0.67	51.12 ± 1.19	55.07 ± 1.14
Jun. 2016	862.75 ± 22.29	1056.25 ± 34.24	59.22 ± 0.63	64.47 ± 0.91	53.82 ± 0.97	55.82 ± 0.78
Jul. 2016	928.25 ± 12.09	1311.5 ± 11.47	61.33 ± 1.26	66.27 ± 0.88	56.55 ± 0.71	59.22 ± 0.91
Aug. 2016	1091.75 ± 24.54	1413.75 ± 30.72	62.05 ± 1.76	70.42 ± 0.69	54.55 ± 1.99	62.12 ± 0.38
Sep. 2016	1297.5 ± 12.87	1509.25 ± 16.58	65.75 ± 0.83	71.57 ± 0.92	58.32 ± 0.35	64.57 ± 0.61
Oct. 2016	255.25 ± 8.73	354.25 ± 10.81	30.47 ± 0.69	32.45 ± 0.88	25.87 ± 0.81	27.65 ± 0.62
Nov. 2016	323.25 ± 9.06	415.75 ± 9.10	32.57 ± 0.82	39.67 ± 0.49	27.27 ± 1.05	34.57 ± 0.59
Dec. 2016	549.75 ± 10.37	605.75 ± 5.38	43.45 ± 1.03	46.05 ± 1.03	38.52 ± 0.65	40.17 ± 1.07

Each value is the mean ± S.D. of four observations

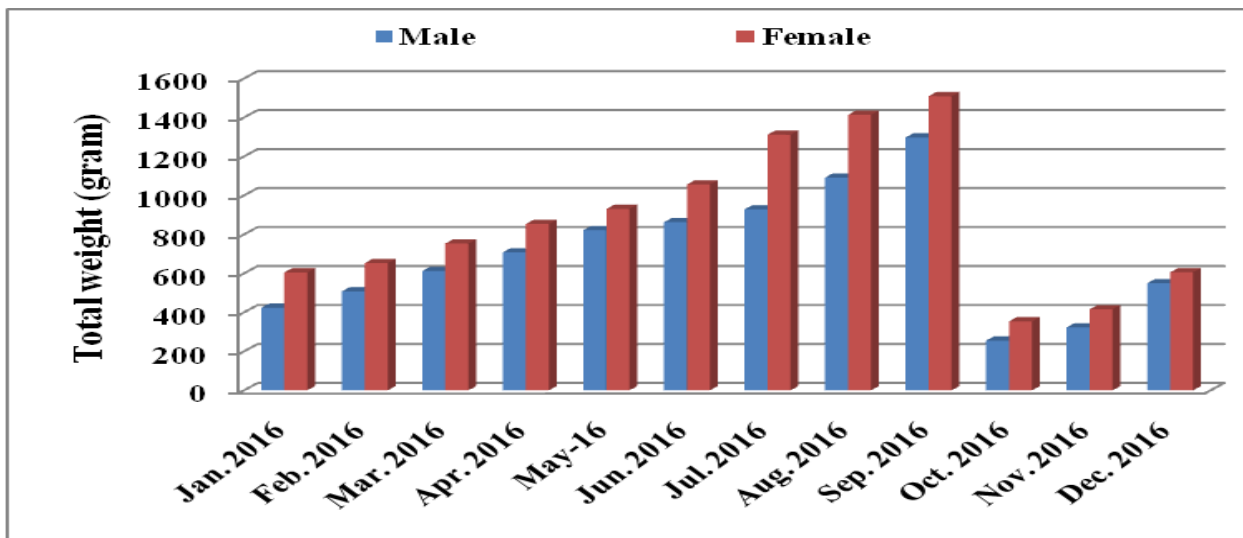


Fig. 1. Total weight of the marine fish *Sphyraena jello* collected from Karikal south east coast of Pondicherry India (January 2016 to December 2016).

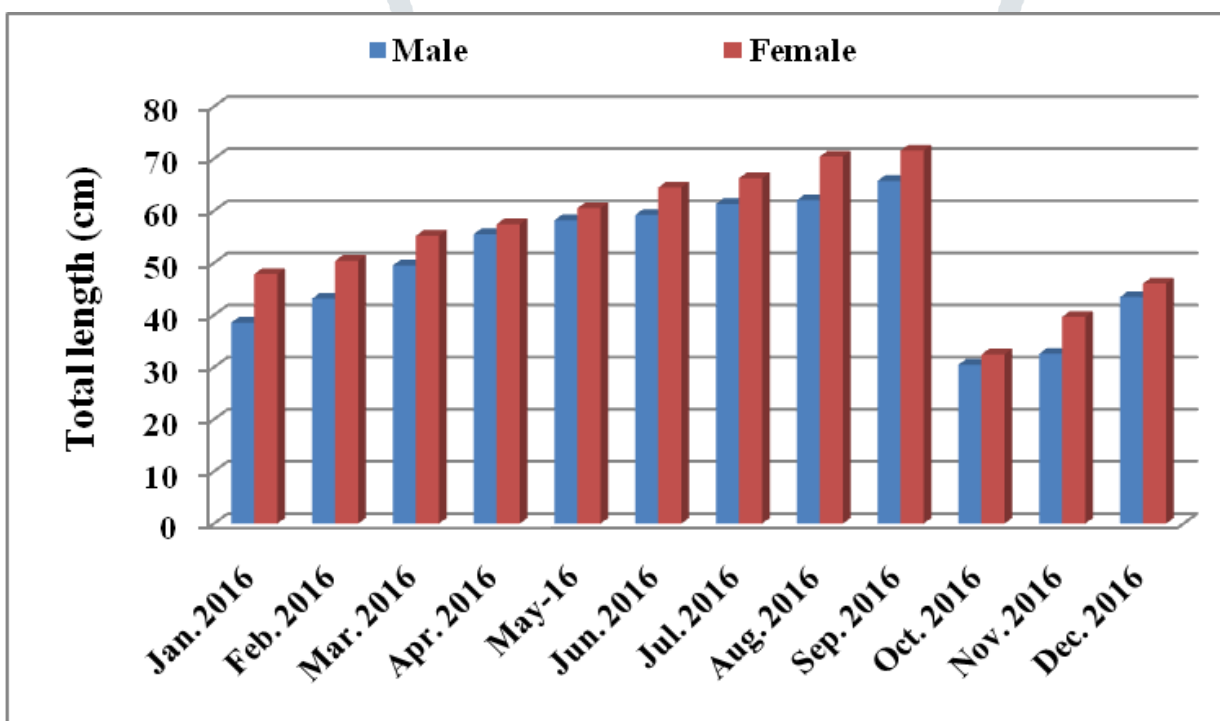


Fig. 2. Total length of the marine fish *Sphyraena jello* collected from Karikal south east coast of Pondicherry India (January 2016 to December 2016).

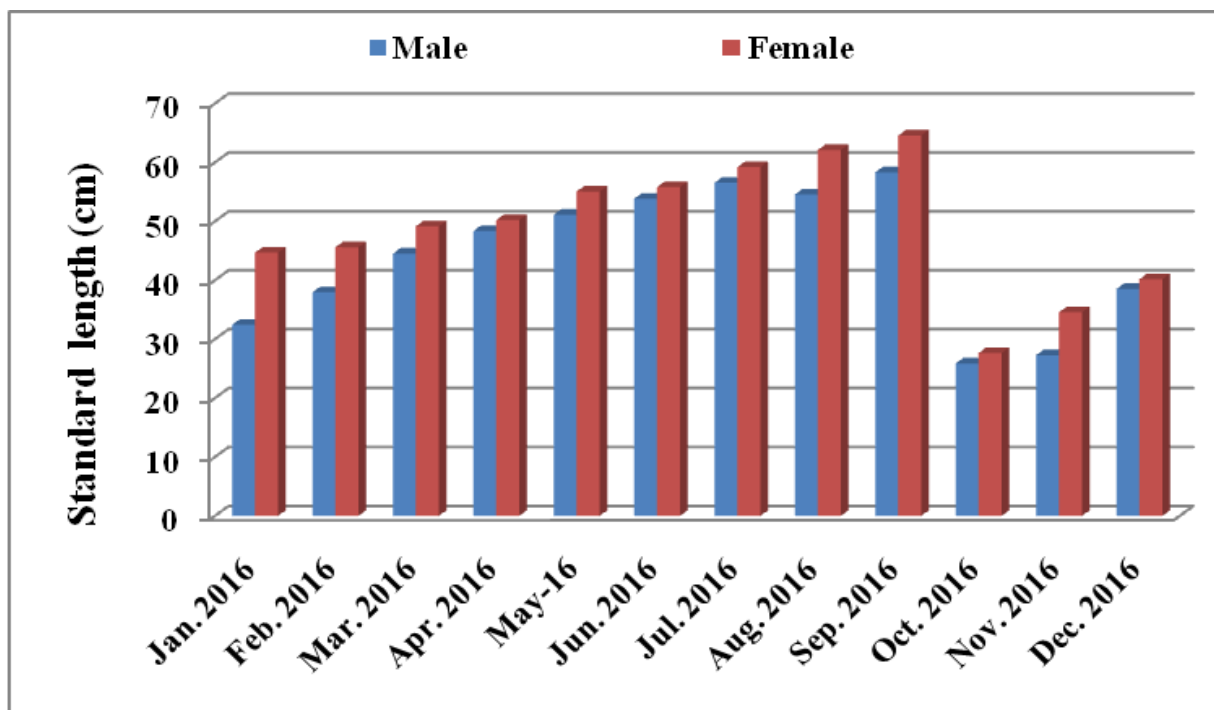


Fig. 3. Total standard length of the marine fish *Sphyraena jello* collected from Karikal south east coast of Pondicherry India (January 2016 to December 2016).

IV. DISCUSSION

In the present investigation, the morphometric study of the experimental fish's *Sphyraena jello* body weight, total length and standard length values are presented. The maximum body weight, total length and standard length were noted September 2016 and minimum body weight, total length and standard length were reported October 2016 during the study period. The length-weight relationship and the relative condition of marine fish *Lates calcarifer* were assessed under culture condition. The length of the fish samples ranged from 25 to 240 mm and the relative condition (wr) of the fish for different length groups ranged from 99.54 to 104.39, indicating the good condition of the fish⁹.

Length-weight relationship was observed in striped grey mullet (*Mugil cepahlus* L.) at Krishna Estuarine region, Andhra Pradesh, India. For these 287 specimens 132 females in length range 13.4 to 30.5cm, and 155 males in the length range 13.4 to 37.0 cm were collected from the fish market at Bantumilli village¹⁰. Ratnakala *et al.*¹¹ were noted the length-weight relationship of marine fish *Lates calcarifer* collected from west Godavari and Krishna districts of Andhra Pradesh, length of the sampled specimens of *Lates calcarifer* varied from 11 cm to 70 cm. The total length ranged between 14 cm and 64 cm with a mean varies from 16.58 to 64, and weight ranged between 280g and 3000 g and corresponding mean varied between 324.34 and 2940 in 2009 - 2010 While the total length ranged between 14 cm and 65 cm with a

mean varies from 17.14 and 63.9, and weight ranged between 280g and 3700 g and corresponding mean varied between 339.38 and 3400 in 2010 - 2011.

Mohanty *et al.*¹² were studied length-weight relationship and relative condition factor of Asian seabass *Lates calcarifer* (Bloch) Chilika lagoon. Total length of fishes ranged from 20.0 to 113.70 cm and wet weight of fishes ranged from 500 to 3394.00 g, measuring changes in robustness/health of this population relative to past or future samples at the same place and season. Lipika Patnaik *et al.*¹³ were carried out to compare feed based variations in *Tilapia sp.* and *Anabas sp.* The main objective of the experimental work was to assess variation in length-weight ratio, Changes in Protein content and associated indices like FCR, PER, PPV, Weight gain of *Tilapia* and *Anabas sp.*

A comparison of the length-weight relationship were observed for males and females showed that most of the fish had negative allometric growth ($b < 3$) with males from Oserian and Hippo sampling stations point showing isometric growth ($b = 3$). Length at first maturity of male and female fish obtained during this study was 17.7 cm total length and 18.0 cm total length respectively¹⁴. Anni Jain Askwith Mary *et al.*¹⁵ were described the length – weight relationship (LWR) and condition factor (k) from 1050 specimens of *Tilapia mossambica* to determine the growth pattern. The experimental fish ranged from 0.50 to 150 cm and 3.00 to 350 g in length and weight respectively.

V. CONCLUSION

In the present basic information of the length-weight relationship would form a useful tool for further. The comparatively highest values of body weight, total length and standard length of fish *Sphyraena jello* were observed in female fishes. This finding has a great importance in future research.

VI. ACKNOWLEDGEMENT

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