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Length weight relationship of cobia, *Rachycentron canadum* from hook and line fishery at Gulf of Mannar region, South East Coast of India.

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Length weight relationship of *Rachycentron canadum* landed by hook and line fishery in Gulf of Mannar coast during February 2010 to March 2012 was estimated. A total of 330 fishes were examined from hook and line fishery consisting of 130 males and 170 females. Total Length (TL) for males ranged between 53 and 144 cm with a mean length of 98.12 ±22.87 cm, and the weight ranged from 1 to 31 kg with a mean of 11.15±7.73kg. In the case of female the Total length observed was between 43 and 148.1 cm with a mean length of 95.84±24.11 cm and the weight observed was between 0.25 to 35.2 kg with a mean weight of 10.37 ± 8.38 kg. This present study suggests that the values of the slope b were 3.12 and 3.36 for male and female cobia respectively which showed positive allometric growth rate (b>3), suggesting that they are fast growing fishes.

[**Keywords**: Cobia, *Rachycentron canadum*, Length-Weight relationship, South East Coast]

Introduction

The lemon fish (Cobia), *Rachycentron canadum*, is a large, economically important marine fish distributed in tropical and subtropical waters[1,2]. Cobia is the only member of the Rachycentridae family and grow to a maximum length of 2 m (TL) and weight about 68 kg, and has a reported maximum age of 15 years[3]. Cobia are relatively common but are rarely encountered in large numbers in fishing practices all along the Gulf of Mannar region. As a result, they are rarely a target of commercial fishers, but are a valued incidental catch particularly in the hook and line fisheries, drift net and bottom trawlers in Gulf of Mannar region. Cobia are fast-growing fish and reach sexual maturity early in its life[4] and an emerging species in mariculture, hence it is very much important to study the length-weight relationship of the species.

Many biological aspects of cobia have been investigated[5,6,7,8,9,10,11,12,13] by several authors. Most of the biological studies on cobia have been conducted on the southeastern coast of the United States, and in particular the Gulf of Mexico[14]. However literatures on the Length- weight relationship of wild population of cobia are limited, which is mainly due to its limited occurrences in fishing nets. This study was aimed to estimate the Length - weight characteristics of its population in Gulf of Mannar waters, which can provide some baseline line information with regard to the growth pattern of cobia in the area.

Material and Methods

Area of study, Muthupettai (N $09^0$12’485’’: E $078^0$43’585’’) and Tirespuram (N $08^0$48’837’’;E $078^0$09’799’’), falls within the Gulf of Mannar coast. Fishes for the study were collected from hooks and line fishing. The hook number used for the fishing practice was 6 and 7(Fig. 1). Around 5 to 7 fishermen are engaged in each fishing craft (Vallam) for the hook and line fishery.

Sampling was carried out on a monthly basis from February 2010 to March 2012. Total length of the fish was measured in Centimeters (cm) to the nearest 0.1 cm, while the body weight was obtained in Kilograms (kg) to the nearest 0.1 kg. Fishing

depth varied from 45 to 60m in the continental shelf region of the Gulf of Mannar waters. A total of 330 *Rachycentron canadum* were examined from hook and line fishery of which males constituted around 130 numbers and females represented around 200 numbers. During the survey period no juveniles were recorded in the hook and line fishery in the observed landing centers.

Fig. 1- Hook and long line gears using for cobia fishing at Gulf of Mannar coast.

The length- weight relationship was established by using the formula $W = aL^b$, where W = weight, L = total length, a = constant, b = exponent[15]. However, the relationships of body dimensions often change with respect to growth rate thus deviating from the cube law. In most cases, the data were analyzed through the logarithmic form of the above equation Log W = log a + b log L, which assumes the form Y = a+bx, where a = intercept; y = log W; x = logL and b = slope of the line or regression co-efficient.

Results

In our observation form February 2010 to March 2012 on cobia landings along southeast coast of India, most of the cobia capture was by hook and long line gears (Fig. 1). Total Length (TL) for males ranged between 53 and 144 cm with a mean length of 98.12 ±22.87 cm, whereas the weight ranged from 1 to 31 kg with a mean of 11.15±7.73kg (Fig. 2). In the case of female the Total length observed was between 43 and 148.1 cm with a mean length of 95.84±24.11 cm. However the weight observed was between 0.25 to 35.2 kg with a mean weight of 10.37 ± 8.38 kg (Fig. 3).

Present study suggests that the values of the slope *b* were 3.12 and 3.36 for male and female respectively (Fig. 2 and 3). Study species shows positive allometric growth rate (b>3), suggesting that they are fast growing fishes. The co-efficient of determination (r^2) was 0.877 and 0.927 for male and female. Linear regressions drawn for males and females were statistically significant (P < 0.05). The linear equations obtained for cobia is:

Male: log W = 3.116 log L – 5.361

Female: log W = 3.364 log L – 6.124

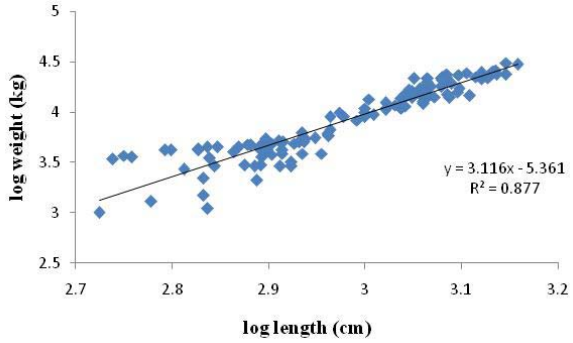

Fig. 2- Length – weight relationship of male, *Rachycentron canadum.*

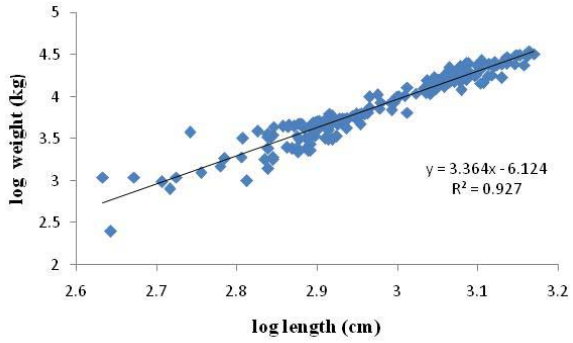

Fig. 3- Length - weight relationship of female, *Rachycentron canadum.*

Discussion

The fishes continue to grow throughout their life whereas rapid growth indicates abundant food supply and other favorable conditions, whereas slow growth is likely to indicate non availability of food as well as unfavorable conditions. Weight of fish increases logarithmically with an increase in length, with the slope value (*b*) lying between 2.5 and 3.5 similar studies done by Carlander *et al*[16].

The '*b*' value was calculated to find out whether the fish is growing allometrically or isometrically. If the '*b*' value is 3.0 the growth is isometric, and it holds good only when the density and form of the fish are constant. If it is allometric, the fish grows with weight increasing at slower (b<3.0) or faster (>3.0) relative to the increase in length[17]. In the present study the study species exhibited positive allometric growth (b>3), suggesting that weight increased proportionately to an increase in length for males and females observed from hook and line fishery from Gulf of Mannar region.

Earlier studies on fish biology has indicated that the values of '*a*' and '*b*' differed not only between different species but also within the same species depending on sex, stage of maturity and food habits[18, 19]. The cubic relationship between length and weight holds good when the '*b*' value was found to be around 3.0[20]. It has been observed that a fair number of species seem to approach this relationship[21]. It has been proposed that the '*b*' value for an ideal fish may range between 2.5 to 4.0[22]. In the present study, the '*b*' values obtained for males and females were 3.12 and 3.36 respectively, suggesting that females were heavier and grows faster than males. Value of exponent (*b* value) assessed by different authors from different regions like Chesapeake Bay[23]; Tanzania[25]; Gulf of Aden[26]; Southern Florida[27]; Soth Africa[28]; Northeastern Gulf of Mexico[31]; Gulf of Mexico[32]; South-west coast of India[34]; North-west coast of India[33,35]; West coast of India[36] are very close to 3.0, similar to the values obtained in the present study [23, 31,32].

Conclusion

The length- weight relationship of *Rachycentron canadum* studied from the continental shelf region of Gulf of Mannar waters reveals that they are fast growing fishes. The analysed data from hook and long line fishery shows positive allometric growth rate and the weight of fish increases logarithmically with an increase in length. This is the first report on length- weight relationship of cobia from hook and long line fishery at Gulf of Mannar region.

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