



## Note

# Length at first maturity of cobia *Rachycentron canadum* (Linnaeus, 1766) from north-west coast of India

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## ABSTRACT

The length at first maturity of cobia *Rachycentron canadum* (Linnaeus, 1766) was estimated from 292 specimens collected during exploratory surveys along the north-west coast of India and from fish landing centres in Mumbai, Maharashtra. Length and age at first maturity of male and female were estimated as 63 and 70 cm and 1.5 and 1.75 years respectively.

Keywords: Age at maturity, Cobia, India, Length at maturity

Reproductive aspects such as size at first maturity, sex ratio, spawning season and recruitment are of great value in fishery prediction and management of fishery resources (Bal and Rao, 1984). Detailed knowledge on reproductive biology of a species will provide vital information on its life history traits, which will be of use in management and conservation of the resource in the wild, as well as in evolving aquaculture and husbandry practices.

The cobia *Rachycentron canadum* (Linnaeus, 1766) is a constituent of marine fish landings in many places along the Indian coast and of late, has acquired considerable aquaculture significance. Sajeevan and Kurup (2013; 2014 a, b) provided information on feeding intensity, systematics, distribution and abundance of cobia inhabiting Indian waters. However, there is not much information on its reproductive biology from Indian waters. Rajan *et al.* (1968), Somvanshi *et al.* (2000), Pillai *et al.* (2009) and Ganga *et al.* (2012) provided some preliminary information on reproductive biology of cobia from Indian waters. Richards (1967), Smith (1995) and Lotz *et al.* (1996) have reported on the size at maturity of cobia from other parts of the world. The present study was undertaken to estimate the length at first maturity of cobia from north-west coast of India.

Samples collected during exploratory surveys of the vessel *M. V. Matsya Nireekshani* of the Mumbai Base of Fishery Survey of India and from the local landing centers at Mumbai were used for the present study. A total of 292 specimens (162 male and 130 female) collected during the period from January 2008 to December 2009 were analysed for the study. Total length of fish was measured to the nearest 1 cm and total weight to the nearest 1 g. Sex of individual specimen was determined by observing the gonads after

dissecting the specimens, whereas the sex of juveniles were identified by microscopic examination of gonads. Stages of maturity of gonads were determined based on morphological appearance. Five stages were identified through macroscopic observations following Qasim (1973).

Fishes belonging to maturity stage III onwards were considered as mature fish and used for calculating the size at first maturity. Specimens with spent/recovering ovary were not included in the calculations as that often leads to biased inference.

Fishes were grouped into different length class of 10 cm class intervals, following Arendt *et al.* (2001). Percentage of mature and immature fish in different size groups was analysed. The length at which 50% of fish were mature was considered as length at first maturity (L<sub>m</sub>) for both sexes (Hodgkiss and Man, 1978). L<sub>m</sub> value was substituted in von Bertalanffy growth equation derived for this species to estimate the age at maturity. Growth parameters were taken as L<sub>∞</sub> = 194.25 cm; K = 0.24 per year and t<sub>0</sub> = -0.1567 years (Sajeevan, 2011).

The percentage occurrence of mature individuals was plotted against different size groups in male and female (Fig. 1). All the fishes below 40 cm were found to be immature. About 18.45% males and 13.04% females in the length group 40-50 cm were observed as mature. More than 50% of both male and female were found mature in the size group 60-70 cm total length. The length at first maturity of male was estimated at 63 cm, while in the case of female, it was 70 cm. By fitting these lengths to the VBGF equation, age at first maturity of male and female was estimated as 1.5 and 1.7 years respectively.

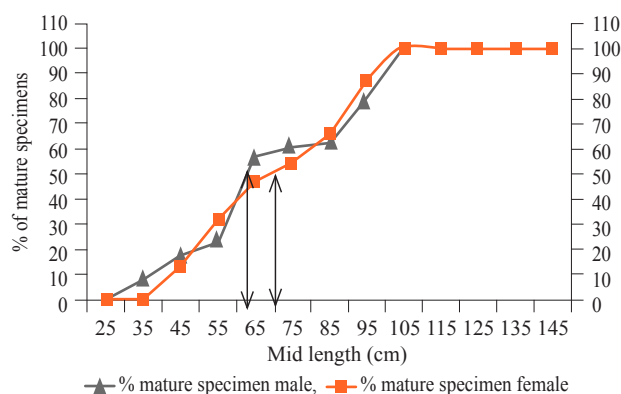


Fig. 1. Length at first maturity of male and female *Rachycentron canadum*

In the present study, 13 mature specimens were recorded in the length group of 40-50 cm, indicating that the onset of maturity in cobia occurs early, at 40-50 cm total length in tropical waters. Rajan *et al.* (1968) reported that 42.6 cm long mature female specimen from Chilka Lake in Odisha. Richards (1967) estimated the size at early maturity of male cobia from Chesapeake Bay, USA at 51.8 cm.

Sizes at first maturity of cobia reported by different authors from various localities (Table 1) range from 42.6 cm in Chilka Lake, India (Rajan *et al.*, 1968), to 84.5 cm in Gulf of Mexico (Williams, 2001). However,

*et al.* (2011) reported that cobia mature at the age of 1-2 years. Kaiser and Holt (2004) reported that male cobia can reach sexual maturity at the age of one and female mature at the age of two. The results of the present study are in concurrence with these findings. However, Richards (1967) estimated the age at maturity of cobia inhabiting Chesapeake Bay as 2 years and 3 years for male and female respectively.

Size and age at first maturity depends on the nature of the environment in which the population of the species inhabits (Moyle and Cech, 2000). Hence geographical difference, differences in physicochemical parameters of the habitat as well as differences in food availability can be considered as the major reasons for such variation.

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Table 1. Length at first maturity of *Rachycentron canadum* reported by various authors from different localities

Author/s	Area of study	Length at first maturity in cm (TL/FL)*	
		Female	Male
Richards (1967)	Chesapeake Bay-East, USA; Chesapeake Bay- West, USA	69.6 (FL)	51.8 (FL)
Rajan <i>et al.</i> (1968)	Chilka Lake, India	42.6(TL)	NA
Smith (1995)	North Carolina, USA	70 (FL)	-
Lotz <i>et al.</i> (1996)	North Central Gulf of Mexico	83.4 (FL)	64.0 (FL)
Williams (2001)	Gulf of Mexico	84.5	64
Kaiser and Holt (2005)	Texas, USA	83.4 (FL)	64.0 (FL)
Tonya <i>et al.</i> (2010)	North-eastern Australia	78.4 (FL)	77 (FL)
Present study	North-west coast of India	70 (TL)	63 (TL)

\*TL: Total length, FL: Fork length

all the studies are concurrent in reporting that size at maturity of male and female differs from each other.

The present study indicates that male cobia matures at smaller length than female, as reported by other workers (Richards, 1967; Lotz *et al.*, 1996; Williams, 2001; Kaiser and Holt, 2005, Tonya *et al.*, 2010). Faster growth rate recorded for female cobia (Sajeevan, 2011) can be attributed as one of the reasons for this difference in size at first maturity of the two sexes.

Age at first maturity estimated for male and female cobia was 1.5 and 1.75 years respectively. Gopakumar

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