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# Life cycle and structure of a population of *Batrachoides surinamensis* in a mangrove swamp, Maranhão, Brazil

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*Batrachoides surinamensis* (Bloch & Schneider, 1801) (Osteichthyes, Batrachoidiformes, Batrachoididae) is distributed from western Atlantic from Honduras to Salvador (Bahia) in Brazil (Nelson, 1994). It is a marine demersal fish, occurring at depths ranging from 1 to 36 m (Uyeno *et al.*, 1983). The aim of this study was to evaluate the life cycle of *B. surinamensis* and provide the first information about its population structure and reproductive biology in a mangrove system in Raposa city, Maranhão, Brazil.

The study area was the Raposa city on the island of São Luís, Maranhão (2°24'S; 44°04'W; Brazil). Sampling was conducted monthly for 16 months in a igarapé (mangrove channel), using a fishing gear similar to a large fyke net. These fyke nets are fixed equipments, arranged at the stream entrance, supported by mangrove sticks and fixed during the low tide. Captured fish are collected during low tides, thus totalizing 12 hours of fishing effort. This type of equipment has a mesh size ranges from 1.0 to 2.0 cm between opposing nodes, with a length from 80 to 200 m and a height of 5 m, being one meter above the water in the high tide. For each captured *B. surinamensis* we measured total length (nearest mm, ± 1mm) and total weight (nearest g, ± 1g) and determined sex and gonad maturity stage (A - immature B - maturing, C - mature and D - spawned). The sex ratio was tested by Chi-square test ( $\chi^2$ ) to identify whether there was a significant predominance of males or females, taking as null hypothesis the ratio of 1:1 (Zar, 1999). The sex and gonad maturity stages determination was

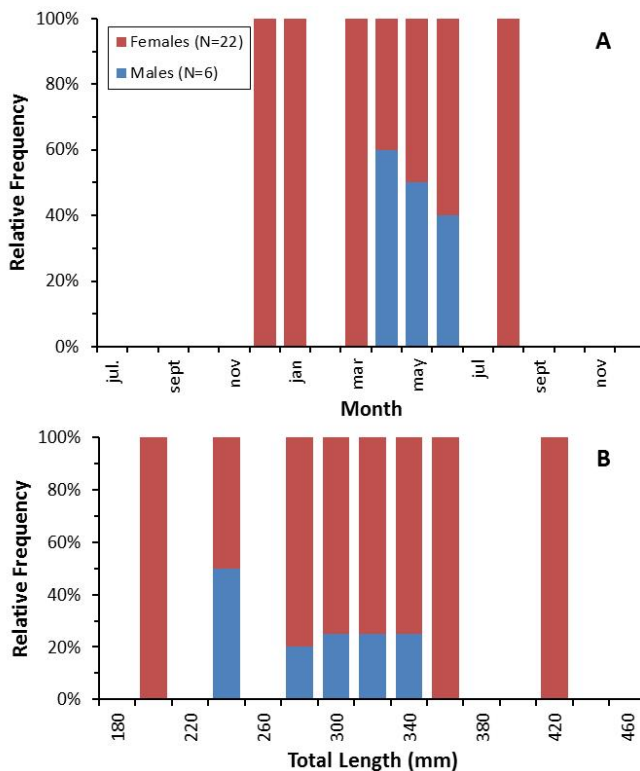
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performed by visual inspection of the gonads, comparing its features with the scales proposed by Vazzoler (1981; 1996) and Dias *et al.* (1998).

A total of 39 specimens, 6 males, 22 females and 11 with indeterminate sex were collected. The total length ranged from 151 to 434 mm, with an average of 299.8 mm and a standard deviation of 58.2 mm. The number of specimens of *B. surinamensis* caught was higher between February and June, a transition period between rainy and dry seasons.

The sex ratio was significantly different from the 1:1 theoretical expected ( $\chi^2 = 9.14 < 3.840$ ,  $df = 1$ ;  $p = 0.05$ ), with a female predominance both in larger size classes and across the months (except for April) (Figure 1A, B).

Individuals were identified in all gonadal maturity stages (A - immature – 3 in the months of March, April and June, B – in maturation – 6 in the months of March, April May, June and September (2), C - mature - 11 in the months of December, January, March (5), June (2), August and September, and D - spawned - 1 in January), as noted Silva-Junior (2012) in the Paciencia estuary river also on São Luis island.



**FIGURE 1.** Relative frequency of males and females of *B. surinamensis* per month (A) and total length (B).

According to Freitas *et al.* (2006) resident estuarine fish would consist of species that spend the entire life cycle within estuarine waters. *Batrachoides surinamensis* is considered a resident species in the mangrove forest of Raposa city because individuals in all gonadal maturity stages have been observed. Studies in other estuarine habitats in Brazil (Golfão Maranhense system) based on the frequency of immature and mature individuals also considered *B. surinamensis* as a resident species that completes its life cycle within estuaries (Martins-Juras, 1989; Castro, 1997; Silva Junior, 2012). Our results allow inferring that *B. surinamensis* uses the mangrove as both growth and reproduction area, due to the presence of mature, immature and even spawned individuals.

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