

## Multimodel approach to the South American spiny-butterfly-ray, *Gymnura altavela* (Chondrichthyes:Myliobatiformes), age and growth

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### ABSTRACT

Age and growth studies are essential for the development of efficient management and conservation strategies, as they are used to assess fish stocks and the risk of species extinction. Variations in life history parameters make it important to obtain data from specific populations and localities. We carried out the first age and growth study in South America on the spiny-butterfly-ray, *Gymnura altavela* (Linnaeus, 1758), a species considered endangered globally and critically endangered in Brazil. Vertebrae from 95 individuals (41 females and 54 males) caught on the south-west coast of Brazil were analyzed by two independent readers. Centrum Edge Analysis (CEA) and Marginal Increment Analysis (MIA) suggested annual *annuli* formation, as assumed by other *G. altavela* age and growth studies. Precision estimates on age determinations were calculated as Average Percent Error (APE = 15,48%), coefficient of variation (CV = 21,89%), and agreement percentage (AP = 69,47%). After a consensus reading, four growth models were calculated: typical Von Bertalanffy, Von Bertalanffy with fixed birth size, Gompertz and Logistic. Sigmoid models have been increasingly used in Batoidea age and growth studies, since they better represent growth changes throughout life stages. Indeed, the Akaike's information criteria indicated that the Gompertz and Logistic models were the best at representing female and male growth, respectively. The estimated growth parameters (asymptotic disc width –  $DW_{\infty}$  and growth coefficient –  $k$ ) were  $DW_{\infty} = 174.10$  cm and  $k = 0.147$  year<sup>-1</sup> for females and  $DW_{\infty} = 120.50$  cm and  $k = 0.311$  year<sup>-1</sup> for males. Sexual dimorphism was observed, with females reaching larger sizes and growing more slowly than males. Life-history data on the South American spiny-butterfly-rays is paramount to

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conservation efforts, as new genetic evidence suggests the existence of cryptic species on the east, northwest and southwest Atlantic.

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