Growth of the South American spiny-butterfly-ray, *Gymnura altavela* (Linnaeus, 1758), *in-situ* and *ex-situ* in a marine aquarium

Clara Velloso Teixeira-Leite[1]
Rachel Ann Hauser-Davis[2]
Jones Santander-Neto[3]
Veronica Takatsuka Manoel[4]
Matheus Felix de Góes[5]
André Martins Vaz-dos-Santos[6]

ABSTRACT

Elasmobranch growth may differ between wild populations and individuals kept under human care due to the phenotypic plasticity in their life-history aspects. The growth of the spiny-butterfly-ray, *Gymnura altavela* (Linnaeus, 1758), was modelled on the south-west coast of Brazil (*in-situ*) and at the Rio de Janeiro Marine Aquarium (*ex-situ*). Seven rays were kept in captivity between 2018 and 2024, two captured on the southeastern coast of Brazil and five born in the aquarium. *Ex-situ* growth parameters (asymptotic disc width – DW∞ and growth coefficient – k) were estimated based on the Von Bertalanffy model (VB) using the Fabens method for females (DW∞ = 172.26 cm and k = 0.190 year-1) and males (DW∞ = 103.21 cm and k = 0.464 year-1). Due to the small sample size, *ex-situ* female DW∞ had to be adjusted to 99% of the maximum disc width ever recorded in Brazil. *In-situ* growth parameters were estimated by analyzing vertebrae from 95 individuals (41 females and 54 males). Four growth models were calculated: typical VB, VB with fixed birth size, Gompertz and Logistic. Akaike's information criteria indicated that the Gompertz model best represented female growth (DW∞ = 174.10 cm and k = 0.147 year-1), and the Logistic model male growth (DW∞ = 120.50 cm and k = 0.311 year-1). Sexual dimorphism was observed in both wild and captive rays, with females reaching larger sizes and growing more slowly than males. Captive individuals grew faster than wild rays, probably due to the constant water temperature, food abundance, low population density, reduced predation rates and high-water quality. Captive males reach smaller

[1] PhD Student in Ecology by the Universidade Federal do Rio de Janeiro – UFRJ, clara.vtl99@gmail.com;
[2] Dr. in Analytical Chemistry by the Pontifícia Universidade Católica do Rio de Janeiro – PUC-Rio, rachelhauserdavis@gmail.com;
[3] Dr. in Animal Biology by the Universidade Federal de Pernambuco – UFPE, jones.santander@ifes.edu.br;
[4] Master in Aquaculture and Fisheries by the Instituto de Pesca – IP, veronicatakatsuka@gmail.com;
[5] Degree in Biological Sciences with emphasis on Marine Biology by Universidade Santa Cecília - UNISANTA, matheus.felix@aquariomarinhodorio.com.br;
[6] Dr. at Biological Oceanography by the Universidade de São Paulo – USP, andrevaz@gmail.com

sizes than wild males, possibly due to the faster growth rate that accelerates reproduction and senescence, reducing longevity. Wild female DW∞ was very close to the DW∞ fixed *ex-situ*, supporting the k calculated in captivity.

Keywords: Age, *Annuli*, Growth modeling, Growth plasticity, Stingray.

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