Technical contribution

Length–weight relationships for 25 fish species from three coastal lagoons in Southeastern Brazil

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Summary
This work analyzes the relationship between length and weight for 25 fish species belonging to 15 families in three mixohaline/hypersaline coastal lagoons in Southeastern Brazil. The study presents the first estimation of L–WRs for six species (Anchoa tricolor, Brevoortia aurea, Jenynsia multidentata, Ctenogobius boleosoma, Microgobius meeki and Bathygobius soporator) and maximum lengths for four species (Atherinella brasiliensis, Jenynsia multidentata, Poecilia vives-para and Microgobius meeki) that are greater than previously recorded.

Introduction
Weight–length relationships are commonly used in fisheries biology to convert length measures into weight. Although such information is scarce for Brazilian coastal lagoons, this information is necessary for fisheries management in the area as well as for estimation of the biomass of the fish species. The objective of the present study was to establish the weight–length relationships for 25 fish species from three coastal lagoons in Southeastern Brazil. Several fish species use coastal lagoons as part of their life cycle (Yáñez-Arancibia et al., 1994; Blaber, 2002; Keffer et al., 2008). The three lagoons have a well-defined salinity gradient and a narrow sea connection in common. Maricá lagoon has an area of 34.7 km² and salinity range between 7 and 35, Saquarema has an area of 21.0 km² and a salinity of 16 to 36, and Araruama has an area of 210 km² and salinity between 36 and 51.

Materials and methods
Sampling of specimens was conducted in three coastal lagoons (S22°49’–22°57’; W42°03’–42°54’), between February and August 2011. Fishes were caught with a beach seine (10 m long, 2.5 m high, 7.5 mm mesh) at sites randomly chosen and covering the entire lagoons areas. Collected fishes were fixed in 10% formalin for 48 h and preserved in 70% ethanol. All fishes were identified to species, measured for total length (±1 mm precision), and weighed with an electronic scale (±0.01 g precision).

Prior to regression analysis, log-log plots of the length–weight pairs were performed to identify outliers (Froese et al., 2011). Extremes outliers attributed to data error were excluded from the analyses. Length-weight relationships were estimated by linear regression analysis based on logarithms: Log (W) = Log (a) + b × Log (L) where W is the weight of the fish (g), L is the total length (cm), a is a scaling constant, and b is a growth parameter (Ricker, 1973). Additionally, 95% confidence limits of b and the coefficient of determination r² were estimated. The plot of log a vs b was used to detect and exclude outliers. Comparisons of maximum sizes recorded in previous studies were performed considering the FishBase website (Froese and Pauly, 2012). A Student’s t-test was used to compare if the calculated b values differed significantly (P < 0.05) from the value of 3.00.

Results and discussion
A total of 22802 specimens belonging to 25 species and 15 families were used to calculate the length–weight relationships (Table 1). For four species, a maximum length greater than reported by Froese and Pauly (2012) was recorded. For six species no length–weight relationships were available in FishBase (Froese and Pauly, 2012), and the LWR parameters obtained are the first records in the scientific literature (Table 1).

Linear regressions were highly significant for all species (P < 0.001). The values of parameter b ranged from 2.693 in Centropomus undecimalis to 3.547 in Sardinella brasiliensis. The mean value for this parameter was calculated as 3.110 (SD: 0.021) and within the range of 2.50–3.50 as suggested by Pauly and Gayanilo (1997). Coefficient of determination values (r²) was >0.95 in 100% of the species, and ranged from 0.95 to 0.99.

In the current literature (Froese and Pauly, 2012) the b values for Genidens genidens (range = 3.041–3.280), Atherinella brasiliensis (3.183–3.277), D. rhomboeus (2.983–3.345), and Centropomus undecimalis (2.851–3.009) were significantly higher than in our findings, possibly due to a large percentage of small specimens in our samples. On the other hand, Elops saurus (2.733–3.187), Jenynsia multidentata (3.014–3.106) and Pogonias chronis (2.870–3.030) had comparatively lower values (Froese and Pauly, 2012) than our findings. The present study is a preliminary reference on six species and three size records, which is useful information on weight-
length relationships of species from coastal lagoons in the Southeastern Brazil.

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References


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