Technical Contribution

Length-weight relationship of 11 fish species from a tributary of the Amazon River system in northern Brazil

By L. M. Abdon Silva[1], M. S. Brito Oliveira[2], A. C. Florentino[2,3] and M. Tavares-Dias[2]

[1]*Instituto de Pesquisas Científicas e Tecnológicas do Estado do Amapá, Núcleo de Pesquisas Aquáticas, Macapá, Brazil;*
[2]*Embrapa Amapá Laboratório de Aquicultura e Pesca, Universidade, Macapá, Brazil;* [3]*Laboratório de Absorção Atômica e Bioprospecção, Universidade Federal do Amapá, Macapá, AP, Brazil*

Summary

The length–weight relationships (LWRs) of 11 freshwater fish for eight families (*Leporinus friderici*, *Pterophyllum scalare*, *Geophagus camopiensis*, *Curimata incompta*, *Astyanax bimaculatus*, *Tetragonopterus chalceus*, *Moenkhausia lepidura*, *Metynnis lippincottianus*, *Plagioscion squamosissimus*, *Hemiodus unimaculatus* and *Colomesus asellus*) captured in tributary of the Amazon River system (Brazil) were investigated. These results represent the first reference on the LWRs for all 11 species in the eastern Amazon.

Introduction

This study determined the length–weight relationships (LWR) for 11 fish species from a tributary of the Amazon River system in Amapá State (eastern Amazon), Brazil. Such information is common for many different systems, but incipient for the Amapá region. In fishing, the LWR is used to generate data for fisheries management, information on the area of management and maintenance of fish stocks (Mateus and Penha, 2007; Giarrizzo et al., 2011; Santos et al., 2012) as well as related natural biology studies. Length–weight relationships are also used to compare interspecific and intrapopulation morphometry, and determine the level of welfare of the fish within its environment (Bolger and Connolly, 1989).

Materials and methods

From March 2012 to August 2013, the collection of 11 fish species was carried out in four sites at the Matapi River in the State of Amapá, Brazil using monofilament gillnets of different mesh sizes. The LWR was calculated using the equation $W = aL^b$, where W is the total weight in g and L the standard length in cm, while a and b are constants. The parameters a and b were estimated by linear regression of the transformed equation: $\log W = \log a + b \log L$. In a few cases, some outliers were removed and the regression was re-evaluated.

Results

A total of 1407 individuals distributed among eight families and 11 fish species were caught in the Matapi River, Amapá

Table 1
Length-weight relationship (LWR) of fish species collected from the Matapi River (Amapá State), a tributary from Amazon River system in Brazil

Family	Species	Standard length (cm) N	Min	Max	Parameters of the LWR a (±95% CL)	b (±95% CL)	r^2
Anastomidae	*Leporinus friderici* (Bloch, 1794)[a]	72	6.7	20.7	0.054 (0.039–0.076)	2.655 (2.514–2.758)	0.953
Characidae	*Astyanax bimaculatus* (Linnaeus, 1758)	201	4.5	10.9	0.014 (0.011–0.019)	3.366 (3.223–3.509)	0.915
Characidae	*Moenkhausia lepidura* (Kner, 1858)	71	4.0	10.0	0.019 (0.013–0.027)	3.045 (2.862–3.229)	0.941
Characidae	*Tetragonopterus chalceus* (Spix & Agassiz, 1829)	84	4.8	12.0	0.032 (0.026–0.040)	3.056 (2.941–3.172)	0.971
Cichlidae	*Geophagus camopiensis* (Pellegrin, 1903)	95	5.5	17.5	0.036 (0.029–0.045)	2.929 (2.844–3.015)	0.980
Cichlidae	*Pterophyllum scalare* (Schultze, 1823)	53	4.3	7.5	0.075 (0.059–0.097)	2.807 (2.658–2.957)	0.965
Curimatidae	*Curimata incompta* (Vari, 1984)	225	6.0	16.7	0.027 (0.023–0.032)	2.960 (2.890–3.031)	0.969
Hemiodontidae	*Hemiodus unimaculatus* (Bloch, 1794)	88	5.5	19.4	0.022 (0.015–0.032)	2.900 (2.752–3.049)	0.946
Sciaenidae	*Plagioscion squamosissimus* (Heckel, 1840)	63	6.8	22.5	0.013 (0.010–0.015)	3.166 (3.088–3.245)	0.991
Serrasalmidae	*Metynnis lippincottianus* (Cope, 1870)	425	4.6	10.2	0.049 (0.043–0.059)	2.954 (2.883–3.024)	0.941
Tetraodontidae	*Colomesus asellus* (Müller & Troschel, 1849)	30	3.4	9.7	0.078 (0.051–0.119)	2.801 (2.578–3.025)	0.959

N, sample size of collected species, Min, minimum standard length; Max, maximum standard length; a, b, r^2, intercept, slope and coefficient of determination of length-weight relationship, respectively; 95% CL, 95% confidence limit level.
[a]This estimate should be taken with caution as it is valid only within the given size range (containing some juveniles).

State, Brazil. Data information is in Table 1. All estimated b-values are within the expected range of 2.5–3.5. All 11 species are listed in FishBase (http://www.fishbase.org; Froese and Pauly, 2014); however, only *Leporinus friderici, Astyanax bimaculatus* and *Plagioscion squamosissimus* present information in relation to the Bayesian LWR predictions, but values of a and b of the linear regression equation for *L. friderici* did not overlap with the LWR Baysean predictions (Table 1).

Discussion

This study increases the level of information related to LWRs for eight other common fish species for the Amapá region. Comparison between the new data set and the Bayesian LWR predictions were possible for only three species and the parameters related to *L. friderici* did not overlap. Probably the higher a-value found in the linear regression equation for this species is related to the type of length measured. The FishBase data set is based on the total fish length, while the present study was based on the standard fish length measurement. In relation to the smaller b-value expressed for *L. friderici*, this is probably due to the immature profile of the majority of fish captures of such species, proven by the lower values of the LM measured whereby most ere smaller than the 18.1 cm typical for this species (Froese and Pauly, 2014). This is the first report of such parameters for these species in the eastern Amazon, thus the data serve as a baseline for further studies of a possible alteration in the biometric parameters.

References

Bolger, T.; Connolly, P. L., 1989: Selection of suitable indices for measurement and analysis of fish condition. J. Fish Biol. **34**, 171–182.

Giarrizzo, T.; Bastos, D.; Andrade, M., 2011: Length-weight relationships for selected fish species of Rio Trombetas Biological Reserve: a reference study for the Amazon basin. J. Appl. Ichthyol. **27**, 1422–1424.

Froese, R.; Pauly, D., (eds), 2014: FishBase. World Wide Web electronic publication. www.fishbase.org, version (08/2014).

Mateus, L. A. F.; Penha, M. F., 2007: Dinâmica populacional de quatro espécies de grandes bagres na bacia do Rio Cuiabá, Pantanal norte, Brasil (Siluriformes, Pimelodidae). Rev. Bras. Zool. **24**, 87–98.

Santos, M. Q. C.; Lemos, J. R. G.; Nascimento Pereira, C.; Oliveira, A. T.; Tavares-Dias, M.; Marcon, J. L., 2012: Length–weight relationships of four freshwater ornamental fish species from the Brazilian Negro River basin. J. Appl. Ichthyol. **28**, 148–149.

Author's address: Alexandro C. Florentino, Laboratório de Absorção Atômica e Bioprospecção, Universidade Federal do Amapá. Rodovia Juscelino Kubitschek KM 2, 1670/1671. 68903-419, Macapá, AP, Brazil.
E-mail: alexandrocezar@unifap.br