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ABSTRACT

The study of the weight-length relationship of a fish species can be used to address several aspects that involve the distinction of small taxonomic units, providing basic information for the study of species biology, in addition, this relationship can also be used as quantitative indicator of the degree of health or well-being of the species in the environment. The objective of this study was to present unpublished data on the weight-length relationship (LWRs) for two species of fish. The fish were sampled in the months of January and July 2017 and January 2018 in rivers belonging to the Upper Paraná and Upper Paraguay basin along the MS-163, collected through sieves and trawls. 49 individuals were captured, distributed in two orders and two families, being 31 from *Hisonotus francirochai* and 18 from *Roeboides*

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descalvadensis. The results showed that the two species are within the expected for both parameters (a and b), even with a relatively low sample number. In addition, the data this study contribute with biological information for the species studied in this work.

Keywords: Freshwater fish, *Hisonotus francirochai*, rivers, *Roeboides descalvadensis*.

RESUMO

O estudo da relação peso-comprimento de uma espécie de peixe pode ser utilizado para abordar diversos aspectos que envolvem a distinção de pequenas unidades taxônomicas, contribuindo com informações básicas para o estudo da biologia das espécies, além disso, esta relação pode ser também usada como indicador quantitavo do grau de saúde ou bem-estar da espécie no ambiente. O objetivo deste trabalho foi apresentar dados não publicados sobre a relação peso-comprimento (LWRs) para duas espécies de peixes. Os peixes foram amostrados nos meses de Janeiro e Julho de 2017 e Janeiro de 2018 em rios pertencentes à bacia do Alto Paraná e Alto Paraguai ao longo da MS-163, coletados através de peneiras e rede de arrasto. Foram capturados 49 individuos, distribuidos em duas ordens e duas familias, sendo 31 de *Hisonotus francirochai* e 18 de *Roeboides descalvadensis*. Os resultados mostraram que as duas espécies estão dentro do que é esperado para ambos os parâmetros (a e b), mesmo apresentando número amostral relativamente baixo. Além disso, os dados deste estudo contribuem com informações biológicas para as espécies estudadas neste trabalho.

Palavras chaves: Peixes de água doce, *Hisonotus francirochai*, rios, *Roeboides descalvadensis*.

RESUMEN

El estudio de la relación peso-longitud de una especie de pez se puede utilizar para abordar varios aspectos que implican la distinción de pequeñas unidades taxonómicas, proporcionando información básica para el estudio de la biología de las especies, además, esta relación también se puede utilizar como indicador cuantitativo del grado de salud o bienestar de las especies en el medio ambiente. El objetivo de este estudio fue presentar datos no publicados sobre la relación peso-longitud (LWR) para dos especies de peces. Los peces fueron muestreados en los meses de enero y julio de 2017 y enero de 2018 en ríos pertenecientes a la cuenca del Alto Paraná y Alto Paraguay a lo largo de la MS-163, recolectados a través de tamices y redes de arrastre. Se capturaron 49 individuos, distribuidos en dos órdenes y dos familias, 31 de Hisonotus francirochai y 18 de Roeboides descalvadensis. Los resultados mostraron que las dos especies están dentro de lo esperado para ambos parámetros (ayb), incluso con un número de muestra relativamente bajo. Además, los datos de este estudio contribuyen con información biológica para las especies estudiadas en este trabajo.

Palabras clave: Peces de agua dulce, *Hisonotus francirochai*, ríos, *Roeboides descalvadensis*.

INTRODUCTION

The correlation between weight and length includes characteristics selected for the population, providing very important information about the specific population (1,2). Among the most frequent uses of the weight and length ratio, the possibility of indirect weight determination by length or vice versa, the indication of the condition of the fish, in relation to fat storage or even the indirect analysis of growth (3). The knowledge of quantitative aspects, such as a weight / length ratio, is of great importance for a better understanding of the role of environmental characteristics in the ecology of species, as well as tools for studies of fisheries biology, threats to the management and conservation of stocks, in addition to population development (4).

Given the above, the objective of this study was to present unpublished data on the weight-length relationship (LWRs) of two species *Hisonotus francirochai* and *Roeboides descalvadensis* sampled in rivers along the MS-163 highway in Mato Grosso do Sul.

MATERIAL AND METHODS

The state of Mato Grosso do Sul is drained by two sub-units of the Prata basin - the Upper Paraná basins to the east and the Paraguay basin to the west (5), belonging to the Upper Paraguay basin, one of the the main basins of the Central-West

Region of Brazil and to the Upper Paraná basin. The lenght-weight ratio is an important tool for describing fish growth and development, regardless of age (6). With this tool we can estimate the condition factor, used as an inference parameter of the health of the sample and its biomass in natural populations to analyze the relationships with the environmental conditions and the behavioral aspects of the species (7,8).

The samples were collected in January and July 2017 and January 2018 in rivers belonging to the state of Mato Grosso of Sul along the MS-163, using a 50 by 50 cm sieve and a 5 mm mesh, and a drag of three meters of mesh of 1 cm. After capture, the fish were euthanized in the field under the effect of the benzocaine anesthetic, after that they were weighed with the aid of on a digital balance (0.00001 g precision) and measured with the aid of a tape measure and analogical caliper (0.1 mm precision) and then placed in 10% formaldehyde solution for fixation. In the laboratory the individuals were transferred to 70% alcohol for preservation and identified with the aid of identification keys and specialized literature (5). In this way, species were identified, and all collected specimens vouchers were deposited in the fish collection at the Laboratório de Ecologia Funcional e Estrutural de Ecosssistemas, Universidade Paulista, Sorocaba campus, São Paulo, Brazil (catalog numbers LEEF 0070-0071). All of the collections were carried out with authorization of the IBAMA license (Authorization Nº 658/2015).

The length-weight ratio for both species was obtained based on Keys (9). Different types of length measurements can be used for length-weight relationship (LWR) studies. The most commons are total length, standard length and fork length. The type of length utilized vary according to study. In our case, we have chosen to use total length because is a measure that include the whole caudal fin and all the individuals sampled in this study presented this structure intact. In cases where the caudal fin presents damages, usually by predation or sampling methodologies, it is better use standard length. As example, the following studies have used total length to calculate LWRs: (10,11,12).

RESULTS

A total of 49 specimens were collected, distributed in two orders (Siluriformes and Characiformes) and two families (Loricariidae and Characidae respectively), being 31 of *Hisonotus francirochai* and 18 of *Roeboides descalvadensis*. The parameters of LWRs are summarized in Table 1.

For *Hisonotus francirochai* there is no published formula for TLxSL, to transform TL (total length) into SL (standard length), so it was not possible to confirm that the value found in TL is greater than the SL record. For *Roeboides descalvadensis*, there is a formula published and disclosed by FishBase: TL = 0+1.182 x SL, where the transformation was performed and the TL found is equivalent to 7.87 cm of SL, unfortunately smaller than the largest record (8.9 cm).

Table 1. Total length (cm) and weight (g) ratio for the two species sampled in rivers along the MS-163 highway in Mato Grosso do Sul, where $W = aL^b$ and n = number of specimens used in the analysis, R2 = correlation coefficient. The length-weight ratios for the two species were significant in p<0.0.

Family	Taxa	n	WT range (g)	TL range (cm)	a (95% CI)	b (95% CI)	R^2
Loricariidae	*Hisonotus francirochai*	31	0.22-0.79	2.80-4.30	0.0096 (0.0062-0.0130)	2.97 (2.65-3.30)	0.923
Chacacidae	*Roeboides descalvadensis*	18	1.24-6.87	4.70-9.30	0.0116 (0.0059-0.0174)	2.88 (2.51-3.25)	0.944

DISCUSSION

The values of parameter b of LWRs ranged from 2.88 to 2.97 (Table 1), which is adequate as demonstrated by Froese (13). Comparing the results with Fishes Bayesian LWR predictions (14), the two species are within what is expected for both parameters (a and b), even presenting slightly low values, which may be related to the smaller variation in size. The r^2 values were considered acceptable for the species, even though they had a relatively low sample number (Table 1) (15).

Biometric variables and the type of growth of fish species can be influenced by several factors, such as food availability, population density, sex, physiology or abiotic factors that can affect the estimated values of use relationships (16,17,18,19). Therefore, more data, a larger sample size, is needed to confirm these growth values.

Although easily obtained, LWRs data are scarce for several species in the Neotropical region, thus, the results of this study contribute with biological information for the species studied in this work.

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