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Length–weight relationship and condition factor of the Characidae matrinxã, *Brycon falcatus* (Müller & Troschel, 1844), in the Teles Pires River, southern Amazon

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Summary

The aim of this study was to verify whether the in situ supply of soybean as a fish attractant bears any influence on the length–weight relationship and condition factor of the omnivorous fish species, *Brycon falcatus*. In addition, estimated was the length–weight relationship, standard and total length, condition factor, and size of *B. falcatus* in the spawning period in the Teles Pires River Basin. In the experimental design, rivers of the Teles Pires Basin containing soybean attractant (Verde River, Celeste River, Teles Pires River and the Tapaiuna River) were mapped. Fish were also collected from the Cristalino River, which contained no soybean attractant (treatment control). Samples were collected from August 2012 to July 2013. Length–weight relationship of *B. falcatus* in the Teles Pires River Basin can be obtained by the expression: $Wt = 0.0091*SL^{3.376}$, $r^2 = .97$, $n = 102$, and length-length relationship: $TL = 1.128*SL + 3.978$, $r^2 = .96$. The condition factor of all specimens collected in the Teles Pires Basin was $k = 1.055$. Size at capable phase (L50) of spawning was estimated at 23 cm standard length. Results showed no significant difference in the length–weight relationship or condition factor of *B. falcatus* collected from rivers with or without soybean attractant. Concluded is that the in situ supply of soybean as a fish attractant does not interfere with the wellbeing of *B. Falcatus* in the Teles Pires River Basin.

1 | INTRODUCTION

In the basins of the Amazon River systems of the Brazilian mid-west, one technique commonly used by fishermen to capture fish, particularly omnivorous species, is the use of food attractants. This practice is known regionally as "cevas" (attractive to fish) (Matos, Silva, Andrade, & Carvalho, 2016). The attractants are offered in situ as large quantities of soybean (*Glycine max*) and provided continuously (Matos & Carvalho, 2015; Matos et al., 2016), which may adversely affect fish behaviour and physiology (Francis, Makkar, & Becker, 2001). Matos et al. (2016) found that specimens of *Brycon falcatus* captured in regions where attractants were used showed a diet composed of 83% soybean, while the diet of fish caught in locations where there were no attractants was composed of fruits, seeds, fish, crustaceans, flowers, leaves and insects. *Brycon falcatus* (Müller and Troschel, 1844) is an omnivorous (Albrecht, Caramaschi, & Horn, 2009) and migratory species commonly known as matrinxã, and belongs to the Bryconinae subfamily. It occurs in the basins of the Guyana, Suriname, Amazon, Orinoco and Araguaia-Tocantins rivers (Lima, 2017). In the middle of the Teles Pires River, matrinxã is one of the species most commonly consumed by humans, and is highly important to the commercial extractive and sport fishing industries. One way to investigate any influence on the growth of *B. Falcatus* caused by the consumption of soybean is to analyse the length–weight relationship and condition factor.

By using the length–weight relationship it is possible to estimate the average weight of an individual from its size (standard length or total) (Merella, Quetglas, Alemany, & Carbonell, 1997), and this has

facilitated fishing production estimates (Giarrizzo, Bastos, & Andrade, 2011; Koutrakis & Tsikliras, 2002). In addition to weight estimation, the length–weight relationship also allows measurement of the population's condition factor (K), which is an indicator of the species' degree of wellbeing (Le Cren, 1951); this may differ among regions, suggesting altered diets (Gomiero & Braga, 2006; Oscoz, Campos, & Escala, 2005), and which allows comparative analyses between two or more populations under different feeding conditions (Lizama & Ambrósio, 2002).

As soybean is used as an attractant for capturing fish in the Teles Pires River Basin, the objective of this study was to estimate the length–weight relationship and condition factor of *B. Falcatus* caught in rivers where attractants are used in comparison to *B. falcatus* caught in rivers where attractants are not used. *Brycon falcatus* is a locally threatened migratory species (personal observation of catch rate decline) due to the dam walls of three hydroelectric power plants located downstream of the study area. Despite its wide distribution and importance to fishing industries, little of its reproductive biology is known. In consideration of this, we performed a literature review and present data from this study on size at the spawning-capable phase (parameter used in fisheries management). In addition, we estimated the length–weight relationship, standard and total length and condition factor of *B. falcatus* in the Teles Pires River Basin. A literature review was performed to complement *B. falcatus* reproductive biology data. Considering that length–weight relationship and condition factor (K) allows for a comparison of the same species located in different regions with different dietary conditions, our hypothesis was that *B. falcatus* collected at locations where attractants are used would present positive allometric growth ($b > 3.0$ and $k > 1$), while *B. falcatus* collected at locations where no attractants are used would present negative allometric growth ($b < 3.0$ and $k < 1$).

2 | MATERIALS AND METHODS

The Teles Pires River is one of the main tributaries of the Tapajós River, located in the Amazon Basin. It is a clear water river, with many previous and current economic activities surrounding the basin such as logging, gold mining, livestock and agriculture (mainly soybean and corn), all of which have led to a large commitment of water resources (Barthem & Goulding, 1997). In the experimental design, we mapped the rivers of the Teles Pires Basin containing soybean attractant: Verde River (11°4'1,99"S; 55°34'17.00"W), Celeste River (12°24'56.00"S; 55°31'28.00"W), Teles Pires River (11°34'48.00"S; 55°39'5.00"W) and the Tapaiuna River (10°41°29.28"S; 55°56'51.11"W). Fish were also collected from the Cristalino River (9°32'47.00"S; 55°47'38.00"W), which did not contain soybean attractant and was therefore the control treatment; this river is located within the Cristalino State Park conservation area.

Samples were collected monthly from August 2012 to July 2013. Rivers subject to the use of attractant were sampled during the dry season (May to October) and the wet season (November to April); the Cristalino River, which was not subject to the use of attractant (control), was sampled during the dry season. Various capture techniques were used, including gillnets (mesh size 12 cm between knots), 60-meter longline with 30 No. 7 hooks, 'anzol de galho' (hooks tied to a branch with a longline), and a fishing rod with artificial bait. After capture, fish were anaesthetised with Eugenol® (Vidal et al., 2008) then packed in ice and plastic bags. Specimens were taken to the Southern Amazon Biological Collection laboratory (Acervo Biológico Amazônia Meridional – ABAM), at the Federal University of Mato Grosso (Universidade Federal de Mato Grosso – UFMT), where biometric data standard length (SL), total weight (WT), sex, and gonadal development was examined. These *B. Falcatus* voucher specimens were deposited at the University of Campinas Museum (Museu da Universidade de Campinas–Unicamp) (lot ZUEC 9190).

For each specimen, the standard length (SL, cm) and total weight (Wt, g) were plotted in a scatter plot prior to regression analyses to identify and exclude possible outliers represented by minor errors during laboratory procedures. The LWR was calculated for *B. falcatus* using power regression $Wt = aSL^b$ (Haimovici & Velasco, 2000a,b), where a = intercept, b = slope, Wt = total weight and SL = standard length. The degree of association between Wt and SL was measured through the coefficient of determination (r^2). Relative condition factor was estimated by the equation $K_{rel} = Wt/aSL^b$ (Le Cren, 1951), where Wt = weight (g); SL = standard length (cm); b = slope and a = intercept of regression between weight and standard length. The condition factor and length–weight relationship of *B. falcatus* were analysed by grouping fish collected from rivers with the attractant separately from those collected from the Cristalino River having no attractant. For length–length relationship (LLRs) of all specimens collected from the Teles Pires River Basin, non-linear regression was performed and the coefficients "*a*", "*b*" and determination "$r^{2"}$ (R Core Team, 2016) were obtained.

The literature review was made through the "Web of Science" and "Portal Periódicos Capes" sites using the key word: *Brycon falcatus* and reproductive biology, covering the period 1970-2016. Only two articles with data on size-at-spawning capable phase and length–length relationship (Camargo, Giarrizzo, & Isaac, 2015; Giarrizzo et al., 2015) were found. The size-at-spawning capable phase (L50) was estimated by calculating the proportion of sexually mature female individuals for medium length classes. Specimens presenting immature gonads were classified as juveniles, and classified as adults when showing any development in the gonads. Fish were separated by sex and grouped into 4 cm length-classes (intervals). Relative frequency values were represented by total length classes (Vazzoler, 1996).

3 | RESULTS

A total of 102 *Brycon falcatus* specimens were collected. The ranges for standard length, weight, and the estimated parameters of length-weight relationship are shown in Table 1.

Regression analysis for weight and length were significant ($p < .001$), with an r^2 value of .963 for fish collected from rivers with the soybean attractant during the dry season, .984 for fish collected

TABLE 1 Range of standard length, weight, estimated parameters of length-weight relationship and condition factor of *Brycon falcatus* collected from rivers in the Teles Pires basin with attractants (Celeste, Teles Pires, Tapaiuna and Verde) during the dry and wet season, and from the control river (Cristalino) during the dry season

Rivers	*N*	Standard length range (cm)	Weight range (g)	*a*	95% CL *a*	*b*	95% CL *b*	r^2	*K*
With attractants									
Dry season	42	19.00–48.50	210–4400	0.0113	0.0042–0.0287	3.323	3.071–3.583	.963	1.007
With attractants									
Wet season	20	24.00–44.50	460–3400	0.0071	0.0032–0.0153	3.448	3.233–3.667	.984	1.000
No attractants									
Dry season	40	15.00–43.50	180–3010	0.0099	0.0037–0.0255	3.344	3.088–3.611	.978	1.128
TelesPires basin (all data)	102	15.00–48.50	180–4400	0.0091	0.0052–0.0157	3.376	3.227–3.527	.971	1.055

N, sample size; a, intercept; b, slope; CL, confidence limit; r^2, coefficient of determination.

during the wet season, and .978 for fish from the control river during the dry season (Table 1, Figure 1). The *b* coefficient ranged between 3.323 and 3.448 (Table 1). Condition factor of fish collected from rivers with the soybean attractant (*K*) ranged from 0.999 during the wet season, 1.128 for fish from the control river during the dry season, and 1.055 for all specimens collected from the Teles Pires Basin. The length–length relationship (LLRs) of all specimens collected from the Teles Pires River Basin was significant ($p < .001$), $r^2 = .960$ and $b = 3.978$ (TL = 1.128*SL + 3.978). The size-at-spawning capable phase (L50) was estimated as 23 cm standard length for females ($n = 84$), but undetermined for males due to a low capture rate.

4 | DISCUSSION

The *b* values found in this study were within the range of 2.5–3.5, as described by Froese (2006) for many species of fish. Length–weight relationship showed positive allometric growth, with *b* values greater than 3.0. This indicates that the increase in weight was greater than length of fish collected from the Teles Pires River Basin, regardless of whether they were collected from sites where an attractant was used. This positive allometric pattern was also described for wild *Brycon cephalus* (Zaniboni-Filho, 1985), wild *B. siebenthalae* (Arias, 1995), cultivated *B. amazonicus* (Arias, Zaniboni-filho, & Aya, 2006), and wild *B. falcatus* (Giarrizzo et al., 2011). However, negative allometric growth was described for wild *B. hilarii* (Garcia, 2006), wild *B. opalinus* (Gomiero & Braga, 2006), and wild *B. amazonicus* (Ayala, 2013), which is expected for species with an elongated body shape (Correa & Freitas, 2013). There were no significant differences in the length–weight relationship between *B. falcatus* collected from the control river or from the rivers with an attractant.

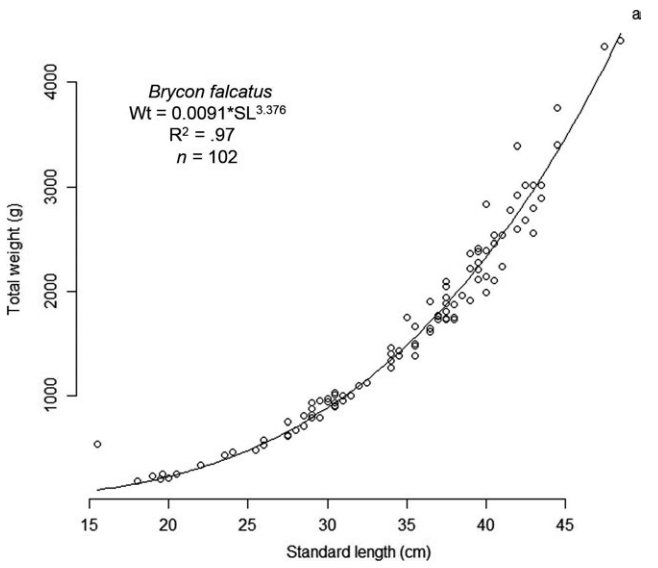

FIGURE 1 Relationship between weight and standard length of *Brycon falcatus* collected from rivers in Teles Pires basin, dry and wet season, 2012 and 2013

The *B. Falcatus* specimens collected from rivers with soybean attractant showed little variation in condition factor. The condition factor reflects the wellbeing of fish (Abowei, 2010), and allows for a comparison between two populations that have different feeding conditions (Ighwela, Ahmed, & Abol-Munafi, 2011). Thus, a condition factor (K) with values close to or greater than 1 usually indicates well-nourished, healthy fish, while K values below 0.8 indicate under weight, and perhaps malnourished fish (Cizidziel, Hinners, Heithmar, Pollard, & Cross, 2002). Goulding (1980) and Zaniboni-Filho (1985) found that in wild species of *Brycon*, a declining condition factor coincided with lower food availability. Gomiero and Braga (2003) pointed out that for a neotropical cichlid, the variation in the condition factor was due mainly to changes in feeding activity. Arias et al. (2006) described a condition factor with an annual variation of 0.85 to 1.10 for adult *B. amazonicus*. During the wet season, available fish food is mainly of allochthonous origin, provided by surrounding vegetation that is accessible and plentiful (Goulding, 1980). However, in the present study, during the dry season the availability of allochthonous food decreased, and the soybean attractant within the Teles Pires River became one of the most abundant resources. Soybeans contain several antinutritional factors (Francis et al., 2001). The term 'antinutritional' describes a substance that has the ability to alter the availability of nutrients contained within food, rendering nutrients or

portions thereof unavailable, resulting in the reduction of digestibility or metabolism, and/or can react antagonistically by altering the physiology of fish (Makkar & Becker, 1997). In a fattening experiment using *Colossoma macropomum*, Rezende, Zuniga, Naoe, Pena, and Rojas (2010) described weight loss for the group while supplying soybean in situ for food. Our hypothesis was not confirmed, as fish collected from both rivers with and without soybean attractant showed values of b > 3 and K > 1. In this context, the supply of soybean as an attractant in rivers of the Teles Pires Basin did not appear to interfere with the *B. falcatus* condition factor during the period of this study.

Length–length relationships are applied to fish stock assessments and are also important in fisheries management for comparative growth studies (Moutopoulos & Stergiou, 2002). In our study, the length–length relationship of *B. falcatus* presented the coefficient $b = 3.978$ and $a = 1.278$ in the Teles Pires River Basin. For *B. falcatus* of the Xingu Basin, the coefficient was found to be $b = 1.15$ and $a = 0.679$ (Giarrizzo et al., 2015). Variations in length–length relationships of the same species from different locations can be explained by the local variation in ecology or physiology of animals (Hossain et al., 2012; Le Cren, 1951).

Literature is scarce regarding the reproductive biology of *B. falcatus*. A small amount of information describes it as a migratory fish where females become capable of spawning at the beginning of the wet season, but detailed data is not yet available on its reproductive biology (Araújo-Lima & Ruffino, 2003;), with only *B. orbygnianus* and *B. amazonicus* described as performing large reproductive migration (Godoy, 1975; Goulding, 1980). Spawning-capable *B. falcatus* females were collected from the Guaporé River (Mato Grosso, Brazil) at the beginning of the wet season, between October and December (Rubio et al., 2012). In this study we present a size-at-spawning capable phase of 23 cm (SL) and 29.2 cm (TL) for *B. falcatus* from the Teles Pires River Basin. For *B. falcatus* from the Xingu River Basin, the size-at-spawning capable phase was described as 28.3 cm (SL) (Camargo et al., 2015).

We conclude that the in situ supply of soybean in rivers as an attractant to capture fish does not interfere with the wellbeing of *B. falcatus* in the Teles Pires River Basin. However, with the downstream construction of a hydroelectric plant and its associated barriers currently underway, the availability of allocthonous resources will change and a new evaluation on the effects of post-construction feed supplement (soybean and corn) will be necessary.

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REFERENCES

Abowei, J. F. N. (2010). The condition factor, length-weight relationship and abundance of *Elops senegalensis* (Regan, 1909) from Nkoro River, Niger Delta, Nigeria. *Advance Journal of Food Science and Technology*, *2*(1), 16–21.

Albrecht, M. P., Caramaschi, E. P., & Horn, M. H. (2009). Population responses of two omnivorous fish species to impoundment of a Brazilian tropical river. *Hydrobiologia*, *627*, 181–193.

Araújo-Lima, C. A. R. M., & Ruffino, M. L.(2003). Migratory fishes of the brazilian Amazon. In J. Carosfeld, B. Harvey, C. Ross & A. Baer (Eds.), *Migratory fishes of South América: Biology, fisheries and conservation status*. (pp. 233–310). Ottawa: World Fisheries Trust/The World Bank/International Development Research Centre, 372 pp.

Arias, C. J. A. (1995). Contribución al conocimiento biológico de los peces de los Llanos, yamú (*Brycon siebenthalae*) y sapuara (*Semaprochilodus laticeps* cf.), con fines de cultivo. Informe Final. Uni Llanos-Colciencias, Villavicencio, Colombia.

Arias, C. J. A., Zaniboni-filho, E., & Aya, B. E. (2006). Cycle reproductive indicators for yamú *Brycon amazonicus*, in captivity. Revista Orinoquia, V. 10 - N° 2.

Ayala, D. M. (2013). Dinâmica pesqueira e estrutura populacional da jatuarana (*Brycon amazonicus*) comercializada nas porções alta e média da bacia do rio Madeira. Dissertação (Mestrado em Desenvolvimento Regional e Meio Ambiente) – Fundação Universidade Federal de Rondônia, Porto Velho, 2013.59p.

Barthem, R., & Goulding, M. (1997). *Os bagres balizadores: Ecologia, migração e conservação de peixes amazônicos*. Tefé, AM; Brasília: Sociedade Civil Mamirauá; CNPq, 140 p.

Camargo, M., Giarrizzo, T., & Isaac, V. J. (2015). Population and biological parameters of selected fish species from the middle Xingu River, Amazon Basin. *Brazilian Journal of Biology*, *75*(suppl.), S112–S124.

Cizidziel, J. V., Hinners, T. A., Heithmar, E. M., Pollard, J. E., & Cross, C. L. (2002). Mercury concentrations in fish from Lake Mead USA, related to fish size, condition, trophic level, location, and consumption risk. *Water, Air, and Soil Pollution*, *135*, 355.

Correa, G. B., & Freitas, C. E. C. (2013). Relação peso-comprimento de *Colossoma macropomum* e *Prochilodus nigricans* a partir de dados de desembarque em Manacapuru-AM. *Scientia Amazonia*, *2*(2), 15–19.

Francis, G., Makkar, H. P. S., & Becker, K. (2001). Antinutritional factors present in plant-derived alternate fish feed ingredients and their effects in fish: Review. *Aquaculture*, *199*, 197–227.

Froese, R. (2006). Cube law, condition factor and weight–length relationships: History, meta-analysis and recommendations. *Journal of Applied Ichthyology*, *22*, 241–253.

Garcia, I. C. B. (2006). Influência da pesca seletiva sobre os comprimentos médios de maturação em populações de dourado (Salminus brasiliensis), piraputangas (Brycon hilarii) e curimbatá (Prochilodus lineatus) no rio Miranda. Mato Grosso do Sul. Dissertação de Mestrado. Universidade Federal do Mato Grosso do Sul, 46 p.

Giarrizzo, T., Bastos, D., & Andrade, M. (2011). Length–weight relationships for selected fish species of Rio Trombetas Biological Reserve: A reference study for the Amazonian basin. *Journal of Applied Ichthyology*, *27*, 1422–1424.

Giarrizzo, T., Sena Oliveira, R. R., Costa Andrade, M., Pedrosa Gonçalves, A., Barbosa, T. A. P., Martins, A. R., … Melo de Sousa, L. (2015). Length–weight and length–length relationships for 135 fish species from the Xingu River (Amazon Basin, Brazil). *Journal of Applied Ichthyology*, *31*, 415–424.

Godoy, M. P. (1975). Peixes do Brasil. Subordem Characoidei. Bacia do Rio Mogi Guassu. Ed. Franciscana, Piracicaba, *vol. II*, 217–398.

Gomiero, L. M., & Braga, F. M. S. (2003). Relação peso-comprimento e fator de condição para *Cichla* cf. *ocellaris* e *Cichla monoculus* (Perciformes, Cichlidae) no reservatório de Volta Grande, Rio Grande- MG/SP. *Acta Scientiarum. Biological Science*, *25*, 79–86.

Gomiero, L. M., & Braga, F. M. S. (2006). Relação peso-comprimento e fator de condição de *Brycon opalinus* (Pisces, Characiformes) no Parque Estadual da Serra do Mar-Núcleo Santa Virgínia, Mata Atlântica, Estado de São Paulo, Brasil. *Acta Scientiarum. Biological Science*, *28*, 135–141.

Goulding, M. (1980). *The fishes and the forest Explorations in Amazonian natural history*. Berkeley: University of California Press, 280p.

Haimovici, M., & Velasco, G. (2000a). Length–weight relationships of marine fishes from southern Brazil. *Fishbyte*, *23*, 19–23.

Haimovici, M., & Velasco, G. (2000b). Relações comprimento-peso de peixes teleósteos marinhos do sul do Brasil com uma avaliação de diferentes métodos de ajuste. *Atlântica*, *22*, 131–140.

Hossain, M. Y., Rahman, M. M., Miranda, R., Leunda, P. M., Oscoz, J., Jewel, M. A. S., … Ohtomi, J. (2012). Size at first sexual maturity, fecundity, length–weight and length–length relationships of *Puntius sophore* (Cyprinidae) in Bangladesh waters. *Journal of Applied Ichthyology*, *28*, 818–822.

Ighwela, A., Ahmed, B., & Abol-Munafi, B. (2011). Condition factor as an indicator of growth and feeding intensity of Nile tilapia fingerlings (*Oreochromis niloticus*) fed on different levels of Maltose. *American-Eurasian Journal of Agriculture and Environmental Sciences*, *11*, 559–563.

Koutrakis, E. T., & Tsikliras, A. C. (2002). Length–weight relationships of fishes from three northern Aegean estuarine systems (Greece). *Journal of Applied Ichthyology*, *19*, 258–260.

Le Cren, E. D. (1951). The length–weight relationship and seasonal cycle in gonad weight and condition in the perch (*Perca fluviatilis*). *Journal of Animal Ecology*, *20*, 201–219.

Lima, F. C. T. (2017). A revision of the cis-andean species of the genus *Brycon* Müller & Troschel (Characiformes: Characidae). *Zootaxa*, *4222*(1), 001–189.

Lizama, M. A. P., & Ambrósio, A. M. (2002). Condition factor in nine species of fish of the Characidae family in the upper Paraná River floodplain. *Brazilian Journal of Biology*, *62*(1), 113–124.

Makkar, H. P. S., & Becker, K. (1997). Nutrients and antiquality factors in different morphological parts of the *Moringa oleifera* tree. *Journal of Agriculture Science*, *128*, 311–322.

Matos, L. S., & Carvalho, L. N. (2015). Consumo de fast-food por peixes: Um estudo de caso do uso da ceva no matrinxã (*Brycon falcatus*, Müller & Troschel, 1844) em afluentes da bacia do rio Tapajós. *Boletim da Sociedade Brasileira de Ictiologia*, *116*, 42–45.

Matos, L. S., Silva, J. O. S., Andrade, P. S. M., & Carvalho, L. N. (2016). Diet of Characin, *Brycon falcatus* (Müller and Troschel, 1844) in the Amazon Basin: A case study on attractant for fish in the Teles Pires River. *Journal of Applied Ichthyology*, *32*, 1080–1085.

Merella, P., Quetglas, A., Alemany, F., & Carbonell, A. (1997). Length–weight relationship of fishes and cephalopods from the Balearic Islands (western Mediterranean). *Naga, ICLARM Q*, *20*, 66–68.

Moutopoulos, D. K., & Stergiou, K. I. (2002). Length-weight and length-length relationships of fish species from Aegean Sea (Greece). *Journal of Applied Ichthyology*, *18*, 200–203.

Müller, J., & Troschel, F. H. (1844). Synopsis generum et specierum familiae characinorum (Prodomus descriptionis novorum generum et specierum). *Archives Naturgesch*, *10*(1), 81–99.

Oscoz, J., Campos, F., & Escala, M. C. (2005). Weight-length relationships of some fish species of the Iberian Peninsula. *Journal of Applied Ichthyology*, *21*, 73–74.

R Core Team (2016). A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. Retrieved from http://www.R-project.org/.

Rezende, J. R., Zuniga, A. D. G., Naoe, L. K., Pena, W. E. L., & Rojas, E. L. G. (2010). Avaliação do soja como fonte de alimentação de tambaqui (*Colossoma macropomum*) produzido no Tocantins. Enciclopédia Biosfera, Centro Científico Conhecer - Goiânia, vol. 6, N.11.

Rubio, T. C., Pötter, C., Navarros, M. S. P., Lima, A. P. A., Batistella, A. M., Mascarenhas, R. O., & Pressinotti, L. N. (2012). Parâmetros biológicos e tamanho mínimo de captura do *Brycon falcatus* (Peixes: Characidae) na bacia do rio Guaporé, Mato Grosso, Brasil. In: P. A. Van Damme, M. Maldonado, M. Pouilly & C. R. C. Doria (Eds.), *Aguas del Iténez o Guaporé: Recursos hidrobiológicos de um patrimônio binacional (Bolivia y Brasil)* (pp. 173–182). Cochabamba: Editorial INIA.

Vazzoler, A. E. A. M. (1996). *Biologia da reprodução de peixes teleósteos: Teoria e prática*. Maringá: NUPELIA, 169p.

Vidal, L. V. O., Albinati, R. C. B., Albinati, A. C. L., Lira, A. D., Almeida, T. R., & Santos, G. B. (2008). Eugenol como anestésico para a tilápia do Nilo. *Pesquisa Agropecuária Brasileira*, *43*(8), 1069–1074.

Zaniboni-Filho, E. (1985). Biologia da reprodução do matrinxã, Brycon cephalus (Günther, 1869) (Teleostei: Characidae). Masters thesis. Instituto Nacional de Pesquisa da Amazônia, Universidade Federal da Amazônia, Manaus, Amazonas, Brazil.

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