ON THE NICHE BREADTH OF *LONTRA LONGICAUDIS* (OLFERS, 1818) (MUSTELIDAE: LUTRINAE)

V.A. G. Bastazini[1,2]

K. S.Sousa[3]; R. A. Dias[2]

[1]PPG - Ecologia, Laboratório de Ecologia de Populações e Comunidades, UFRGS, Av. Bento Gonçalves 9500, Agronomia 90501 - 970, Porto Alegre-RS, Brazil, bastazini @hotmail.com
[2]Laboratório de Biologia e Ecologia de Cordados, UCPel, Av. Félix da Cunha 412, Centro 96010 - 000, Caixa Postal 402, Pelotas-RS, Brazil
[3]Ecólogo

INTRODUÇÃO

Despite its large geographical distribution, *Lontra longicaudis* is considered a "virtually unknown" carnivore (Kruuk 2006). There is a lack of basic information on many aspects of its biology, ecology and conservation status. Among the many aspects of its ecology that have received little attention and sound quantification are its niche requirements. Few authors have quantified the trophic dimension of its niche (Macías - Sánchez & Aranda, 1999, Oliveira 2002, Kasper *et al.*, 2008, Sousa 2008).

Due to the potential functional role that otters may have in freshwater ecosystems, Bifolchi & Lodé (2005) argument that the conservation of Lutrinae is a priority in strategies and management of freshwater ecosystems. Therefore, conservation plans for the Neotropical Otter may have an important role for conservation of Neotropical freshwater ecosystems.

The ecological niche is considered one of the most interesting tools to reveal processes arising from species interactions within a community (Pinto - Coelho 2000), and may be an important ecological aspect to be considered in conservation plans.

OBJETIVOS

Upon this context, our study aims to quantify: i) the niche breadth of the Neotropical Otter (i.e., the trophic dimension of the niche space) based on published studies from Brazil and based on our own data collected in southern Brazil; ii) the correlation between its niche breadth and latitude; iii) the relationship between niche breadth index and sampling effort; iv) the dependence of niche breadth upon fish consumption.

MATERIAL E MÉTODOS

Information about the Neotropical Otter feeding habits were acquired through an extensive bibliographical revision (Olímpio 1992, Helder - José & Andrade 1997, Pardini 1998, Colares & Waldemarin 2000, Quadros & Monteiro–Filho 2001, Oliveira 2002, Louzada - Silva *et al.*, 2003, Alarcon & Simões–Lopes 2004, Brandt 2004, Waldemarin 2004, Kasper *et al.*, 2008, Sousa 2008) and from unpublished data from southernmost Brazil, comprising 16 study areas.

Niche breadth was calculated using the standardized form of Levins' index (B_{sta}), proposed by Colwell & Futuyma (1971). This measure estimates quantitatively the degree of feeding specialization of a species, describing the diversity of resources required by the species, with values raging from zero (smallest niche breadth possible, maximum specialization) to one (highest niche breadth possible, least specialization). Prey items were classified in the following categories: mollusks, crustaceans, chelicerats, insects, fish, amphibians, reptiles, birds and mammals.

Linear regressions were employed to verify whether or not the results found for niche breadth analysis could be an effect of different sampling effort among areas and to verify the dependence of niche breadth values upon the relative consumption of fish. We used Pearson's correlation coefficients to evaluate associations between niche breadth and latitude. Linear models were carried out in the statistical package R (R Development Core Team 2009), and followed procedures reviewed in ter Braak & Looman (1995) and Gotteli & Ellison (2004). Significance level adopted in all analysis was $\alpha = 0.05$.

RESULTADOS

Niche breadth analysis indicates that *L. longicaudis* has a specialist feeding habit (n = 16; mean B_{sta}= 0.21; SD = ±

0.10), where few prey items, especially fish, are consumed in high percentage. We did not found a significant relationship between niche breadth results and sampling size ($r^2 = 0.02$; $F_{1,14} = 0.31$; $p = 0.59$), which suggests that our results did not suffer an effect from different sampling effort among areas.

A highly significant negative relationship between niche breadth index and fish consumption was detected ($r^2 = 0.80$; $F_{1,14} = 52.85$; $p < 0.0001$). This result was expected due to the species piscivorous behavior. There are very few studies about the niche breadth of *L. longicaudis* (e.g., Macías - Sánchez & Aranda, 1999, Oliveira 2002, Kasper *et al.*, 2008, Sousa 2008). Using the standardized form of Levins' index, Kasper *et al.*, (2008), in their studies in the Taquari valley, found similar values of niche breadth to the mean value found in this study.

There is a lack of information about the basic ecology of other Lutrinae species, including niche breadth analyses, which makes comparisons difficult. Macdonald (2002), in a revision about mustelids in Great Britain, found a mean value of $B_{sta} = 0.05$ (SD $\pm$ 0.04) for *Lutra lutra*, a value of niche breadth sensibly inferior to our result for *L. longicaudis*.

Niche breadth and latitude presented a significant positive correlation ($r = 0.55$; $t = 2.49$; $df = 14$; $p = 0.03$). Gause's hypothesis predicts that the higher diversity in the tropics could be explained by narrower niche breadth and lesser niche overlap among species. One may expect that Gause's hypothesis could be expanded to populations of species that are distributed along a latitudinal gradient, such as the Neotropical Otter. Information on the geographical variation of niche breadth of other species that are distributed along a latitudinal gradient would be of great importance to elucidate this question.

CONCLUSÃO

This is the first study that tries to enlighten issues related to the niche breadth of *Lontra longicaudis* in a large geographical scale. We found that *L. longicaudis* is a specialist feeder and that its niche breadth is positively correlated with latitude. Studies that investigate prey diversity and the diversity of trophically equivalent species that occupy the same trophic guild of *L. longicaudis* could contribute to elucidate this correlation.

Acknowledgments

We acknowledge our appreciation for J. B. Garcias and his family, for their kind hospitality at the Santa Helena Ranch, Arroio Grande. Spraints from Taim Ecological Station were provided by F. D. Mazim, to whom we are thankful.

REFERÊNCIAS

Alarcon, G. G. & P. C. Simões - Lopes. 2004. The Neotropical otter Lontra longicaudis feeding habits in a marine coastal area, southern Brazil. IUCN Otter Specialist Group Bulletin, 21(1):24 - 30.

Bifolchi, A. & T Lodé. 2005. Efficiency of conservation shortcuts: an investigation with otters as umbrella species. Biological Conservation 126:523 - 527.

Brandt, A. P. 2004. Dieta e uso de habitat por Lontra longicaudis (Carnivora:Mustelidae) no Parque Estadual de Itapuã, Viamão, RS.Dissertação de mestrado. Instituto de Biociências. Universidade federal do rio Grande do Sul, Porto Alegre.

Colares, E.P. & H. F. Waldemarin. 2000. Feeding of the Neotropical river otter (Lontra longicaudis) in the costal region of the Rio Grande do Sul State, Southern Brazil. IUCN Otter Specialist Group Bulletin 17: 6 - 13.

Colwell, R.K. & D.J. Futuyma. 1971. On the measurement of niche breadth and overlap. Ecology 52(4): 567–576.

Gotelli, N. J. & A. M Ellison. 2004.A primer of ecological statistics. Sinauer Associates. Sunderland Inc. 510 p.

Kasper, C. B., V. A. G Bastazini, M. J. Feldens, J, Salvi, H. C. Z. Grillo. 2008. Trophic ecology and the use of shelters and latrines by the Neotropical otter (Lontra longicaudis) in the Taquari Valley, Rio Grande do Sul, Brazil. Iheringia 98(4):469 - 474.

Kruuk, H.2006. Otters: ecology, behaviour and conservation. Oxford. Oxford University Press. 265p.

Louzada - Silva, D., T. M. Vieira, J. P. de Carvalho, A. P. Hercos, B. M de Souza. 2003. Uso de espaço e de alimento por Lontra longicaudis no Lago Paranoá, Brasília, DF. Universitas: Ciências da Saúde 1(2):305 - 316.

Macdonald, R. A. 2002 Resource partitioning among British and Irish mustelids. Journal of Animal Ecology 71:185 - 200.

Macías - Sánchez, S. & M. Aranda. 1999. Analisis de la alimentacion de la nutria Lontra longicudis (Mammalia: Carnivora) en un sector Del rio Los Pescados, Veracruz, Mexico. Acta Zoologica Mexicana 76: 49 - 57.

Olímpio, J. 1992. Considerações preliminares sobre os hábitos alimentares de Lutra longicaudis (olfers, 1818) (Carnívora: Mustelidae), na Lagoa do Peri, Ilha de Santa Catarina. In: Oporto, J. A.; Brieva, L. M.; Praderi, R. (eds.). Anales de la III reunion de trabajos de especialistas en mamiferos acuaticos de América del Sur. Valdevia: Central de Publicaciones Universidad Austral del Chile, pp.36 - 42.

Oliveira, E. N. C. de. 2002. Ecologia alimentar e área de vida de carnívoros da floresta Nacional de Ipanema, Iperó, SP (Carnívora: Mammalia). Dissertação de mestrado. Instituto de Biologia. Universidade Estadual de Campinas, Campinas.

Pardini, R. 1998. Feeding ecology of the neotropical river otter Lontra longicaudis in Atlantic Forest strem, south - estern Brazil. Journal of Zoology 245: 385 - 391.

Pinto - Coelho, R. M. 2000. Fundamentos em ecologia. Artmed. Porto Alegre.

Quadros, J. & E. L. A., Monteiro - Filho. 2001. Diet of the Neotropical Otter, Lontra longicaudis, in an Atlantic Forest Area, Santa Catarina State, Southern Brazil. Studies of the Neotropical Fauna and Environment 36:15 - 21.

R Development Core Team. 2009. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna. Disponível em: < http://www.R - project.org >.

Sousa, K. S. 2008 Hábito trófico de Lontra longicaudis no baixo curso do Arroio Grande. Monografia de Especialização. Instituto de Oceanografia. Fundação Universidade Federal de Rio Grande, Rio Grande.
ter Braak, C. J. F. & C. W. N. Looman. 1995. Regression. In: Jongman, R. H. G., C. J. F ter Braak & O. F. R. van Tongeren (eds.). Data Analysis in community and landscape ecology. Cambridge University Press. Cambridge. Pp:29 - 77.
Waldemarin, H. F. 2004. Ecologia da lontra neotropical. (Lontra longicaudis), no trecho inferior da bacia do Rio Mambucaba, Angra dos Reis. Tese de Doutorado. Instituto de Biologia Roberto Alcântara Gomes. Universidade do Estado do Rio de Janeiro, Rio de Janeiro.