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DIET OF THE NEOTROPICAL OTTER *LONTRA LONGICAUDIS* (CARNIVORA: MUSTELIDAE) FROM THE SANTIAGO RIVER BASIN, MEXICO

DIETA DE LA NUTRIA NEOTROPICAL *LONTRA LONGICAUDIS* (CARNIVORA: MUSTELIDAE) EN EL RÍO SANTIAGO, NAYARIT-JALISCO, MÉXICO

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ABSTRACT. The diet of the neotropical otter *Lontra longicaudis* is reported in the Santiago River, Nayarit - Jalisco, Mexico. A diet based on fish was found (percentage of occurrence 43.86%), with lower frequencies of insects (22.81%), reptiles (9.36%) and amphibians (8.77%), with the introduced fish *Oreochromis aureus* and *Cyprinus carpio*, the most consumed.

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RESUMEN. Se reporta la dieta de la nutria neotropical *Lontra longicaudis* en el Río Santiago, Nayarit/Jalisco, México. Se encontró una dieta basada en peces (porcentaje de ocurrencia 43.86%), con frecuencias menores de insectos (22.81%), reptiles (9.36%) y anfibios (8.77%), siendo los peces introducidos *Oreochromis aureus* y *Cyprinus carpio*, las especies más consumidas.

The neotropical otter *Lontra longicaudis* (Olfers, 1818) has been considered as generalist due to the plasticity of its diet (Quadros & Monteiro-Filho, 2001; Rheingantz *et al*., 2017). Fish are the main prey item throughout its distribution range (Rheingantz *et al*., 2017); but otters consume alternative prey frequently, such as amphibians, reptiles, birds, mammals, insects, crustaceans, mollusks, and fruits (see Macías-Sánchez & Aranda, 1999; Casariego-Madorell *et al.*, 2008; Monroy-Vilchis & Mundo, 2009; Gallo & Casariego, 2014). Food habits of *L. longicaudis* in Mexico have been determined at several locations (see Macías-Sánchez & Aranda, 1999; Casariego-Madorell *et al.*, 2008; Monroy-Vilchis & Mundo, 2009; Briones-Salas *et al*., 2013; Duque-Dávila *et al*., 2013; Monterrubio-Rico & Charre-

Medellín, 2014; Cruz-García *et al*., 2017); however, considering its wide range of distribution, knowledge on the diet of the species in the country is far from complete. The results presented here were obtained from analyses of 81 fecal samples (spraints) collected during January 2005-December 2008 at three sites in the Santiago River, Nayarit/Jalisco, Mexico (elevation 245-480 m, 22°C mean temperature, 800-1000 mm annual rainfall): confluence of the Bolaños river (Number of spraints = 13; reference point: 21°.192174, -104°.067054), El Cajón reservoir (*N* = 52; 21°.119621, -103°.977932), and Santo Domingo (*N* = 16; 21°.427587, -104°.437750). Spraints were individually processed, washed, and air-dried; diet items were identified to the lowest possible taxonomic level. To identify the taxonomic category of the items registered in the spraints we used scales and other bony structures of fish, reptiles, and amphibians; seeds for plant matter, and appendices, elytrae and wings of insects. We compared those items with specimens voucher of vertebrates, entomology and botanic collections of the Departamento de Botánica y Zoología of the Universidad de Guadalajara. The results were subjected to the following formulae (Maehr & Brady, 1986; Jacobsen & Hansen, 1996):

$$\text{Frequency occurrence } FO = \frac{n}{N},$$

where n = number of spraints containing a specific diet item, and N = total number of spraints

$$\text{Percentage occurrence } PO = \frac{Fi}{Ft},$$

where F_i = total frequency of a diet item, and F_t = the sum of all frequencies

The predominant diet items were: fish (*PO* 43.86%), insects (*PO* 22.81%), reptiles (*PO* 9.36%), and amphibians (*PO* 8.77%). Plant matter, mammals, crustaceans, mollusks, and birds, showed much lower *PO* and were not analyzed to further detail (Table 1). Six species of fish were identified as prey; the introduced *Oreochromis aureus* and *Cyprinus carpio* were the main prey, but native species as *Moxostoma austrinum* and the three endemics *Ictalurus dugesii*, *Cichlasoma beani*, and *Chirostoma arge* were also found in spraints. The main insect prey items were Hemiptera and Coleoptera, followed by Orthoptera and Hymenoptera; reptile prey, in order of importance, were *Ctenosaura pectinata* and horned lizards (Phrynosomatidae). Fish consumption was similar in all sites (χ^2 = 2.56, p-value = 0.278), but was highest at the Bolaños river for insects (χ^2 = 9.35, p-value = 0.009) and at El Cajón reservoir and Bolaños river for reptiles (χ^2 = 14.48, p-value = 0.001). The PO of the main fish items were different between sites; the highest values of *O. aureus* (*PO* 23.91%) and *C. carpio* (*PO* 21.74%) were at Santo Domingo, but were similar at El Cajón reservoir (*O. aureus* 15.38%; *C. carpio* 7.69%) and Bolaños River (*O. aureus* 16.25%; *C. carpio* 12.5%).

The highest frequency of introduced fish species in the diet, and the lowest frequency of native species may reflect fish population abundance at the Santiago River, as fishery records suggest that *O. aureus* and *C. carpio* are the most abundant species at the study site (pers. obs.). Studies of food habits of *L. longicaudis* at other sites also identify fish as the main prey item, but differ from the present study, as reptiles and insects were less frequently consumed therein (Parera, 1993; Macías-Sánchez & Aranda, 1999; Quadros & Monteiro-Filho, 2001; Kasper *et al*., 2004; Casariego *et al*., 2006; Briones-Salas *et al*., 2013; Duque-Dávila *et al*., 2013; Rangel-Aguilar & Gallo-Reynoso, 2013; Monterrubio-Rico & Charre-Medellín, 2014; Cruz-García *et al*., 2017). During this study, water levels were rising rapidly due to the filling-up process of the El Cajón reservoir, and individuals of *Ctenosaura pectinata,* horned lizards, small mammals, and insects were frequently observed on tree-tops surrounded by water and in open waters of the reservoir, which could make them a prey of opportunity to aquatic predators, including *L. longicaudis*. The differences in the PO between sampling sites of groups as fish, reptiles, and insects could be a reflection of the differential effects of the reservoir filling, between those sites. Results from this study show that fish are the main prey on the diet of *L. longicaudis*, but the presence of reptiles and insects could be influenced by the conditions of the sites during the sampling period. Our results support the assumption that *L. longicaudis* is a facultative predator according to Rheingantz *et al*. (2017). On the other hand, the fact that *L. longicaudis* consumes mainly introduced fish prey might be a useful information for the management of these species, and the conservation of native diversity.

Table 1. Foods of *Lontra longicaudis* in the Santiago River Basin, Mexico (2005-2008), based on 81 spraints.

Food item	*N*	Frequency	Percent
Total fish		**92.59**	**43.86**
Oreochromis aureus	40	49.38	18.35
Cyprinus carpio	32	39.51	14.68
Ictalurus dugesii	8	9.88	3.67
Cichlasoma beani	3	3.70	1.38
Moxostoma austrinum	6	7.41	2.75
Chirostoma arge	3	3.70	1.38
Total insects		**48.15**	**22.81**
Coleoptera	18	22.22	8.26
Orthoptera	9	11.11	4.13
Hemiptera	30	37.04	13.76
Himenoptera	8	9.88	3.67
Total reptiles		**19.75**	**9.36**
Ctenosaura pectinata	10	12.35	4.59
Phrynosomatidae	8	9.88	3.67
Total amphibians		**18.52**	**8.77**
Amphibians	15	18.52	6.88
Total plant matter (seeds)		**12.35**	**5.85**
Leguminoseae	3	3.70	1.38
Poaceae	2	2.49	0.92
Anacardiaceae	1	1.23	0.46
Rhamnaceae	5	6.17	2.29
Fabaceae	1	1.23	0.46
Total undetermined		**6.17**	**2.92**
Undetermined	**5**	**6.17**	**2.29**
Total crustaceans		**4.94**	**2.34**
Crustaceans	4	4.94	1.83
Total mammals		**4.94**	**2.34**
Mammals	4	4.94	1.83
Total molluscs		**3.70**	**1.75**
Molluscs	3	3.70	1.38

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